NUCLEAR FUEL SERVICES, INC.
a subsidiary of The Babcock & Wilcox Company

▪ 1205 banner hill road ▪ erwin, tn 37650 ▪ phone 423.743.9141
▪ www.nuclearfuelservices.com

21G-10-0133
GOV-01-55-04
ACF-10-0185

June 29, 2010

Mr. Luis A. Reyes, Regional Administrator
U.S. Nuclear Regulatory Commission, Region II
245 Peachtree Center Avenue NE, Suite 1200
Atlanta, GA 30303-1257

References: 1) Docket No. 70-143; SNM-124
2) NRC Confirmatory Order Modifying License (Order), dated February 21, 2007
3) NRC Confirmatory Action Letter (CAL), dated January 7, 2010

Subject: Information to Fulfill Confirmatory Order, Section V, Paragraph 3.e.

Dear Sir:

As required by Reference 2 above, Nuclear Fuel Services, Inc (NFS) hereby submits the third-party contractor's report *NFS-Erwin Site 2009/2010 Independent Safety Culture Assessment – Results Report* (hereafter referred to as the SCA – Safety Culture Assessment), dated June 21, 2010. The attached SCA provides the second of the two third-party assessments of safety culture envisioned in the Order and represents an important progress check on the efforts taken to date at NFS to strengthen the safety culture.

Although recently received by NFS, the report has been thoroughly reviewed by my staff and me. It identifies areas across the spectrum of safety culture components on which NFS has a continuing need to focus to further strengthen the safety culture. The report provides a clear challenge to my management team of continuous improvement, but also provides important indications that the strong initiatives taken in 2010 are on the right course and have already made a significant, measurable improvement.

Review of the SCA with my staff and the internal reviews conducted associated with the events that resulted in the recent operations shutdown, made it clear that the efforts over the past few years, while valuable, were insufficient to provide the degree of strengthening of the safety culture that was sought during that time-frame. In short, the management team failed to take all of the actions necessary to keep the improvements on-track and made early mistakes in the improvement strategy that resulted in later problems. NFS understands this shortcoming and has been working in earnest since the shutdown to rectify mistakes and set a new path forward. The new path forward, which began in January 2010, prior to receipt of the SCA, and under the aegis of the NRC Confirmatory Action Letter (CAL), has focused on conduct of operations, standards and behaviors, event response, and management oversight system improvements.

Significant progress has been achieved in 2010. The events of fall of 2009 could not occur in today's environment. Additionally, NRC inspectors have worked tirelessly during multiple inspections to assess and verify the actions we have taken in 2010 under the NRC CAL, as well as many additional NFS management directed actions. The assessment teams have on each occasion provided you and your management team at NRC with the indications necessary to give confidence in NFS' ability to safely operate our production lines.

The shortcomings in addressing the first SAC identified by my staff and me regarding past performance can be summarized as follows:

- we failed to initially develop a coherent strategy, and instead implemented tactical activities (addressing individual recommendations); in short, we focused on programs rather than behaviors – and assumed programs would drive behaviors;
- we failed to organize for success - did not initially (February 2008) assign a full-time project manager to the safety culture improvement initiative;
- we failed to maintain focus in the face of other challenges – sale and acquisition of the company; transition to new owner and new corporate systems and benefits; and the construction and startup of the Commercial Development Line.

These failures are well understood by me and were a major impetus for many of the changes already made following the temporary facility shutdown and during my brief tenure at NFS.

The SCA provides seven High Priority Recommendations, which the Safety Culture Board of Advisors (SCuBA) team suggested in their exit with us should be our focus. This approach will greatly assist in the assimilation of the learning from this report. The seven areas are as follows:

1. Organizational and individual accountability
2. Corrective Action Program effectiveness
3. Resource management
4. Technical/ professional competencies
5. Questioning attitude
6. Work control
7. Safety Conscious Work Environment (SCWE)

We already had efforts of improvement underway in these areas and had made important strides. We will fold specific aspects of their recommendations, where not already considered, into our current efforts and plans.

In order to assure that NFS assimilation of the SCA is part of a coherent strategy, I will make improvement of performance in each of the seven areas a specific part of NFS' business strategy. I will also continue my approach of addressing behaviors, not programs as the primary means of affecting cultural change. Additionally, I will assign a dedicated executive level resource to manage the continuing safety culture improvement initiative which will assure maintained focus in the midst of other challenges.

Part of the strategy that I am already addressing is satisfying the on-going need for high-level expert oversight, as has been provided by the SCuBA team which conducted the SCA. This oversight will now be provided by the Nuclear Safety Review Board (NSRB), which was established by the NFS Board of Directors (Board) during their May 2010 meeting. The NSRB will provide the NFS Board and me with assessment and advice necessary to assure that the improvement areas identified by the SCuBA team are being effectively addressed by my staff and me. Additionally, I have already provided direction and requisite funding to conduct a safety culture survey in 2011 of the same type conducted in 2007 and 2009, which will provide an important progress check on safety culture improvement efforts.

It is my appraisal that the combination of the firm actions required by the NRC in the restart of our facilities under the January 7 CAL, combined with the many NFS management-directed actions, have resulted in a step change in NFS performance. The changes I have made to the standards, organization, and programs will assure that this new environment is sustained and one of continuous improvement. Again, the pattern of events that led to the recent shutdown and CAL could not occur in the current environment.

I appreciate the significant effort that the NRC has put forth in the review of the CAL actions and those assessments associated with the restart of our facilities. The reports from these inspections and assessments provide vital feedback to my staff and me as we seek to improve the operation of our facilities.

If you or staff have any questions, require additional information, or wish to discuss this matter further, please contact me at (423) 743-1702. Please reference our unique document identification number (21G-10-0133) in any correspondence concerning this letter.

Sincerely,
NUCLEAR FUEL SERVICES, INC.

David B. Amerine

David B. Amerine
President

WRS/smd

Copy:

Mr. Victor McCree, Deputy Regional Administrator
U.S. Nuclear Regulatory Commission, Region II
245 Peachtree Center Avenue NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Eugene Cobey, Deputy Director
Division of Fuel Facility Inspection
U.S. Nuclear Regulatory Commission, Region II
245 Peachtree Center Avenue NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Manuel Crespo
Project Inspector
U.S. Nuclear Regulatory Commission, Region II
245 Peachtree Center Avenue NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Galen Smith
Senior Resident Inspector
U.S. Nuclear Regulatory Commission

Mr. Joseph Shea, Director
Division of Fuel Facility Inspection
U.S. Nuclear Regulatory Commission, Region II
245 Peachtree Center Avenue NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Steven Vias, Branch Chief
Division of Fuel Facility Inspection
U.S. Nuclear Regulatory Commission, Region II
245 Peachtree Center Avenue NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Kevin Ramsey
Fuel Manufacturing Branch
Fuel Facility Licensing Directorate
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attachment

NFS-Erwin Site 2009/2010 Independent Safety Culture Assessment – Results Report

(326 Pages)

June 21, 2010

Mr. David B. Amerine, President
Nuclear Fuel Services, Inc.
1205 Banner Hill Road
Erwin, TN 37650

Subject: NFS-Erwin Site 2009/2010 Independent Safety Culture Assessment Results Report

Dear Mr. Amerine:

The purpose of this letter is to transmit the subject Results Report.

On February 21, 2007, the NRC issued a Confirmatory Order modifying License Number SNM-124, which, among other things, reflected an agreement between the NRC and NFS that "NFS will conduct, via a third party, an independent safety culture assessment within the parameters described in Section V (of the Order)," and that "NFS will conduct an additional third-party assessment approximately 24 months following the completion of the initial assessment."

The assessment was to include:

- All licensed activities at the NFS-Erwin site, including nuclear material security.
- The commitments NFS made at a management meeting with the NRC on September 18, 2006.
- An assessment template based on the 13 safety culture components discussed in the NRC's Regulatory Issue Summary (RIS) 2006-13.

A team of expert consultants was assembled to serve as the NFS Safety Culture Board of Advisors (collectively known as the SCUBA Team). The first Independent Safety Culture Assessment (ISCA) was performed by the SCUBA Team during 2007/2008, and a Results Report was issued on February 16, 2008.

On May 15, 2008, NFS submitted to the NRC the SCUBA Team's Results Report and the NFS plan and schedule for addressing the recommendations provided by the SCUBA Team. The NFS plan was identified as the NFS Comprehensive Safety Culture Improvement Initiative (CSCII).

The second ISCA required by the NRC Confirmatory Order began in August 2009 and was completed in early May 2010. This assessment was also conducted by the SCUBA Team. The members of the independent SCUBA Team, whose qualifications were previously reviewed and approved by the NRC in 2007, have not changed since the 2007/2008 ISCA, thereby ensuring continuity of the assessment process.

During this time period, the SCUBA Team has obtained sufficient information to objectively and accurately characterize the safety culture at the NFS-Erwin site, to determine areas of relative strength and weakness, and to identify and characterize needs for improvement in organizational safety culture.

It should be noted that the focus of the SCUBA Team's assessment was on the organizational Safety Culture at the NFS-Erwin Site, rather than on NFS-Erwin's compliance with Nuclear Regulatory Commission (NRC) requirements. During the conduct of its assessment, the SCUBA Team reviewed the design and implementation of a number of NFS-Erwin programs, processes, procedures and functions that are subject to NRC requirements, and identified areas where NRC "regulatory expectations" (as stated in or as implied by the information presented in NRC Regulatory Issue Summary 2006-13) were not being met, were being partially met, or were being minimally met.

During the conduct of the 2009/2010 ISCA, the SCUBA Team primarily utilized commercial nuclear power plant industry norms for comparison purposes. However, nuclear fuel cycle facility norms and chemical industry norms were also considered. Application of these evaluation criteria has led to the identification of a significant number of identified "Areas for Improvement" and "Areas in Need of Attention".

In recognition of the fact that not all Findings are of equal priority in terms of the combined considerations of importance and urgency, the SCUBA Team has identified the Findings and Topical Areas that it believes to be the most significant in terms of addressing near-term challenges. In this regard, the SCUBA Team has identified nine Summary Level Findings and seven Topical Areas, each of which has a number of associated Findings. These are documented in the Executive Summary Section of the 2009/2010 ISCA Results Report.

Overall, with a few notable exceptions, the SCUBA Team has concluded that NFS has made only nominal progress in improving the safety culture at NFS since the 2007/2008 ISCA and that the vast majority of the 2009/2010 ISCA Findings are essentially Repeat Findings.

Recent changes, areas of emphasis, and additional planned changes at the NFS-Erwin Site, particularly those sponsored and driven by the new NFS President, appear to have had a positive effect on organizational safety culture in the short-term and hold the promise for continued and future improvements that could prove to have a long-term, lasting positive effect. Examples include:

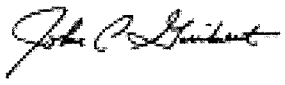
- Providing more appropriate checks and balances in the NFS-Erwin organizational structure and reporting relationships.
- Initiating activities (in progress and/or planned) to provide resource loading for all activities conducted at the NFS-Erwin Site to provide the ability to establish and maintain both organizational and individual accountability.
- Increasing emphasis on improving the Safety Conscious Work Environment at the NFS-Erwin Site, including planned enhancements to supporting processes and/or programs.
- Establishing enhanced organizational standards and expectations, and communicating same throughout the organization.
- Requiring single-point accountability.
- Increasing emphasis on expectations for management engagement with personnel in the workplace to communicate vision, values, standards and expectations, to reinforce standards and expectations, and to carry out effective two-way communications.
- Increasing emphasis on establishing and implementing an effective NFS work control process.

The SCUBA Team has determined that it is not in a position at this time to do much more than acknowledge that the above-mentioned changes, areas of emphasis, and plans for improvements exist, and that they represent initial steps in the right direction. There simply has not been adequate observation time or data to determine whether the corrective actions taken during the regulatory-related shutdown will be sustained in the face of future production and schedule pressures or to what extent they will prove to be lasting in nature. The SCUBA Team believes that only time will tell if the operating strategy changes adopted during the most recent regulatory shutdown and the actions taken by the new NFS President will indeed be effective and lasting.

The SCUBA Team wishes NFS success in the future, and hopes the insights provided through the 2009/2010 ISCA will facilitate the Safety Culture improvement process at the NFS-Erwin Site.

The SCUBA Team wishes to express its gratitude to the management staff and employees at NFS-Erwin. Throughout the course of this assessment, NFS personnel have been unfailingly courteous and responsive to requests for information and steadfastly forthright in sharing their opinions and beliefs. The task of the SCUBA Team could not have been accomplished without such a cooperative spirit.

Sincerely,



John C. Guibert
SCUBA Team Leader

cc:
Mr. John W. Nagy, NFS Director of Assurance
Mr. Mark P. Elliott, NFS Director of Quality, Safety & Safeguards

Attachment:
NFS-Erwin Site 2009/2010 Independent Safety Culture Assessment Results Report

NFS-Erwin Site
2009/2010 Independent Safety Culture Assessment

RESULTS REPORT

June 21, 2010

NFS Safety Culture Board of Advisors

2009/2010 NFS-Erwin Independent Safety Culture Assessment
SCUBA Team Results Report

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I. EXECUTIVE SUMMARY

I.A Introduction

Nuclear Fuel Services, Incorporated (NFS) is the holder of Special Nuclear Materials License Number SNM-124, which was issued by the Nuclear Regulatory Commission (NRC) pursuant to 10CFR Part 70. This license authorizes the operation of the facilities located at the NFS site in Erwin, Tennessee in accordance with specified license conditions.

On February 21, 2007, the NRC issued a Confirmatory Order modifying License Number SNM-124, which, among other things, reflected an agreement between the NRC and NFS that "NFS will conduct, via a third party, an independent safety culture assessment within the parameters described in Section V (of the Order)," and that "*NFS will conduct an additional third-party assessment approximately 24 months following the completion of the initial assessment.*" (emphasis added)

The NRC-specified parameters for the conduct of the 2009/2010 Independent Safety Culture Assessment (ISCA) – that is, those parameters that carried-over from the 2007/2008 ISCA – are as follows:

1. The assessment will include all licensed activities at the NFS-Erwin site, including nuclear material security.
2. The assessment shall include the 13 safety culture components discussed in the NRC Regulatory Issue Summary (RIS) 2006-13, dated July 31, 2006. While the NRC will inform its review of the 2009/2010 ISCA using the relevant guidance contained in NRC Inspection Procedure (IP) 95003, NFS will not be bound by any specific provision of the NRC guidance documents.
3. The assessment shall also include the following specific areas: (1) the NFS Configuration Management Program, (2) the quality of NFS responses to NRC Notices of Violation, and (3) the quality of the NFS Commitment Management Program.
4. NFS will conduct an additional third-party culture assessment approximately 24 months following the completion of the initial assessment and provide the report to the NRC.
5. Within 90 days following the third party's issuance of the independent safety culture assessment (ISCA) report to NFS, NFS shall provide the third party contractor's (i.e., SCUBA Team) report documenting its findings and assessment of the safety culture at NFS and a plan and schedule for implementing assessment recommendations and actions to address identified issues[1].
6. Upon request by NRC, NFS shall also make available the supporting documentation and data compiled by and/or relied upon by the third party contractor in making its assessment.

[1] An acceptable safety culture implementation plan must include metrics that will be used to measure the success of the program.

2009/2010 NFS-Erwin Independent Safety Culture Assessment
SCUBA Team Results Report

An independent Safety Culture Board of Advisors (SCUBA) conducted the 2007/2008 ISCA and the 2009/2010 ISCA. These assessments utilized the framework of the Nuclear Regulatory Commission's RIS 2006-13 model of the safety culture. The members of the independent SCUBA Team, whose qualifications were previously reviewed and approved by the NRC in 2007, have not changed since the 2007/2008 ISCA, thereby ensuring continuity of the assessment process.

The 2007/2008 ISCA was completed on February 16, 2008 with the issuance of the SCUBA Team's Results Report for the 2007/2008 ISCA of the NFS-Erwin Site. On May 15, 2008, NFS submitted to the NRC the SCUBA Team's Results Report and the NFS plan and schedule for implementing the recommendations provided by the SCUBA Team. The NFS plan was identified as the NFS Comprehensive Safety Culture Improvement Initiative (CSCII).

The original schedule for the conduct of the 2009/2010 ISCA specified a completion date of May 10, 2010. As discussed further in Section I.D of this Report, "Chronology of Events," the specified completion date for the 2009/2010 ISCA (i.e., the date for issuance of the SCUBA Team's Results Report) was subsequently revised to June 21, 2010.

It is also noteworthy that the SCUBA Team maintained frequent contact with NFS during the period between the end of the 2007/2008 ISCA and the commencement of the 2009/2010 ISCA for the primary purpose of providing feedback to the NFS Board of Directors and to NFS-Erwin senior management on progress achieved by NFS in their implementation of the NFS CSCII. This is discussed further in Section I.D of this Report, "Chronology of Events."

I.B Assessment Scope and Objectives

Scope

As was the case for the 2007/2008 ISCA, the primary emphasis of the 2009/2010 ISCA was on organizational safety culture and the influence of organizational safety culture on safety-related performance, including the adequacy of the structure and implementation of policies, programs, processes and functions supporting safety-related performance. The 2009/2010 ISCA evaluated NFS-Erwin safety-related performance to the extent necessary to identify inter-dependent relationships and effects on organizational safety culture.

As was the case for the 2007/2008 ISCA, the scope of the 2009/2010 ISCA:

- Included the Safety Culture Components (SCCs) set forth in NRC RIS 2006-13
- Covered all safety-related activities authorized or required at the NFS-Erwin site by License Number SNM-124, including nuclear material security and the activities at the Blended Low Enriched Uranium (BLEU) Complex managed by AREVA.
- Included cultural considerations related to industrial/chemical/personnel safety.

- Included all functional groups working at the NFS-Erwin Site and all levels of management with line responsibility for licensed facility operations, up to and including the NFS President.

As was the case for the 2007/2008 ISCA, the scope of the 2009/2010 ISCA also included specific coverage of the following additional assessment areas:

- A discrete additional programmatic assessment of the NFS-Erwin nuclear material security programs[2].
- Assessment of the adequacy of an NFS internal Self-Assessment of NFS-Erwin's current status with respect to the Safety Culture Components and associated attributes set forth in NRC RIS 2006-13.

The scope of the 2007/2008 ISCA also included specific coverage of the following additional assessment areas:

- Assessment of the adequacy of the corrective actions taken (or planned) by NFS-Erwin in response to the issues identified in Sections V.1 and V.2 of the NRC Confirmatory Order for Program Improvements dated February 21, 2007.
- Assessment of the adequacy of the actions taken (or planned) by NFS-Erwin with respect to the commitments made by NFS at the management meeting with the NRC on September 18, 2006.

In this regard, the scope of the 2009/2010 ISCA:

- Included an assessment of the NFS-Erwin Configuration Management Program as was the case for the 2007/2008 ISCA.
- Expanded the scope of the SCUBA Team's review of the adequacy of NFS responses to NRC Notices of Violation (NOV) by also including a sample of NFS responses to more recent NOVs.
- Expanded the scope of the SCUBA Team's review of the adequacy of NFS Regulatory Commitments/Commitment Management to include a sample of more recent regulatory commitments, including the closure of commitments made to the NRC in the NFS CSCII.

[2] The SCUBA Team obtained and used information on the safety culture within the NFS-Erwin security organizations in its assessment of the 13 Safety Culture Components of NRC RIS 2006-13. This information was obtained through personnel interviews, behavioral observations, documentation reviews, workforce survey numerical ratings and workforce survey write-in comments. In addition, since the Confirmatory Order specifically called for a review of NFS nuclear material security, the SCUBA Team concluded that the NRC meant that NFS nuclear material security should not only be included in the assessment of the safety culture at the NFS-Erwin Site but also should be assessed in greater organizational and programmatic detail. As a result the SCUBA Team, with the assistance of the SCUBA Team Advisor on matters related to nuclear material security, also conducted a discrete assessment of NFS-Erwin's nuclear material security programs, processes, and policies.

2009/2010 NFS-Erwin Independent Safety Culture Assessment
SCUBA Team Results Report

As was the case for the 2007/2008 ISCA, the SCUBA Team did not perform a discrete assessment of the Chemical Safety Program at NFS-Erwin[3]. That is, the SCUBA Team did not perform a specific, comprehensive evaluation of the NFS-Erwin Chemical Safety Program and Processes, including compliance with the EPA Risk Management Program, OSHA Process Safety Requirements and EPA Emission Standards. As was the case for the 2007/2008 ISCA, the 2009/2010 ISCA was a safety culture assessment – not a chemical hazards assessment.

In this regard, in the course of conducting other assessment activities directly related to the 2007/2008 ISCA, the SCUBA Team developed a set of observations and suggestions related to the NFS-Erwin Chemical Safety Program which were provided separately to NFS management. As part of the 2009/2010 ISCA, the SCUBA Team reviewed the actions taken by NFS in response to those observations and suggestions, and has provided the results of that review separately to NFS management.

Objectives

As was the case for the 2007/2008 ISCA, the 2009/2010 ISCA was originally designed to obtain sufficient information to objectively and accurately characterize the current safety culture at the NFS-Erwin site, to determine areas of relative strength and weakness, to identify, characterize and prioritize any needs for improvement in organizational safety culture and to identify additional opportunities for continued improvement in organizational safety culture.

As discussed further in Section I.D of this Report, "Chronology of Events," during the course of the conduct of the 2009/2010 ISCA, NFS-Erwin experienced a series of operational events with significant safety culture implications. Several of these events led to increased regulatory scrutiny and evaluation, including an NRC Augmented Inspection Team assessment. This ultimately led to the issuance of a Confirmatory Action Letter (CAL) by the NRC on January 7, 2010, which included an agreement by NFS to shutdown all production activities at the NFS-Erwin Site pending completion of the actions specified in the CAL and an NRC assessment of NFS readiness to restart production activities. The shutdown of NFS-Erwin production activities lasted from December 2009 to April 2010 for Navy Fuel operations, and lasted from December 2009 to May 2010 for Blended Low Enriched Uranium Processing Facility (BPF) operations.

As discussed in Section I.E of this Report, "Conclusions," this situation created some difficulties for the SCUBA Team in reaching definitive conclusions related to the current safety culture at NFS-Erwin.

[3] Chemical safety was included in the SCUBA Team's assessment of the safety culture at the NFS-Erwin Site. Chemical safety was assessed within the context of NRC-licensed activities, with particular emphasis on potential challenges to industrial/personnel safety. It was addressed in the workforce survey, in personnel interviews, and in behavioral observations. It was evaluated from the perspective of having an influence on the overall safety culture at NFS-Erwin.

I.C Changes in Assessment Methodology

The methodology utilized by the SCUBA Team in the conduct of the 2009/2010 ISCA was very similar to that utilized for the conduct of the 2007/2008 ISCA. Details on the 2009/2010 ISCA assessment methodology are provided in Section II of this Report, "Assessment Methodology."

There were a few changes to the assessment methodology; these are highlighted below:

- For the 2009/2010 ISCA, the SCUBA Team included Case Studies as an additional source of assessment input. The 2009/2010 ISCA Assessment Plan afforded the possibility of conducting Case Studies as discussed below. (In this regard, the SCUBA Team conducted four Case Studies as part of the 2009/2010 ISCA. These are provided in Attachment G to this Report.)
  - Case Studies may be conducted by the SCUBA Team in order to evaluate the adequacy of the NFS response to a significant problem or event that occurs while the 2009/2010 ISCA is in progress. Case Studies will place particular emphasis on the manner in which NFS identifies and addresses any potential safety culture implications associated with the problem or event. As such, Case Studies are intended to obtain information related to the NFS safety culture that will augment information obtained through other sources of assessment input (i.e., the workforce safety culture survey numerical results, the workforce safety culture survey write-in comments, personnel interviews, behavioral observations, and documentation reviews).
  - There is no pre-designated quota for the number of Case Studies to be conducted by the SCUBA Team, since the need or desirability for the conduct of Case Studies is situational in nature. It was anticipated that one to four Case Studies may be conducted.
- For the 2009/2010 ISCA, the SCUBA Team did not commence conducting personnel interviews until the SCUBA Team had the opportunity to fully familiarize itself with (1) the results of the 2009 NFS-Erwin Safety Culture Survey and (2) the results of the NFS Self-Assessment of its safety culture using the NRC RIS 2006-13 cultural attributes.
- For the 2009/2010 ISCA, the SCUBA Team conducted the following set of formal interviews[4] with NFS personnel and NFS contractor personnel. This represents a slightly different approach than that used during the conduct of the 2007/2008 ISCA.
  - Subject Matter Expert Interviews: These interviews were targeted[5] interviews with personnel who were most knowledgeable of the NFS programs, policies, procedures, performance measures/metrics, and improvement initiatives related to

[4] As was the case for the 2007/2008 ISCA, both general and specific guidance for the conduct of personnel interviews were developed and utilized by the SCUBA Team.
[5] In this context, "targeted" means that the individuals selected to be interviewed were selected by the SCUBA Team based on the knowledge of the interviewees rather than on a random basis.

each of the thirteen NRC RIS 2006-13 Safety Culture Components and to each of the other topical areas to be evaluated through the ISCA. These interviews were primarily (but not exclusively) with management and supervisory personnel, including the NFS-designated Safety Culture Component Leads and Executive Sponsors. These interviews included a combination of structured and non-structured interview questions. (161 Subject Matter Expert Interviews were conducted by the SCUBA Team.)

- Random: These interviews were conducted with members of the NFS-Erwin workforce (including hourly employees, salaried employees, and contractors) who were randomly selected by the SCUBA Team. Both supervisory and non-supervisory personnel were included in the population base for the random selections. The random selection process was applied such that the distribution of those selected was representative of the population base of each NFS-Erwin functional organization. The random selection process was applied such that approximately 20% of the NFS-Erwin supervisory and non-supervisory population was interviewed. These interviews were primarily structured in nature. (230 Random Interviews were conducted by the SCUBA Team.)

- Survey-Driven: These interviews were dictated by the 2009 NFS Safety Culture Survey participation levels and the survey results for individual NFS Functional Organizations. If survey participation was particularly low within a specific NFS-Erwin Functional Organization, personnel from that organization were randomly selected for personnel interviews. If a specific NFS-Erwin Functional Organization provided significantly low and/or notably declined ratings of key cultural metrics based on the survey numerical results, it was characterized as an "outlier organization" and was subject to personnel interviews intended to obtain additional insights into the underlying reasons for the low and/or declined survey numerical ratings. Personnel from such organizations were randomly selected for personnel interviews. Management and supervisory personnel from those organizations were also selected to be interviewed. These interviews were both structured and non-structured in nature. (39 Survey-Driven Interviews were conducted by the SCUBA Team.)

I.D 2009/2010 ISCA Chronology of Events

In order to place the 2009/2010 ISCA in proper context, it is important to understand the sequence and timing of activities and events that occurred both prior to and during the formal assessment period that began in early September 2009 and ended on or about May 1, 2010.

1. On February 16, 2008, the SCUBA Team issued its Results Report for the 2007/2008 ISCA of the NFS-Erwin Site.

2. On May 15, 2008, NFS submitted to the NRC the SCUBA Team's Results Report and the NFS plan and schedule for addressing the recommendations provided by the SCUBA Team. The NFS plan was identified as the NFS Comprehensive Safety Culture Improvement Initiative.

3. In September/October 2008, at the request of the NFS Board of Directors, the SCUBA Team conducted an assessment of the adequacy and appropriateness of the NFS CSCII plan and schedule. On October 28, 2008, the SCUBA Team briefed NFS senior management on the preliminary results of this assessment. The documented results of this assessment were provided to NFS senior management on November 21, 2008. (This document is provided as Attachment E-1 to this 2009/2010 ISCA Results Report.)

4. In September/October 2008, at the request of the NFS Board of Directors, the SCUBA Team conducted an assessment of NFS-Erwin's progress to date in implementing the NFS CSCII. On October 28, 2008, the SCUBA Team briefed NFS senior management on the preliminary results of this assessment. The documented results of this assessment were provided to NFS senior management on November 26, 2008. (This document is provided as Attachment E-2 to this 2009/2010 ISCA Results Report.)

5. In March 2009, SCUBA Team members met with NFS-designated Safety Culture Component Leads and NFS senior managers to review and discuss performance measures and metrics for safety culture.

6. In March 2009, the SCUBA Team briefed the newly-constituted NFS Board of Directors on past assessment activities and results, including the reviews conducted in October/September 2008, and on planned SCUBA Team activities for the future.

7. In late July 2009, the SCUBA Team conducted a second review and assessment of NFS-Erwin's progress to date in implementing the NFS CSCII. On July 24, 2009, the SCUBA Team briefed NFS senior management on the preliminary results of this assessment. On September 9, 2009, the SCUBA Team provided the NFS Board of Directors a summary-level briefing on the results of that progress review. The documented results of this assessment were provided to NFS senior management on September 25, 2009. (This document is provided as Attachment E-3 to this 2009/2010 ISCA Results Report.)

8. The 2009 Safety Culture Survey of the NFS-Erwin workforce was administered in August 2009. The preliminary results of this survey were provided to the SCUBA Team and the SCUBA Team was briefed on the survey results on November 17, 2009. NFS senior management was briefed on the survey results on November 18, 2009. The SCUBA Team briefed the NFS Board of Directors on the survey results on December 2, 2009. The NFS-Erwin Site 2009 Safety Culture Survey Results Report, including all Attachments and Supporting Information, was provided by SYNERGY Consulting

Services Corporation to NFS senior management and to the SCUBA Team on December 7, 2009.

9. The SCUBA Team commenced its formal 2009/2010 ISCA activities on or about September 1, 2009 beginning with the conduct of behavioral observations (meeting, field, and training observations) and documentation reviews.

10. During the period from September 2009 to November 2009, NFS-Erwin experienced a series of safety/regulatory related operational loss events. These loss events included (1) the failure to properly execute a fire damper inspection program; (2) an unexpected exothermic chemical reaction and nitrous oxide (NOx) release after making a process change that had been inadequately reviewed; and (3) an unexpected chemical reaction and fire in a new UF6 sublimation process. These events eventually resulted in a regulatory-related plant shutdown that lasted from December 2009 to April 2010 for Navy Fuel operations, and from December 2009 to May 2010 for BPF operations. Root Cause Analyses (RCAs) and Safety Culture Implication Reviews (SCIRs) performed by NFS-Erwin, and Case Studies performed by the SCUBA Team concluded that a number of safety culture related deficiencies[6] had contributed to these events, including:

    - Lack of a questioning attitude/willingness to proceed in the face of uncertainty
    - Non-conservative decision making/susceptibility to production pressure
    - Lack of formality and/or a systematic approach
    - Lack of management oversight
    - A standard of "minimal regulatory compliance"

11. The SCUBA Team independently conducted four Case Studies, each of which involved in-process observations, in-process and end-of-process documentation reviews, personnel interviews, and the development of suggestions, recommendations, and findings. The SCUBA Team Case Studies are provided in Attachment G to this Report. The SCUBA Team Case Studies addressed the following events/situations:

    - Fire Damper Inspection Program
    - BPF Bowl Cleaning Station Event
    - Commercial Development Line (CDL) Sublimation Station Event
    - PSL Phase 4 Project

12. In the course of reviewing the NFS evaluation of these four events, at the request of NFS, the SCUBA Team provided comments and suggestions on the quality of the NFS root cause analyses of these events. Early on in this process, during its initial review of the NFS analysis of the "Fire Damper Inspection" event, on October 13, 2009, the SCUBA Team suggested to NFS senior management that the root cause analysis of this event and

[6] The SCUBA Team believes these are long-standing cultural deficiencies, as they were previously identified as areas of concern by the SCUBA Team in the 2007/2008 ISCA Results Report.

of any other significant events occurring in the future should include a specific evaluation of the safety culture implications of such events. As part of this recommendation, the SCUBA Team provided information to NFS senior management on the process used at commercial nuclear power plants to conduct safety culture implications evaluations. NFS accepted this recommendation and began to conduct safety culture implications evaluations of significant events. Applicable NFS procedures were eventually modified to institutionalize this review process.

13. As indicated previously, the above-mentioned events led to increased regulatory scrutiny and evaluation, including an NRC Augmented Inspection Team assessment. This ultimately led to the issuance of a Confirmatory Action Letter by the NRC on January 7, 2010, which included an agreement by NFS to shut down all production activities at NFS pending completion of the actions specified in the CAL and an NRC assessment of NFS readiness to restart production activities.

14. As indicated previously, the SCUBA Team's Plan for conducting the 2009/2010 ISCA specified that the formal personnel interview process would not commence until the SCUBA Team members were informed both of the results of the 2009 NFS Safety Culture Survey and of the results of the NFS Self-Assessment of its current safety culture on a Safety Culture Component by Component basis. As a result, the formal personnel interview process was initially scheduled to commence on or about January 4, 2010.

    As indicated above, the SCUBA Team was informed of the Safety Culture Survey results on November 17, 2009. NFS had committed to complete the NFS Self-Assessment by December 1, 2009; however, on that date only about 50% of the NFS Self-Assessments were available for review. A complete set of self-assessments was made available to the SCUBA Team on December 15, 2009. Based on a preliminary review of that information, on December 16, 2009, the SCUBA Team informed NFS senior management that most of the self-assessments were sub-standard and had not been conducted in accordance with the guidelines NFS had established for the conduct of the self-assessments. The SCUBA Team recommended that additional attention be provided to improving the quality of the self-assessments before they were formally reviewed by the SCUBA Team. NFS accepted this recommendation and the final versions of the self-assessments were made available to the SCUBA Team on or about January 16, 2010. This delayed the schedule for commencement of the SCUBA Team's formal personnel interview program.

15. As it became evident to the SCUBA Team that the issuance of an NRC CAL was imminent, on December 21, 2009, the SCUBA Team provided NFS senior management documents providing the key preliminary take-offs from the four SCUBA Team Case Studies so that they could be factored into the NFS Action Plan for response to the CAL.

16. During the week of January 4, 2010, the SCUBA Team recommended to the Chairman of the NFS Board of Directors and to NFS senior management that the SCUBA Team's 2009/2010 ISCA activities be truncated after the SCUBA Team's review of the NFS Self-Assessments and that the SCUBA Team issue a Report documenting the results of its independent assessment up to that point in time. It was further recommended that a comprehensive assessment of the lasting effects on the NFS-Erwin safety culture of any changes taken by NFS in response to the CAL should be conducted approximately 12 months after those changes had been successfully effected and restart of production activities had been authorized by the NRC.

    The bases for those recommendations included the following: (1) the SCUBA Team believed that it would be in the best long-term interests of all involved parties and stakeholders for all of the information developed by the SCUBA Team on the then current NFS safety culture become available as soon as possible for consideration in responding to the CAL and in determining readiness for restart of production activities; (2) the SCUBA Team believed that it would be very difficult, if not impossible, to determine within a few months the lasting effects on safety culture of any changes undertaken by NFS in response to the CAL; (3) the actual date for authorization of the restart of NFS production activities was indeterminate and it appeared to be unlikely that the SCUBA Team would have much, if any, time to observe even the short-term impact on the NFS safety culture of any changes made in response to the CAL in the context of the conduct of actual production activities; and (4) in light of the NFS organization's focus on responding to the CAL and on obtaining authorization to restart production activities, NFS did not believe that it would be able to simultaneously support the implementation of the SCUBA Team's personnel interview program.

    On January 7, 2010, NFS accepted these recommendations and agreed to seek NRC approval to truncate the conduct of the 2009/2010 ISCA activities. The SCUBA Team agreed to defer implementation of its formal personnel interview program pending input from the NRC and to focus on documenting the results of assessment activities conducted to date.

    Subsequently, on January 21, 2010, NFS senior management informed the SCUBA Team that the NRC had rejected the truncation of the 2009/2010 ISCA activities, and that the NRC wanted the SCUBA Team to complete its assessment activities in accordance with the previously-agreed schedule. At that point, the SCUBA Team indicated that it would redirect its focus accordingly, but that there would be an impact on the schedule for completion of the 2009/2010 ISCA due to the impacts of (1) the delay in receipt of the NFS Self-Assessments and (2) the delay in commencing the SCUBA Team's personnel interview program. The SCUBA Team also advised NFS senior management that, while the SCUBA Team would try to consider the NFS safety culture both "before" and "after" any changes made in response to the CAL, it would be extremely difficult (if not impossible) to do so in a meaningful, substantiated manner.

On January 26, 2010, the SCUBA Team advised NFS senior management that (1) the SCUBA Team would commence its formal personnel interview program on or about February 8, 2010; (2) the new schedule for completion of the 2009/2010 ISCA (i.e., the issuance of the 2009/2010 ISCA Results Report) was June 21, 2010; and (3) that this schedule was predicated on the completion of SCUBA Team assessment activities on or about May 1, 2010. At that time, the SCUBA Team also committed to provide NFS senior management a draft of the 2009/2010 ISCA Results Report on or about June 2, 2010 and to provide presentations of the 2009/2010 ISCA results to NFS senior management during the week of June 7, 2010. These latter two commitments were intended to provide NFS senior management with information on the 2009/2010 ISCA results as soon as possible.

17. During the period from January 2010 through the end of April 2010, the SCUBA Team (1) conducted its formal personnel interview program, (2) conducted another phase of behavioral observations, and (3) conducted additional documentation reviews. In order to help differentiate between long-standing cultural issues and behavioral changes since the issuance of the CAL on January 7, 2010, the SCUBA Team conducted specific post-CAL observations and interviews to evaluate behavior and attitude changes in the admittedly short sample space of time available for review prior to issuance of this Report. Due to the limited time available to observe actual production-related activities, behavioral observations were primarily associated with activities conducted prior to and in support of the restart of NFS production activities. The SCUBA Team has been careful to limit its prediction of future performance based solely on these limited observations.

18. On March 1, 2010, the new NFS President assumed his position of responsibility at the NFS-Erwin Site. Within a short period of time, he began to pursue his agenda for change.

19. On March 23, 2010, the NRC authorized NFS to deliberately restart production activities at the NFS Navy Fuel process lines. On March 30, 2010, the NFS Management Readiness Assessment Review Board authorized NFS Operations to proceed with a deliberate restart of those process lines.

20. During the period from March 1, 2010 through May 17, 2010, several significant changes were made to the NFS organizational structure, reporting relationships, and management personnel assignments.

21. On May 19, 2010, the NRC authorized NFS to restart limited production activities at the BPF – specifically to restart the uranium metal/oxide process line.

22. On May 24, 2010, at the request of the NFS President, the SCUBA Team Leader met with the NFS President, the Director of the newly-formed NFS Assurance Organization, and the recently-appointed NFS Manager of Nuclear Safety and Licensing Compliance.

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The purpose of the meeting was for NFS senior management to obtain advance information on the results of the 2009/2010 ISCA to assist NFS senior management in its preparations for a meeting with the NRC Commissioners later that week – that is, the Commission's annual Agency Action Review Meeting. The information provided at that meeting was that the SCUBA Team was likely to conclude that:

- NFS had made only nominal progress in improving the safety culture at NFS since the 2007/2008 ISCA and that the vast majority of the 2009/2010 ISCA Findings would essentially be Repeat Findings.
- While the SCUBA Team acknowledges the positive efforts recently taken and/or planned by NFS senior management, there was insufficient run time to provide a meaningful assessment of their potential lasting effects on the NFS safety culture. The SCUBA Team would characterize those efforts as initial steps in the right direction.
- NFS had not taken the results of the 2007/2008 ISCA seriously enough and, self-admittedly, had not taken the implementation of the NFS CSCII seriously enough. This situation was adversely affected by insufficient ownership and involvement on the part of NFS leadership, insufficient attention to individual accountability, and insufficient attention to management of resources; i.e., work prioritization and workload management.
- NFS management apparently had not understood or sufficiently recognized that the NFS CSCII commitments were commitments to the NRC, as opposed to commitments to the SCUBA Team[7].
- Based on a review by the SCUBA Team of those CSCII commitments/actions determined by NFS to be complete/closed (based on the assigned individual having declared through the NFS Corrective Action Program that the action was completed and on the NFS Corrective Action Review Board (CARB) having endorsed the action as completed), the SCUBA Team concluded that at least 25%, and as many as 50%, of such "completed" actions did not meet appropriate standards for considering an action to have been completed.
- To the best of the SCUBA Team's knowledge, NFS had not yet performed a single Effectiveness Review of a "completed" CSCII commitment/action item prior to the closure of the audit window on May 1, 2010.
- NFS has continued to demonstrate that actions/commitments processed through the NFS Corrective Action Program are all too often inappropriately closed out based on future actions/promises that are all too frequently not rigorously followed-up.

[7] It should be noted that as early as October 2008 the SCUBA Team had expressed concerns in this regard directly to the NFS Vice-President of Operations and the NFS Nuclear Safety Officer.

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1.E Summary of Results

The model of safety culture set forth in NRC RIS 2006-13 was established as the basic framework for the conduct of the 2007/2008 ISCA. This model, which includes 13 Safety Culture Components, was designed for application at operating commercial nuclear power plants. Nonetheless, with a few minor exceptions, the SCUBA Team considered this model to be directly applicable to NFS-Erwin. It should be noted that the details contained in this model reflect high regulatory expectations for safety culture and safety performance.

During the conduct of the 2007/2008 ISCA, NFS senior management informed the SCUBA Team that, with respect to safety culture, its vision for NFS-Erwin is "Within the next four years, all NFS employees will demonstrate excellence in everyday safety resulting in an organizational safety culture recognized by stakeholders as a standard in the nuclear industry." Accordingly, the NFS-Erwin Safety Culture Leadership Team requested the SCUBA Team to perform a critical assessment of NFS-Erwin's safety culture based upon comparisons with industry best practices. Such comparisons were utilized for the 2007/2008 ISCA.

For the conduct of the 2009/2010 ISCA, the SCUBA Team felt that it would be more appropriate to utilize comparisons based on industry norms, and it has done so.

In characterizing the Overall Nuclear Safety Culture rating, the individual Safety Culture Component ratings, and the ratings of individual Findings that resulted from the 2009/2010 ISCA, the SCUBA Team utilized commercial nuclear power plant industry norms as the bases for comparison. The following specific criteria were used by the SCUBA Team in assigning rating characterizations to the various components of the safety culture at NFS-Erwin.

1. *Area for Improvement (AFI):* A component or attribute of the NFS-Erwin safety culture that is considered to be deficient when compared to industry norms. Such components or attributes require corrective action.

2. *Area in Need of Attention (ANA):* A component or attribute of the NFS-Erwin safety culture that is considered to be only marginally effective when compared to industry norms. Such components or attributes are significant candidates for continuous improvement.

3. *Opportunity for Improvement (OFI):* A component or attribute of the NFS-Erwin safety culture that is considered to be generally effective when compared to industry norms, but that is a noteworthy candidate for continuous improvement.

4. *Area of Adequacy (AOA):* A component or attribute of the NFS-Erwin safety culture that is considered to almost always meet industry norms.

5. *Area of Strength (AOS)*: A component or attribute of the NFS-Erwin safety culture that is considered to almost always exceed industry norms.

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The focus of the SCUBA Team's assessment was on the organizational safety culture at the NFS-Erwin Site, rather than on NFS-Erwin's compliance with Nuclear Regulatory Commission requirements. The SCUBA Team did characterize the components of the NFS-Erwin safety culture in terms of the degree to which they met NRC "regulatory expectations" (as set forth in or as implied by NRC RIS 2006-13).

Table 1 provides the summary-level results of the SCUBA Team's assessment and characterization of each Safety Culture Component based on comparisons with industry norms.

Table 2 provides the summary-level results of the SCUBA Team's assessment and characterization of each Safety Culture Component based on comparisons with regulatory expectations as set forth or as inferred by NRC RIS 2006-13.

Table 3 provides a summary-level scorecard of the SCUBA Team's Assessment Findings on a Safety Culture Component-by-Component basis (refer to Section III of this Report). It should be noted that the vast majority of the 2009/2010 ISCA Findings are essentially Repeat Findings from the 2007/2008 ISCA.

Table 4 provides a summary-level scorecard of the SCUBA Team's Assessment Findings:

- The Summary Findings presented in this Executive Summary
- Findings developed through the SCUBA Team's assessment of the adequacy of NFS responses to NRC Notices of Violations (refer to Section IV.A of this Report)
- Findings developed through the SCUBA Team's assessment of the adequacy of NFS Regulatory Commitment Management (refer to Section IV.B of this Report)
- Findings developed through the SCUBA Team's assessment of the adequacy of the NFS Configuration Management Program (refer to Section IV.C of this Report)
- Findings developed through the SCUBA Team's assessment of the individual "outlier organizations" identified through the 2009 NFS Safety Culture Survey (refer to Section V of this Report)
- Findings developed through the SCUBA Team's Case Studies of loss events (refer to Section IV.F of this Report)

Due to security classification considerations, the Findings associated with the SCUBA Team's Nuclear Material Security Assessment Report, which documents the results of its assessment of the NFS Nuclear Material Security Program, are not included in Table 4.

When considered on an integrated basis, the information presented in Tables 1, 2, 3, and 4 indicates that the 2009/2010 ISCA results are very similar to the 2007/2008 ISCA results. This is both indicative of a general lack of progress since the 2007/2008 ISCA and the need for increased management attention to achieve necessary improvements in the NFS-Erwin safety culture.

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TABLE 1
SCUBA TEAM RATING CHARACTERIZATIONS
NRC RIS 2006-13 SAFETY CULTURE COMPONENTS

SAFETY CUTURE COMPONENT	2009/2010 ISCA SCUBA TEAM RATING CHARACTERIZATION	2007/2008 ISCA SCUBA TEAM RATING CHARACTERIZATION
OVERALL SAFETY CULTURE	**AREA FOR IMPROVEMENT**	**AREA FOR IMPROVEMENT**
> Decision Making	Area for Improvement	Area for Improvement
> Resources	Area for Improvement	Area for Improvement
> Work Control	Area for Improvement	Opportunity for Improvement
> Work Practices	Area for Improvement	Area for Improvement
> Corrective Action Program (PIRCS)	Area for Improvement	Area for Improvement
> Operating Experience	Area for Improvement	Area for Improvement
> Self-/Independent Assessment	Area for Improvement	Area for Improvement
> Environment for Raising Concerns	Area in Need of Attention	Area in Need of Attention
> Prevent, Detect, and Mitigate Perceptions of Retaliation	Area for Improvement	Area for Improvement
> Accountability	Area for Improvement	Area for Improvement
> Continuous Learning Environment	Area for Improvement	Area for Improvement
> Organizational Change Management	Area for Improvement	Area for Improvement
> Safety Policies	Area for Improvement	Area in Need of Attention

TABLE 2
SCUBA TEAM CONCLUSIONS
NRC RIS 2006-13 SAFETY CULTURE COMPONENTS – REGULATORY EXPECTATIONS

SAFETY CUTURE COMPONENT	2009/2010 ISCA SCUBA TEAM CONCLUSION	2007/2008 ISCA SCUBA TEAM CONCLUSION
OVERALL SAFETY CULTURE	**Does not meet regulatory expectations**	**Does not meet regulatory expectations**
> Decision Making	Does not meet regulatory expectations	Does not meet regulatory expectations
> Resources	Does not meet regulatory expectations	Does not meet regulatory expectations
> Work Control	Does not meet regulatory expectations	Does not meet regulatory expectations
> Work Practices	Does not meet regulatory expectations	Does not meet regulatory expectations
> Corrective Action Program (PIRCS)	Does not meet regulatory expectations	Partially meets regulatory expectations
> Operating Experience	Does not meet regulatory expectations	Does not meet regulatory expectations
> Self-/Independent Assessment	Does not meet regulatory expectations	Does not meet regulatory expectations
> Environment for Raising Concerns	Meets minimum regulatory expectations	Meets minimum regulatory expectations
> Prevent, Detect, and Mitigate Perceptions of Retaliation	Meets minimum regulatory expectations	Meets minimum regulatory expectations
> Accountability	Does not meet regulatory expectations	Does not meet regulatory expectations
> Continuous Learning Environment	Does not meet regulatory expectations	Does not meet regulatory expectations
> Organizational Change Management	Does not meet regulatory expectations	Does not meet regulatory expectations
> Safety Policies	Partially meets regulatory expectations[8]	Meets minimum regulatory expectations

[8] In that generally appropriate Safety Policies exist and that the minimum level of Training is provided.

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TABLE 3
SUMMARY TABLE OF SCUBA TEAM FINDINGS
FOR EACH OF THE NRC RIS 2006-13 SAFETY CULTURE COMPONENTS

SAFETY CUTURE COMPONENT	2009/2010 SCUBA TEAM FINDINGS (TOTAL # BY TYPE)	2007/2008 SCUBA TEAM FINDINGS (TOTAL # BY TYPE)
ALL 13 COMPONENTS COMBINED	**3 AOA, 60 AFI, 9 ANA, 2 OFI**	**29 AFI, 6 ANA, 6 OFI**
> Decision Making	3 AFI, 0 ANA, 0 OFI	2 AFI, 1 ANA, 0 OFI
> Resources	4 AFI, 0 ANA, 0 OFI	4 AFI, 1 ANA, 2 OFI
> Work Control	6 AFI, 2 ANA, 0 OFI	0 AFI, 1 ANA, 1 OFI
> Work Practices	1 AOA, 8 AFI, 3 ANA, 1 OFI	3 AFI, 0 ANA, 0 OFI
> Corrective Action Program (PIRCS)	7 AFI, 1 ANA, 0 OFI	4 AFI, 1 ANA, 0 OFI
> Operating Experience	3 AFI, 0 ANA, 0 OFI	2 AFI, 0 ANA, 1 OFI
> Self-/Independent Assessment	6 AFI, 0 ANA, 0 OFI	2 AFI, 0 ANA, 0 OFI
> Environment for Raising Concerns	1 AOA, 0 AFI, 1 ANA, 0 OFI	1 AFI, 1 ANA, 0 OFI
> Prevent, Detect, and Mitigate Perceptions of Retaliation	1 AFI, 0 ANA, 0 OFI	1 AFI, 0 ANA, 0 OFI
> Accountability	6 AFI, 0 ANA, 0 OFI	5 AFI, 0 ANA, 0 OFI
> Continuous Learning Environment	10 AFI, 1 ANA, 1 OFI	3 AFI, 1 ANA, 1 OFI
> Organizational Change Management	2 AFI, 1 ANA, 0 OFI	1 AFI, 0 ANA, 0 OFI
> Safety Policies	1 AOA, 4 AFI, 0 ANA, 0 OFI	1 AFI, 0 ANA, 1 OFI

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TABLE 4
SUMMARY TABLE OF SCUBA TEAM FINDINGS
FROM SOURCES OTHER THAN THE SAFETY CULTURE COMPONENTS

SAFETY CUTURE COMPONENT	2009/2010 SCUBA TEAM FINDINGS (TOTAL # BY TYPE)
TOTAL FINDINGS FROM OTHER SOURCES	**1 AOA, 26 AFI, 4 ANA, 4 OFI**
Summary Findings presented in the Executive Summary of the 2009/2010 ISCA Results Report	9AFI
Adequacy of NFS responses to NRC Notices of Violations (refer to Section IV.A of this Report)	1 AFI
Adequacy of the NFS Regulatory Commitment Management Program (refer to Section IV.B of this Report)	1 AFI, 1 ANA
Adequacy of the NFS Configuration Management Program (refer to Section IV.C of this Report)	1 AOA, 1 AFI, 2 ANA, 3 OFI
Case Studies (refer to Section IV.F of this Report)[9]	12 AFI, 0 ANA, 0 OFI
Findings developed through the SCUBA Team's assessment of the individual "outlier organizations" identified through the 2009 NFS Safety Culture Survey (refer to Section V of this Report)	2 AFI, 1 ANA, 1 OFI

[9] The Findings cited in this row are the discrete findings (that is, non-repetitive findings) from Appendix G that are listed in Section IV.F of this Report.

1.F Conclusions and Over-Arching Findings

Introduction

Reaching conclusions on the current safety culture at the NFS-Erwin Site is a difficult undertaking for a number of reasons, including the following:

1. As is discussed in Section II of this Report, "Assessment Methodology," the reliance that can be placed on the numerical results obtained through the NFS Workforce Survey, which was administered in August 2009, is compromised somewhat based on the timeframe in which it was administered. Based on personnel interviews conducted by the SCUBA Team in January-April 2010, it is reasonable to assume that the Survey numerical ratings would have been lower if the Survey had been administered after the workforce had become aware of the facts associated with the series of operational events that occurred during the fourth quarter of 2009.

2. The approach utilized by NFS management and the actions taken by NFS management to respond to the 2007/2008 ISCA Results Report were flawed in many respects. (Refer to SCUBA Team Finding 2009/2010 AFI-SUM-04.)

   In addition, for the most part, activities undertaken by NFS under the banner of the NFS CSCII and/or in response to SCUBA Team suggestions, recommendations, and criticisms of both the adequacy and pace of such activities (1) diminished significantly during the fourth quarter of 2009 in the face of a series of significant operational events at the NFS-Erwin Site and as a result of increasing regulatory scrutiny and involvement due to those events, (2) went essentially into a state of dormancy in the first quarter of 2010 as the NFS organizational focus shifted almost entirely to responding to the January 7, 2007 CAL and on securing NRC approval to restart the NFS production lines, and (3) continues to be in a general state of dormancy as the NFS organizational focus has shifted to implementation of the new NFS President's change agenda[10] and to sequenced restart activities.

3. Recent changes, areas of emphasis, and additional planned changes at the NFS-Erwin Site, particularly those sponsored and driven by the new NFS President, appear to have had a positive effect on organizational safety culture in the short-term and hold the promise for continued and future improvements that could prove to have a long-term, lasting positive effect. Examples include:

   - Providing more appropriate checks and balances in the NFS-Erwin organizational structure and reporting relationships.
   - Initiating activities (in progress and/or planned) to provide resource loading for all activities conducted at the NFS-Erwin Site to provide the ability to establish and maintain both organizational and individual accountability.

[10] It should be noted that the vast majority of this change agenda is directed at improving organizational safety culture, either directly or indirectly, whether or not carried out under the banner of the NFS CSCII.

- Increasing emphasis on improving the Safety Conscious Work Environment at the NFS-Erwin Site, including planned enhancements to supporting processes and/or programs.
- Establishing enhanced organizational standards and expectations, and communicating same throughout the organization.
- Requiring single-point accountability.
- Increasing emphasis on expectations for management engagement with personnel in the workplace to communicate vision, values, standards and expectations, to reinforce standards and expectations, and to carry out effective two-way communications.
- Increasing emphasis on establishing and implementing an effective NFS work control process.

4. On the other hand:

    - NFS-Erwin has demonstrated long-standing cultural deficiencies in areas such as consistently following-through on effective corrective actions, improvement initiatives, and regulatory commitments, as well as in the associated areas of organizational and individual accountability.
    - NFS-Erwin has demonstrated a long-standing approach of minimum regulatory compliance.
    - NFS-Erwin has historically demonstrated a tendency to conduct limited root cause analyses and associated analyses of identified problems.
    - NFS-Erwin has historically demonstrated both an insufficiently rigorous approach to independent oversight of its activities and an insufficient appreciation of the value of self-assessment as a mechanism to drive improvement.
    - The information[11] presented in Attachment E to this Report, "SCUBA Team In-Process Recommendations to NFS Management," and in Attachment H to this Report, "Key Insights Derived from SCUBA Team Behavioral Observations through January 1, 2010," provides significant insights into the safety culture at the NFS-Erwin Site as it existed as of January 1, 2010. These insights indicate a safety culture in need of much improvement.
    - Events leading up to issuance of the NRC CAL and the associated shutdown of the NFS production lines demonstrated significant cultural deficiencies at NFS-Erwin in areas such as (1) non-conservative decision making by management and other members of the white-collar workforce in the face of production or schedule pressures, (2) the lack of an environment that encouraged and was receptive to questioning attitudes or differing views, particularly in the face of production or schedule pressures, (3) insufficient management control of its programs and processes, and (4) insufficient management attention to resource management (i.e., work prioritization and workload management).

[11] The SCUBA Team recommends that new NFS senior managers should review this information thoroughly as they continue to develop their agenda for change and improvement in the NFS-Erwin safety culture. At a minimum, the cultural deficiencies identified in these documents are indicative of the challenges to be overcome in the development of an improved safety culture at the NFS-Erwin Site.

- Some key personnel, who both contributed to the operational loss events and were associated with the lack of sufficient progress in effectively addressing and resolving previously-identified cultural deficiencies, remain in place.
- The very recent changes and the current areas of senior management emphasis (current or planned) do not have sufficient run-time to allow a meaningful assessment of their lasting impact and effectiveness.

5. Based on personnel interviews and behavioral observations conducted by the SCUBA Team during the January-April 2010 time frame, NFS activities during the preparations for restart of its production lines received mixed reviews.

   On the positive side, the SCUBA Team noted that:

   - NFS-Erwin employees generally appreciate the nature of the safety/regulatory requirements they must satisfy, and seem to be genuinely committed to satisfying those requirements.
   - The newly appointed President of NFS is rapidly gaining the trust and confidence of the workforce.
   - NFS management utilized the regulatory shutdown to provide:
     - Increased organizational focus on (1) having a questioning attitude and (2) not proceeding in the face of uncertainty.
     - Improved communications between the shop floor and senior management by implementing a Senior Engineering Watch (SEW) process.
   - Shop floor employees seem to be more willing to push back if they encounter inappropriate production pressure or other management actions that could compromise safe facility operation.

   On the negative side, the SCUBA Team noted that:

   - It is not yet clear that the white-collar workforce will consistently push back if they encounter inappropriate production pressure or other management actions that could compromise safe facility operations.
   - Some senior level managers continued to exhibit behaviors that are not consistent with the President's stated priorities of safety, quality, production, and cost.
   - To varying degrees, some NFS middle management personnel indicated that their views were not solicited or welcomed during the preparations for restart.
   - NFS-Erwin continues to pursue unique/one-of-a-kind highly enriched uranium scrap processing opportunities. These opportunities have consistently challenged the organization's resources and capabilities, and have resulted in a number of process upsets/loss events having both safety and regulatory implications, including two major shutdowns of BPF Operations. NFS-Erwin has not yet demonstrated that it can successfully take on these new processes without having safety and regulatory related upsets and problems.

Accordingly, the SCUBA Team has determined that it is not in a position at this time to do much more than acknowledge that the above-mentioned changes, areas of emphasis, and plans for improvements exist, and that they represent initial steps in the right direction. There is not, however, adequate observation time or data to determine whether the corrective actions taken

during the regulatory-related shutdown will be sustained in the face of future production and schedule pressures or to what extent they will prove to be lasting in nature. Given the safety culture history cited above, the SCUBA Team believes that only time will tell if the operating strategy changes adopted during the most recent regulatory shutdown and the actions taken by the new NFS President will indeed be effective and lasting. In this regard, the SCUBA Team provides the following recommendation:

2009/2010 AFI-SUM-01: The SCUBA Team recommends that NFS conduct a comprehensive Independent Safety Culture Assessment of the NFS-Erwin Site approximately 12-18 months after the date of resumption of production activities at the NFS-Erwin Site.

Conclusions

The SCUBA Team has sufficient information and bases to provide a meaningful evaluation of the safety culture as it was found at the NFS-Erwin Site at least through the middle of January 2010. The information provided in the balance of this Report should be considered in that context. As discussed above, key elements of the safety culture existing at that time were developed and reinforced over a long period of time.

The SCUBA Team continues to consider the organizational safety culture at the NFS-Erwin Site to be generally deficient when compared to industry norms and to generally fail to meet regulatory expectations as set forth in NRC RIS 2006-13.

NFS has made only nominal progress in improving the safety culture at the NFS-Erwin Site since the 2007/2008 ISCA. In this regard, NFS management has not consistently demonstrated a bias for action in implementing meaningful and effective improvements in the NFS safety culture and in safety-related performance. With few exceptions, the findings and concerns identified through the 2007/2008 ISCA continue to be applicable today[12].

The following conclusions are provided in the format of Findings in order to facilitate the NFS response to the 2009/2010 ISCA Report.

2009/2010 AFI-SUM-02: Until very recently, NFS management appeared to be content both with the current state of the safety culture at the NFS-Erwin Site and with its rate of progress in implementing initiatives to improve safety culture and safety-related performance. This reflects a weakness in management standards and expectations, including a lack of sufficient understanding of what improvements are needed, the time frame in which they are needed, and how to effect meaningful improvements.

In addition, there appears to be an inherent resistance to change at NFS-Erwin that exists at all levels of the organization. Until very recently, many, including management personnel, appeared to have become content with the adequacy of the status quo, even to the extent of apparent denial in the face of evidence to the contrary. Many appeared to believe that existing standards, expectations, management controls, programs and processes were sound – based on a belief that they have served the organization well in the past. Many, including management personnel,

[12] Notable exceptions include the establishment of the NFS Employee Concerns Program, the implementation of the Configuration Management Program, the implementation of the training phase of the Human Performance Program, and the resolution of a number of previously-identified operator work-arounds and degraded equipment conditions.

appeared to believe that the recent operational loss events represented inopportune anomalies rather than indicators of fundamental weaknesses in safety culture, standards and expectations, management controls, programs and processes. This has been a long-standing cultural deficiency at the NFS-Erwin Site, and presents a significant challenge to the assimilation of higher organizational standards and expectations and to the conduct of sufficiently self-critical assessments of the adequacy and effectiveness of management controls, programs, and processes.

2009/2010 AFI-SUM-03: While NFS management previously indicated that their goal is to achieve excellence within the nuclear industry in the area of safety culture, for the most part, NFS management has functioned in a manner indicative of seeking to meet minimum regulatory requirements and expectations. As such, NFS management has tended to act and respond in a manner consistent with their perception of the level of interest or concern held or expressed by regulatory bodies. This has been a long-standing cultural deficiency at the NFS-Erwin Site.

If this situation is to improve in the future, NFS senior management will need to truly embrace the need for change, particularly with respect to adopting, internalizing, and consistently reinforcing higher standards and expectations for safety culture and safety performance.

2009/2010 AFI-SUM-04: The approach utilized by NFS management and the actions taken by NFS management to respond to the 2007/2008 ISCA Results Report were flawed in many respects, including (but not limited to) the following:

- With few exceptions, improvement initiatives defined by NFS management in response to the 2007/2008 ISCA have been slow in development and/or implementation. In a number of cases, delays have occurred to schedules that were not particularly aggressive in the first place. In some areas in which the SCUBA Team had previously identified high priority needs for improvement, NFS scheduled actions to effect the necessary improvements in the distant future with few, if any, intermediate milestones defined. At the same time, NFS management did not sufficiently focus on identifying and acting upon opportunities to implement actions to achieve intermediate improvements in these areas.
- There has been inadequate NFS senior management sponsorship of and involvement in execution of the NFS CSCII Plan.
- Despite repeated urging by the SCUBA Team, NFS senior management did not assign a project manager to coordinate and monitor activities associated with the implementation of the NFS CSCII Plan until almost a year after its issuance. Despite significant effort on the part of the assigned project manager, NFS senior management did not adequately support his endeavors. As a result, he routinely encountered considerable difficulties in executing his assigned responsibilities, including (but not limited to) attempts to hold other management personnel accountable for both commitments made under the CSCII Plan itself and commitments made in response to SCUBA Team suggestions, recommendations, and criticisms related to the CSCII Plan and its implementation.
- The actions specified in the NFS CSCII Plan were entered into the NFS PIRCS system for tracking and completion. However, these commitments in effect appeared to have been inappropriately treated and/or thought of as commitments to the SCUBA Team as opposed to being treated as commitments to the NRC – which they are.

- To the best knowledge of the SCUBA Team, despite repetitive urgings by the SCUBA Team, NFS senior management has not yet conducted a single Effectiveness Review of the CSCII actions that were declared to have been completed by NFS management.
- As part of this 2009/2010 ISCA, the SCUBA Team reviewed the adequacy of the bases for closure of those CSCII actions that had been characterized as "Complete" and "Approved by the NFS CARB." The results of this review are documented in Section III of this Report, which presents the results of the SCUBA Team's assessment of the status of each of the 13 Safety Culture Components. On an integrated basis, the SCUBA Team's review of the adequacy of the bases for closure of the above-mentioned CSCII actions indicated that approximately 50% of those completed actions do not meet acceptable standards for closure of an action. (Refer also to Findings 2009/2010 AFI-CAP-03 and 2009/2010 AFI-CAP-04).
- The April 10, 2007 Confirmatory Order specifically required NFS to develop performance based metrics to measure the success of the NFS Safety Culture Improvement Plan and Program. The SCUBA Team repeatedly advised NFS senior management of their failure to establish appropriate performance metrics for safety culture. The SCUBA Team went so far as (1) to meet with each NFS-designated Safety Culture Component Lead to describe how to develop such metrics based on the concept of "flow down from a characterization of what excellence would look like in each Safety Culture Component" and also to provide representative examples of what such metrics might look like; and (2) to request NFS management to develop and use safety culture metrics based on either this approach or some other equally rigorous approach preferable to NFS. While commitments were made by NFS to develop a comprehensive set of safety culture metrics based on the "flow down from excellence" approach by October 1, 2009, this commitment was not met and, from the SCUBA Team's perspective, continues to remain open. (See also SCUBA Team Finding 2009/2010 AFI-SA-02).

2009/2010 AFI-SUM-05: Significant problems related to accountability have continued to exist within the NFS organization. This applies to all aspects of the organization's activities and is rooted in the lack of management focus on holding personnel – management, supervision, and workers alike – accountable for meeting commitments, for conducting activities in accordance with standards and expectations, and for demonstrating and supporting questioning attitudes. This has been a long-standing cultural deficiency at the NFS-Erwin Site.

2009/2010 AFI-SUM-06: NFS-Erwin has demonstrated a bias for production, cost and schedule priorities over safety priorities. This has been manifested in both subtle and not-so-subtle decisions made on a day-to-day basis that are not sufficiently conservative or rigorous. Recent operational loss events exposed what appears to be a systemic problem in this regard as hasty decisions compounded simple problems into complex events. This is also manifested by the lack of urgency in resolving certain degraded conditions. This has been a long-standing cultural deficiency at the NFS-Erwin Site.

2009/2010 AFI-SUM-07: While NFS management demonstrated some improvement in articulating and communicating values, standards and expectations related to safety culture and safety-related performance:

- There continues to be considerable room for improvement in upgrading NFS's organizational values, standards, and expectations to meet industry standards of excellence.
- There has been insufficient management attention to rigorously ensuring that values, standards, and expectations have been effectively assimilated by the organization. Until very recently, little improvement was made in effectively reinforcing standards and expectations on a day-to-day basis with management, supervision, and workers. There has been a long-standing pattern of insufficient management attention to the conduct of meaningful observations of work activities in the field, and to coaching and mentoring personnel on how to meet standards and expectations on a day-to-day basis.

2009/2010 AFI-SUM-08: There has been a continuing pattern of insufficient management attention to conducting meaningful self-assessments and of a failure by management to demonstrate and promote a culture that values critical self-assessments as a means to drive continuous improvement. This has been a long-standing cultural deficiency at the NFS-Erwin Site.

2009/2010 AFI-SUM-09: NFS management apparently had not understood or sufficiently recognized that the NFS CSCII commitments were commitments to the NRC, as opposed to commitments to the SCUBA Team. Based on a review by the SCUBA Team of those CSCII commitments/actions determined by NFS to be complete/closed (based on the assigned individual having declared through the NFS Corrective Action Program that the action was completed and on the NFS Corrective Action Review Board having endorsed the action as completed), the SCUBA Team has concluded that approximately 50% of such "completed" actions did not meet appropriate standards for considering an action to have been completed.

I.G High-Priority Findings and Recommendations

Introduction

As indicated in Tables 3 and 4 in Section I.E of this Report, the SCUBA Team has identified a significant number of Findings during the conduct of the 2009/2010 ISCA. As indicated previously, the vast majority of these are essentially Repeat Findings from the 2007/2008 ISCA. Detailed information on the individual Findings and associated SCUBA Team recommendations to address them are provided in this Executive Summary and in Sections III, IV and V of this Report.

The SCUBA Team recognizes that:

- The individual Findings are not all equal in importance and/or urgency.
- There are significant variations in the nature and level of effort that will be necessary to address individual Findings.

For the 2007/2008 ISCA, the SCUBA Team developed recommendations on the relative priority of the identified Findings using a set of nine major themes[13] to organize, categorize and cross-correlate the individual Findings. The SCUBA Team recommended that NFS senior management adopt either this approach or a similar binning process to evaluate and address the Findings. In this regard, the SCUBA Team believed that such an approach would help to ensure that the assigned corrective action issue owners would be aligned and could effectively coordinate their efforts with co-workers who were working on similar broad themes within different Safety Culture Components. NFS senior management did not act on this recommendation and, as a result, there was little effective coordination of such efforts.

For the most part, the challenges described in the context of those nine overarching themes remain applicable today. The SCUBA Team recommends that the new members of the NFS senior management team familiarize themselves with that information.

For the 2009/2010 ISCA, the SCUBA Team has taken a similar approach to suggesting relative priorities for NFS to consider as it develops its response to this Report. The SCUBA Team has identified (1) a set of nine Summary-Level Findings and (2) a set of seven Topical Areas with one or more Findings that are considered to be of higher relative priority than the other Findings identified in this Report.

These seven Topical Areas and a listing of the related Findings, framed in terms of positive, desirable behaviors are identified on the following pages.

Organizational and Individual Accountability

- Ensure clarity of (1) roles & responsibilities, (2) standards & expectations, and (3) assigned accountabilities. Include all of the above in individual and organizational Performance Evaluation and Management Program documents.
- Wherever possible, assign a single point of accountability.
- Establish an Accountability Ethic that, if you do not think you can meet or might not be able to meet a commitment for whatever reason, you are obligated to inform your supervisor/manager well in advance to negotiate a resolution. Similarly, establish an Accountability Ethic that supervisors/managers are responsible for taking action to resolve such situations.
- Implement a meaningful system of rewards and consequences to reinforce accountability.

The following findings are relevant to achieving Organizational and Individual Accountability, but should not be considered as the only actions necessary or appropriate to address this topical area:

- 2009/2010 AFI-WP-01: Implement a reinforcement plan to change safety culture and assure accountability
- 2009/2010 AFI-CAP-06: Improve the process used to close PIRCS issues
- 2009/2010 AFI-CAP-07: Improve the quality of PIRCS commitments presented for closure

[13] The nine thematic areas were: (1) Organizational Values, Standards, and Expectations, (2) Communication of Values, Standards, and Expectations, (3) Human Performance Challenges, (4) Emphasize Ownership and Accountability, (5) Resourcing for Success, (6) Enhance Effectiveness of Programs and Processes, (7) Eliminate Tolerance for Degraded Conditions, (8) Expand the Organization's Frame of Reference, and (9) Focus on Continuous Improvement.

- 2009/2010 AFI-ACC-01: Management consistently demonstrates and promotes a questioning attitude
- 2009/2010 AFI-ACC-04: Institute single point accountability
- 2009/2010 AFI-ACC-06: Institute a performance management process
- 2009/2010 AFI-CLE-01: Management consistently utilizes and promotes the strategic planning process for continuous Safety Culture improvement
- 2009/2010 AFI-SP-01: Senior management demonstrates belief in verbalized values, standards and expectations
- 2009/2010 AFI-SP-03: Senior management accountability and oversight of the CSCII
- 2009/2010 AFI-SP- 04: Reinforce understanding of key NFS safety policies

Corrective Action Program Effectiveness

- Establish and enforce higher and more appropriate standards for "closure" of corrective actions. Do not allow closing corrective actions to programs, processes, promises, or "other paper" – until the actual corrective action has been effected.
- Use improved analytical tools for root cause analysis, extent of condition analysis, extent of cause analysis, etc. Utilize root cause analytical techniques that include human performance and management performance as possible root causes or contributing causes.
- Establish and use a program to systematically and periodically review PIRCS data for the purpose of identifying adverse trends, recurring problems, and common cause events. This should include implementing a formal internal operating experience program.

The following findings are relevant to Corrective Action Program Effectiveness, but should not be considered as the only actions necessary or appropriate to address this topical area:

- 2009/2010 AFI-CAP-02: Implement Corrective Action Program tracking and trending improvements
- 2009/2010 AFI-CAP-04: Improve the quality of event investigations and corrective actions
- 2009/2010 AFI-CAP-06: Improve the process used to close PIRCS issues
- 2009/2010 AFI-CAP-07: Improve the quality of PIRCS commitments presented for closure
- 2009/2010 AFI-SP-03: Senior management accountability and oversight of the CSCII

Resource Management

- Establish and use a process to resource-load all work, cascaded down to individual workloads.
- Establish and use a process for work prioritization and resource allocation that resolves the inevitable workload/accountability mismatches – particularly at the individual level.

The following findings are relevant to successful Resource Management, but should not be considered as the only actions necessary or appropriate to address this topical area:

- 2009/2010 AFI-RES-03: Assure adequate engineering resources for safe operations
- 2009/2010 AFI-RES-04: Address functional organizational resource issues
- 2009/2010 AFI-WC-03: Implement a work management system
- 2009/2010 AFI-ACC-05: Balance workload and resources

Technical/Professional Competencies (White Collar Workforce)

- Identify the technical capabilities/knowledge and experience required/desired for each positional assignment at the NFS-Erwin Site, particularly for the white-collar workforce. Identify the technical capabilities/knowledge and experience of the incumbents of each positional assignment. Develop individual development plans to systematically close any identified gaps. This will likely identify the need for specific technical training, professional development training, and continuing training programs.
- Identify necessary continuing technical training/developmental needs for each positional assignment/job category. This will likely identify the need for specific training programs.
- Move the reporting relationship of the NFS Training organization out from under the Operations organization in recognition that NFS needs more in the way of training programs than merely operations and maintenance training. If NFS wishes to follow a proven approach used in the commercial nuclear power plant industry, NFS could modify the current organizational structure by moving the NFS Training organization under the NFS Assurance organization and renaming the Assurance organization as the NFS Performance Improvement organization. Alternatively, NFS could establish another NFS Training Program reporting other than to Operations (e.g., to Engineering).
- Implementation of Human Performance principles and tools needs to be aggressively pursued in the white collar organization, as knowledge workers have been the principal source of the errors in judgment that led to NFS's loss events. This is particularly important for the Process/Project Engineering and Safety organizations.
- Obtain advice and counsel from the Institute of Nuclear Power Operations (INPO) on suggested approaches to identify and respond to technical training needs, and on how best to construct a technical training and development program.

The following findings are relevant to successful Technical /Professional Competencies, but should not be considered as the only actions necessary or appropriate to address this topical area:

- 2009/2010 AFI-WC-05: Improve the robustness of the Integrated Safety Analysis (ISA) process
- 2009/2010 AFI-WP-06: Implement Human Performance principles and tools for knowledge workers, with first priority being technical personnel (engineers)
- 2009/2010 AFI-CLE-03: Basics of production training
- 2009/2010 AFI-CLE-04: Provide focused chemical engineering training
- 2009/2010 AFI-CLE-05: Develop and implement a technical competence program
- 2009/2010 AFI-CLE-06: Change Training organization reporting relationship in recognition of breadth of its required training and development activities
- 2009/2010 AFI-CLE-07: Leadership development
- 2009/2010 AFI-CLE-08: Support continuous learning, training/development and technical/professional competence via specific assigned responsibilities within the organization

Questioning Attitude

- Focus on developing an environment at NFS where (1) questioning attitudes, challenges, and differing views are encouraged, sought out, and respected; and (2) where every

question, challenge or differing view receives an open, honest, objective, and respectful reaction and response.

- Honor and reward those who demonstrate a good questioning attitude and those who provide open, honest, objective, and respectful reactions and responses. Sanction those who do not demonstrate appropriate behaviors.
- Proactively seek out input from those most knowledgeable before making decisions.
- Hold everyone accountable for demonstrating appropriate behaviors, i.e., walk the talk.

The following findings are relevant to the development of an organization-wide Questioning Attitude, but should not be considered as the only actions necessary or appropriate to address this topical area:

- 2009/2010 AFI-DEC-01: Seek relevant expertise for operational and design challenges
- 2009/2010 AFI-DEC-03: Eliminate production decisions that challenge safe facilities operation
- 2009/2010 AFI-WP-01: Implement a reinforcement plan to change safety culture and assure accountability
- 2009/2010 AFI-ACC-01: Management consistently demonstrates and promotes a questioning attitude
- 2009/2010 AFI-ACC-04: Institute single point accountability
- 2009/2010 AFI-ACC-06: Institute a performance management process
- 2009/2010 AFI-SP-01: Senior management demonstrates belief in verbalized values, standards and expectations

Work Control

- Establish and utilize an effective Work Management Process at NFS-Erwin to identify, prioritize, plan, schedule, coordinate and execute work.

The following findings are relevant to Work Control, but should not be considered as the only actions necessary or appropriate to address this topical area:

- 2009/2010 AFI-WC-03: Implement a Work Management System
- 2009/2010 AFI-WC-04: Implement a Deficiency Tag Program

Safety Conscious Work Environment

- Provide Safety Conscious Work Environment sensitivity training to all supervisors and managers. Utilize external professionals to provide such training.
- Develop a process for identifying, retraining, and/or removing those in supervisory roles who are not successful at developing a safety conscious work environment for the employees who report to them.

The following findings are relevant to Safety Conscious Work Environment, but should not be considered as the only actions necessary or appropriate to address this topical area:

- 2009/2010 AFI-PDM-01: Demonstrate a zero tolerance for inappropriate behaviors on the part of management and employees

II. ASSESSMENT METHODOLOGY

II.A Introduction

As was the case for the 2007/2008 Independent Safety Culture Assessment (ISCA), the SCUBA Team utilized the safety culture component framework set forth in NRC Regulatory Issue Summary (RIS) 2006-13 for the conduct of the 2009/2010 ISCA, and was informed by the relevant guidance contained in NRC Inspection Procedure 95003.

The SCUBA Team planned to conduct the 2009/2010 ISCA in three overlapping phases followed by a fourth and final phase. As discussed below, plan schedule adjustments were required due to unanticipated circumstances.

1. The Preliminary Phase was intended to include activities that at least initially would not require direct SCUBA Team involvement. However, completion of the preliminary phase activities was considered to be a necessary condition for the commencement of certain SCUBA activities. For example, the commencement of the SCUBA Team's formal personnel interview program depended upon the SCUBA Team having been informed by the results of the 2009 NFS Safety Culture Survey. Preliminary phase activities were to include the following:

    - Conduct of the 2009 NFS Safety Culture Survey by SYNERGY Consulting Services Corporation (SYNERGY) on behalf of NFS and the SCUBA Team. The survey was administered to personnel at the NFS-Erwin Site during August 2009. SYNERGY briefed both the SCUBA Team and NFS management on the survey results in mid-November 2009. SYNERGY provided detailed documentation of the survey results to the SCUBA Team and to NFS management on December 7, 2009. This information served as two primary sources of input to the 2009/2010 ISCA: (1) survey numerical results (e.g., 2009 survey numerical ratings and 2007-2009 numerical rating trend information); and (2) the 2009 survey confidential write-in comments.
    - Conduct by NFS of critical self-assessments of its current safety culture, on a Safety Culture Component-by-Component basis, using the framework set forth in the NRC RIS 2006-13. This information served as a primary source of input to the 2009/2010 ISCA.

    NFS management committed to conduct these self-assessments in October/November 2009 and to provide the associated assessment results reports to the SCUBA Team by December 1, 2009. Due in part to a series of operational loss events at NFS-Erwin during the fourth quarter of 2009, the reports were not provided in final form to the SCUBA Team until on or about January 16, 2010. Since the commencement of the SCUBA Team's formal personnel interview program depended upon the SCUBA Team's having been informed by the results of these NFS self-assessments, this delay contributed to a delay in the commencement of that program.

2. The Initial Phase of SCUBA Team Assessment Activities was intended to include three primary assessment activities and to also accommodate the possibility of a fourth assessment activity. This phase was scheduled to commence on or about September 1, 2009 and to conclude on or about December 31, 2009. The initial phase of SCUBA Team assessment activities was to include the following:

    - Conduct of behavioral observations by the SCUBA Team, including observations of meetings, field work activities, and training activities at the NFS-Erwin Site. The SCUBA Team planned to conduct approximately 60-70% of its total planned behavioral observations during this time period. (This goal was met.) Behavioral observations constitute a primary source of assessment input.
    - Review and assimilation of the 2009 NFS Safety Culture Survey results and the NFS Self-Assessment results. (The Survey results were available and were reviewed. The NFS Self-Assessment results were not available until mid-January 2010; they were reviewed by February 8, 2010.)
    - Conduct of documentation reviews. Documentation reviews constitute a primary source of assessment input.
    - The possibility of initiation of one or more SCUBA Team Case Studies to evaluate the adequacy of the NFS response to a significant problem or event that occurred while the 2009/2010 ISCA was in progress. Such Case Studies would place particular emphasis on the manner in which NFS identifies and addresses any potential safety culture implications associated with the problem or event. (As it turned out, the SCUBA Team conducted four Case Studies during the 2009/2010 ISCA all of which were initiated during this Phase. The Case Studies constituted yet another primary source of assessment input.)

3. The Second Phase of SCUBA Team Assessment Activities was intended to include three primary assessment activities and to also accommodate the possibility of a fourth assessment activity. This phase was scheduled to commence on or about January 4, 2010 and to conclude on or about April 10, 2010. (Due to delays beyond the control of the SCUBA Team, this phase commenced on February 8, 2010 and concluded in early May 2010.) The second phase of SCUBA Team assessment activities was to include the following:

    - Conduct of the SCUBA Team's Personnel Interview Program, including Subject Matter Expert Interviews, Random Interviews, and Survey Results-Driven Interviews. (This goal was met.) Personnel interviews constitute a primary source of assessment input.
    - Conduct of behavioral observations by the SCUBA Team, including observations of meetings, field work activities, and training activities at the NFS-Erwin Site. The SCUBA Team planned to conduct approximately 30-40% of its total planned behavioral observations during this time period. (This goal was met.) Behavioral observations constitute a primary source of assessment input.
    - Conduct of documentation reviews. (This goal was met.) Documentation reviews constitute a primary source of assessment input.
    - The possibility of initiation of one or more SCUBA Team Case Studies to evaluate the adequacy of the NFS response to a significant problem or event that occurred

while the 2009/2010 ISCA was in progress. Such Case Studies would place particular emphasis on the manner in which NFS identified and addressed any potential safety culture implications associated with the problem or event. (The SCUBA Team did not initiate any new Case Studies during this Phase.)

4. The Third Phase of SCUBA Team Assessment Activities was intended to include:

   - SCUBA Team collegial activities related to the sharing, discussion, and integration of the 2009/2010 ISCA results.
   - SCUBA Team collegial activities related to the development of 2009/2010 ISCA Conclusions, Findings, and Recommendations.
   - SCUBA Team collegial activities related to the development of the 2009/2010 ISCA Results Report, the Report Attachments, and other Supporting Information.
   - Presentation of the 2009/2010 ISCA results to NFS senior management.
   - Transmission of the 2009/2010 ISCA Results Report, the Report Attachments, and other Supporting Information to NFS senior management.

   This phase was originally scheduled to commence on or about April 10, 2010 and to conclude on or about May 10, 2010. (Due to delays beyond the control of the SCUBA Team, this phase commenced in early May 2010 and concluded on June 21, 2010.)

As was the case for the 2007/2008 ISCA, the SCUBA Team committed to:

- Inform NFS senior management of potentially significant issues identified through the 2009/2010 ISCA on a real time basis, including key findings and conclusions.
- Provide recommendations and suggestions to address identified issues on a real time basis, to the extent practicable.
- Document any such real-time recommendations and suggestions in an attachment to the 2009/2010 ISCA Final Report. (Attachment E to this Report identifies the 2009/2010 in-process recommendations provided by the SCUBA Team to NFS management.)

II.B Sources of Assessment Input

As was the case for the 2007/2008 ISCA, the SCUBA Team utilized the five following diverse sources of input in conducting the 2009/2010 ISCA:

- Confidential personnel interviews
- Behavioral observations
- Documentation reviews
- Workforce survey numerical results
- Workforce survey confidential write-in comments

As indicated previously, for the 2009/2010 ISCA, the SCUBA Team utilized a sixth diverse source of input – Case Studies. Four Case Studies were conducted by the SCUBA Team.

All sources of information were evaluated on an integrated basis by the SCUBA Team in the process of identifying findings and reaching conclusions.

Confidential Personnel Interviews

All personnel interviews were conducted either by members of the SCUBA Team or by the independent SCUBA Team Advisor on matters related to nuclear material security. All personnel interviews were individual interviews as opposed to group interviews.

The SCUBA Team developed and used a guidance document for the conduct of personnel interviews, including a requirement for the use of interview checklists; i.e., a listing of potential questions or areas to be covered in the interviews. These checklists incorporated information derived from the SCUBA Team's (1) review of several sources of information on safety culture attributes including, but not limited to, NRC RIS 2006-13 and NRC Inspection Procedure 95003; and (2) experience gained through the conduct of the 2007/2008 ISCA.

Information obtained from personnel interviews that contributed to SCUBA Team conclusions and findings is included in:

- The "Supporting Information" sub-section of the individual Safety Component Results Sections of this Report (Sections III.A through III.M).
- Attachments A, B, C and D to this Report, which address the additional areas of assessment scope.
- The SCUBA Team's separate classified report on NFS-Erwin nuclear material security.
- Confidential documents that present the results of the SCUBA Team's interview-based exploration of the underlying reasons for lower workforce survey numerical ratings provided by individual NFS-Erwin sub-organizations that were identified as "organizational outliers" based on the survey results (Refer to Section V of this Report.)

In this regard, the information obtained from personnel interviews has been treated as confidential information with respect to attribution of the source of such information. To provide further protection of the confidentiality of interviewees, the information obtained from personnel interviews has been reported collectively with information obtained from other sources of assessment input.

The following three types of formal personnel interviews were conducted by the SCUBA Team:

- Subject Matter Expert (SME) Interviews: These interviews were targeted[14] interviews with personnel who were most knowledgeable of the NFS programs, policies, procedures, performance measures/metrics, and improvement initiatives related to each of the thirteen NRC RIS 2006-13 Safety Culture Components and to each of the other topical areas to be evaluated through the ISCA. These interviews were primarily (but not exclusively) with management and supervisory personnel, including the NFS-designated Safety Culture Component Leads and Executive Sponsors. These interviews included a combination of structured and non-structured interview questions, and SMEs responded to questions related to their area of expertise, to a set of five generic safety culture questions, and to a set of nine questions aimed at gaining insight into safety culture-related changes at NFS-

[14] In this context, "targeted" means that the individuals selected to be interviewed were selected by the SCUBA Team based on the knowledge of the interviewees rather than on a random basis.

Erwin following the issuance of the January 7, 2010 Confirmatory Action Letter (CAL). (161 Subject Matter Expert Interviews were conducted by the SCUBA Team.)

- Random Interviews: These interviews were with members of the NFS-Erwin workforce (including hourly employees, salaried employees, and contractors) who were randomly selected by the SCUBA Team. Supervisory and non-supervisory personnel were included in the population base for the random selections. The random selection process was applied such that the distribution of those selected was representative of the population base of each NFS-Erwin functional organization. The random selection process was applied such that approximately 20% of the NFS-Erwin supervisory and non-supervisory population was interviewed. These interviews were primarily structured in nature and used a set of pre-established core questions related to safety culture. (230 Random Interviews were conducted by the SCUBA Team.)

- Survey-Driven Interviews: These interviews were dictated by the 2009 NFS Safety Culture survey participation levels and the survey numerical rating results for individual NFS Functional Organizations. If survey participation was particularly low within a specific NFS-Erwin Functional Organization, personnel from that organization were randomly selected for personnel interviews. If a specific NFS-Erwin Functional Organization provided significantly low ratings and/or notably declined ratings of key cultural metrics based on the survey numerical results, it was characterized as an "outlier organization" and was subject to personnel interviews intended to obtain additional insights into the underlying reasons for the low and/or declined survey numerical ratings. Personnel from such organizations were randomly selected for personnel interviews. Management and supervisory personnel from those organizations were also selected to be interviewed. The number of interviews conducted within each such organization was in accordance with the criteria specified in the Assessment Plan and the specific personnel interviewed were selected using random methods. Interviews of personnel from identified outlier organizations and low-responding organizations were more non-structured or open-ended in nature, as they were intended to obtain insights on the underlying reasons for the low and/or declined survey numerical ratings. The SCUBA Team used a specific set of interview questions that were augmented with questions based upon the analysis of the survey results, including the analysis of the write-in comments, for each identified outlier organization. (39 Survey Driven Interviews were conducted by the SCUBA Team.)

The SCUBA Team conducted a total of 430 formal personnel interviews during the conduct of the 2009/2010 ISCA. This total does not include follow-up interviews, casual interviews with NFS-Erwin personnel while in the field conducting behavioral observations, or casual interviews while gathering information associated with SCUBA Team Case Studies – all of which occurred during the conduct of the assessment.

Attachment F to this Report provides information on the distribution of the personnel interviews by worker category, by organizational affiliation and by Safety Culture Component. Appendix F also includes detailed information on the interview checklists used in the conduct of all three types of formal personnel interviews.

Behavioral Observations

All behavioral observation were conducted either by members of the SCUBA Team or by the independent SCUBA Team Advisor on matters related to nuclear material security.

The SCUBA Team developed and used guidance documents for the conduct of behavioral observations. Three guidance documents were developed and used by the SCUBA Team; these corresponded to each of the three categories of behavioral observations that were conducted as part of the 2009/2010 ISCA.

- Observations of Meetings
- Observations of Field Work Activities
- Observations of Training Activities

These guidance documents provided behavioral observation checklists that were "fit for purpose" for the type and nature of each type of activity to be observed. These checklists incorporated information derived from the SCUBA Team's (1) review of several sources of information on conducting behavioral observations, including but not limited to NRC Inspection Procedure 95003 and (2) experience gained through the conduct of the 2007/2008 ISCA.

The SCUBA Team conducted 270 behavioral observations, including:

- 119 observations of NFS-Erwin meetings ranging from Safety and Safeguards Review Council meetings to work planning meetings to shift turnovers.
- 131 observations of fieldwork activities ranging from conduct of facility operations to product packaging and transportation.
- 20 observations of training activities ranging from craft technical training to human performance training to site drills.

Attachment F to this Report provides more detailed information on the distribution of these behavioral observations by behavioral observation category type.

Information obtained from behavioral observations that contributed to SCUBA Team conclusions and findings is included in:

- The "Supporting Information" sub-section of the individual Safety Component Results Sections of this Report (Sections III.A through III.M).
- The SCUBA Team's separate classified report on NFS-Erwin nuclear material security.

Documentation Reviews

All documentation reviews were conducted either by members of the SCUBA Team or by the independent SCUBA Team Advisor on matters related to nuclear material security.

The SCUBA Team developed guidance documents for the conduct of documentation reviews.

Information obtained from documentation reviews that contributed to SCUBA Team conclusions and findings is included in:

- The "Supporting Information" sub-section of the individual Safety Culture Component Results Sections of this Report (Sections III.A through III.M).

- Attachments A, B, C and D to this Report, which address additional areas of assessment.
- The SCUBA Team's separate classified report on NFS-Erwin nuclear material security.

The SCUBA Team obtained and reviewed an extensive amount of NFS-Erwin documentation. The SCUBA Team also had ready access to documentation on the NFS-Erwin intranet web-site and on the NFS SharePoint web-site throughout the duration of the 2009/2010 ISCA.

Workforce Survey

As was the case for the 2007/2008 ISCA, NFS obtained the services of SYNERGY Consulting Services Corporation (SYNERGY) to conduct a safety culture survey of the NFS-Erwin workforce to obtain information to support the SCUBA Team's 2009/2010 assessment activities.

As was the case in for the 2007 NFS Safety Culture Survey:

- SYNERGY designed the 2009 NFS Safety Culture Survey based on the NRC RIS model of organizational safety culture and used that model in its analysis of the numerically-rated survey questions used in the survey. This model groups related survey questions (i.e. cultural attributes) into 13 components of organizational safety culture.
- The individual questions used in the 2009 NFS Safety Culture Survey were specifically designed and modeled to address the cultural attributes associated with each of the NRC RIS Safety Culture Components as they apply to licensed activities at the NFS-Erwin Site. In this regard, the same 148 numerically-rated questions that were utilized and modeled in 2007 were utilized and modeled in 2009[15].

As indicated in the Results Report for the 2007 NFS Safety Culture Survey:

- SYNERGY obtained the services of Westat, a recognized leader in statistical survey research, to perform psychometric analyses of the specific survey questions and the specific modeling used in the 2007 NFS Safety Culture Survey.
- The psychometric properties of the 2007 NFS Safety Culture Survey were found by Westat to be well within commonly accepted standards for such instruments.

Since the survey questions and modeling used to produce the numerical ratings and trends of key Safety Culture attributes and metrics were the same in 2009 as those used in 2007, the Westat conclusions on the psychometric properties of the 2007 NFS Safety Culture Survey also apply to the 2009 NFS Safety Culture Survey.

The target population for participation in the survey included all employees (including AREVA employees) and long-term contractors working at the NFS-Erwin Site. Long-term contractors were defined as contractor personnel that had been providing services for six months or longer. The target population for the survey included 1,069 personnel.

Participation in the survey was voluntary, but was highly encouraged by NFS-Erwin Site management. NFS-Erwin Site management provided opportunities for personnel to take the survey in small group sessions scheduled during normal working hours.

[15] The 2009 survey included 15 additional (new) survey questions that were used for information gathering purposes as requested by the SCUBA Team. These survey questions were not included in the modeling that was used to produce the numerical ratings and rating trends for key Safety Culture metrics.

The paper survey was administered during the August 16-30, 2009 time period by NFS-Erwin Site workforce personnel who had been trained by SYNERGY to serve as survey administrators.

After two weeks of survey administration, 911 responses were received, resulting in an 85% response rate. This compares to an 88% response rate in August 2007.

The 2009 NFS Survey Culture Survey participation rate of 85% is higher than the industry average of 77% for surveys conducted by SYNERGY. This level of survey participation is more than sufficient to obtain meaningful insights and to reach conclusions.

The participation rate for NFS Employees was 91%. The participation rate for NFS-Erwin Contractors was 69%. The participation rate for NFS Hourly/Union Employees was 87%. All of these participation rates are higher than industry norms as observed by SYNERGY.

One NFS-Erwin individual Functional Organization was identified as a low-participating organization based on a low survey participation rate. The SCUBA Team conducted interviews with randomly-selected personnel from this organization.

The survey results served as a source of information that was used by the SCUBA to:

- Validate and/or clarify preliminary findings and conclusions based on the SCUBA Team's collective evaluation of information obtained through personnel interviews, behavioral observations and documentation reviews.
- Identify potential additional areas for further assessment.
- Identify potential additional findings and/or conclusions.
- Identify and evaluate individual NFS-Erwin Functional Organizations that were identified as "organizational outliers" based on the survey results.
- Determine the need for additional personnel interviews.

Information obtained from the workforce survey that contributed to SCUBA Team conclusions and findings is included in the "Supporting Information" sub-section of the individual Safety Component Results Sections of this Report (Sections III.A through III.M).

Based on the survey numerical results, several individual NFS-Erwin Functional Organizations were identified as "organizational outliers." The SCUBA Team's assessments of these organizations are discussed further in Section V of this Report.

Detailed information on the workforce survey results are presented in the "2009 NFS-Erwin Site Safety Culture Survey Results Report," dated December 7, 2009, prepared by SYNERGY.

Survey Numerical Results

NFS requested SYNERGY to characterize the survey numerical results using commercial nuclear power plant industry norms.

SYNERGY provided survey numerical rating results for the Overall Nuclear Safety Culture, for each of the Safety Culture Components set forth in NRC RIS 2006-13 and for individual cultural attributes/survey questions. This information was provided for the NFS-Erwin Site Composite organization, for all NFS-Erwin functional organizations and for all NFS-Erwin demographic categories. Extensive 2007-2009 trending information was also provided by SYNERGY.

SYNERGY identified a number of cautionary considerations related to interpreting NFS-Erwin workforce perceptions as reflected in the survey numerical results, including the following:

- In interpreting the benchmarking of the survey numerical results, NFS management and the SCUBA Team should be mindful that the nature of the activities conducted at the NFS-Erwin Site differ from the activities conducted at commercial nuclear power plants, as do the associated risks to individual workers and to the public.
  - The workforce is likely to think of nuclear safety in terms of nuclear criticality safety and in terms of radiological exposure, radiological contamination, and radiological uptake.
  - The nature of the risks to public health and safety are very different as compared to the nature of the risks associated with the operation of commercial nuclear power plants. Commercial nuclear power plants have numerous safety-related features and systems that are designed, operated and maintained to prevent and mitigate the consequences of potential events and accidents that are unique to commercial nuclear power plant operations. NFS-Erwin does not require this level of checks and balances in its approach to system design and operation.
- To the extent that NFS-Erwin has been insular with respect to commercial nuclear power plant industry standards, workforce perceptions associated with some ratings/rating characterizations may be artificially high due to the lack of an adequate frame of reference or adequate understanding of a particular cultural attribute.
- Some ratings/rating characterizations may be comparatively high due to the more limited scope of nuclear safety considerations/applications at a fuel cycle facility.
- Some numerical ratings may be high on an absolute basis, but may have lower rating characterizations due to the higher levels reflected in commercial nuclear power plant norms.
- Some numerical ratings may be low on an absolute basis, but may have higher rating characterizations due to the lower levels of excellence reflected in commercial nuclear power plant industry norms.

The SCUBA Team agrees that the survey numerical ratings provided by NFS-Erwin Site personnel are inflated due to the lack of an appropriately accurate frame of reference.
In comparing the workforce survey numerical results with the information obtained from other sources of assessment input, the SCUBA Team found that NFS-Erwin workforce perceptions were generally (and in some cases were significantly) more positive than warranted. In most cases, this was clearly the result of an inadequate frame of reference with respect to industry standards of excellence. The NFS-Erwin workforce did accurately identify a significant number of specific areas in need of improvement, but failed to recognize or appreciate the need for improvement in other areas. In addition, personnel interviews indicated that some NFS workforce personnel do not yet understand some basic concepts addressed in the survey, such as "self-assessment" and "use of operating experience." The numerical survey results served to validate and amplify the SCUBA Team's concerns with respect to the "frame of reference" issue at NFS-Erwin, as well as to validate specific areas in need of improvement.

The SCUBA Team also believes that the reliance that can be placed on the numerical results obtained through the 2009 NFS Safety Culture Survey, which was administered in August 2009, is compromised somewhat based on the very timeframe in which it was administered. Based on personnel interviews conducted by the SCUBA Team in January-April 2010, it is reasonable to

assume that the survey numerical ratings would have been lower if the survey had been administered after the workforce had become aware of the facts associated with the series of operational events that occurred during the fourth quarter of 2009.

Confidential Survey Write-In Comments

Approximately 34% of the survey respondents provided write-in comments, which is close to the industry average of 33% observed by SYNERGY. This percentage declined from 48% in 2007.

A total of 839 write-in comments were provided. Of these, approximately 39% were positive in nature and 58% were negative in nature[16].

Write-in comments served to obtain information that:

- Was used to validate the interpretation of the numerical survey results.
- Provided insights into the underlying reasons for the numerical survey ratings.
- Identified issues that were not specifically addressed by the survey questions.
- Provided insights into the underlying reasons for the lower numerical survey ratings provided by individual NFS-Erwin organizations identified by SYNERGY as "outlier organizations."

The write-in comments were solicited with the guarantee that they would be treated in confidence with respect to potential attribution of the comments to specific individuals. Hence, access to the write-in comments is controlled and limited. In accordance with SYNERGY's Confidentiality Protection Policy:

- The NFS-Erwin write-in comments were redacted as necessary to protect the identity of the individuals providing the comments.
- A copy of the redacted write-in comments has been provided to NFS-Erwin senior management on the basis that access to this information will be controlled and limited to those with a genuine "need-to-know."

SYNERGY provided a copy of the redacted write-in comments to the SCUBA Team based on its clear "need-to-know."

The SCUBA Team found the write-in comments to be a valuable source of assessment input.

[16] This compares to 1,114 write-in comments in 2007, with approximately 36% positive in nature and 64% negative in nature.

III. ASSESSMENT RESULTS – SAFETY CULTURE COMPONENTS

The SCUBA Team's assessment of the NFS-Erwin Safety Culture with respect to each of the 13 Safety Culture Components set forth in NRC RIS 2006-13 is presented below.

For each Safety Culture Component, the SCUBA Team has provided:

- The RIS 2006-13 Safety Component description
- An Overall Conclusion
- An Overall Rating Characterization based on comparisons with industry norms
- A Conclusion with respect to NRC regulatory expectations as expressed in or as implied by NRC RIS 2006-13
- Findings and Recommendations
- Supporting Information

III.A DECISION MAKING SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

Licensee decisions demonstrate that nuclear safety is an overriding priority.

SCUBA Team Conclusions

This component of NFS-Erwin safety culture is considered to be deficient when compared to commercial nuclear power plant industry norms and represents an Area for Improvement (AFI). The Site has not met regulatory expectations with respect to formalization of the decision making process, and has not consistently met regulatory expectations with respect to conservatism in decision making.

The above conclusion is based on a number of significant deficiencies noted in NFS's decision making-related management practices:

- Although industry standards call for an orderly approach to operational decision making, examples exist of a series of non-conservative, white-collar decisions being made, resulting in the decisions being hurried or shortcuts being taken – particularly when continued production was at stake. Illustrative examples can be found in the four Case Studies provided as Attachment G to this Report.
  - CDL Fire
  - Bowl Cleaning Station Event
  - Fire Damper Inspections
  - PSL Phase 4
- Insufficient technical expertise has led to unintended consequences.
- Non-conservative assumptions are tolerated. Most noteworthy example: 840 samples of fines materials, six samples tested, four different results, and yet the process was approved for use by Operations.
- The process for obtaining qualified, multi-level input on operational decisions is weak.
- The inappropriate use of management authority may suppress questioning attitudes. Failure to actively seek contrarian views and all possible inputs may be driven by perceived time pressure, but it can result in the loss of potentially valuable advice.
- Process for qualifying on plant equipment and processes is weak, as are the expectations for who should be qualified and in what length of time.
- The process for operational decision making is not sufficiently formalized or systematically implemented, despite the issuance of an Operational Decision Making (ODM) procedure (NFS-GH-946). The procedure assumes operational challenges will be recognized and entered into the PIRCS system. PIRCS is currently the trigger for ODM; recognition of an operational problem should be the trigger.
- Decisions are not consistently developed with the requisite degree of conservatism, particularly when a potential for personal injury is involved.
- Communication to employees of the bases for key decisions affecting safety is in many instances untimely, insufficient, or lacking.
- Design modifications are not properly vetted by the Change Control Board (CCB)/Safety and Safeguards Review Council (SSRC) process. Inadequate quality of originator

documents and assumptions made in the oversight process leads to decisions that are not based on rigorous technical analysis. The oversight process is performed at high level and does not drive the sufficiency or adequacy of technical detail. Example: the potential loss of power (and functionality while in active use) to three pieces of safety related equipment (SRE) when a 120V power panel in Bldg 137 was de-energized to wire in some ventilation (HVAC) equipment.

- The high number of approval signatures required for certain decisions may mean no one is really responsible.
- Production pressures negatively influenced organizational priorities in that the support for required new projects compromised safe facilities operations.

SCUBA Team Findings and Recommendations

2009/2010 AFI-DEC-01: The quality of white-collar decisions is flawed in that it does not consistently seek out relevant expertise and bring it to bear on operational or design challenges. Non-conservative assumptions are not challenged. NFS-Erwin has a systematic and formalized system for operational decision making (ODM) when risk-significant or safety-significant issues arise (NFS-GH-946, Operational Decision Making). However, it is not being utilized in a manner that precludes operational upsets caused flawed decision making.

The SCUBA Team recommends the following:

- Develop the ability to acknowledge uncertainty during the analysis phase: encourage making it acceptable to say "I don't know." The "ember" precursor is a good example of this principle.
- Change from dependency on ODM as the primary defense mechanism and substitute ODM-like behaviors for all decision making evolutions: have a clear definition of who makes decisions, determine what expertise should be brought to bear, challenge assumptions, and maintain a deliberate pace, especially when production pressures are high.
- Review recent plant events (e.g., Commercial Development Line (CDL) and bowl cleaning station (BCS)) to revise the ODM. Confirm the adequacy of guidance for authority, roles, and formal process steps for making operational decisions when issues involving safety and safe facility operations are under consideration.
- Assign full-time technical support to the CCB and the SSRC. Move their deliberation processes away from a high-level review (or individual desktop review) and create more of a challenging environment that is not satisfied with the first workable answer or solution.

2009/2010 AFI-DEC-02: NFS does not adequately communicate the bases for decisions related to nuclear safety or safe facility operations to the workforce. The communications group formed to communicate operational decision bases is ineffective, based on personnel interviews and survey results.

The SCUBA Team recommends the following:

- Management should document the basis for its decisions.

- Management should review its communications strategy for delivering timely and effective communications on the bases/reasons for decisions, particularly decisions that could otherwise potentially be interpreted by the workforce as compromising nuclear safety or industrial/personnel safety. Develop a feedback loop (that includes all shifts) to determine the effectiveness/penetration of decision-based communications.

2009/2010 AFI-DEC-03: NFS-Erwin has demonstrated an inappropriate focus on production when making decisions. The basic premise for going forward with any safety-significant or risk-significant activity should be that it has been shown that it is safe to proceed as planned, rather than that it is acceptable to proceed unless it can be proven that it is unsafe to do so. The recent Confirmatory Action Letter (CAL) and the associated cessation of production activities created an opportunity for changing the culture in regard to decision making. Employees are optimistic that there will be a genuine change in focus, but the majority has adopted a "wait-and-see" attitude. The recent roll-out of "Conduct of Operations" training may have helped to redefine decision making priorities, but it is too early to determine buy-in and effectiveness in the face of actual challenges faced during production activities.

The SCUBA Team recommends the following:

- Establish and enforce the expectation that clear and convincing evidence that a proposed action is safe and compliant will be required before proceeding.
- Communicate the bases for all decisions made in the plant via a weekly summary. Extraordinary communication efforts will be required to seize and maintain the narrow window of opportunity to significantly change the NFS culture.
- Improve oversight/challenge of decision making at the white-collar (individual) level, where those decisions are part of a larger decision chain. Flawed decision making during input and analysis steps can skew the basis for the decision.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the overall rating of the Decision Making Component for the NFS-Erwin Site Composite Organization, as perceived by the survey participants, was characterized as an Area of Adequacy based on industry norms. This rating places the NFS-Erwin Site Composite Organization in the third quartile of the commercial nuclear power plant Sites in SYNERGY's industry database. This rating has improved notably by 4.8% since August 2007.

Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area, as reflected by the overall rating characterization, are significantly more positive than is justified by actual performance.

Numerical ratings of several individual cultural attributes indicate that the workforce perceives the need for improvement in the following areas:

- Management obtains input and review from experts in appropriate disciplines for important issues or activities that could affect nuclear safety or safe facility operations. (bottom of third quartile)

- Management is sufficiently and appropriately involved in important issues or activities that could affect nuclear safety or safe facility operations. (fourth quartile)
- Management obtains first hand information from the personnel who are most intimately involved in important issues or activities that could affect nuclear safety or safe facility operations. (fourth quartile)
- Management effectively communicates to the workforce the reasons for significant decisions related to nuclear safety and safe facility operations. (fourth quartile)
- For important issues or activities that could affect nuclear safety or safe facility operations, management obtains first hand information from the personnel who are most intimately involved. (fourth quartile)
- At our site, we properly balance nuclear safety, production, schedule and cost priorities as demonstrated by decisions related to timely and effective resolution of equipment problems. (bottom decile)

There were areas of perceived notable improvement in several attribute ratings. However, the improvements were not sufficient to overcome performance relative to industry norms. There is still a gap in the frame of reference for excellence

There were 16 written comments in this component area; two were positive, the remaining 14 (88%) were negative. It should also be noted that the Safety Policies Component includes write-in comments related to nuclear safety as top priority, which has a direct connection to the Decision Making Component. The 21 comments related to nuclear safety as top priority were predominantly negative in nature (76%).The negative comments indicated that:

- Some believe that decision makers are not sufficiently knowledgeable of conditions in the field to make the best decisions, and do not sufficiently engage the workforce in decision making.
- A few indicated that it is difficult to obtain decisions.
- A few indicated that communication of the bases for decisions to the workforce needs improvement.
- Two examples of perceived non-conservative decisions were provided.

Examples of thought-provoking write-in comments are:

- "Operations personnel are not involved enough during development/initial stages of new or updated processes. Engineers design systems to work and sometimes lose focus on 'how' the system should work. This could prevent nuclear safety issues down the road."
- "The desire to keep a new process running with the presence of a hazard was expressed by Director level individuals. This hazard was specifically addressed by safety personnel as a "stop work" hazard. When asked why work was not being halted, management expressed the hazard was only minor. This particular hazard was deemed major in any form by safety."

Personnel Interviews, Behavioral Observations and Documentation Reviews

The SCUBA Team gained significant insights during personnel interviews, behavioral observations, and documentation reviews. The SCUBA Team asked specific questions to address the recent regulatory shutdown and its perceived causes and consequences. Insights include:

- The recent stand down has created a very high level of understanding of the expectation that employees are not to proceed in the face of uncertainty.
- Employees expressed doubt that the new conservative standards espoused during regulatory shutdown will continue to be supported once production resumes and pressures mount.
- The ODM is not being internalized/utilized to prevent events.
- Individual decisions that rely on the skill and discipline of the workforce still create risk (e.g., electing to operate outside of procedural guidance). Old habits die hard.
- Effectiveness Reviews of safety-related decisions to verify validity of underlying assumptions, identify unintended consequences, and improve future decisions are not typically performed. The quality of Effectiveness Reviews, when performed, is not up to industry norms.
- The decision making process is typically multi-disciplinary, but is not fully participative; operators and craft personnel are not typically involved. This is borne out by feedback from the workforce survey and the interview process.
- Information obtained from employee interviews indicates that employees rarely understand the basis for decisions involving risk-significant or safety-significant situations. It appears this is due to the lack of a communication tool for informing employees about key decisions. As a result, information flows down the chain of authority with varying degrees of effectiveness.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed all of the original CSCII PIRCS Commitments listed for the Decision Making Safety Culture Component (SCC). Five commitments were identified as "Complete" and "Approved by CARB." Key observations were as follows:

- PIRCS 13644 - Commitment C6210 was written to formally define the authority, roles, and formal process steps for making decisions. The commitment was closed to the issuance of the ODM procedure (NFS-GH-946). The procedure assumes operational challenges will be recognized and entered into the PIRCS system: PIRCS is the trigger for ODM. A problem that bypasses PIRCS will not trigger ODM: recognition should be the trigger. NARROW SCOPE OF RESPONSE
- PIRCS 13644 - Commitment C6211 concerned establishing a process for operational decisions when safe facility operations are under consideration. It is identified as complete, but does not contain a link to the final ODM procedure to which it is closed (NFS-GH-946). It is closed to a draft version. INCOMPLETE DOCUMENTATION
- PIRCS 13644 - Commitment C6212 sets the expectation NFS management will: "adopt a proactive communications strategy to deliver timely and effective communications on the bases/reasons for decisions." The commitment is closed out to the issuance of the Change Management Policy, which does not sufficiently address the scope of the commitment. NARROW SCOPE OF RESPONSE
- PIRCS 13644 - Commitment C6213 concerns management setting expectations about not proceeding in the face of uncertainty. Credit is taken for "monthly management meeting involving issues and opportunities related to meeting these expectations as an accountability step." No specific name or tracking information given to these meetings. VAGUE RESPONSE

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the SCUBA Team Progress Review conducted during July 2009. There were two commitments:

- PIRCS – Commitment C10030 required training employees on ODM. Credit was taken for some training conducted on October 8, 2009, but no record was kept. Due date extended to July 9, 2010 from entry date of September 30, 2009. NOT TIMELY
- PIRCS - Commitment C10232 required management to "Develop metrics for loss of margin in aggregate (e.g., operator workarounds, LOAs, etc.)." Entry date of September 24. 2009, due date of December 1, 2010. Zero % complete to date. NOT TIMELY

NFS Self-Assessment

NFS-Erwin self-assessed its conservatism in decision making as "Red: Ineffective, unsatisfactory, poor understanding of requirements requires action." The SCUBA Team concurs with the assessment. The SCUBA Team believes NFS was self-critical in that it accurately acknowledged the lack of conservatism (and effectiveness) that characterizes some of its decision making processes. However, the SCUBA Team also determined that management is less aware of its lack of effectiveness in the area of communicating significant decisions related to nuclear safety and safe facility operations to the workforce.

NFS had the following additional observations relative to Decision Making:

- There are recent examples of inappropriate weight being given to production schedules. Examples include the CDL fire and the BCS event
- Integrated Safety Analyses (ISA) has the option (not required) of reviewing completed work for acceptance
- In the case where an event is not evaluated by an ISA, the organization relies upon the training and experience of Safety and Operations management for decision making.
- Decision making is not perceived by NFS employees as appropriately conservative.
- There are a variety of review processes to review decisions made relative to project work
- NFS does not routinely drill its Emergency Response Organization to ensure it will operate well in an actual accident or event
- NFS does not ensure that there is continuity of personnel in technical reviews on SSRC and CCB and that the quality of those reviews is held to a common and high standard

The SCUBA Team concurs with these observations.

III.B RESOURCES SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

The licensee ensures that personnel, equipment, procedures and other resources are available and adequate to assure nuclear safety.

SCUBA Team Conclusions

Based on the integration of all sources of assessment input, the SCUBA Team has concluded that the Resources Safety Culture Component is deficient when compared to commercial nuclear power plant industry norms and, as a result, represents an Area for Improvement (AFI). It has also concluded that this Safety Culture Component (SCC) does not meet regulatory expectations. In this regard, the SCUBA Team has concluded that:

- The embedded tolerance of degraded conditions has improved, but the slow rate of progress, e.g., gaps identified by Human Performance (HuP) Implementation Teams and the Top Ten Infrastructure List, continue to raise significant concerns regarding the current safety culture.
- Weaknesses or fragilities exist in the effectiveness of key supporting functions, programs and processes, the most notable of which are (1) the shortage of Process and Project Engineering expertise, particularly in the BLEU Processing Facility (BPF) area, (2) inadequate support personnel for the Corrective Action, Industrial Safety, and Integrated Safety Analysis functions, and (3) inadequate implementation support for the HuP and Work Management Programs.
- The Training Department has difficulties in supporting training other than technical training in support of production. The HuP Program was deprived of resources during implementation of the Commercial Development Line (CDL) Project that adversely impacted the progress of HuP training. Training initiatives in support of the Comprehensive Safety Culture Implementation Initiatives (CSCII) have been scheduled in the distant future due to a lack of resources.
- The organization does not have a comprehensive, integrated approach to planning, prioritizing, scheduling, and resourcing project work. As a result, there are (1) near-continuous production pressures to prematurely implement new projects and processes that are consistently over budget and behind schedule; and (2) as-installed shop floor processes and equipment that do not function as originally intended, and that must be de-bugged during production. The production pressures cited above, have led to a lack of a questioning attitude and non-conservative decision making on the part of employees; resulting in loss events that resulted in a lengthy regulatory-related shutdown.

SCUBA Team Findings and Recommendations

2009/2010 AFI-RES-01: This is essentially a repeat Finding from the 2007/2008 Independent Safety Culture Assessment (ISCA). Although NFS-Erwin has made progress, it continues to tolerate recurring equipment problems, operational burdens and workarounds, and degraded infrastructure issues. For the most part, these do not represent immediate challenges to nuclear safety per se, but there continue to be challenges to industrial/personnel safety. Organizational tolerance of such degraded conditions, and the corresponding message that is sent with respect to management values and standards represents (1) a deficiency with respect to industry standards

and norms, (2) a challenge to be overcome in leadership's quest for excellence and, unless abated, (3) the potential for adverse carryover effects on the organization's nuclear safety culture.

The SCUBA Team recommends the following near-term actions:

- Demonstrate higher management standards by aggressively focusing organizational attention, e.g., a "top ten list" that includes the following areas:
  - Operational burdens and workarounds with nuclear safety implications
  - Operational burdens and workarounds with industrial/personnel safety implications
  - Recurring equipment problems, including those identified through a Work Management Deficiency Tag Program
  - Gaps identified by HuP Implementation Teams
  - Latent Weaknesses/Flawed Defenses identified during HuP event evaluations

2009/2010 AFI-RES-02: This is essentially a repeat Finding from the 2007/2008 ISCA. The current physical condition of the facility is considered to be deficient when compared to industry standards and norms. In this regard, it recommended that NFS continues to provide funding and allocate resources to support implementation of the NFS-Erwin Infrastructure Improvement Plan in a timely and aggressive manner, with priority applied to those areas representing the highest operational safety and regulatory compliance risks.

2009/2010 AFI-RES-03: This is essentially a repeat Finding from the 2007/2008 ISCA. While it appears that NFS has sufficient engineering resources to support safe operations of its nuclear facilities, these resources are frequently diverted to support new business opportunities and the associated major project activities. This has contributed to significant engineering work backlogs, tolerance of degraded equipment conditions, delays in resolving recurring equipment problems, delays in addressing facility infrastructure improvement needs, and loss events related to industrial and chemical safety. It also represents a challenge to the timely and effective evaluation and resolution of problems identified through the Corrective Action (PIRCS) and HuP Programs.

The SCUBA Team recommends the following:

- Inventory and prioritize the entire Engineering work backlog, including the CSCII.
- Ensure the adequacy and sufficiency of both internal and external engineering support resources to support Operations, Process Engineering, and Project Engineering related activities. Particular attention should be paid to the BPF area, where the introduction of new projects/processes has become a way of life.

2009/2010 AFI-RES-04: This is essentially a repeat Finding from the 2007/2008 ISCA. NFS-Erwin must successfully address a number of staffing issues in order to ensure the effectiveness of key programs and processes. Appropriately qualified and trained staff is needed in the areas identified below. In some cases, this additional staffing is needed to ensure that regulatory commitments and/or regulatory expectations are met.

The SCUBA Team recommends the following:

- Corrective Action Program staffing needs to be augmented. There is inadequate staffing at the present time to ensure that causal analyses, corrective actions, effectiveness reviews, and tracking and trending activities are conducted in a timely and effective manner.
- Industrial/Personnel Safety staffing needs to be increased to assure (1) that all applicable regulations are identified and effectively implemented and (2) that there is increased field presence to provide first-hand behavioral reinforcement of industrial safety standards and required practices.
- Integrated Safety Analysis (ISA) functions need to be strengthened to assure adequate/robust reviews are performed for proposed facility changes.
- Implementation of other initiatives under the Safety Culture Improvement Plan will likely require the dedication of additional organizational resources, e.g., timely implementation of the HuP and Work Management Programs.
- The Training Organization staff needs to be strengthened in order to provide timely training in support of the CSCII to ensure and maintain technical competence, as well as other continuous improvement initiatives.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the overall rating of the Resources Component for the NFS-Erwin Site Composite Organization was characterized as an "Area of Strength" based on comparisons to industry norms. Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area, as reflected by the overall survey rating characterization, are more positive than is justified by actual performance. In particular:

- The rating of "sufficiency of financial resources to maintain nuclear safety and safe facility operations" as a perceived Area of Strength is inconsistent with the continued lack of sufficient Engineering resources to address operator workarounds, operator burdens, degraded conditions and work backlogs.
- The rating of "we have high quality procedures that help us to meet expectations for procedure use and adherence" as a perceived Area of Strength is inconsistent with direct observations and interviews, which suggest that many procedures are overly complex in terms of both format and content, and frequently require interpretation and/or clarification for the end user. Furthermore, deficient procedures are not consistently corrected in a timely manner.
- The rating of "workload is **NOT** having an adverse impact on our ability to assure the quality of our work and work products" is not consistent with the production pressures identified by NFS-Erwin as causal/contributing factors to the loss events that occurred in the last quarter of 2009.

Numerical ratings of several individual cultural attributes indicate that the workforce perceives the need for improvement in the following areas:

- Maintaining low backlogs of work (e.g., maintenance work requests, corrective actions, and engineering projects).

- Minimizing and effectively controlling delays as well as deferrals of scheduled preventive maintenance.
- Sufficient staffing levels to avoid the need for extensive or continuous overtime work.
- Ensuring that work order packages are of high quality.

The items above were in the lowest 10% of all safety culture attribute ratings in the 2009 survey, and were also perceived as needing improvement in the 2007 survey.

There were 114 write-in comments related to Resources. Eighty-eight were negative, 25 were positive, and one was neutral. The principal concerns expressed in the write-in comments were as follows:

- Limited human resources/insufficient prioritization of programs/initiatives:
  - Some feel that there is too much going on (new projects, programs, and initiatives) to be adequately supported.
  - Some perceive a need for increased staffing in Engineering and other support organizations so that Operations can be supported in a timely manner
  - Some indicated that workload is too high for process engineers
  - Some feel that Engineering is overwhelmed with work from PIRCS. Corrective actions are frequently extended due to workload and competing priorities.
  - Some feel that additional staff is required to address Configuration Management changes and issues identified through the HuP Program
- Insufficient attention to equipment problems, facilities and infrastructure:
  - Some feel that too much equipment has been in a degraded condition for too long – and that replacement and/or upgrades should be performed as opposed to neglect and ineffective "quick fixes"
  - Some identified that infrastructure issues remain unaddressed, including habitability issues
  - Some feel that there is too much clutter, and that housekeeping needs improvement
- Insufficient attention to procedures: Some feel that both operating and administrative procedure quality is poor for various reasons including being vague, confusing, too long, complex, cumbersome, and including excessive requirements.

Most, if not all, of the write-in comments described above were previously expressed as concerns in the 2007 survey.

Personnel Interviews, Behavioral Observations, Documentation Reviews and Case Studies

The SCUBA Team has observed that NFS has historically provided sufficient resources to assure safe operations of its primary production facilities, particularly with respect to nuclear criticality considerations, but that such assurance has generally been at the "meet minimum regulatory requirements" level. Over the past few years, rather than consistently focusing resources on pursuing improvements in its safety culture and its safety-related performance, NFS has continued to be in a position of diverting its relatively scarce resources to address immediate situational challenges to pursuing and responding to new business opportunities. Among other things, this has fostered a culture where there continues to be a lack of consistent support for (1) PIRCS corrective actions, (2) HuP Implementation Team Gaps, (3) resolution of issues identified in HuP Event Evaluations (e.g., flawed defenses), (4) correction of long-standing infrastructure

issues, (5) elimination of degraded conditions throughout the facility, (6) development of improved leadership skills, and (7) continuous improvement activities of any kind. Some examples are as follows:

- The SCUBA Team has continued to observe a significant number of operator burdens/workarounds as a response to degraded equipment conditions - many of which involve the use of administrative controls in lieu of engineering controls. A number of examples can be found in the corrective actions for loss events that occurred in late 2009.
- The SCUBA Team has continued to observe degraded conditions, some of which create industrial/personnel safety risk, and some of which create risk to continued production. Examples include the physical condition of the NFS-Erwin tank farms and switchgear. In all cases, tolerance of these degraded conditions reinforces lower than desired management standards and contributes to a poor value system that has the potential to carry over into the nuclear safety culture.
- The SCUBA Team has continued to observe (1) recurring equipment problems that have not been corrected in a timely manner and (2) equipment problems that have become accepted on the basis of a "run to failure" philosophy. An example of the latter is the frequent calciner high pressure interlock shutdowns in the fuel recycle area (approximately one per week).
- The SCUBA Team has observed that most of NFS-Erwin's major projects are behind schedule and over budget. When these schedule and cost situations are confronted with further production schedule slippages, production pressure from senior management typically drives engineering and safety analysis functions to complete projects as rapidly as possible in order to begin generating revenue, despite the availability of limited resources.. When these pressures overwhelm available resource capabilities, the results are typically (1) lack of a questioning attitude, (2) non-conservative decision making and (3) initiation of some type of loss event.
- There continue to be numerous plant infrastructure needs including roof replacements, HVAC system component replacements, selective process equipment replacements, etc.
- The Training Organization is limited in its ability to support the CSCII in a timely fashion. Initiatives for leadership development and continuing improvement have been limited. Leadership development is primarily an ad hoc process; first line supervision has not been expected or equipped to set expectations and improve organizational performance.

NFS has developed an Infrastructure Improvement Plan to aid in the development of capital budgets. The plan has identified a long list of problems that need to be fixed. A key issue is prioritizing this list so that degraded conditions, including security, nuclear safety, personnel safety, and production capability are addressed in a timely manner commensurate with risk. An additional management challenge is ensuring that engineering and safety analysis resources are sufficient and consistent with the scope and timing of this plan.

Based on the integration of all sources of assessment input, the SCUBA Team has also concluded that several other key NFS-Erwin programs, processes and functions needed to support a strong safety culture are not sufficiently staffed for success or to meet regulatory expectations. Additional staffing is needed to ensure the effective implementation of (1) the NFS Corrective Action Program, (2) the NFS Industrial/Personnel Safety Program, (3) the ISA function, (4) the HuP Program, (5) the Work Management Program, (6) the Training

Organization, and (7) new programs, processes and functions designed to improve both safety culture and safety performance, including the CSCII. An integrated resource, planning and scheduling approach would undoubtedly help in resolving some of the issues cited above. Nonetheless, it is expected that resource additions will have to be made in some, if not all, of the above areas unless/until such time as the number of new processes being introduced to the facility is substantially reduced.

The SCUBA Team has the following observations related to conduct of maintenance:

- Maintenance backlogs are low enough to support safe operations. There is typically a two to three week backlog of work orders, which is normal for a fuel cycle facility of this size. Maintenance of safety related equipment (SRE) is given priority and there is little or no backlog for SRE work orders.
- The maintenance backlog is likely deceptively low because chronic issues tend to be under-reported and a Deficiency Tag Program proposed to rectify the situation has been deferred.
- NFS-Erwin has a reactive approach to preventive maintenance and tends to operate equipment until it fails. This approach can lead to degraded safety margins and does not exemplify high standards or best business practices. While not rising to the level of a finding, the SCUBA Team continues to recommend consideration of a reliability-centered approach to preventive maintenance.

Reviews and observations of procedures and other process-related documentation revealed that a number of employees feel that current procedures are too detailed and clumsy to use in the field, and that it is difficult to make timely changes to procedures. (It is believed that this is largely due to the shortage of process engineering support resources.) In fact, several employees indicated that the deficiencies in the procedure change process contributed to inconsistent procedure use. There was also frustration over procedure changes made without operator consultation, in that the resultant procedures were frequently impossible to implement without operator workarounds or manual compensation. Procedure compliance issues are discussed in further detail in the Work Practices Safety Culture Component section of this Report.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed all "Complete" and "Approved by CARB" PIRCS Commitments listed for the Resources Safety Culture Component. A total of 41 items were reviewed. Twenty-nine were viewed as having been successfully implemented. Ten were implemented, but were ineffective or not lasting. NFS-Erwin elected not to implement two items. Key observations were as follows:

- PIRCS 13647 – Commitment C6214 was established to demonstrate higher management standards by focusing organizational attention and resources on "top ten priority lists." Although a list has been established, progress has been limited. INCOMPLETE – ACTIONS NOT ADEQUATE
- PIRCS 13649 – Commitment C6217 was established to inventory and prioritize the entire engineering work backlog. INCOMPLETE – ACTIONS NOT ADEQUATE
- PIRCS 13649 – Commitment C6218 was established to develop and effectively implement a strategic approach to ensure the adequacy and sufficiency of engineering

support resources, including resolution of HVAC issues. INCOMPLETE – ACTIONS INEFFECTIVE

- PIRCS 13650 – Commitment C6220 was established to resolve Industrial/Personnel Safety staffing needs. INCOMPLETE – ACTIONS NOT LASTING
- PIRCS 13700 – Commitment C6361 was established to eliminate language in NFS-GH-901 that implied safety reviews/checks were optional. NFS-Erwin elected not to implement this commitment. INCOMPLETE – NO ACTION TAKEN
- PIRCS 13702 – Commitment C6370 was established to include operators in ISA analyses. NFS-Erwin elected not to implement this commitment. INCOMPLETE – NO ACTION TAKEN
- PIRCS 13707 – Commitment C6376 was established to augment resources supporting the implementation of the NFS-Erwin Corrective Action Program, including the appointment of Department Process Improvement Coordinators (DPICs). Credit was taken for developing a DPIC charter in mid-year 2009 and the commitment was closed. As of the end of 2009, only one DPIC had been appointed. INCOMPLETE – COMMITMENT CLOSED TO INTENT TO TAKE ACTION
- PIRCS 13707 – Commitment C6377 was established to augment resources supporting the implementation of the NFS-Erwin Industrial/Personnel Safety Program. INCOMPLETE – ACTIONS NOT LASTING
- PIRCS 13707 – Commitment C6378 was established to augment engineering resources to ensure increased availability of process and project engineers. INCOMPLETE – ACTIONS NOT EFFECTIVE
- PIRCS 13707 – Commitment C6380 was established to allocate the resources necessary for the implementation of a supervisor/manager leadership training program. INCOMPLETE – ACTIONS NOT EFFECTIVE
- PIRCS 13707 – Commitment C6383 was established to evaluate augmentation of engineering resources, including but not limited to providing support for HVAC issues. INCOMPLETE – ACTIONS NOT EFFECTIVE
- PIRCS 13707 – Commitment C6388 was established to assign ownership and accountability to a single person for design and coordination of the implementation of an NFS-Erwin Operating Experience Program. INCOMPLETE – ACTIONS NOT EFFECTIVE

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the SCUBA Team Progress Review conducted during July 2009. Seven items were reviewed in total. One was indicated as complete, but the response is believed to be inadequate; and two were incomplete and overdue. Key observations were as follows:

- PIRCS 13700 - Commitment C10026 established a requirement develop a process for evaluating the desirable end-state for the configuration management database by January 1, 2010. Recognizing that inadequate resources existed, the commitment was closed as complete but only by noting that areas such as wastewater treatment, fire protection, bulk chemical storage, and security remained outliers. AFI-RES-04 pertains. COMPLETE – NOT ADEQUATE
- PIRCS 20667 - Commitment C10055 established a requirement for a long-term project plan by April 1, 2010. NOT COMPLETE – OVERDUE

- PIRCS 20667 - Commitment C10235 established a requirement to establish Human Performance resources needed for success by April 1, 2010. Evidently this task has not been completed because the engineers are stretched too thin tending to small projects, Tollgate requirements, and unexpected tasks. NOT COMPLETE- OVERDUE

NFS Self-Assessment

NFS rated the Resources SCC as "sometimes effective, somewhat reactive, requires monitoring" when compared to the attributes identified in NRC Regulatory Issue Summary 2006-13. NFS noted the following deficiencies related to this rating:

- A long-term infrastructure improvement plan is in place, but implementation of the plan lags principally due to the execution of projects, and challenges in the effective integration of project stakeholders (responsibility/accountability for identifying/defining project requirements)
- Systems to effectively manage and prioritize equipment deficiencies have not been established.
- There is presently no effective data base on equipment reliability and frequency of repair, although a software system (Maximo) was under development. Preventive maintenance requirements are, therefore, identified in engineering procedures and are typically based upon manufacturer's recommendations.
- Design basis documentation is weak in formality for some preexisting systems. Technical basis documentation for changes to structures, systems, and components has lacked formality and consistency. Program changes to improve technical rigor and formality have not been fully implemented. Design decision making is not well documented.
- Process Engineering does not have an upper level tracking system to ensure that system challenges are properly tracked and managed.
- Although the capital budgeting process prioritizes processes based on safety impact, and projects status is reviewed by management in regularly scheduled meetings; individual groups do not have a formal process to track assets and push projects with safety impacts.
- Formality around design margin for non-safety systems needs improvement.
- Process Engineering resources have been increased, but continue to be challenged by prioritization issues.
- Individual overtime is not formally tracked. However, supervisors are generally aware of personnel who work substantially more overtime than the norm.
- Employees may not work more than 16 hour by policy; but there is no limit to working 16 hours on multiple days.
- Fatigue is not a formal part of the Fitness-For-Duty (FFD) program. Supervisors are not trained to recognize the symptoms of fatigue.
- NFS has been challenged in recent years to complete those projects necessary to meet regulatory requirements and contractual commitments. A lack of Project Engineering resources has been the primary constraint.
- Process Engineering resources are able to meet immediate needs, but this does not leave adequate time for process improvements including timely response to PIRCS items, personnel development, improving engineering/work package documentation, etc.
- Overtime for engineering resources is not generally paid or tracked.

- The Configuration Management Program software system (LINC) is not currently intended to provide access to design documentation for either the Bulk Chemical System or the Waste Treatment Systems. (See AFI-CM-01.)
- Design basis documentation for areas outside the NRC regulatory arena needs improvement.
- Work packages typically provide the minimum required information and little procedural guidance. They do not comport with nuclear industry norms.

The SCUBA Team believes the NFS-Erwin self-assessment was not sufficiently self-critical in that (1) it did not identify resource issues in the Industrial Safety, ISA, Corrective Action and Work Management implementation functions; and (2) it did not address the relationship between resource availability/work priorities, project schedules and several of the recent regulatory events experienced during 2009 (e.g., the failure to perform required fire damper inspections, and CDL UF6 sublimation fire). The Safety Culture Self-Assessment roadmap was not followed; hence, previously documented SCUBA concerns, component metrics, performance gaps, and the status of current and/or planned corrective actions (PIRCS) were not discussed.

The basis for the overall assessment rating of "Yellow/improving" was not clearly explained. However, the SCUBA Team believes a more appropriate evaluation would be "Red" as resource issues/challenges did not improve significantly during calendar year 2009. This is particularly true for business expansion activities (e.g., Reliable Fuel Supply and Commercial Development Line), which continue to stretch organizational resources. In the SCUBA Team's view, Resources continues to be viewed as an Area for Improvement. The SCUBA Team also believes that the following items are worth reemphasizing:

- The organization has developed a long-standing tolerance for degraded equipment, degraded infrastructure, recurring equipment problems and the associated operator burdens and workarounds.
- Although the most severe resource shortages are in the project and process engineering areas, there are significant resource needs in other key areas.
- The company's efforts to aggressively pursue business expansion opportunities will continue to put immediate pressure on resources, particularly engineering and ISA/Nuclear Criticality Safety resources.
- A strategic plan needs to be developed to manage NFS-Erwin's resource needs.

III.C WORK CONTROL SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

The licensee plans and coordinates work activities consistent with nuclear safety.

Regulatory Issue Summary (RIS) 2006-13 was developed for application at commercial nuclear power plants. Although most of the Safety Culture Components set forth in RIS 2006-13 are directly applicable to fuel cycle facilities, this is not fully the case for the Work Control Safety Culture Component. Commercial power reactors have large amounts of stored energy in the form of fission products and decay heat. They also have relatively complex, integrated safety systems, almost all of which have multiple trains, redundant systems, or other back-up capabilities. Maintenance of these systems requires careful planning, resource coordination and risk assessment lest such activities lead to an unintended impact on plant operations and protection of the reactor core. Fuel cycle facilities have neither the stored energy, complexity nor integrated systems typical of a nuclear power plant. Instead, fuel cycle facility safety systems are based on Integrated Safety Analyses (ISA) that identify items relied on for safety (IROFS) that are not typically redundant. Maintenance activities at fuel cycle facilities are focused on assuring the reliability and availability of these IROFS. Thus, risk assessment and maintenance activities do not involve Probabilistic Risk Assessment or other tools in the same manner as at commercial nuclear power plants. As was the case during the 2007/2008 Integrated Safety Culture Assessment (ISCA), the SCUBA Team has evaluated the Work Control Safety Culture Component with these differences in mind.

SCUBA Team Conclusions

Work Control is an attribute of the NFS-Erwin safety culture that is considered to be deficient when compared to fuel cycle facility norms and is considered to be an Area for Improvement (AFI). It does not meet regulatory expectations in that existing processes for scheduling and executing work continue to be largely reactive, and a significant backlog of undocumented maintenance issues continue to exist. This backlog, in turn, contributes to (1) increased operator burdens/work-arounds and (2) the use of compensatory measures that rely on manual actions and administrative controls, e.g., Letters of Authorization (LOA) and Site Operating Procedures (SOP). In this regard, the SCUBA Team has concluded that:

- NFS has not implemented a comprehensive work management process/system to identify, prioritize, plan, schedule, manage risks and execute work. The SCUBA Team continues to believe, however, that a rigorous work management system would (1) significantly improve equipment/process equipment reliability, safety margins and operating efficiency and (2) support resolution of the backlog of degraded equipment issues that continues to characterize the NFS-Erwin site.
- NFS-Erwin has not established a Work Control Department, assigned work week managers, or adequately implemented practices that limit the "urgent" categorization of work requests that side-step the planning process needed to improve work in the field. Very recently, a new Work Management Proposal Team has been put in place to:
    - Propose a Work Management structure as a stand-alone entity that will include Work Management, Work Planning/Release and Work Control
    - Identify roles and responsibilities, and lines of accountability

- Provide job descriptions
- Propose a process for work flow
- Propose an implementation plan

The proposed Work Management Program will be loosely based on Institute of Nuclear Power Operations (INPO) practices, but will not include a Deficiency Tag Program. A trial Work Management Program will be put in place in the BLEU Processing Facility (BPF) via LOA-MISC-10-020 with plant-wide roll-out scheduled for September 2010, with full roll-out of the accompanying Work Management software scheduled for October 2010 -- approximately one year behind the original published schedule for these initiatives. It is unclear how or whether the implementation efforts developed during the past eighteen months will be incorporated into this new initiative.

- Efforts to improve the quality of Work Requests (WR) have not received sufficient organizational attention. Currently, as-submitted WRs are frequently incomplete and of poor quality, and do not provide the degree of specificity needed to assure error-free implementation. Work instructions are written as broad guidelines that fail to provide adequate guidance, do not consider the potential for decisions required during troubleshooting, and allow for deviation without violating the written order. Required tools are infrequently included, spare parts are not listed, and items such as torque specifications are among the many attributes that are not typically included in current NFS-Erwin WRs. Senior management sponsorship of this effort has been inconsistent – as evidenced by the fact that there has been resistance to documenting poor quality WRs in PIRCS.
- The Preventive Maintenance Program continues to be more reactive than proactive. There is little or no equipment performance monitoring or equipment lifecycle management and reliability-centered maintenance is not a focal point for the organization.
- Industrial Safety oversight of contractor activities needs to receive continued management attention for the specific purpose of providing on-going reinforcement of safety requirements. (It should be noted that contractor oversight activities have improved since the last ISCA, as reflected by a reduction in the number and seriousness of contractor events documented in the PIRCS system.)
- The PSL Phase IV Case Study identified inadequate documentation and procedural control for contractors in the field. It is common industry practice to provide specific procedures, test methods, and documentation – especially for code, critical and/or hazardous services. NFS does not require these practices, and has been committed to a non-rigorous process for some time.

SCUBA Team Findings and Recommendations

2009/2010 AFI-WC-01: The existing process for developing work requests does not have the rigor needed to ensure procedure compliance or configuration control in the field. Sponsoring engineers are too frequently tasked with developing every aspect of the work plan, short of the written request. Weekly planning meetings are conducted as drop-in sessions, and lack a sense of continuity or an appreciation for resource limitations. Incomplete plans are ratified without a formal plan for closing gaps or a timetable to report back in order to ensure work completion. Special Work Permits (SWP) appear to be the only exception to this practice. The SCUBA Team recommends adopting the SWP approach as the framework for work week planning.

2009/2010 AFI-WC-02: The warehouse lacks a stock numbering system that connects ~~to~~ pre-SAP and post-SAP nomenclature. Consequently, it is challenging to correlate new part numbers with as-built components. Additionally, there is wide latitude for hardware replacement when lost or damaged components, e.g., fasteners, are discovered during field work. The SCUBA Team recommends formally linking old part numbers to new SAP designations.

2009/2010 AFI-WC-03: NFS-Erwin should implement a comprehensive Work Management Program to provide an integrated, organization-wide process for identifying and prioritizing projects, planning the required work and associated resources, and executing work in a safe and error-free manner. Objectives of this initiative should include:

- Improving equipment safety margin and reliability.
- Increasing the rigor, formality and management oversight of the work order process.
- Increasing organizational focus on reliability-centered maintenance, including documentation of equipment and process-related issues for continuous improvement in performance and reliability.
- Eliminating the backlog of degraded equipment facilities, equipment and processes, and the associated operator work-arounds.

Continued interaction with INPO and manufacturing facilities having world-class Maintenance and/or Work Management programs is recommended as well.

2009/2010 AFI-WC-04: NFS-Erwin has elected not to implement a Deficiency Tag program. The SCUBA Team believes that NFS management should reconsider this decision as it (1) would provide a vehicle for identification of equipment issues that are not presently visible to the organization, (2) would provide a process for shop floor input to management regarding equipment problems, and (3) will assist in addressing the Site's second lowest rated attribute identified in the 2009 NFS Safety Culture survey: "At our Site, we effectively minimize and control putting off scheduled preventative maintenance."

2009/2010 AFI-WC-05: NFS-Erwin should take several actions to improve the robustness of its ISA process:

- The activities of the ISA staff should be reviewed and analyzed. The results of this analysis should be compared to NFS implementing procedures to ensure appropriate guidance is provided for all ISA staff activities and that all required skill sets are identified and available.
- NFS should benchmark ISA staff qualifications and training with other fuel facilities, the Department of Energy, and the NRC, and implement improvements/upgrades as appropriate. These activities should also establish specific ISA training/qualification requirements and processes for its staff.

2009/2010 AFI-WC-06: NFS-Erwin should develop and implement a reliability-centered approach to preventive maintenance, rather than continuing to pursue an approach that runs equipment to failure. A reliability-centered approach would also address the Site's second lowest rated attribute identified in the 2009 NFS Safety Culture survey: "At our Site, we effectively minimize and control putting off scheduled preventative maintenance."

2009/2010 ANA-WC-01: Industrial Safety oversight of maintenance, project, and contractor activities should receive continued attention. Industrial Safety presence in these areas remains at low levels due to staffing issues; and, as a result, there has been inconsistent reinforcement of safety requirements.

2009/2010 ANA-WC-02: An initiative to address documentation and procedural control for contractor work should be formalized, resourced, and progress tracked to completion. The Maintenance organization should subscribe to a similar set of protocols and requirements.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the overall rating of the Work Control Component for the NFS-Erwin Site Composite Organization was characterized as an Opportunity for Improvement based on comparisons to industry norms. This rating places the NFS-Erwin Site Composite Organization in the bottom of the third quartile of the commercial nuclear power plant Sites in SYNERGY's industry database. Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area, as reflected by the overall rating characterizations, are more positive than justified by actual performance.

Based on benchmarking against industry norms, several individual cultural attribute received low ratings:

- OFI – Effectiveness in coordinating nuclear safety related work activities when multiple groups are involved
- AFI – Anticipating potential problems associated with planned work activities and taking appropriate precautions to minimize adverse impacts
- AFI – Appropriately utilizing insights from risk analyses in planning and decision making

Based on the lowest mean value ratings provided by the NFS Site Composite Organization itself, the following Work Control attribute characterizations are noteworthy:

Attributes falling in the lowest 20% of all 2009 NFS Safety Culture Survey attribute numerical ratings included the following:

- At our Site, we minimize and control the use of temporary modifications and other compensatory measures that rely on manual actions
- At our Site, we anticipate potential problems associated with planned work activities and take appropriate precautions to minimize adverse impacts
- At our Site, we appropriately utilize insights from risk analyses in our planning and decision making

Attributes falling in the lowest 10% of all 2009 NFS Safety Culture Survey attribute numerical ratings included the following:

- Within my Functional Organization, we have an effective work prioritization and management process

There were a total number of 71 write-in comments related to Work Control. Forty-two of these were negative in nature, while 29 were positive. The negative comments were focused in the following areas:

- There is an excessive reliance on administrative controls
- There are insufficient details in Work Requests
- There is a need for improved job planning, coordination, and communication – particularly regarding project activities
- There are opportunities for improved contamination control
- There are a number of documentation issues
  - Complexity of Station Limit Cards
  - Too many temporary instructions, e.g., LOAs and SOPs
  - Perceived lack of quality of control documents and procedures
  - Job hazard analyses are not incorporated into procedures
  - There is no conduct of operations document
  - There is insufficient communication between procedure generators and procedure users

Personnel Interviews, Behavioral Observations, and Documentation Reviews

Although NFS-Erwin has spent considerable time and effort developing work management software (i.e., Maximo) and procedures, it does not have a formal, comprehensive work management system to identify, prioritize, plan, schedule, coordinate and execute work. The conversion to SAP has impeded progress, although the implementation efforts to date have resulted in some limited, incremental improvement in the ability to perform work in a safe, compliant, and efficient manner.

- NFS-Erwin has used INPO's Work Management Process Description (with AP-928 as its primary technical basis) to begin to formulate a process where:
  - Most work-planning activities have been shifted from Maintenance Supervisors to a team of dedicated planners
  - Long-term work scheduling activities have been shifted from Maintenance Supervisors to a dedicated Work Coordinator
  - Most pre-work activities (staging of parts and materials, making sure lock-outs are implemented, etc.) have been shifted from Maintenance Supervisors to a dedicated Work Coordinator
- A Work Management procedure has been drafted and informally applied (formal application has been awaiting a rewrite of SOP-392 to separate Work Management and Configuration Management activities). Improvements include:
  - Development of more consistent and comprehensive work packages across the Site
  - An additional level of review for requested work prior to its execution
  - More consistent work area preparation activities
  - More efficient use of Maintenance Services labor resources
  - Increased Maintenance Supervisor oversight of Maintenance Services shop floor activities

The Work Management function has recently been moved out of the Maintenance Services group and given a charter to implement work management on a site-wide basis as rapidly as

possible. The SCUBA Team has been informed that it will be loosely based on INPO Work Management principles, but that there will be no Deficiency Tag program in the foreseeable future. It is unclear to the SCUBA Team as to how or whether the pre-existing work management implementation efforts will be utilized as the new project team as it proceeds with the planning and implementation of a formal Work Management System.

Pending Work Management Program implementation, NFS-Erwin continues to formally control maintenance and project work and manage risk through SOP 392, Work Request Procedure, and the associated permitting procedures and processes. These include Safety Work Permits, Confined Space Entry, Lock-out/Tag-out, Hot Work, Underground Work Release, Security Escort, MAA Penetration, Utility Interruption, Firewall Penetration, Fire System Impairment and Radiation Protection. Risk assessment efforts are focused on assuring that the work being performed can be executed safely; and that the safety of structures, systems and components (SSC) and the associated license requirements are not compromised once the work has been completed.

NFS-Erwin has a procedure system to govern the operation and maintenance of structures, systems and components (SSC). Included in this system is an Integrated Safety Analysis (ISA) procedure that provides guidance on performing safety analyses on NFS processes, as well as providing comprehensive guidance regarding Fire Protection, Industrial Safety, Chemical Safety, Nuclear Criticality Safety, Environmental Protection, Radiation Safety, ALARA, and Safety Related Equipment (SRE). Recent loss events suggest that the ISA process does not consistently identify hazards that have the potential to affect safety analyses, IROFS and SRE. Based on a review of the ISA process, the SCUBA Team believes the ISA program and organization would benefit from upgrades regarding procedures, staffing, and training.

The Work Request system continues to have a two to three week backlog of maintenance work orders, most of which are reactive and corrective action focused. This backlog does not include equipment issues where a Work Request has not yet been generated. Examples include work requests that are in queue for engineering support, and equipment that is in a degraded condition, but for which no corrective action request has been documented (that is, no Work Request, engineering work request, or PIRCS corrective action system entry has been generated). It is not clear how many systems, or how much equipment requires corrective action that has not been documented; but there are multiple examples where degraded conditions have become a way of life, and Operations personnel have learned to live with and accommodate these degraded conditions.

Reviews of existing Work Requests revealed that these documents are not always completed properly, and frequently do not provide the degree of specificity needed to assure error-free implementation. The Work Management function, which was part of the Maintenance group until April 2010, was reviewing all Work Requests to assure the above issues were resolved on a case-by-case basis.

NFS has a limited Preventive Maintenance Program. Maintenance requirements for individual systems are established by the system owner (typically a Process Engineer) and turned over to Maintenance to execute the requirements. Although IROFS and SRE are identified along with any functional testing requirements, there is no systematic effort to identify other critical plant

components, manage critical spare parts, or perform contingency planning. Preventive maintenance activities appear to be completed on schedule; but there is still little or no effort expended in the areas of equipment performance monitoring, equipment reliability improvement, or equipment life-cycle management. As a result, the overall system and equipment maintenance effort remains much more reactive than proactive. The Preventative Maintenance Program for SRE and IROFS is also reactive in that functional testing failure determines when SRE and IROFS receive maintenance attention.

The organization does not consistently consider work-related risk analyses in the context of Human Performance (HuP) concepts such as Latent Organizational Weaknesses, Flawed Defenses, Error Precursors, or the Initiating Actions that can lead to an event; and HuP tools are not consistently used to provide and/or manage risk insights. As discussed in the previous ISCA, pre-job briefs are a component of SOP 392 and are used by maintenance personnel. A guidance document for performing pre-job briefs has been developed by the Maintenance Department, but it has not been formalized. As a result, the structure, content and quality of pre-job briefs continues to vary substantially. Contingency planning and abort criteria tend to be developed on an ad hoc basis depending on the magnitude and extent of any unanticipated problems that occur.

Oversight of maintenance, work orders, and shop floor project work is typically provided by Maintenance Supervisors, work group, and work area supervision as time pressures permit. Back-shift and weekend coverage is frequently provided by Plant Superintendents. Radiation Protection oversight is also provided for these activities and appears to be appropriate in scope. Industrial Safety oversight of these activities is typically limited in scope. It has been noted that the least experienced workers and supervisors are assigned to weekends and back shifts.

Oversight of contractor work activities is provided by project engineers, construction superintendents and work area supervisors, as appropriate. This oversight is more comprehensive in the highly enriched uranium processing areas than in the balance of the plant. The Construction Management function has plans to formalize and upgrade contractor oversight activities significantly since the last ISCA.

The impact of work on the shop floor and on other work groups is communicated through a variety of regularly scheduled meetings, including shift turnover meetings. However, maintenance shift turnover meetings are not formalized and the content is left to the discretion of the individuals. Special meetings are called on an as-needed basis. The system used to coordinate work has not been formalized; however, roles and responsibilities of maintenance personnel, project engineers, process engineers, construction coordinators, etc. are described in project management procedures. These communications (e.g., shift-turnovers) are not as well-structured or as well documented as those that typically occur in the nuclear or chemical industries.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed all of the original CSCII PIRCS Commitments listed for the Work Control Safety Culture Component that were identified as "Complete" and "Approved by CARB." Key observations were as follows:

- Three of four commitments were identified as "Complete" and "Approved by CARB." All three had been completed satisfactorily as indicated.
- The commitment to implement a Work Management system has not been met, and is approximately six months behind its original due date. INCOMPLETE

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Commitments related to the SCUBA Team progress review conducted during July 2009. Key observations were as follows:

- PIRCS 13662 - Commitment C10019 established a requirement for better oversight by the Industrial Safety organization by April 1, 2010. This task was addressed by assigning a rotational watch bill for the Industrial Safety staff to establish a presence in the field to walk down jobs. The commitment was met on April 6, 2010. COMPLETE
- PIRCS 13663 - Commitment C10020 established a requirement to resource Maximo implementation to avoid further schedule slippages (beyond December 31, 2009). Management determined that no further staffing was necessary. Maximo had not been implemented as of the end of April 2010. COMPLETE – ACTION INEFFECTIVE
- PIRCS 13663 - Commitment C10021 established a requirement establish a formal preventive maintenance deferral process by May 30, 2010. An approach, which informally applied a planned Work Management procedure, has been delayed pending implementation of a Work Management Program. The Work Management function has subsequently been moved out of the Maintenance organization and has been given a new charter to implement a site-wide Work Management process. The project is documented as being 90% complete. NOT COMPLETE
- PIRCS 13663 - Commitment C10229 established a requirement for a deficiency tag program by June 1, 2010. A draft procedure has been developed. Commitment is identified as 99% complete, but this is not believed to be accurate given the status of the effort to date; and given the fact that the impact of the new Work Management Project Team is unknown. NOT COMPLETE

NFS Self-Assessment

NFS management's overall conclusion in its self-assessment of Work Control was that the processes were "Yellow: sometimes effective, somewhat reactive, requires monitoring." Specific observations were as follows:

- There are no metrics for the quality of work packages or effectiveness of risk assessments
- NFS-Erwin has noted that in a recent Licensee Performance Review, the NRC identified that additional management attention is needed to ensure that procedures used at the facility are written in a manner to reduce the potential for human error
- NFS-Erwin has no formal procedure for shift turnover
- Effort is underway to provide more direct contact from management and observation of worker performance as guided by the Work Management process

The SCUBA Team believes that NFS self-assessment was more optimistic than objective, in that it focused on planned actions as opposed to actual completed commitments and accomplishments; an example being the most recently released schedule for implementation of Work Management. Other observations made by the SCUBA Team are that (1) despite being an organizational objective and PIRCS commitment since the 2007/2008 ISCA, there is still no

comprehensive/integrated Work Management process to identify, prioritize, plan, schedule, manage risks and execute work; (2) there is a backlog of equipment issues that is not in the Work Order system whose scope is not fully understood; (3) maintenance activities continue to be more reactive than proactive; (4) Human Performance principles are not consistently utilized in performing work-related risk analyses; and (5) Work Control processes would benefit from increased management sponsorship and oversight.

The NFS Safety Culture Self-Assessment guidance was not followed in the conduct of this self-assessment; hence, previously documented SCUBA concerns, component metrics, performance gaps, and the status of current and/or planned corrective actions were not discussed.

III.D WORK PRACTICES SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

Work practices support human performance.

SCUBA Team Conclusions

Based on the integration of all sources of assessment input, the SCUBA Team has concluded that the Work Practices Safety Culture Component (SCC) at NFS-Erwin is deficient when compared to commercial nuclear power plant industry norms and represents an Area for Improvement (AFI). Human performance (HuP), particularly in the area of procedural compliance, does not meet regulatory expectations. In this regard, the SCUBA Team has concluded that:

- Management oversight and control of work in the field is lacking and deficient. The organization has a history of proceeding in the face of uncertainty.
- Organizational standards are principally focused on completion of tasks in support of production as opposed to the details required to assure safe facilities operation, e.g., elimination of flawed defenses. When long-standing deficient conditions are not corrected, error traps are perpetuated.
- The Site generally accepts continuation of inappropriate work practices, e.g., the excessive dependence on administrative controls as opposed to engineered controls.
- The workforce has embraced the Human Performance Program. Toolbox training within the hourly workforce has been emphasized; however a formal program for utilization of HuP tools has not been initiated.
- The work practices associated with the human performance across the Engineering organizations (Project and Process) are lacking.
- Management involvement and support for HuP is sporadic and lacking.
- The HuP Coaching and Positive Reinforcement Observation Program for supervision has not been embraced by supervision and management. There is frequently a strong supervisory presence in place in the field, but its primary focus is to respond to production and quality issues. Little supervisory time is spent on establishing, coaching and reinforcing safety performance standards, including procedural compliance.
- Management presence in the field is deficient. Management is not frequently seen in the field, except in response to problems. As a result, there is generally little management reinforcement of safety performance standards in the field, including procedural compliance. An initiative to strengthen management's presence on the shop floor was implemented during the January 2010 regulatory shutdown. Results from this initiative are limited to date; however, the SCUBA Team's observations and interviews indicate minimal interface with the workforce. Management attendance at shop floor meetings which are already attended by the Senior Engineering Watch (SEW), etc. has been the primary activity observed.
- Procedural compliance initiatives are not a priority despite a long history of procedural non-compliance issues.
- Industrial/Personnel Safety standards and expectations do not receive appropriate emphasis and priority.

- Operating experience and information from the Corrective Action Program (CAP) are either not utilized or not effectively utilized in the development of procedures and work practices.

SCUBA Team Findings and Recommendations

2009/2010 AOA-WP-01: NFS-Erwin recognized the value and benefits of a Human Performance (HuP) Program as an initiative for improving safety culture. The Director of Training and the Human Performance Manager have been actively engaged with the formation of implementation teams and the development and delivery of implementation training. The HuP Program Event Clock was kicked off in July 2008 with union and senior management participation. The workforce has embraced the program as determined by field observations, personnel interviews and employee survey write-in comments. A team implementation checklist/roadmap was developed and has progressed. The SCUBA team recommended that the security organization be pulled forward in the implementation schedule due to the potential HuP vulnerabilities. This recommendation was accepted, and implementation originally scheduled for 2010 (one of the last organizations) was pulled forward into the 2009 schedule. The establishment of HuP teams and the delivery of the initial implementation training have elevated awareness of HuP issues and led to acceptance and support by the workforce. These initial steps are considered to have successfully established a foundation for safety culture improvement regarding Work Practices.

2009/2010 AFI-WP-01: A focused initiative to inform/educate supervision and management of the expectations for effective oversight of work, and for reinforcing the policy of not proceeding in the face of uncertainty is needed. This effort should include an ongoing reinforcement plan with direct management involvement to change culture and to hold individuals accountable. This cannot be accomplished solely with an All Employee Meeting, procedure changes, a Conduct of Operations document, or declarations. This must be approached and managed as a culture change over the long term. The SCUBA Team acknowledges that this was an emphasis area with the efforts conducted in association with Confirmatory Action Letter (CAL), and was successful in elevating workforce sensitivity to questioning attitude and not proceeding in the face of uncertainty. However, this effort must be sustained after the resumption of production to engrain the appropriate behaviors when the inherent pressures of production activities return. It is recommended that a formal plan including on-going reinforcement with management participation for dealing with these deficiencies be developed and implemented. An initiative of this nature is an integral component of a Strategic Planning Process. Refer also to Finding 2009/2010 AFI-CLE-01.

2009 /2010 AFI-WP-02: This is essentially a repeat Finding from the 2007/2008 Integrated Safety Culture Assessment (ISCA). It is recommended that a more direct approach be pursued to improve procedure compliance deficiencies. A work-around was essentially devised with the decision to allow HuP to eventually address procedural compliance issues. In regard to procedures, the SCUBA Team has identified the following deficient characteristics:

- Complicated/too detailed
- Reinforcement of expectations for compliance lacking
- Incomplete coverage of situations
- Direction from supervision periodically required
- Procedural changes are difficult consuming time contributing to work-arounds

- Deficiencies in coverage contribute to procedure non-use
- Lack of operator input contributes to deficiencies

The improvement effort should consider procedure simplification, adequacy of coverage, and expectations for utilization. Procedures should not include superfluous information, but should be concise and instruct individuals in the appropriate steps and precautions. This requires a clear understanding of expectations, work practices, and boundaries. It is rare to find procedures used as reference documents in the field. Once trained, qualified, and experienced, NFS workers typically perform assigned tasks from memory, and rarely have the applicable procedure in hand. In those areas where verbatim control is required, run sheets are the accepted vehicles for recording results. This process does ensure that a step-by-step progression is respected, but does not give the operator the benefit of reading notes or precautions. It is recommended that this effort include placing designated procedures into categories such as "in hand," "reference," or "information." Management expectations should be established for procedural use and such expectations must be reinforced in the field. The effort must be supported with a robust program for maintenance of procedures. Field observations identified the lack of supervisory interaction in correcting procedural difficulties and deficiencies. The expectation for supervision to address and correct procedural issues is a requirement to which all must be accountable.

2009/2010 AFI-WP-03: This is essentially a repeat Finding from the 2007/2008 ISCA. NFS-Erwin is deficient in the area of Industrial Safety. Expectations and performance are substandard with little emphasis toward improvement. It is recommended a performance improvement initiative be developed and executed. The area of Industrial / Personnel Safety should be staffed and supported to develop and implement a new vision with enhanced expectations and support for safety as a top priority. Staffing for the Industrial Safety function is also addressed in Finding 2009/2010 AFI-RES-04.

2009/2010 AFI-WP-04: A discontinuity between the white collar workforce including midlevel management and senior management is growing. Priorities are being translated such that production pressures could potentially manifest into inappropriate behaviors. The white collar workforce is presently subjected to a constant demand for improved schedules to meet production requirements without due consideration of workload. Input and guidance from the white collar workforce should be sought, considered, and work schedules adjusted appropriately. Meetings have been conducted to discuss scheduling versus a Safety Conscious Work Environment (SCWE); however, the white collar workforce is guarded in discussing such imbedded cultural issues. It is recommended that a focused and continuing effort be initiated to alter any feeling of disenfranchisement in the white collar workforce. Once this is complete, mid-level managers and the white collar workforce should be judged based upon the quality of their decisions as well as on their performance.

2009/2010 AFI-WP-05: Support for the Coaching and Positive Reinforcement Program is deficient. This is a primary avenue for the reinforcement of HuP. The program also provides insight into progress and continual improvement opportunities. It is recommended that expectations and accountabilities for implementation of this Program be addressed to ensure the successful evolution of this program.

2009/2010 AFI-WP-06: Implementation of HuP training by the Process and Project Engineering organizations were delayed from initial plans. INPO HuP basic training indicates that latent organizational weaknesses dominate the causes of human performance errors. This principle was not fully integrated into the implementation program. It is recommended that implementation of the HuP program be aggressively pursued in the engineering organizations; and that it be based upon INPO Human Performance Tools for Engineers and Other Knowledge Workers 05-002.

2009/2010 AFI-WP-07: It is recommended that the evaluation of Latent Organizational Weaknesses/Flawed Defenses be performed more rigorously in incident investigations. Evidence indicates that these types of organizational deficiencies are not systematically and/or consistently considered in all event investigations.

2009/2010 AFI-WP-08: The reported initiative to increase oversight and control of contractor activities as well as enhanced safety and quality control (QC) requirements should be prioritized, resourced, and included in the Comprehensive Safety Culture Improvement Initiative (CSCII).

2009/2010 ANA-WP-01: The quality of pre-job briefs observed by the SCUBA Team is inadequate. Pre-job briefs are inconsistent in content and are not conducted with emergent work where changes to the work environment can result in new error traps. An initiative to improve the quality of pre-job briefs should be formalized in conjunction with Finding 2009/2010 ANA-WP-03.

2009/2010 ANA-WP-02: This is essentially a repeat Finding from the 2007/2008 ISCA. It is the SCUBA Team's understanding that the lack of Maintenance supervisory presence during weekends, a significant maintenance window, has recently been addressed; however, it should be noted that NFS-Erwin operated without this coverage for a significant period. In addition, the standard practice is to assign the least experienced individuals for weekend duty. Experienced individuals and supervision should be equitably dispersed across all shifts and during the weekend to assure a balanced level of support. This should include rotation of experienced supervision for weekend work. It is recommended that the coverage and experience level applied to the conduct of weekend work be evaluated and appropriate actions be implemented to address identified deficiencies and/or potential vulnerabilities.

2009/2010 ANA-WP-03: HuP has been primarily focused on delivery of training and education. It is recommended the HuP Program develop and implement a plan to formalize tool utilization across the site, to monitor the results, and reinforce the efforts to improve performance. This can begin by insisting on completion of pre-job briefings every day, every shift, and by ensuring that the pre-job briefings follow a formal checklist to ensure the basics are covered. A requirement to turn in completed forms for review by middle management to assure adherence and quality of the process should be established. Senior management should observe and audit the process. Measures of excellence should also be established and monitored. Supervision and management should be held accountable for implementation and results.

2009/2010 OFI-WP-01: Presently individual responsibility is not universally understood by the workforce. A portion of the workforce has a belief that an honest mistake resolves all culpability. As the HuP Program grows within the organization, NFS should address this situation and emphasis responsibility even in the event of an honest mistake. The objective is not to blame or discipline an individual, but rather instill a healthy safety culture where the workforce functions from a frame of reference where all feel a responsibility to improve -- even from unintended outcomes.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the overall rating of the Work Practices Component for the NFS-Erwin Site Composite Organization, as perceived by the survey participants, was characterized as an Area of Adequacy based on industry norms. This rating places the NFS-Erwin Site Composite Organization in the third quartile of the commercial nuclear power plant Sites in SYNERGY's industry database.

Based on benchmarking against industry norms, the following Work Practices attribute characterizations are noteworthy:

1. Opportunities for Improvement
   - At our Site, we provide appropriate levels of oversight and control of contractor work activities to ensure that nuclear safety is maintained.
2. Areas in Need of Management Attention
   - In my Work Group, we effectively review our work in progress through self-checking and or peer checking.
   - Within my Functional Organization, managers are sufficiently visible and accessible in the field.
   - At our Site, Senior Site Management is sufficiently visible and accessible in the field.
3. Areas for Improvement
   - Supervisors and managers in my Functional Organization ensure that individuals are appropriately trained and qualified for the work they are assigned.
   - We conduct effective pre-job briefings to assure that we are adequately prepared to do our work.
   - At our Site, our contractors demonstrate a strong commitment to industrial/personnel safety.
   - In my Functional Organization supervisors are sufficiently visible and accessible in the field.
   - At our Site, appropriate emphasis is placed on industrial/personnel safety.
   - Supervisors and managers in my Functional Organization take industrial and personnel safety requirements seriously.

The numerical ratings leading to the characterization of the three cultural attributes related to the "adherence with procedural requirements, radiological requirements and personnel/industrial requirements" as perceived Areas of Strength appeared to be relatively high in 2007 in light of

the enforcement history at NFS-Erwin. These ratings continued to be high in 2009. Based upon information from behavioral observations and interviews, the SCUBA Team believes that the ratings are inconsistent with the findings. Such inconsistencies reflect an organizational frame of reference issue with respect to industry standards and expectations.

A significant number of the positive write-in comments related to Work Practices were complimentary about aspects of the Human Performance Program, whereas the majority of the negative comments were related to aspects of the Industrial Safety Program.

The positive comments indicate that:

- Some feel that the Human Performance Program is a very positive step forward and is on the road to becoming a strength. (Good tools, good program.)
- Some cited the responsibility and ability to stop work, if necessary.
- A few noted that people watch out for each other.
- A few noted that the organization is getting better at walk-downs and pre-job briefs.
- Some noted an increased emphasis on Industrial Safety in the past few months. It is being taken more seriously.

The negative comments indicate that:

- Some perceive a need to implement/expand the Human Performance Program faster.
- Some question management's commitment to the Human Performance Program based in part on lack of timely resolution of identified issues.
- A few indicated that speed pressure exists on the job; they feel that they are being pushed to rush work.
- Some noted the need more Industrial Safety staffing in order to increase presence in the field.
- A few view Industrial Safety personnel as nitpickers.
- Some indicated that Industrial Safety is not being taken sufficiently seriously enough at the top (production over safety). Need to shoot for higher goals in Industrial Safety.
- A few indicated that the organization is too reactive, not proactive, on Industrial Safety issues. Only way to get issues addressed is to write a PIRCS report.
- A few indicated that safety culture is being abused as an excuse to slow down work.
- Some noted that supervisors and managers are not spending sufficient time in the field observing work and coaching.

Personnel Interviews, Behavioral Observations and Documentation Reviews

Benchmarking efforts and INPO information were utilized in the development of the HuP Program. A dedicated Human Performance Manager was appointed to oversee the program. An implementation roadmap (schedule) was developed for progression of the program. A Plant Implementation Committee was established to provide overall program direction; while a Steering Team with an advocate was established for each unit or area to be inducted into the program. Guidelines/checklists were developed for the steering teams, including a requirement for periodically reporting to the Plant Implementation Committee. Workforce participation in the Steering Teams has provided the opportunity for identification of latent organizational weaknesses and flawed defenses. Union management has been involved in the development of

the HuP Program, and the HuP Program has been well accepted by the workforce. Although HuP holds promise for future safety culture improvement, there has not been consistent management sponsorship, and the rate of program progress has suffered as a result.

The following Work Practice key principles/characteristics have been violated as demonstrated by the SCUBA Team Case Studies, NFS Root Cause Analyses, and acknowledgements by NFS management.

- *Supervisory and management oversight of work activities, including contractors, is effective and that nuclear safety is supported.* In the PSL Phase 4 case study, safety related equipment (SRE) tests specified by NFS and conducted by contractors were not sufficient to demonstrate system integrity. Supervisory and management oversight in the same study neglected to adequately address potentials hazards that resulted in a system over-pressurization and failed to recognize the significance of the event. Investigation into the cause of the BPF overheating incident raised tempers over delays in production caused while pursuing procedure improvements and root causes.
- *Personnel do not proceed in the face of uncertainty or unexpected circumstances.* The behavior to proceed with the processing of fines in the BLEU Processing Facility (BPF) Centrifuge Bowl Cleaning Incident without proper characterization of the material and the continuation of processing of UF6 cylinders after a previous precursor event exemplify a deficient safety culture characteristic.

The SCUBA Team's PSL Phase 4 Case Study identified the following Work Practice deficiencies:

- The work practices in the Engineering organizations (Project and Process) are lacking formality and discipline. For example: documentation of the basis for the system design and final design decisions were not recorded and process engineers did not consider potential hazards and mediating actions in the evolution of work. The SCUBA Team's root cause evaluation indentified inadequate work practices as the most frequent root cause in the Human Error/ Inappropriate Action Chart. This is apparent in the failure to recognize potential safety issues.
- There is inadequate documentation and procedural control for contractors in the field. It is common industry practice to provide specific procedures, test methods, and documentation, especially for code, critical and/or hazardous services. The facility does not require these practices and has been committed to a non-rigorous process for some time.
- The work practices associated with human performance across the engineering organizations (Project and Process) is lacking. The SCUBA root cause evaluation identified inadequate work practices in the engineering support functions as the most frequent root cause in the Human Error/Inappropriate Action Chart for the study. This is apparent in the failure to recognize the potential issues identified in the case study.

The Human Performance (HuP) Program has been embraced thus far by the workforce. The effort has been primarily focused on the delivery of training, and elimination of individual worker errors. The state of implementation of HuP tools can be summarized as "limited to awareness" and is characterized by the following deficiencies:

- Program roll-out was slow due to a lack of implementation resources.
- The HuP Program has developed and implemented a Coaching and Positive Reinforcement Plan directed at supervision. This was initiated in October 2009, but has not been fully embraced and supported. This is presently the primary mechanism to set expectations and reinforce the desired behaviors. The HuP effort is destined to struggle without feedback and reinforcement from supervision as well as from management. Active management support and participation has been limited, inconsistent, and not viewed as a priority for the organization.
- Management support for HuP Implementation Team efforts to eliminate flawed defenses, latent organizational weaknesses, and error precursors are limited. HuP basic training notes that latent organizational weaknesses dominate the causes of human performance errors, and this area is only now starting to be pursued. Pre-job briefs are not consistent in content and are not conducted with emergent work where changes to the work environment can result in new error traps.
- HuP Program emphasis, training, and implementation in other functions (Engineering, staff meetings, etc.) are lacking.
- HuP Event Evaluation corrective actions lack consistent follow-up.
- Management sponsorship is weak.

Increasing and improving the effectiveness of supervision and management presence in workplace has been an initiative since the 2007/2008 ISCA but has not achieved significant progress. The formal training for field observation enhancements was not scheduled until mid-2010 and this timing has not changed. Observations, survey results and NFS Senior Management have acknowledged the deficiency. Management presence on the shop floor is addressed in Finding 2009/2010 AFI-SP-04. In addition, information developed through behavioral observations indicates that there is a lack of supervisory presence in the field during the conduct of planned maintenance, particularly on the weekends when most significant maintenance work is oftentimes scheduled to be performed by the least experienced maintenance personnel.

Procedure compliance was identified as an AFI in the 2007/2008 ISCA. NFS has chosen not to directly address the SCUBA Team recommendation in this area other than to issue documentation concerning expectations. The lack of progress on efforts to improve procedural compliance was re-emphasized in the progress review conducted by the SCUBA Team during the week of July 20, 2009. The culture and approach to procedural compliance has not significantly changed. The NFS position has been to rely upon the HuP Program to address procedure deficiencies. This approach is slow to deal with specific issues. Information developed through both the behavioral observations and the Case Studies indicate continuing problems with procedural adherence/compliance and failure to comply with established expectations. Recently, improper valve line-ups have been found to be a recent recurring problem. The failure to utilize NFS-TS-009 in one of the Case Studies violated the principle that procedure prerequisites are satisfied before other procedures are executed. Interviews, documentation reviews, and observations of implementation of procedures and other process-related documentation reveal that a number of employees feel the current procedures are too detailed and clumsy to use in the field, and that it is difficult to obtain timely changes to procedures. Procedures often exclude or do not consider certain situations resulting in work interruption and the need to address the issue which results in further details and limitations. Several employees indicated that the deficiencies in the procedure change process contribute to inconsistent procedure use and the behavior to

develop and accept a work-around. There is also frustration over procedure changes being made without operator consultation, in that the resultant procedures were frequently impossible to implement without operator work-arounds or manual compensation. Some survey write-in comments also indicate that there is pressure by supervision and/or management to not fully comply with procedural requirements and/or failure to establish expectations for work practices.

Procedure use in the field is not commonplace throughout NFS-Erwin Maintenance teams, production crews and the Chemistry Laboratory. Since there is no indication as to the expectations for procedure use (e.g., step-by-step, reference use, or general information), the choice is left up to the judgment of the Operator. When a failure to stay within the bounds of a process procedure was discovered, it was unlikely that procedure use in the field was cited as a cause. Instead, the tendency was to treat such poor practices as isolated instances without an analysis of the generic effect of this laxity. Examples include:

- During one observation, the weekly startup needed to be suspended because the Process Engineer's guidance was incomplete and the Operator had not previewed the procedure.
- Valve line-ups have been noted to be an ongoing problem without an emphasis on crosscutting actions to prevent reoccurrence across the organization. One such event resulted in contaminated effluent (above normal but within approved limits) being discharged.
- Laboratory analysis procedures were frequently performed from memory.
- Transportation procedures allowed the shipment of uranium products despite the fact that one of the formulas for calculation of U-232 was non-conservative (and had been for several months beyond the biennial review requirement).
- Fall protection was not always used when working at height.

Hold points are not used effectively in work procedures and quality control personnel are not evident at the job site. It is uncommon to find a QC hold point outside of laboratory procedures. For instance, when replacing contaminated piping in the wastewater treatment area, the maintenance crew skipped the step for determining the radiological cleanliness of the scrap material before discarding it for free release. Either quality control or supervisory control could have prevented this error but was not present. The SCUBA Team observer intervened and corrected the solution. The scope of this particular issue was not adequately realized and documented in PIRCS until the SCUBA Team observer made an issue of the event.

Expectations for work performance varied considerably among groups and between procedures. For example, SOPs were hampered by the excessive use of Letters of Authorization (LOA) to provide temporary instructions, job hazard analyses were not routinely incorporated into procedures, the Process Development Laboratory lacked the discipline offered by a Quality Assurance Program, and the complexity of Station Limit Cards was confusing. In this regard, the development of a Conduct of Operations Manual had been under development for over a year. A conduct of operations document was implemented with actions associated with the CAL and the regulatory shutdown.

The organization continued to emphasize production over safety. It was not uncommon to find workers/supervisors implementing one-off solutions as opposed to formally changing procedures and/or addressing these behaviors to improve safety culture. For example:

- When acid of an incorrect molarity was delivered, Operators wanted to halt production while management decided to use the material. The result was degradation in product quality.
- A Fuels Operator suggested the use of a checklist to improve performance and this suggestion was summarily rejected due to the additional time required.
- A process to address problems is almost never a final consideration; instead, individual or direct action is usually the first and only alternative considered. For example, when a problem arose with an Operations lock, the resolution addressed the individual problem instead of implementing a process to inventory and manage all Operations locks. This more generic solution was not given serious consideration in the specific area much less across the entire organization.

Operational Readiness Reviews (ORR) were ineffective. The SCUBA Team drew this conclusion based upon results as much as upon observation. In particular, the PSL Phase 4 process was instituted after a series of failed walk-through evolutions (these evolutions were not categorized as drills because supervisors did not believe that the facility was far enough along to benefit from the strictures of a drill), the operating procedure was full of pen-and-ink changes that had not been firmly reviewed and incorporated, and an SRE test conducted prior to startup failed to detect several significant leaks in the system. When the system was put into operation, it failed.

Industrial Safety/Personal Safety is deficient and not emphasized. The deficiency has been validated by SCUBA Team observations, interviews and the 2009 Safety Culture Survey. This is a repeat issue from the 2007/2008 ISCA. The subject of Industrial Safety also received a significant number of negative survey write-in comments:

- Some noted the need more Industrial Safety (IS) staffing in order to increase presence in the field
- Some indicated that Industrial Safety is not being taken sufficiently seriously enough at the top (production over safety). Need to shoot for higher goals in Industrial Safety.
- A few indicated that the organization is too reactive, not proactive, on Industrial Safety issues, and the only way to get issues addressed is to write a PIRCS report.

The SCUBA Team observed repeated instances of inadequate use of personal protection equipment (PPE). An operator in one area indicated the timing of certain events precluded the ability to obtain PPE but the individual was comfortable with the associated risk of injury. The presence of supervisors does not seem to have a salutary effect and the equipment worn by various members of the same work team varied. The expectations for PPE are not routinely covered during operations pre-job briefs. The conclusion is that personal safety is not a focus of the individual worker, the industrial safety organization, or management.

The resources available for IS have been an issue, and the IS Manager position remained vacant for an extended period. The injury rate for the site does not compare favorably with the industry and any emphasis to improve the situation has been limited and not a priority. Individual accountably for personal safety is not routinely emphasized.

2009/2010 NFS-Erwin Independent Safety Culture Assessment
SCUBA Team Results Report

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed the original CSCII PIRCS Commitments listed for the Work Practices Safety Culture Component. Key observations were as follows:

- PIRCS 13664 - Commitment 6234: Establish the specified details of the HuP Program. The initiative is reported to be 75% complete and was extended from December 30, 2009 to June 15, 2010. A HuP Program has been established. The program was slow in development and staffing. The formal program has been successfully embraced by the workforce. The focus of the effort to date has been delivery of training. A Coaching and Positive Reinforcement Observation Program directed toward first-line supervision has struggled from the lack of support by area and senior management. Utilization of the tools is primarily at the discretion of the operators, and a formal program for utilization has not been developed. HuP training has been focused on operators with only recent efforts to educate engineering and support groups in HuP techniques. NOT COMPLETE – EXTENDED.
- PIRCS 13665 - Commitment 6235: Clearly communicate expectations and responsibilities to the organization along with the reasons for an immediate step-change in organizational focus on meeting procedural adherence expectations. This commitment was closed with the initiation of HuP with procedural compliance as a point within the program. COMPLETE – INEFFECTIVE.
- PIRCS 13665 - Commitment 6236: Hold individuals, supervisors, and managers accountable for consistently meeting expectations for procedural adherence. This commitment was closed after a memorandum stating senior management expectations. COMPLETE – INEFFECTIVE
- PIRCS 13665 - Commitment 6237: Establish an oversight/observation program with a reinforcement plan specifically focused on procedural adherence. This commitment has been extended from June 30, 2009 until April 15, 2010. INCOMPLETE
- PIRCS 13665 - Commitment 6238: Evaluate results of the initiative and adjust as necessary to reinforce strict procedural adherence. This commitment was extended to December 31, 2010. UNTIMELY
- PIRCS 13665 - Commitment 6239: Commit the appropriate resources to successfully effect a change in procedural adherence. This commitment was extended to December 31, 2011. UNTIMELY
- PIRCS 13665 - Commitment 6240: Ensure that there is organization-wide ownership and accountability for procedural compliance. This commitment was closed after a memorandum stating senior management expectations and the reliance upon the HuP Program. COMPLETE – INEFFECTIVE.
- PIRCS 13665 - Commitment 6241: Management must encourage the workforce to develop a questioning attitude. This commitment was closed after a memorandum stating senior management expectations and the reliance upon reinforcement via routine meetings. COMPLETE – INEFFECTIVE
- PIRCS 13665 - Commitment 6242: Provide support resources for a change in procedural compliance performance that is likely to be required. This commitment was closed with the expectation the new Corrective Action Program will identify needs and new expectation for procedural compliance in engineering and operations. COMPLETE - INEFFECTIVE

- PIRCS 13665 - Commitment 6243: Reinforce classroom lessons on procedural use and reference. Scheduled for completion December 31, 2010. UNTIMELY
- PIRCS 13665 - Commitment: 6244: Union management should be apprised of the change necessary in procedural compliance expectations and performance, and afforded the opportunity to participate in plan development and implementation. COMPLETE
- PIRCS 13665 - Commitment 6245: Contractor management must subscribe to the same standards and expectations as the balance of the site. This commitment was closed with Procedure NFS-GH-83, NFS Contractor Pre-Qualification and Safety Requirements, completed and effective on February 15, 2010. COMPLETE
- PIRCS 13666 - Commitment 6246: A totally revised lock-out/tag-out procedure and training have been completed. The QA group has undertaken audits of the procedure and items have been tracked in PIRCS. Other than the ongoing QA audits, an effectiveness review of the overall effort has not been completed. Occasional problems with lock-out/tag-out practices continue to be observed by the SCUBA Team members in the field without reversion to PIRCS reporting. COMPLETE

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the SCUBA Team progress review conducted during July 2009.

- PIRCS 13665 - Commitment C10052: Established a requirement to accelerate the incorporation of the Security organization in the Human Performance initiative by January 1, 2010. The establishment of a weekly steering group met this requirement. COMPLETE – ON TIME
- PIRCS 13665 - Commitment C10053: Established a requirement for metrics for procedural compliance by January 1, 2010, but was extended to March 1, 2010. A clock reset metric has been established; however, a comprehensive set of performance metrics to support a vision of excellence has not been established for the Work Practice Component. NOT COMPLETE – OVERDUE
- PIRCS 13665 - Commitment C10054: Established a requirement to devise metrics to meet a statement of excellence by December 1, 2009, but was extended to March 1, 2010. NOT COMPLETE – OVERDUE.
- PIRCS 13664 - Commitment C10241: Established a requirement to develop a statement of excellence with focused metrics by January 1. 2010, but was extended to 1 March 2010. NOT COMPLETE – OVERDUE
- PIRCS 13664-Commitment C100242: Established a requirement to assess the effectiveness of Human Performance advocates by January 1, 2010, but was extended to March 1, 2010. NOT COMPLETE – OVERDUE
- PIRCS 13666-Commitment C10243: Established a requirement to audit the lock-out/tag-out program by December 1, 2009. This commitment was credited to the annual audit required of the Quality Assurance organization since 2000. COMPLETE – ON TIME
- PIRCS 13666-Commitment C12044: Established a requirement to track PIRCS entries pertaining to lock-out/tag-out issues by November 1, 2009. It was completed on November 2, 2009. COMPLETE – ESSENTIALLY ON TIME

2009/2010 NFS-Erwin Independent Safety Culture Assessment
SCUBA Team Results Report

NFS Self Assessment

The NFS self-assessment of this Safety Culture Component (SCC) resulted in an overall assessment rating of "Yellow" with an improving trend in performance. The NFS Safety Culture Self Assessment (SCSA) of the Work Practices SCC was not sufficiently self-critical in that it seems unreasonable to rate this area as "Yellow" when half of the key areas are rated as "Red."

Use of lock-out/tag-out practices was a source of concern during the preceding ISCA, during subsequent field observations, and again during the SCUBA Team progress review in July 2009; there were no related comments in the NFS review. NFS takes credit for initiating a Human Performance Program yet there is no serious discussion of improvements noted. There have been too many field observations by SCUBA Team members that have revealed procedure deviations or maintenance errors; the self-assessment is silent on this deficiency.

Within the context of the rating characterization protocol used by NFS, the overall rating is neither reasonable, nor roughly equivalent to the SCUBA Team's rating of this Safety Culture Component; i.e., as an Area for Improvement. The SCUBA Team also does not believe that performance has been sufficient to warrant an improving trend.

III.E CORRECTIVE ACTION PROGRAM SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

The licensee ensures that issues potentially impacting nuclear safety are promptly identified, fully evaluated, and that actions are taken to address safety issues in a timely manner, commensurate with their significance.

SCUBA Team Conclusion

This component of NFS-Erwin safety culture is considered to be deficient when compared to commercial nuclear power plant industry norms and represents an Area for Improvement (AFI). It does not meet minimum regulatory expectations with respect to problem identification due to lack of universal use, and it fails to meet regulatory expectations with respect to problem resolution and program implementation (e.g., Common Cause Analyses, Effectiveness Reviews, department subject matter experts). This conclusion is essentially the same as that of the 2007/2008 ISCA, allowing for the fact that an intervening opportunity for improvement actions has passed without an acceleration of target goals, still scheduled for completion by December 2010. Some due dates have been extended into 2011.

The Corrective Action Program (CAP) at NFS-Erwin continues to rely primarily on an intranet-based tool (PIRCS) for the identification and resolution of site issues. The fundamental design of the process is sound, however inadequate resources have been applied to making PIRCS a useful tool for tracking and trending minor issues and rigorously resolving major ones. There have been a few improvements made to the process over the past two years, such as anonymous reporting, electronic feedback, and assigning a second analyst to the CAP organization but the stated long-term goal of task completion by December 2010 is too late to drive the needed improvement and completion dates have been slipping. Day-to-day CAP execution suffers from inconsistent use; it seems apparent that neither the workforce nor the management team has acknowledged the intrinsic value of a rigorous CAP. Other safety components such as Operating Experience, Work Control, and Self-/Independent Assessments suffer as a result. For instance:

- The volume of PIRCS reports is increasing but there is evident frustration as indicated by openly stated public comments that many of the submittals are adding little value to site improvement. Apparently, CAP usage is dependent on the supervisory chain of command and there is some evidence that condition reports are being used for personal ends.
- Committees charged with the efficient execution of the CAP are not smoothly integrated. Some duties overlap while other tasks are gapped. It would be appropriate to take a holistic view of the PIRCS Review Committee, PIRCS Oversight Committee, and Corrective Action Review Board (CARB) in order to improve the process and the product.
- Department Performance Improvement Coordinators (DPIC) are still unassigned despite the stated belief that by NFS that their services are an integral part of improving the effectiveness of the CAP. The same management team that is calling for their assignment has been successfully resisting such assignments due to resource considerations.
- Root Cause Analyses (RCA) are gaining in use and importance, yet executive sponsors are not assuring management errors and/or deficiencies are fully evaluated, and that corrective actions are effective and lasting. Instead, their principal function appears to be

defining the scope of these investigations.

- The quality of significant event investigations does not meet industry norms. Investigators tend to seize the first compliance failure and describe that failure as the cause. The lack of effective executive sponsorship to ensure that the problem statement is accurate and the course of review appropriately focused allow this practice to continue. Additionally, TapRoot techniques naturally tend away from personal culpability and the management team has not historically taken the steps to compensate when circumstances dictate. It is recognized that Balance of Error techniques to determine whether or not disciplinary action is warranted; and adoption of the Culpability Decision Tree, recommended by the Institute of Nuclear Power Operation, are steps in the right direction.
- "Extent of Condition" is a term being used more regularly; "Extent of Cause" is creeping into the vocabulary. However, until these terms are better understood and applied, it is likely that the observed quality of root cause analysis reports will not measure up to nuclear industry norms or serve as effective tools for improving the safety culture.
- There is no formal guidance for performing a Safety Culture Implication Review (SCIR) during the investigation of significant events, although the requirement for conducting a SCIR is defined in NFS-GH-918 and NFS-GH-922. It would be appropriate to provide such formal guidance since some of these reviews are beginning to be included in event investigations.
- Implementation of a formal RCA grading system would better define organizational expectations for RCA content and quality level, and provide constructive feedback to team leaders and members.
- In February 2010, a week of formal TapRoot training was conducted for selected team leaders in order to reverse the trend of low quality RCAs, although there is a sense that TapRoot is not the ideal (and should not be the only) tool for use at NFS. It needs to be modified to ensure that it includes areas of personal accountability, such as management effectiveness and management errors, as well as organizational and programmatic deficiencies as potential root or contributing causes.
- There remains a group of individuals, across the spectrum of seniority, that does not support the use of CAP because they doubt its effectiveness in following through, object to the additional workload imposed by more aggressive problem identification and resolution, or simply choose to resist this management-sponsored program.
- Supervisory preference for CAP use is a significant driver in the PIRCS generation rate by organization.
- The site lacks a systematic means of converting lessons learned from PIRCS reports into standard safety messages, pre-job briefings, internal operating experience, or cautionary notes for work instructions.
- NFS has in imperfect view of issues that constitute commitments to be tracked and closed using a quality record, such as PIRCS. For instance, the Comprehensive Safety Culture Improvement Initiative (CSCII) specified actions to be taken in response to the 2007/2008 ISCA. These actions devolved from a Confirmatory Order and consequently carry with them the weight of any other docketed commitment.

SCUBA Team Findings and Recommendations

2009/2010 AFI-CAP-01: This is essentially a repeat Finding from the 2007/2008 ISCA. NFS-Erwin needs to clearly define the protocol for issue identification. The cornerstone of the problem identification and resolution process must be universal and robust submittal of any and all issues. This has not been the case at NFW-Erwin. In some cases, the supervisory element has placed differing value on writing PIRCS reports which affects willingness to participate, some employees simply do not participate, deficiencies discovered during scheduled work are handled in the field without documentary support, Human Performance tool gaps go unreported, and long-lasting, low level material problems are allowed to continue to exist. Each of these attributes signals an organization that does not adequately credit the value of writing a PIRCS report as the default position. Additionally, there is vocal concern that (1) the growing size of the PIRCS backlog is hurting the ability to resolve issues, (2) all PIRCS issues seem to be treated with the same priority in terms of due dates, and (3) that PIRCS is too frequently used as a weapon.

The SCUBA Team recommends the following:

- Track the quantitative PIRCS generation rate and compare it to benchmarked values that compare NFS with industry norms.
- Consistently include implicit commitments (i.e., who, what, when) in the discussion of any issue entered into CAP for resolution.
- Track the PIRCS generation rate by organization. Confirm or refute the contention that supervisory preference is a strong driver in CAP use and take steps to influence supervisory attitudes needed to meet industry norms.
- Firmly control the backlog by establishing a low threshold for due date extensions.
- Implement a Deficiency Tag Program and begin a campaign of tagging material deficiencies. This practice will help to establish a baseline for the maintenance backlog as well as proving a starting point for prioritizing work and assigning resources.

2009/2010 AFI-CAP-02: This is essentially a repeat Finding from the 2007/2008 ISCA. The PIRCS software does not use all of the available tools to allow tracking and trending low level issues in order to allow intervention before small issues grow to be large ones. Common cause analysis is difficult because cause codes with sufficient granularity to permit tracking and trending remain in draft status and have no definite promulgation date. Keyword searches will remain the norm for use in common cause analyses until this change occurs. Additionally, there are no plans to back fit the significant number of condition reports that document repeat or related conditions. Consequently, it is not unusual to find recurring events, within the past twelve months, numbered in the hundreds on any given PIRCS report. As a result, much of the workforce has the impression that PIRCS is not an effective tool for problem resolution. The lack of a subject matter expert within each major department affects the Site's ability to collate and analyze the database, particularly as problems are identified.

The SCUBA Team recommends the following:

- Assign DPICs to improve program execution. These individuals should set standards for problem identification and then help to frame the response.
- Establish a bin for low-level issues raised at PIRCS Steering Committee meetings. Set a

timetable for routine reviews to detect trends.
- Establish cause codes with sufficient granularity to build organizational confidence that recurring events are being tracked with sufficient precision to minimize recurrence.
- Conduct Common Cause Analyses using cause coded trending information.

2009/2010 AFI-CAP-03: Improve the efficiency and effectiveness of the various committees that screen and process CAP documents. For instance, the PIRCS Oversight Committee has not met regularly since December 2009 and has informally been supplanted by the CARB. Consequently, the current process allows for overlap that blurs lines of responsibility and is partially responsible for those instances where PIRCS has not been an effective tool for problem resolution.

The SCUBA Team recommends the following:

- Consolidate ownership and accountability for the quality and effectiveness of the CAP within the CARB.
- Transfer the CAP functions currently being performed by the Safety and Safeguards Review Council (SSRC) to the CARB. This action might require a license amendment.
- Assign process oversight responsibilities to the PIRCS Oversight Committee.

2009/2010 AFI-CAP-04: Major event investigations suffer from quality issues and prototypical examples of these shortcomings can be found in the Case Studies (Attachment G) section of this ISCA. NFS-Erwin management must make a significant commitment to improving the quality of event investigations and assigned corrective actions.

The SCUBA Team recommends the following:

- Divorce ownership of root cause issues from sponsorship of root cause teams.
- Assign an executive sponsor to every root cause analysis to challenge the team leader and support the effort rather than to set the bounds on the initial problem statement.
- Evaluate potential management errors and deficiencies when performing RCAs as these are sometimes causal and/or contributing factors.
- Critique the recent full-team TapRoot reviews to improve the product. Use the SCUBA Team Case Studies as a model at first.
- Establish a quantifiable measure of effectiveness to gauge the quality of the finished product with a review board (e.g., CARB) evaluating selected PIRCS documents and event analyses, prioritized on risk and consequence.

2009/2010 AFI-CAP-05: NFS has just begun to use every tool available to the RCA team and, consequently, has not historically elicited all of the available lessons learned from significant site events. Effectiveness Reviews, SCIRs, Extent of Cause analyses, and Extent of Condition reviews have just begun to be used to evaluate the safety culture through the lens of site events.

The SCUBA Team recommends the following:

- Establish a formal process for determining when to assign Effective Reviews.
- Establish a formal process for determining when to conduct SCIRs.
- Require all RCAs to include each of these tools as part of the analysis process.

- Adopt the Apparent Cause Evaluation (ACE) process for less significant events. Benchmark a successful nuclear power plant in order to establish a standard of performance that matches nuclear industry norms.
- Consider using some (if not all) of these tools when performing ACEs on events that do not rise to the level of a RCA.

2009/2010 AFI-CAP-06: This is essentially a repeat Finding from the 2007/2008 ISCA. NFS-Erwin has failed to effectively use the PIRCS process to track commitments to closure, particularly when those commitments do not follow the classic regulatory track. The use of quality checks, such as Effectiveness Reviews and CARB screens have not provided the necessary backstop to ensure success.

The SCUBA Team recommends the following:

- Establish a definition of the criteria needed to declare an issue as complete and then reviewed as adequately closed before considering the matter resolved. Ensure that this definition prohibits the current practice of closing paper with paper or promises (i.e., preventing the practice of considering an issue as complete by reference to another PIRCS report, or a policy statement that is issued before implementation is complete, or when a work request is written without having completed the work).
- Review the 2008 CSCII and both SCSAs for completeness in terms of PIRCS data entry. Prepare condition reports for subject areas that lack documentary support.
- Review the progress of issues highlighted during the SCUBA Team review of CSCII implementation conducted in July 2009.
- Critically review and evaluate the efficacy of CARB screens and Effectiveness Reviews already performed in order to satisfy senior management that both the letter and intent of SCUBA Team and NRF-Erwin findings have been appropriately addressed.
- Schedule an annual self-assessment of safety culture attributes.
- Review NFS-GH-947 for completeness in outlining the process for commitment tracking.

2009/2010 AFI-CAP-07: This is essentially a repeat Finding from the 2007/2008 ISCA. Improve the process for evaluating the quality of the product presented for issue closure. The recent problem with fire dampers highlights the need to correct practices that continue to allow crediting incomplete or inaccurate actions taken in response to PIRCS issues as acceptable for closure. Conversely, issues such as the BLEU Processing Facility exothermal event or PSL Phase 4 testing highlight the slow response of the PIRCS process to fast-paced decisions when production is involved. In either situation, NFS was not appropriately using all of the available information for problem resolution.

The SCUBA Team recommends the following:

- Eliminate the practice of allowing one commitment to be closed by another. The chain of control is too easily lost and the generation of a new initiation date with each new commitment complicates the business of controlling the age of the backlog, ensuring timely closure, and tracking adequacy of actions.
- Use qualitative metrics to develop a level of confidence in the newly developed processes to evaluate both corrective action and commitment closure in order to verify completion and adequacy. Measures such as grading the quality of RCAs and formally evaluating

corrective action effectiveness are potentially useful tools.

- Expand CARB reviews beyond the evaluation of regulatory commitments and Quality Assurance (QA) issues.
- Improve the quantitative metrics used to measure the success of PIRCS, especially those that are quality related. Measures such as repetitive occurrence, rework, average age, relative number of each category of investigation, and total hours spent on analysis by TapRoot teams are examples of potentially useful additions.
- Stringently limit paper-based changes to processes and procedures (i.e., Letters of Authorization (LOA)) due to the increased opportunity for the simultaneous existence of conflicting documentation, undermining the consistency of procedure adherence and problem resolution during fast-paced operational issues. This recommendation is similar to a finding the Configuration Management topical area of this report.

2009/2010 ANA-CAP-01: NFS-Erwin needs to fully link the computerized systems to raise regulatory confidence in the ability to properly identify and resolve problems. Maximo, SAP, LINC, and PIRCS each control one or more aspects of configuration control. It is important to ensure that engineering changes, replacement parts, work orders, and drawing changes are interlocked to deliver an accurate design. Tied to this sequence must be the ongoing effort to fully document safety related equipment and items relied on for safety.

The SCUBA Team recommends the following:

- Use PIRCS as the vehicle for tracking design differences to ensure configuration control. Assign the Configuration Management group responsibility for delivering a reliable end product, relying on accurate input and data management along the way. When design or as-built problems arise, it is important to ensure that issues are accurately identified for resolution by the appropriate organization using PIRCS.
- Conduct a benchmarking visit to a nuclear generating station with a solid reputation for equipment reliability and backlog control.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the overall rating of the Corrective Action Program Component for the NFS-Erwin Site Composite Organization, as perceived by the survey participants, was characterized as an Area of Competency based on industry norms. This rating places the NFS-Erwin Site Composite Organization in the second quartile of the commercial nuclear power plant sites in SYNERGY's industry database. This rating has improved slightly (by 1.8%) since August 2007. While survey numerical ratings of "awareness of alternate channels for raising concerns" and "satisfaction with feedback" notably improved, survey numerical ratings of "confidence that the PIRCS process ensures that all potential nuclear safety issues or concerns are reported" notably degraded.

Based on information obtained from other sources, the SCUBA Team believes that workforce perceptions in this area, as reflected by the overall rating characterization, are more positive than is justified by actual performance. For instance, the population showing the largest improvement in appreciation for the CAP was hourly employees (5.8% improvement), although a large number of these individuals reported that they rarely, if ever, write PIRCS reports.

Some noteworthy findings from the 2009 NFS Safety Culture Survey were:

- The numerical rating of workforce confidence that the CAP will provide feedback on how the issues or concerns were addressed and resolved as an Area of Strength reflects the effectiveness of the electronic feedback process adopted since the last survey.
- The numerical rating of "awareness of the alternative channels available to raise a potential nuclear safety issue or concern if uncomfortable with raising it through the PIRCS process or through the management chain" was evaluated as an Area of Strength and reflects the effectiveness of having adopted the anonymous reporting process since the last survey.
- The numerical rating that the PIRCS process positively affects the willingness to identify and pursue resolution of potential nuclear safety issues or concerns as an Area for Improvement reflects workforce concern that PIRCS is viable for problem identification but not problem resolution. In fact, confidence that the PIRCS process will ensure that adverse trends that could have a negative impact on nuclear safety are addressed in a timely manner, consistent with significance, was among the lowest 20% of the safety culture attributes rated.
- Confidence that the PIRCS process will ensure that issues that could potentially have an adverse impact on nuclear safety are resolved in a timely and effective manner was evaluated among the lowest 10% of safety culture attributes rated.

There were a large number of write-in comments related to the CAP. They were about equally divided between negative comments and positive comments (44%-56%). Most of the positive comments indicated that the PIRCS system was beneficial because it was universally available and was complemented by anonymous PIRCS and the Employee Concerns Program. A few indicated that problem resolution had improved because of PIRCS effectiveness. The negative comments indicated concerns that:

- The increased emphasis on the use of PIRCS is overloading the organization's ability to effectively implement corrective actions. This impairment has the coincident effect of discouraging some people from using PIRCS.
- PIRCS too often generates ineffective corrective actions or quick fixes that do not work for long as evidenced by repetitive occurrences.
- Too many PIRCS issues are trivial in nature, thereby diluting resources available to correct actual issues. Others expressed concern that PIRCS was being used as a vehicle for retaliation.
- There is insufficient involvement of knowledgeable personnel in the PIRCS screening process and it is being over-driven by senior management.

Personnel Interviews, Behavioral Observations and Documentation Reviews

The SCUBA Team gained significant insights during interviews, observations, and documentation reviews. This information tended to fall into four major categories: issue identification, PIRCS quality, issue resolution, and trending.

Issue Identification

- The SCUBA Team heard from several individuals that the tolerance for PIRCS submission is directly related to the supervisor's attitude regarding PIRCS. Contrary to

NFS-GH-65, some supervisors discourage the use of PIRCS and, since many hourly workers defer to them for report preparation, problems are either ignored or resolved through informal channels.

- There remain parallel databases that still compete with PIRCS, although fewer than when the SCUBA Team last reported. The security force maintains separate records for reasons of classification, LOAs are tracked on paper (until fully incorporated into LINC), drill critiques are stand-alone documents, and the results of benchmarking trips are informally reported and filed for action.
- The PIRCS reporting process is still not as universally used as would be expected. According to interviews and survey results, material problems are frequently not reported because many employees believe that the process is overloaded, especially when issues go unresolved with little or no feedback. Many hourly workers routinely forward issues to their supervisor for action rather than writing a PIRCS report themselves. Equipment problems discovered during maintenance are routinely corrected without report. The same is true of failed preventive maintenance tasks where wide latitude is given to the craftsmen before an issue is ever reported in PIRCS.
- Some personnel safety issues are resolved by work-arounds, rather than entering the problem is PIRCS to facilitate resolution. For instance, one supervisor chose to personally pump a flooded dike area rather than expose his team to the electrical hazard of operating equipment in a flooded environment.
- Operators resolve some equipment performance issues through work-arounds rather than by formal resolution through PIRCS. For instance, two pumps (one air operated and one motor operated) in the Waste Water Treatment Area pump less when used together than when one is run separately. This is obviously an anomaly that should be resolved but a PIRCS report has not been submitted to document this long-standing issue.
- Human Performance tools have grown in use and popularity. However, they have become substitutes for documenting erroneous performance in PIRCS, delaying the ability to change endemic behaviors that require correction across the site. For example, Personal Protection Equipment is not consistently worn and Fuels Supervisors appear to be the only individual not to wear latex gloves for contamination control within the Material Access Area. These behaviors should be highlighted to hasten corrective change.
- There were occasional reports of instances when problem reports were filed to use PIRCS as a weapon rather than a tool. The current screening process does not have a simple means for tracking and trending issues of low risk significance in order to improve responsiveness and discriminate between valid concerns.
- NFS has recently taken steps to minimize the use of "urgent" and "immediate" Work Requests, limiting their use to safety and quality issues, respectively. The SCUBA Team has observed several instances of attempts to game the system for low priority with the specific intent of avoiding the rigors of work planning and systematic review.

PIRCS Quality

- Subject matter experts assigned as PIRCS overseers and mentors (DPICs) have been a topic of conversation since the 2007/2008 ISCA. To date, only one person has been nominated to a nominal six-person quorum. Consequently, there is little consistency among PIRCS originators, duplicate submittals occur while some known problems go unreported, and trend analysis falls entirely on a very small CAP management team. A single point of contact within each major organization would improve the situation but at

the likely cost of a full-time equivalent's labor within each group. NFS has decided that this is a necessary step but has failed to follow through.

- The Vice President of Safety and Regulatory (former job title) was responsible for assigning all investigation team leaders and vice presidents must approve non-QA root cause analyses in their area of responsibility per NFS-GH-922. The titles have changed but the basic policy has not. However, no formal training has been offered relative to the conduct of Apparent Cause Evaluations. RCA team leaders are not required to demonstrate proficiency at an appointed periodicity.
- The site lacks a comprehensive self-assessment tool and the CAP has not yet received a self-assessment that would meet industry standards. The employment of an independent contractor to help with process improvements should not be considered an adequate substitute.

Issue Resolution

- Immediately following the previous ISCA, there was a marked focus by NFS management on clearing the "Top 10" equipment issues. By observation and interview, the SCUBA Team has concluded that this emphasis has faded.
- Some significant personal safety issues have not bubbled up to the level of regulatory interest and consequently they are resolved within the self-imposed standards at NFS. As an example, PIRCS 21774 was written to document an event when fumes overcame personnel. The issue was considered to be a commonplace occurrence that had not been an issue during the many previous years of operation and production resumed shortly. The implication of production over safety was obvious.
- There is a stated perception that NFS manages PIRCS rather than managing problems raised through the PIRCS process. The SCUBA Team has seen some substantiation of this concern where completion dates are assigned by rote rather than by thoughtful evaluation of risk/consequence. Additionally, some trivial issues are assigned specific actions prior to closure when screening and binning would suffice. This practice contributes to the sense of overload and prompts responders to deal with issues chronologically rather than in response to severity.
- The CAP has not been effective in applying the long-term corrective action needed to reverse adverse trends associated with safety-related issues. There are recurring issues associated with production-related components, involving business risk, or the potential for personal injury that are permitted to linger. For example, the decision to check the fuse rating of production-related components was made near the end of the regulatory shutdown period but was conducted without de-energizing affected power panels because the most convenient time for this precaution had passed. The pot-washing site in Area 801 was permitted to reach a stage where a critical lack of rudimentary spare parts threatened the ability to resume production. Occasional problems with lock-out/tag-out practices continue to be observed by the SCUBA Team members in the field without reversion to PIRCS reporting.
- There are occasions when PIRCS commitments are closed to other commitments, with neither resulting in definitive action. The same is true for completing PIRCS actions by writing a work request without ensure that the attendant work is performed. This practice is inconsistent with industry norms and can be unacceptable if the PIRCS report relates to safety-significant work.
- Following the SCUBA Team progress review of CSCII progress conducted in July 2009,

one PIRCS report (13669/C10231) was written to establish a metric for the timeliness of CAP responses and resolutions. Action was begun in response to this commitment but it remains overdue beyond its February 1, 2010 assigned completion date.

- In response to the 2009 SCSA, PIRCS reports were written for most of the issues categorized as "Yellow." None of them has been completed; they are either overdue or have been extended beyond the December 2010 date originally committed for completion of CAP actions highlighted in the 2007/2008 ISCA.

Trending

- CAP is governed by NFS-GH-922, in which roles and responsibilities are clearly designated. The most notable shortcoming remains the reliance on performance metrics that are entirely quantitative in nature, as this data would not be expected to provide early indications of emerging problems or degraded trends in quality. The information reviewed at each PIRCS Oversight Committee is not widely disseminated in that the charts and graphs used to measure performance are not systematically promulgated to the organization as a whole.
- Equipment rework and problem recurrence are not tied together in PIRCS. It is not uncommon to find dozens of repeat occurrences without follow-up action to prevent recurrence and there is no formal program within the Maintenance organization to categorize and learn from human performance errors or material performance issues that result in rework.
- The cause codes assigned to problem categories are not granular enough to break issues down into component parts for more precise trending or extent of condition/cause reviews before the issue develops into a significant problem. This situation should change once the draft version of more precise cause codes is put in place, but the change has not been approved for use and there is no scheduled date for implementation. There are no stated plans to back fit the large number of existing condition reports to assist with analyzing repeat or recurring events.
- There are no expectations that PIRCS will be systematically used as a vehicle for tracking and trending the performance of safety related equipment (SRE) or items relied on for safety (IROFS). Typically, repairs are promptly made when a safety-related piece of equipment fails a periodic test. Trend data is available in paper form, but is not correlated in any systematic fashion to allow for intervention prior to a system fault or test failure. Procedure NFS-GH-56 refers. Stated another way, SRE and IROFS are run to failure. Strategic use of data, tracked and trended in PIRCS, could reverse this process.

<u>Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews</u>

The SCUBA Team reviewed each of the original CSCII PIRCS Entries/Commitments listed for the Corrective Action Program Safety Culture Component that were identified as "Complete" and/or "Approved by CARB" and sampled the remaining Commitments. Key observations were:

- Twelve commitments were identified as "Complete" and/or "Approved by CARB." The SCUBA Team concurs that most of these items had been adequately carried through to closure but follow-through has been lacking in a few cases. For example:
  - PIRCS 13670 Commitment C6265 – Establish a process to evaluate the adequacy of commitments prior to closure of the PIRCS document. Procedure NFS-GH-947 was

developed in response but was originally rejected by the CARB due to technical deficiencies with the procedure. CARB subsequently approved the procedure and took closure action in February 2010, only one month before the station missed a regulatory commitment. IMPLEMENTATION NOT EFFECTIVE

- PIRCS 13670 Commitment C6269 – Establish a protocol to preclude closing a commitment with another commitment. Based on the demonstrated ineffectiveness of actions taken to meet Commitment C6265, it would be reasonable to expect CARB to review their decision to accept NFS-GH-947 as adequate insurance to prevent recurrence of the cited issue. IMPLEMENTATION POTENTIALLY INEFFECTIVE

- Half of the 26 commitments not identified as "Complete" were sampled for their contemporary status. The SCUBA Team found most of the status information to be accurate although some of the items still listed as due or overdue were actually complete (e.g., PIRCS 13698 C6353 – Senior manager involvement in issue closure). Some projected due dates were far in the future and could be correlated with continuing performance problems in those areas. For example:
  - PIRCS 13698 Commitment C6348 – Conduct a benchmarking visit in order to collect data on root cause analysis and human performance practices. The established due date is June 30, 2011 and the SCUBA Team challenges the timeliness of that commitment. NOT OVERDUE – NOT A CHALLENGING DUE DATE
  - PIRCS 13671 Commitment C6271 – Establish cause codes in order to facilitate trending. The established due date is June 30, 2011 and shows 0% completion. This delay will continue to impact that station's ability to conduct effective common cause analyses. NOT OVERDUE – NOT A CHALLENGING DUE DATE
  - PIRCS 13669 Commitment C6261 – Establish effective metrics in order to evaluate and improve the effectiveness of the CAP. The committed completion date remains December 31, 2010 but the status shows 0% complete. It is reasonable to assume that the station has work remaining in this area, but also reasonable to recognize that there has been some progress and it would seem that 0% is not an accurate progress indicator. NOT OVERDUE – INACCURATE STATUS
  - PIRCS 13698 Commitment C6350 – Develop a robust, highly accountable process for ensuring regulatory compliance with commitments. The committed completion date remains June 30, 2010 but the status shows 0% complete. It is reasonable to assume that this commitment date will be challenged if the documented progress is accurate. NOT OVERDUE – IN JEOPARDY
  - PIRCS 13669 Commitment C6255 – Ensure steps are taken to provide timely and high quality responses to PIRCS issues. The committed completion date remains June 30, 2010 and the status shows 40% complete but employment of DPICs was a principal component of the proposed response and that initiative is lagging. NOT OVERDUE – IN JEOPARDY

PIRCS Cross-Cutting Issues

The SCUBA Team reviewed all of the performance issues attributed to PIRCS as a cross-cutting issue. Of the 64 Commitments made, 23 were designated as "Complete" and/or "Approved by CARB." Eleven of the 17 Commitments submitted to CARB were rejected and five of the six accepted were overdue at the time of approval. A random sample of outstanding PIRCS reports was reviewed and the following pertinent issues were noted:

- PIRCS 13667 Commitment C6247 – The SCUBA Team recommended that NFS initially focus on safety-related structures, systems, and components in order to establish a baseline for a functioning CAP. NFS rejected this notion but established a due date of March 31, 2011. The documented rate of progress is 0% indicating little connection between plans and reality. NOT OVERDUE – INACCURATE STATUS
- PIRCS 13669 Commitment C6258 – Increase the number of common cause analyses conducted. The commitment date remains December 31, 2010 but progress is logged as 0%. NOT OVERDUE – IN JEOPARDY
- PIRCS 13669 Commitment C6395 – Ensure high quality review of commitment closure. The corrective action was rejected by CARB on December 1, 2009 but remains on track for the June 30, 2010 completion date. Progress is logged as 0%. NOT OVEDUE – INACCURATE STATUS

NFS Self-Assessment

In the NFS self-assessment, the site again graded its overall performance as "Sometimes effective, somewhat reactive, requires monitoring" with a positive trend. Specific observations were as follows:

- Significant efforts have been made to remove barriers that could potentially discourage problem reporting in PIRCS.
- The PIRCS screening process was revised to improve responsiveness.
- The problem risk definitions were revised by the PIRCS Oversight Committee to better align problem descriptions with risk significance
- A common cause analysis procedure is under development but not yet formalized.
- Pertinent information resulting from the identification of programmatic and common cause problems has not been adequately communicated to applicable personnel.
- Effectiveness evaluations are performed on all QA findings and selected health and safety audit findings. With the launching of the revised screening committee and the implementation of the CARB, effectiveness evaluations are now being assigned during the daily problem screening meetings.
- DPICs are actively being implemented to assist line management.
- CARB was established in January 2009 and currently meets bi-weekly.
- PIRCS is being actively being modified to allow multiple reviews prior to approval and closure. This function will be incorporated into the CAP process and will utilize DPICs, line managers, and CARB to improve the quality of investigations and corrective actions.
- Alternative reporting processes have been established. Based on information contained in the self-assessment for SCWE (Environment for Raising Concerns), the assessor stated, "There is limited data here since both of the independent alternative programs are new (Employee Concerns Program - April, Ethics - March)."

The SCUBA Team believes NFS was not sufficiently self-critical in its self-assessment of the CAP.

- Interviews and observations indicate that some employees have lost faith in the ability of the PIRCS to resolve identified problems, and consequently choose not to use the system. This attitude is more prevalent among, but not limited to, hourly employees and detracts from the full utilization of PIRCS.

- Common cause analyses for trending purposes are still hampered by a lack of granularity in cause codes. For example, it is not unusual to find hundreds of repeat occurrences documented on PIRCS reports – most likely due to poor keyword searches. The delay in approving and issuing a draft version of improved cause codes was not cited as an issue for resolution.
- Effectiveness reviews have been applied to regulatory and QA-originated PIRCS reports but the practices had not been expanded to the point where it is possible to assess the value of the process as employed at NFS.
- The CAP staff remains significantly under-manned. A second analyst has only recently been assigned and only one DPIC has been notionally assigned.
- The responsibilities of the PIRCS Oversight Committee and CARB have been co-mingled. Neither is charged with responsibility for protecting the schedule or ensuring the timeliness of corrective actions.

Within the context of the rating characterization protocol used by NFS, the overall rating is inconsistent with the SCUBA Team's rating of this SCC as an Area for Improvement. The SCUBA Team does not believe that CAP performance has been sufficient to warrant an improving trend.

III.F OPERATING EXPERIENCE PROGRAM SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

The licensee used operating experience information, including vendor recommendations and internally generated lessons learned, to support plant safety.

SCUBA Team Conclusions

Based on the integration of all source of assessment input, the SCUBA Team has concluded that the Operating Experience Safety Culture Component is deficient when compared to commercial nuclear power plant industry norms and, as a result, represents an Area for Improvement (AFI). The finding is essentially the same as that of the 20072008 Independent Safety Culture Assessment (ISCA). The SCUBA Team has also concluded that NFS does not yet meet regulatory expectations related to this Safety Culture Component (SCC). In this regard, the SCUBA Team has concluded that:

- NFS has no formal written internal or external Operating Experience (OE) program. This is essentially a repeat Finding from the 2007/2008 ISCA. Although the actions on this component were not scheduled for completion until the end of 2010, almost no activity had occurred as of April 2010 and efforts to develop a procedure have just begun.
- The limited regulatory requirements for use of external OE appear to be met. NRC generic communications are reviewed by licensee staff and action taken if deemed necessary.
- Of the eight commitment items associated with this SCC only one is shown by the NFS SharePoint site as completed and closed. The SCUBA Team believes that this closure was inappropriate. Closure was based on a one page memo that stated that everything started as planned rather than based on an in-depth lessons-learned from the start up of the Reliable Fuel Supply project. The SCUBA Team continues to believe that in-depth lessons learned report that could be used for future projects should be developed.
- Although NFS has taken credit in their 2009 Safety Culture Self-Assessment (SCSA) for informal use of operating experience, events have occurred since the 2007 SCSA in which the lack of use of internal and external operating experience was a contributing safety culture factor.
- Many, and perhaps the majority, of the NFS workforce do not understand what OE is or means.
- There has not been strong leadership in to this area. Responsibility for lead in this area has changed several times in the past two years with essentially no progress being made. The recent reorganization indicates that an Assurance Department will include this safety culture component along with other SCCs including the Corrective Action Program and the Self- and Independent Assessment Programs. It has yet to be determined what the program will be for this safety culture component.

2009/2010 NFS-Erwin Independent Safety Culture Assessment
SCUBA Team Results Report

SCUBA Team Findings and Recommendations

2009/2010 AFI-OE-01: This finding is essentially a repeat Finding from the 2007/2008 Independent Safety Culture Assessment (ISCA). NFS currently does not currently have a systematic, thorough and formal program/process in place for obtaining, evaluating and acting upon external operating experience. NFS needs to ensure ownership and accountability for this program/process. In this regard SCUBA recommends the following:

- Develop and implement a comprehensive External Operating Experience Program. The program should include guidance on objectives, process, management oversight, training, and performance metrics.
- Assign leadership and accountability for the program to a qualified individual.
- Conduct benchmarking activities to identify industry best practices for the design and implementation of an OE program that is applicable to NFS.
- Identify the potential sources of information applicable to NFS. Some sources were listed in the 2007/2008 ISCA Results Report.
- For specialized areas such as: nuclear criticality, radiation protection, chemical and industrial safety, process engineering and uranium chemistry, seek out and consider what external information is available and useful to NFS from professional organizations and their journals.

2009/2010 AFI-OE-02: This finding is almost identical to the Finding in the 2007/2008 ISCA Results Report. NFS does not have a systematic, thorough and formal program/process in place for obtaining, evaluating and acting upon internal operating experience. The SCUBA Team continues to believe that NFS will identify more useful operating experience information, at least in the near term, from internal performance history than it will from external sources. However, there may be an exception for the case of major process changes or the development of new processes.

The SCUBA Team recommends the following:

- NFS should develop and implement a comprehensive Internal Operating Experience Program.
- NFS should establish and use a program to systematically and periodically review PIRCS data to identify adverse trends, recurring problems, and common cause events to ensure that opportunities to learn from internal operating experience are effectively captured and acted upon. NFS should also utilize the information developed through root cause investigations.
- NFS should note that the actions recommended for Finding 2009/2010 AFI-OE-01 are also applicable to the development and management of an internal OE program.

2009/2010 AFI-OE-03: NFS does not currently have a comprehensive process to incorporate lessons learned from operating experience into its procedures or knowledge base to ensure a high probability of it being used or useful to the staff. NFS needs to develop a policy and/or process to ensure such information can be easily retrieved by the staff.

The SCUBA Team recommends the following:

- Develop policies with regard to procedure revision based on lessons-learned or OE.

- Develop manuals or handbooks of "Good Practices" which incorporate this kind of information. (Some organizations like Nuclear Criticality at NFS do this now.)
- Develop training programs, including directed readings, for professional or technical staff based on relevant information.
- Incorporate selected lessons-learned into General Employee Training (GET) and annual refresher training much like has been done for Configuration Management.
- Incorporate operating experience into pre-job briefings and work control processes.

Supporting Information

Workforce Survey Results

The 2009 NFS-Site Safety Culture Survey Results Report indicates that the overall rating for this Safety Culture component, as perceived by the survey participants, is to be in the third quartile and characterized as an Area of Adequacy based on comparisons with nuclear power plant industry norms. This was an improvement over the 2007 Survey when it was rated in the fourth quartile and characterized as an "Area in Need of Attention." However, based on information from other sources, the SCUBA Team believes that this rating may be based on the lack of understanding by many of the NFS staff as to what constitutes OE. This component had the fewest number of write in comments, seven of a total of 682. From interviews, it appears that many understand OE to be the knowledge that an individual acquires from doing the job rather than learning from the experiences of others both from within one's organization and from outside one's organization. This is indicative of a poor organizational frame of reference

Interviews with knowledgeable NFS staff including responsible managers of major technical areas indicate that little or no information on activities, experiences or events at other nuclear or chemical facilities is obtained by NFS. Similarly there is little information received from vendors. There are a few areas of exception but much of this is information on what issues are being raised by the NRC during recent inspections.

Personnel Interviews, Behavioral Observations, and Documentation Reviews

Personnel interviews and documentation reviews indicate that limited progress has been made for this safety culture component. This was noted in the SCUBA Team's July 2009 progress review. It is difficult to see how activities relating to this component can be completed by the end of 2010. It is now a function of the newly-formed NFS Assurance organization.

- Interviews indicated that most non-managerial staff had an incorrect understanding of operating experience. Most considered it as long term job experience. Most managers had a correct understanding of operating experience but had not evidently conveyed the concept to the workforce.
- Most individuals interviewed including managers stated that NFS did not receive or use information from other nuclear or chemical facilities.
- Most of the findings from the 2007/2008 ISCA remain unchanged as of this assessment.
- The review of NRC generic correspondence by NFS is acceptable, but there is no data base or formal mechanism to create institutional memory of how these generic communications have been addressed. Some NRC generic communications do create changes in policies, plans and procedures. Major changes in security practices and equipment have resulted from NRC generic communications.

- There are no systematic reviews of outside audits, inspections or reports to create a data base of external operating experience.
- Operating experience was rarely used at any meetings except in a very general way despite a widely held belief that the informal use of lessons learned is effective on an ad-hoc basis. When used, the discussions were usually focused on significant events associated with the Nuclear Regulatory Commission. The use of operating experience was more prevalent as the seniority of the participants increased.
- Safety messages were neither effective nor routinely delivered. When presented, they frequently referred to medical events, traffic safety, home and car safety or some other safety issue not relating to either NFS or the nuclear industry.
- Operating experience was not often observed in use on the job. When used during pre-job briefings, the lessons were generally informally delivered and direct application of that operating experience was lacking. Maintenance involving cranes and forklifts, contaminated material control, and hand tool safety were all areas that would have benefited from hearing about best practices among peers.
- Operating experience was lacking in most training sessions. Neither the syllabus nor the class content contained operating experience.
- NFS could use PIRCS to collect internal operating experience from events and incidents. It is the data base that links RCA investigations and corrective actions to incidents and events. Currently, "Similar Events" shown in PIRCS are rarely related. Therefore, systematic searches for information to develop internal OE are not performed.
- Progress was finally made in December 2009 and January 2010 in that the PIRCS database was modified to add "Common Cause Codes" to events in order to enable searches that could contribute to extracting useful Operating Experience information. Procedures for the use of "Common Cause Codes" have been drafted, but have not yet been approved.
- Progress was finally made in December 2009 and January 2010 to modify the PIRCS data base to add Common Cause Codes to events in order to enable searches that could contribute to extracting useful Operating Experience information. Procedures for the use of Common Cause Codes have been drafted but are not yet approved.
- As an example of lack of use of OE is the case of the Bowl Cleaning incident for which it was determined that Procedure NFS-TS-009 was developed as a result of a previous problem/corrective action dating back several years, but was never assigned in T&Q; thus, almost no one in the organization knew that there were documented guidelines for implementation process changes.
- SCUBA Team members identified the lack of leveraging internal and external operating experience as contributing to several events reviewed in 2009 and 2010 as Case Studies.
- An NFS TapRoot investigation in "Safety Culture Review of Event 23257, 333 Panel X-U002 Upgrade Event," identified a deficiency in Internal Operating Experience in that a previous event in 2009 in the 105 Laboratory had a similar problem in that an item relied on for safety (IROFS) was not clearly identified in the work request. The NFS TapRoot investigation also stated that, "Ineffective distribution of lessons learned to NFS departments and employees is known to NFS management and is being addressed."
- The lead for this component has been transferred three times since the Comprehensive Safety Culture Improvement Initiative (CSCII) started. An interview of the current lead assigned in early February 2010 indicated that the assigned individual was not sure of what OE was and had recently accepted a new assignment. He stated that he did not think

he could start on OE activities until his new assignment ended in the fall of 2010. Subsequently, he did state that as time permitted he was undertaking some OE activities.

- In a series of all-staff meetings in February 2010, NFS senior management stated that, as an action resulting from small group follow-up meetings, GET (General Employee Training) would incorporate NFS OE. In a subsequent interview and further communication with the NFS Manager of Human Performance and Training, the SCUBA Team was informed that the three 2009 operational events would be included in training. Since there was no formal OE program yet at NFS, no systematic program of incorporating OE into training existed. Until the formal OE program is established, the existing ad hoc process of management identifying items for training would be followed.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

NFS CSCII generated seven PIRCS commitments to address SCUBA Findings in the 2007 Assessment. One additional PIRCS commitment was generated in response to SCUBA recommendations made during the July 2009 SCUBA progress evaluations. The NFS SharePoint site shows that of a total of eight commitments, one been closed. This was in response to 2007/2008 ISCA Finding OFI-OE-01. A review of PIRCS indicates that for most of the remaining commitments either no activity has occurred or no more than 10% has been completed up to the end of April 2010. In May 2010, a number of the PIRCS Commitments associated with this component were revised and are shown as 70%-80% complete. The SCUBA Team has had insufficient time to evaluate these recently completed actions.

- 2007/2008 ISCA Finding OFI-OE-01 was a recommendation to develop a comprehensive lessons learned report from start up of the Reliable Fuel Supply production line. The PIRCS commitment 13674 C6282 was closed by a relative brief memo that stated that everything started as planned. This was originally rejected by CARB but eventually closed by the Corrective Action Review Board on May 18, 2009. This was closed with no in-depth lessons learned report provided that could be used for future projects. COMPLETE-INEFFECTIVE.

NFS 2009 Self-Assessment

The NFS 2009 Self-Assessment of this Safety Culture Component concluded that this area was "ineffective, unsatisfactory, poor understanding of requirements, or requires action" when compared to the attributes identified in NRC RIS 2006-13. The evaluation concluded that "Most of the processes to evaluate OE at NFS are ad-hoc, that is, no formal procedures/program exists." One bright spot is the review and evaluation of NRC generated OE which is formally handled through the Safety and Safeguards Review Council (SSRC) and the improvements in formality to evaluate other regulatory agency information by the recent adoption of GH-947. Based on a review of corrective actions assigned by NFS to strengthen operating experience in the CSCII, it was concluded that all OE assessment areas would be improved to "Green" status when implemented. Current schedules indicate that the NFS OE program is planned to be implemented by December 31, 2010.

The NFS Self-Assessment of this Safety Culture Component (SCC) was very self-critical and resulted in a "Red" summary finding. This conclusion was based on the fact that almost no progress was made on this SCC since the first NFS self-assessment conducted in 2007 which resulted in a "Yellow" finding with a positive trend. This difference between the 2009 and 2007

summary ratings may be due to the fact that the individual performing the self-assessment in this area had extensive experience outside of NFS and had a more up-to-date frame of reference.

The SCUBA Team agrees with this self-assessment rating.

III.G SELF-ASSESSMENT AND INDEPENDENT ASSESSMENT SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

The licensee conducts self and independent assessments of their activities and practices, as appropriate, to assess performance and identify areas for improvement.

SCUBA Team Conclusion

The SCUBA Team concluded that the Self and Independent Assessment Safety Culture Component at NFS is deficient with respect to nuclear power plant industry norms and represents an Area for Improvement (AFI). The SCUBA Team has also concluded that this Safety Culture Component does not meet regulatory expectations in that (1) although NFS has established a proposed set of performance metrics, they are not closely linked to safety culture, integrated, consistently managed, or used to drive improvement, (2) the self- and independent assessment program remains driven for the most part by regulatory compliance rather than performance, (3) much of the work expended in this area has been associated with incomplete program development as opposed to program implementation, and (4) assessment information is frequently neglected and fails to improve performance.

In this regard the SCUBA Team has also concluded that:

- Responsibilities for this component were not managed and coordinated by a specific single point of accountability for either of the 2007/2008 ISCA (Findings AFI-SA-01 and AFI-SA-02) as recommended by the SCUBA Team.
- A management effort to focus on improving the effectiveness of the self-assessment program (NFS-GH-945, Rev. 1, Self-Assessment Program) which was initiated in July, 2007, has had poor success. Management and supervisory compliance with this procedure has been weak and managers have not been held accountable for compliance with the procedure.
- Draft procedures have been developed in several areas of self and independent assessment but have not yet approved for implementation. Thus their effectiveness cannot be evaluated.
- Certain activities in this component were initiated under the Comprehensive Safety Culture Improvement Initiative (CSCII), but were not sustained or were ineffective in furthering new actions.
- Most self- and independent assessments conducted at the NFS are those conducted as a result of regulatory requirements, their customers' requirements or the requirements of organizations that NFS has business relations with, such as the Nevada Test Site for Waste Disposal.
- The NFS self- and independent assessment program was ineffective in identifying latent institutional errors that led to operational loss events.
- Integration of self and independent assessment with the corrective action program, lessons-learned, and operating experience is lacking. NFS has initiated a restructuring that will bring all of these activities into an Assurance Department. This organization has not had an opportunity to demonstrate it can be effective.

- Some benchmarking has been performed to make use of nuclear industry experience in developing a self and independent assessment program and to obtain information in support of establishing appropriate performance metrics.
- The development, maintenance, and implementation of a performance metrics system either for general purposes or to specifically monitor and evaluate the NFS safety culture is overdue and incomplete. In this regard, NFS does not sufficiently value the use of performance metrics to drive improvement.
- NFS has demonstrated a strong preference to develop performance metrics that represent outputs (e.g., counts) rather than outcomes (e.g., effective results).
- The February 21, 2007 Confirmatory Order specifically required NFS to develop performance based metrics to measure the success of the NFS Safety Culture Improvement Plan and Program. The SCUBA Team repeatedly advised NFS senior management of their failure to establish appropriate performance metrics for safety culture and provided recommendations as to how to develop such metrics. This situation remains unresolved.

SCUBA Team Findings and Recommendations

2009/2010 AFI-SA-01: This is essentially a repeat Finding from the 2007/2008 Independent Safety Culture Assessment (ISCA) The current NFS formal Self-Assessment Program instituted in 2007 and documented in NFS-GH-945, Rev. 1, was limited in scope and inadequately implemented. New procedures for a program more comprehensive in scope have been drafted but not reviewed or approved. Further, a new NFS organization dedicated to Assurance and reporting directly to the President of NFS has very recently been created but has not had time to demonstrate effectiveness. In this regard SCUBA Team recommends the following:

- Develop, implement and maintain a multi-year, integrated self and independent assessment plan that:
  - Includes a combination of compliance-based audits (which are focused on compliance with regulatory and customer requirements) and performance-based assessments (which are designed to evaluate the effectiveness of programs, processes and functions as compared to industry standards and best practices).
  - Includes an appropriate mix of external assessments and/or industry peer participation on NFS performance-based self-assessments to ensure that NFS keeps abreast of evolving industry standards and best practices.
  - Includes forward-looking elements designed to self-identify potential fragilities in organizational effectiveness and performance.
  - Incorporates insights from Operating Experience, the Corrective Action Program, and systematic analysis of repetitive events, incidents and failures; is sufficiently flexible to address unanticipated or emerging performance assessment needs.
  - Is managed and coordinated by a single individual with effective control over all processes and who is held accountable for successful outcome.
- Continue needed benchmarking activities to identify best practices for the design and implementation of the integrated self and independent assessment plan.
- Continue benchmarking activities as needed to identify industry best practices for the design and implementation of periodic comprehensive self-assessments of organizational effectiveness performed by line organizations.

- Hold individuals accountable for complying with self- and independent assessment procedures.
- Integrate relevant NRC Confirmatory Action Letter requirements into the self-assessment program with the appropriate procedures, which may be draft NFS-MGT-09-XX, Integrated Assessment Program and NFS-GH-945, Rev. 2, Functional Area Management and Casual Ongoing Assessment Program or alternatives. This should also include:
  - Training of staff in the procedures.
  - Tracking of procedure and program implementation
  - Effective accountability of managers, supervisors and staff for implementation.
  - Determination of the continuing functions and role of the Senior Engineering Watch (SEW) and Senior Management Observer (SMO).

2009/2010 AFI-SA-02: This is essentially a repeat Finding from the 2007/2008 ISCA. NFS needs to develop and institutionalize a comprehensive, formal program/process to effectively establish, implement and maintain performance metrics for evaluating and addressing weaknesses in organizational effectiveness and organizational performance. NFS should assign a single point of accountability for such a program/process. Managers and responsible staff who are responsible for providing metric data must be held accountable for performance and for identifying needs for improvement.

2009/2010 AFI-SA-03: NFS needs to develop and institutionalize a comprehensive, formal process to effectively establish, implement and maintain performance metrics for evaluating and addressing weaknesses in organizational safety culture. The commitments made by NFS to develop a comprehensive set of safety culture metrics based on the "flow down from excellence" approach should be met as soon as possible so that (1) NFS will conform with regulatory commitments in this regard and (2) such metrics can begin to be populated and used to drive improvements in the NFS safety culture. NFS should assign a single point of accountability for such a process. Managers and responsible staff who are responsible for providing metric data must be held accountable for performance and for identifying needs for improvement.

2009/2010 AFI-SA-04: The NFS Self-Assessments of its safety culture as compared to the cultural attributes set forth in (or implied by) NRC Regulatory Issue Summary 2006-13 were both late and deficient. A detailed SCUBA Team evaluation of the quality of these self-assessments is provided in Attachment D to this Report, "SCUBA Team Evaluation of the NFS Self-Assessment (Dec 2009/Jan 2010)." As indicated in Attachment D, NFS does not yet appreciate the value of a self-assessment as a means to performance improvement.

The SCUBA Team recommends that:

- NFS should clearly establish a policy and associated expectations for self-assessments of the NFS safety culture.
- NFS should providing training on methods and expectations for conducting self-assessments of the NFS safety culture, including but not limited to the feedback contained in Attachment D to this Report.

2009/2010 AFI-SA-05: NFS needs to monitor and assess progress achieved in improving the safety culture at the NFS-Erwin Site. In this regard, the SCUBA Team recommends that NFS should conduct a formal self-assessment of its safety culture on at least an annual basis.

2009/2010 AFI-SA-06: NFS has not made effective use of external assessments in that the results have generally not received priority attention. NFS needs to ensure that the findings of external assessments receive proper attention.

Supporting Information

Workforce Survey Results

The overall rating of the Self-Assessment/Independent Assessment Component for the NFS Site Composite Organization, from the perspective of the survey participants, was characterized as an Area of Adequacy based on comparison with industry norms. Numerical ratings of three related attributes declined from 2007 to 2009 while none improved. These included:

- Within my functional organization, we are effective at communicating the results of self assessments and independent assessments to affected personnel. (third quartile)
- Within my functional organization, we are effective at addressing and resolving the areas of weaknesses identified through self assessments and independent assessments in a timely manner, consistent with their significance. (third quartile)
- Within my functional organization, we value and use the insights and perspectives provided by our Quality Assurance organization and by other independent reviewers to strengthen nuclear safety and to improve our performance. (fourth quartile)

The SCUBA Team believes that the 2009 Safety Culture survey numerical ratings are higher than justified by actual performance. This is due to a less than well-developed organizational frame of reference in this area.

There were only 13 survey write-in comments relating to this safety culture component. The paucity of survey write-in comments raises the distinct possibility that this safety component may not be well understood by the workforce. This was also identified as an issue through the 2007 NFS Safety Culture survey.

The survey write-in comments indicated that a few perceive that there is extensive and improved oversight at NFS, while a few others perceive that there is a need for increased frequency of inspections and increased communications on inspection results. A few also perceive that metrics need to be improved and need to be more visible.

Based on information received from other sources of input, the SCUBA Team believes that workforce perceptions in this area, as reflected in the overall rating characterization, is more positive than justified by actual performance. It appears that the NFS frame of reference on what constitutes effective self- and independent assessment is inconsistent with nuclear power industry contemporary norms.

Personnel Interviews, Behavioral Observations and Documentation Reviews

SCUBA interviews, behavioral observations and documentation reviews indicate that slight progress has been made for this safety culture component. This was also noted in the SCUBA Team's July 2009 progress review. However, for some CSCII actions shown as completed, ongoing activity was not maintained. Further, some self- and independent assessment activities

being performed as Corrective Action Program activities do not appear to be integrated well with activities under this safety culture component. However, since this component is now a function of the new Assurance Department which also includes the Corrective Action Program, Lessons Learned and Operating Experience, a new opportunity for integration is available.

The NFS 2009 Annual Self-Assessment Report indicated a poor history of compliance with NFS-GHS-945, Rev. 1. Of the 31 designated functional areas, 26 participated to some degree in the program in 2009 and five did nothing. However, most functional areas did not fully follow the procedure with respect to Management by Walking Around, Monthly Self-Assessments or Quarterly Review Meetings. Quarterly Review Meetings were rare. Management by Walking Around declined during 2009 as did Functional Area Self-Assessments.

The targeted Senior Management Oversight (SMO) program initiated in response to the January 7, 2010 NRC Confirmatory Action Letter has been more successful in getting NFS managers on the plant floor to perform assessment activities. NFS has also initiated a temporary SEW. The Management Readiness Assessment Council reviews the reports of the SMOs and the SEWs in order to take actions based on these reviews. These programs are new and their long-term sustainability cannot yet be assessed.

Interviews of NFS managers, supervisors, salary and hourly staff indicated that a majority of those not actually performing self-assessments, audits or not involved with independent assessments do not know what self-assessment is. Most individuals had little association with, or appreciation for, a formal program self-assessment. Many consider self-assessment to be self-checking.

Interviews of NFS staff indicated that most believed that Quality Assurance (QA)/Quality Control have little impact. This finding is consistent with the above-mentioned related 2009 Safety Culture Survey finding

Most self- and independent assessment performed at NFS is either required by NRC regulations, the NRC license, NFS customer(s) or other organizations with which NFS has business relationships. There is considerable room to expand the scope of the integrated NFS assessment programs in order to approach industry norms in this area.

NFS's QA audit program was viewed as an independent assessment activity in the 2009 NFS Self-Assessment and was generally rated as a green sub-component due to completion and favorable inspections results from the NRC. The SCUBA Team reviewed six NFS QA audits conducted in 2009. They were generally found to be audits of program areas. There were audit plans, reports with findings, and disposition of results using the PIRCS process. The SCUBA Team found all findings and observations for these audits in PIRCS. Most required actions were completed on time. For one audit, there were several investigation open beyond the due dates.

One audit relating to overtime, fatigue and worker injury was ordered by NFS management for cause. Corrective action based on that audit's observations has been completed.

Observations of meetings showed that the Corrective Action Program did not effectively incorporate the results of independent or self assessments. Most activities relating to off-normal events that were entered into PIRCS, and reviewed at various PIRCS Screening Committee Meetings, were not subject to any in-depth self assessment. Consequently corrective actions appeared to be narrowly focused.

Commitment closure of PIRCS items resulting from three Independent Assessments performed at NFS in 2009 appears mixed. All five actions required by an NNSA Radioactive Waste Acceptance Program Surveillance of Nuclear Fuels Services conducted on March 31- April 1, 2009, were closed. These had to be completed so NFS could continue to ship waste. Of seven high priority items identified by a B&W Environmental Health and Safety Management Assessment and Compliance Audit of NFS conducted February 23-26, 2009 and requiring an NFS closure plan, one is closed, one has correction action complete and is awaiting an effectiveness evaluation, and five are still in-progress. Of the remaining 43 lower priority findings in the B&W Audit about 25% are closed. Several are waiting for an effectiveness evaluation and a few have overdue corrective actions. Most have some actions on-going. Of four recommendations identified in an Institute of Nuclear Power Operations Assist Visit on April 21-24, 2009, for the configuration management program, all are currently open. They were classified as low priority with most due dates in mid-2010. Some progress has been made on a few of the proposed actions.

No QA audits or other type of program assessments were conducted of Development Laboratory activities that supported process development and changes and production activities in the BLEU Processing Facility or Commercial Development Line. As a result, NFS failed to identify the fact that procedure NFS-TS-009, developed as a corrective action for an earlier event, was never assigned in the training and qualification (T&Q) system. This, in part, contributed to the October, 2009 Bowl Cleaning event. This also appears to be required by 10 CFR Part 70.62(d) which requires NFS to have management measures to ensure compliance with 10 CFR Part 70.61.

The February 21, 2007 Confirmatory Order specifically required NFS to develop performance based metrics to measure the success of the NFS Safety Culture Improvement Plan and Program. The SCUBA Team repeatedly advised NFS senior management of their failure to establish appropriate performance metrics for safety culture. This situation remains unresolved. The SCUBA Team went so far as (1) to meet with each NFS-designated Safety Culture Component Lead to describe how to develop such metrics based on the concept of "flow down from a characterization of what excellence would look like in each Safety Culture Component" and also to provide representative examples of what such metrics might look like and (2) to request NFS management to develop and use safety culture metrics based on either this approach or some other equally rigorous approach preferable to NFS. While commitments were made by NFS to develop a comprehensive set of safety culture metrics based on the "flow down from excellence" approach by October 1, 2009, this commitment was not met and, from the SCUBA Team's perspective, continues to remain open.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

- CSCII PIRCS Commitment C6289 is shown as closed and reviewed as effective by the Corrective Action review Board (CARB). It was to include "demonstrated effectiveness in conducting self-assessment activities" as a performance measure in the annual performance evaluations of NFS managers and supervisors. However, the 2009 NFS Self-Assessment of the Accountability component stated that in 2009 no effective performance evaluation was completed. An NFS senior manager stated that NFS met the words in the item because these words were in the performance evaluation even though

effective performance reviews were not actually done. COMPLETE BUT MISLEADING AND INEFFECTIVE.

- CSCIII PIRCS Commitment C6283, shown as closed and reviewed as effective by CARB, is the development of a multi-year integrated self assessment plan with multiple characteristics. For a significant period of time after the item was closed, the Comprehensive Assessment Plan was not maintained current. As of May 9, 2010, the 2009 Comprehensive Assessment Plan was fairly complete and generally maintained at least through November 25, 2009. The 2010 Comprehensive Assessment Plan, whose file is dated February 2010, was incomplete, and the 2011 Comprehensive Assessment Plan was an empty form. By the end of May, there was updating of the Plans for 2009 and 2010. DESIGNATED AS COMPLETED WITHOUT BEING FULLY COMPLETED. EFFECTIVENESS REMAINS TO BE DEMONSTRATED.
- CSCII PIRCS Commitment C6284 is shown as closed and reviewed as effective by the CARB. This is related to benchmarking for development of a self- and independent assessment program. COMPLETED.
- CSCII PIRCS Commitment C8285 is shown as 90% complete based on the development of draft procedure NFS-GH-945, Rev. 2, NFS Functional Area Manager and Casual Ongoing Assessment Program. The original due date on this item was September 15, 2008. The due date is now June 25, 2010. OPEN.
- CSCII PIRCS Commitment C8286 is shown a 90% complete based on past benchmarking activities of industry periodic self-assessments. Responsibility for this item was transferred 5/26/2010. This item is currently due June 30, 2010. OPEN
- CSCII PIRCS Commitment C8287 is shown as 90% complete based on the development of draft procedure NFS-GH-945, Rev. 2. This item is the enhancement of the effectiveness of management by walking around based on the provision of the procedure to provide training and coaching OJT. A criterion for closure based on the approval of a procedure without actual demonstration of performance appears questionable. OPEN BUT BASIS FOR CLOSURE IS QUESTIONABLE.
- CSCII PIRCS Commitment C8288 is shown as 50% complete. This item is the training of managers in program and process self-assessment. OPEN
- CSCII PIRCS Commitment C8290 is shown as closed and reviewed as effective by CARB. It is the assignment of a lead (ownership and accountability) for the development and implementation of an NFS site wide performance metrics system. This responsibility has been passed several times and for some time responsibility for components has been fragmented. Responsibility has been fragmented and portions assigned to multiple individuals. Many assignment dates noted on the NFS SharePoint site are not being met. In the very recent new organizational restructuring, an individual in the Assurance Department has responsibility for this item. Whether this is effective is unknown based on past performance. COMPLETE (BASED ON ACTIONS TAKEN AFTER IT WAS IDENTIFED AS COMPLETE) BUT EFFECTIVENESS REMAINS TO BE DEMONSTRATED.
- CSCII PIRCS Commitment C6291 is shown as closed and reviewed as effective by CARB. This is the development of comprehensive metrics associated with the implementation of NFS performance and cultural improvement initiatives. Closure was based on the development of metrics, including metrics under evaluation, and their acceptance by the NFS Board of Directors and the CARB. However, the NFS SharePoint Site, the 2009 NFS Self-Assessment and interviews show that these metrics have only

been partially implemented and developed and have been erratically maintained. COMPLETE BUT INEFFECTIVE.

- CSCII PIRCS Commitment C6292 is shown as closed and reviewed as effective by CARB. This is related to PIRCS C6291 and closed based on the same development of metrics which has not progressed. COMPLETE BUT INEFFECTIVE.
- CSCII PIRCS Commitment C6293 is shown as closed and reviewed as effective by CARB. This is a formal, collegial management team review of site-wide performance metrics on a monthly basis. With metrics only partially developed and not always maintained, it is difficult to understand how effective a review would be. COMPLETE.
- CSCII PIRCS Commitment C6371 is shown as closed and reviewed as effective by CARB. This is the adoption of an approach to Nuclear Oversight that is both "compliance based" and "performance based." COMPLETE.
- CSCII PIRCS Commitment C6372 is shown as closed and reviewed as effective by CARB. This was closed with the creation of a senior management position to serve as the leader of the Nuclear Oversight function reporting directly to the NFS Chief Executive Officer. COMPLETE.
- CSCII PIRCS Commitment C10049 is shown as closed and reviewed as effective by CARB. This item was closed with the development of the 2010 Strategic Plan. COMPLETE BUT INEFFECTIVE
- CSCII PIRCS Commitment C10050 is shown as 90% complete and is due June 25, 2010. It is the analysis of output of Management by Walking Around (comments) in PIRCS. Responsibility was transferred on May 26, 2010. OPEN.
- CSCII PIRCS Commitment C10051 is shown as 95% complete and is due June 25, 2010. It is the overall restructuring of the assessment program. Responsibility was transferred on May 26, 2010. OPEN.
- CSCII PIRCS Commitment C10240 is shown as 90% complete and is due June 25, 2010. It is the development of outcome metrics other than NRC Violations. Responsibility was transferred on May 26, 2010. OPEN

NFS Self-Assessment

The 2009 NFS Self-Assessment of this Safety Culture Component was split into two areas composed of an Independent Assessment sub-component and a Self Assessment sub-component. This Self-Assessment was conducted in November/December 2009. The overall rating for each of these components in the NFS SCSA was "Yellow" with an improving trend, and was more self-critical than the self-assessment conducted in 2007 but still not sufficiently self-critical in the view of the SCUBA Team. NFS set down qualitative and quantitative expectations (the roadmap) for assessments for 2009 but did not take steps to hold the appropriate managers accountable when they failed to meet these expectations. The Safety Culture Self-Assessment (SCSA) did not follow the roadmap.

To the credit of the author of the Self-Assessment, the component was rated "Red" with regard to depth, comprehensiveness and self-criticality, due to the recognition that the NFS frame of reference required change.

There was some overlap in the NFS self-assessments, and there is considerable credit taken for regulatory required QA audits and other types of required assessments. The need to perform

assessments to address particular problem areas is not addressed. Credit is taken for draft procedures that will define the overall program and for the 2009 Comprehensive Assessment Plan. However, completion of many of the actions tied to the draft procedures has been moved to later dates and during this assessment period, the Comprehensive Assessment Plan was not always maintained. The SCSA states that "very little planning of assessments and benchmarking trips have been submitted for 2009 and 2010 Comprehensive Assessment Plans." Further, credit was taken for metrics but the SCSA notes that the metrics have not been maintained. No assessment was made on the effectiveness self- and independent assessments on addressing the major problems encountered by NFS in the past year or whether any consideration was given to conducting relevant assessments.

The SCUBA Team continues to view Self- and Independent Assessments as an Area for Improvement

III.H ENVIRONMENT FOR RAISING CONCERNS SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

An environment exists in which employees feel free to raise concerns to their management and/or to the NRC without fear of retaliation, and employees are encouraged to raise such concerns.

SCUBA Team Conclusions

Based on the integration of all sources of assessment input, the SCUBA Team has concluded that the Environment for Raising Concerns Safety Culture Component is an Area in Need of Attention (ANA) at the NFS-Erwin Site when compared to commercial nuclear power plant industry norms. The SCUBA Team also concluded that this Safety Culture Component (SCC) meets minimum regulatory expectations. The Employee Concerns Program (ECP) has been introduced and appears to have solid traction with the majority of employees. However, there are still employees within the organization unwilling to use the ECP and there are still pockets of resistance to creating a Safety and Compliance Conscious Work Environment (SCCWE), most notably in the outlier organizations identified in the 2007/2008 Independent Safety Culture Assessment (ISCA). It is also noted that the number of allegations received by the NRC concerning NFS is high, relative to other fuel facilities, even given the caveat that a significant number come from outside the workforce.

The Overview of Employee Concerns Program Services and Methods, NFS-ECP-001, the Employee Concerns Processing, NFS-ECP-002, and the Employee Concerns Program Document, NFS-ECP-003 guidance documents have been released. An anonymous reporting option has been added to the PIRCS program and has been used. An Ethics Helpline (800 number) has been instituted as part of the McDermott Ethics program. The NFS Safety and Compliance Culture Policy, NFS-MGT-05-007, the NFS Safety and Compliance Conscious Work Environment (SCCWE), NFS-MGT-04-006, and the NFS Procedure Against Harassment and Discrimination, NFS-HR-04-001-A (prohibiting Harassment, Intimidation, Retaliation, and Discrimination (HIRD)) policies have been introduced. General Employee Training (GET) includes sections on SCCWE and ECP. SCCWE and ECP language and expectations have been inserted into NFS contract language.

As shown through the 2009 NFS Safety Culture Survey results, the clear majority of NFS employees report a willingness to raise issues or concerns related to nuclear safety, both to management and to the NRC, without worrying about retaliation. However, it should be noted that the nuclear power industry standard for this component is very high and the survey data band is narrow. That is reflected in the lower quartile placement of the NFS survey results. Training on SCCWE and ECP has been provided to NFS employees and baseline contractors. Nevertheless, barriers remain to free reporting of all issues and concerns by all employees. For example:

- Legacy issues involving perceived instances of retaliation in the past are still cited in personnel interviews.
- Beliefs are held by some employees that, under certain circumstances, negative reactions short of retaliation may result from raising issues or concerns.
- Employees perceive that individuals who demonstrate a questioning attitude and are willing to challenge assumptions on matters related to nuclear safety and safe facility operations are not sufficiently valued.
- Employees believe that open and honest discussion and debate are not sufficiently encouraged when nuclear safety matters are being evaluated.
- Some employees believe that management does not want safety issues raised. (Refer to the SCUBA Team's Fire Damper Inspection Case Study, Attachment G-1)
- There is insufficient confidence that management will act in a timely manner on identified issues.
- There is insufficient confidence that adequate feedback will be provided on the evaluation and resolution of identified issues or concerns.
- There is some unwillingness to use ECP.
- There are perceptions of retaliation.
- There are perceptions that some risk of negative consequences may be involved in raising concerns that slow or halt production.
- There are perceptions, particularly among bargaining unit employees, that raising certain types of issues or concerns has the potential for creating negative consequence for coworkers – or from coworkers for the one who raised the issue.

NFS issued a Differing Professional Opinion (DPO) process on April 28, 2010. There is insufficient run time to evaluate its effectiveness.

SCUBA Team Findings and Recommendations

2009/2010 AOA-ERC-01: NFS-Erwin has established a functional Employee Concerns Program that is recognized by most employees as an alternative means of raising nuclear safety concerns. Additionally, it is seen as a venue for raising issues that fall under the general heading of Safety and Compliance Conscious Work Environment (SCCWE), such as concerns about harassment, intimidation, retaliation or discrimination. Employees generally expressed confidence in the confidentiality provided by the program and its effectiveness in resolving issues.

The ECP replaces the previous alternate reporting avenues (General Counsel, Human Resources, and site Discrimination Council) which were considered ineffective by most employees

2009/2010 ANA-ERC-01: NFS has not yet fully achieved the desired goal of a completely free reporting environment. It is noted that the ECP has been a positive influence. The Ombudsman Program, once introduced, will add another path for raising/resolving employee issues.

The SCUBA Team recommends the following:

- Provide supervisory skills training for all NFS managers and supervisors, particularly those new to a supervisory or managerial role. Include behavioral expectations for:
  - Responding to issues and concerns raised by employees so that:
    - Employees know their concern is welcomed by the supervisor
    - Employees are updated on the evaluation and resolution of their concern
    - Feedback and resolution take place in a timely manner
  - Include a feedback loop from front line employees to determine training effectiveness
- Work with Union leadership to create an environment where reporting of issues will not be considered a personal matter or a violation of membership solidarity.
- Work with Union leadership to mitigate peer-on-peer HIRD
- Work with front-line employees and supervisors to create a collaborative problem-solving process that includes subject matter expertise from all levels of the organization.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the overall rating of the Safety Conscious Work Environment (SCWE) Cross-cutting Component for the NFS-Erwin Site Composite Organization, based on the perceptions of the survey participants, was characterized as an Opportunity for Improvement based on industry norms and places the NFS-Erwin Site Composite Organization near the bottom of the third quartile of the commercial nuclear power plant Sites in SYNERGY's industry database. This rating has improved by 3.3% since the August 2007 survey.

Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area are generally consistent with the actual current work environment. As indicated above, there are areas of notable exception.

With respect to indicators of a potentially chilled work environment, the percentages of NFS-Erwin Site Composite survey respondents indicating that they had personally received a negative reaction for identifying or pursuing issues related to nuclear safety or that they know of someone else who had received a negative reaction are generally within commercial nuclear power plant norms. However, the following are examples of perceptions that scored in the fourth quartile:

- Individual willingness to inform supervision and or to initiate a Problem Report in the event that he/she identified a potential nuclear safety issue or concern.
- Confidence in ability to raise or pursue a potential nuclear safety issue or concern without fear of harassment, intimidation, retaliation or discrimination.
- Valuing individuals who challenge assumptions on matters related to nuclear safety and safe facility operations.
- Respecting differing professional opinions on matters related to nuclear safety and resolving them in a fair and objective manner.
- Personal experience of having received a negative reaction from management for having identified or pursued issues related to nuclear safety.

The following are examples of perceptions that scored in the bottom decile:

- Personal experience of having received a negative reaction from peers for having identified or pursued issues related to nuclear safety.
- Personal experience of having received a negative reaction from supervision for having identified or pursued issues related to nuclear safety.
- Knowledge of someone else who received a negative reaction from supervision or management for having identified or pursued issues related to nuclear safety.

The following are examples of perceptions that scored as Areas of Notable Improvement:

- We value individuals who challenge assumptions on matters related to nuclear safety and safe facility operations. (↑ 9%)
- We encourage open and honest discussion and debate when nuclear safety matters are being evaluated. (↑ 8%)
- We respect differing professional opinions on matters related to nuclear safety and resolve them in a fair and objective manner. (↑ 8%)

There were a total number of 60 write-in comments related to the Environment for Raising Concerns component. Of the 13 SCCs, the Environment for Raising Concerns component ranked fifth in the number of comments received – a relatively high ranking that indicates a high level of interest in this area. Of the 60 comments, 23 were positive in nature, 36 were negative in nature, and one was neutral in nature

The positive write-in comments indicated that:

- Some feel that they are encouraged to report safety issues without fear of reprisal, and that concerns or fear of retaliation have decreased.
- A few indicated that there are many ways to report safety issues, including alternative and/or anonymous methods such as the ECP.
- A few noted that senior management communicates and reinforces that harassment, retaliation and intimidation will not be tolerated at NFS-Erwin.

The negative write-in comments indicated that:

- Some are aware of situations where either they or others have been discouraged from reporting safety issues – either directly or indirectly. A number of examples were provided of perceived "discouraging actions" by peers, supervision, management and senior management.
- Some indicated that they know of retaliation experienced by others from peers, supervisors, and/or managers for raising safety concerns. Examples were provided.
- A few indicated that they had personally experienced retaliation from peers, supervision, and/or management for raising safety concerns. Several examples were provided.

Examples of thought-provoking comments are:

- "I have seen at times when an operator has been looked down upon by first line supervision for raising safety concerns. Sometimes I believe that some of the younger supervisors look at it as a challenge to their authority."

- "Hourly employees are subject to harassment from their peers for reporting issues that may get another employee in trouble."
- "I do know that people sometimes receive harassment/intimidation from peers. A survey of how supervisors respond to harassment/intimidation may help identify and resolve this problem."

Personnel Interviews, Behavioral Observations and Documentation Reviews

The SCUBA Team gained significant insights during personnel interviews, observations, and documentation reviews. The SCUBA Team asked specific questions to address the recent regulatory shutdown and its perceived causes and consequences.

- NFS-Erwin recognized the value and benefits of an Employee Concerns Program (ECP) as an integral element of a strong safety culture. The Chief Nuclear Safety Officer began organizing the framework for ECP in March, 2008, upon receipt of the recommendation in the 2007/2008 ISCA. Within a few months, NFS had selected and trained an ECP Manager and the program was officially launched April 6, 2009 with a site-wide communications program. Benchmarking trips were conducted to South Texas and North Anna and INPO was consulted in development of the EC Program. Policies and procedures were developed specifically for ECP: 1) NFS-ECP-001 Overview of Employee Concerns Program Services and Methods, 2), NFS-ECP-002 Employee Concerns Processing, and 3) NFS-ECP-003 Employee Concerns Program Document.
- An anonymous reporting option has been added to the PIRCS program and an Ethics Helpline (800 number) has been instituted as part of the McDermott Ethics program. General Employee Training (GET) includes sections on SCCWE and ECP. SCCWE and ECP language and expectations have been inserted into NFS contract language.
- NFS initiated an Executive Review Board in March and issued a Differing Professional Opinion (DPO) process in April, 2010. There has been insufficient run time to evaluate the effectiveness of either initiative in supporting the ECP.
- The recent regulatory shutdown allowed management the opportunity to reinforce the message all employees that they are encouraged to identify potential safety issues and raising concerns is welcome, regardless of the potential impact on production. Based on interview feedback, this effort has been successful, and the workforce appears to be willing to internalize the message. However, there is also skepticism: it will take some run time of all NFS processes to ensure that the desired culture change is genuine and not a short-lived phenomenon.
- Employees clearly expressed their willingness to raise issues related to nuclear safety; however, confidence that raising issues was welcome became less evident if the significance of their issue became more subjective or the impact on production became more pronounced.
- Some interviewees reported experiencing negative or retaliatory reactions to raising concerns.
- Employees were aware of the methods for raising issues and could name several alternate paths if they did not want to use conventional processes.
- The ECP has a set of metrics and shares them regularly with upper management. The ECP Manager has immediate and unfiltered access to top management at NFS.

- Employees generally reported trusting relationships with their direct supervisors. Reservations, where noted, tended to refer to newly appointed (and sometimes relatively inexperienced) supervisors.
- Front line employees expressed frustration about the lack of opportunity to provide input to management when it came to technical challenges in their area of expertise. The sentiment was summed up as "they seldom ask; and when they do – they don't listen." This is a legacy issue that will take proactive effort to reverse.
- Employees continue to provide examples of negative reactions from co-workers when a concern is raised. Employees refer to being "PIRCed" when a concern is written in PIRCS that relates to their work, the fact that the issue was raised is taken personally. There is also still an element of belief among the bargaining unit that an issue should not be raised if it might expose a fellow member to potential harm (e.g., discipline, ridicule). This is a legacy issue that will take proactive effort to reverse.
- The Human Performance (HuP) program gets credit from employees for putting errors into problem-solving space instead of exclusively into the discipline process. However, there are pockets of resistance/skepticism about the protection afforded to employees who self-report HuP issues.
- Employees and the NRC Resident Inspectors appear to enjoy a good relationship that has continued through NRC personnel changes. Employees feel comfortable going to the NRC.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed all of the original CSCII Commitments listed in PIRCS for the Environment for Raising Concerns Safety Culture Component. Twelve commitments were identified as "Complete" and "Approved by CARB." Key observations selected from the review are as follows:

- PIRCS 13677 Commitment C6294 "In this regard, the SCUBA Team recommends developing and implementing an Employee Concerns Program (ECP), such as those deployed in the commercial nuclear power plant industry, with a dedicated ECP Representative reporting directly to the NFS Chief Nuclear Safety Officer. This reporting chain provides an alternate path that is completely outside line management, thereby establishing its independence." EFFECTIVE
- PIRCS 13678 Commitment C6296 "Bring contractors into the environment on an active basis; currently there is no oversight of contractor SCCWE." There are SCCWE expectations set in NFS contract language, but no formal oversight of contractor compliance. NOT EFFECTIVE
- PIRCS 13678 Commitment C6302 "Establish and reinforce SCCWE expectations for management and supervision. Include behavioral expectations in performance evaluations (PEP)." Entry in PEP only made reference to the policy – no behavioral guidance. PEP not implemented. CLOSED TO ACTION NOT PERFORMED/NOT EFFECTIVE
- Commitment C6298 was written to "Demonstrate that validated safety concerns will be addressed in a timely and effective manner." The commitment was written on May 18, 2008, started on April 6, 2009, and has a due date of May 30, 2011. NOT TIMELY

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the SCUBA Team progress review of the CSCII implementation conducted in July 2009. There were three items to review: two are complete. The third commitment is not yet complete:

- Commitment C10039 "Consider informal near-term soft skill steps for NFS" was intended to address gaps in new supervisor skill sets. Inappropriately closed to C6302, which dealt with contractors." Supervisory training has been planned and is in the early stages of implementation. IMPROPERLY CLOSED/INCOMPLETE

NFS Self-Assessment

The NFS Self-Assessment of the Environment for Raising Concerns component, conducted November 10, 2009, was sufficiently self-critical. It resulted in an Overall Assessment Rating of "Yellow: sometimes effective, sometimes reactive, requires monitoring," and a trend of "Positive (Improving)." The finding correctly assesses two key areas (out of six) as "Green: usually effective, proactive, meets expectations, eliminates problems, acceptable." The SCUBA Team concurs with the results of the NFS self-assessment.

III.I PREVENTING, DETECTING AND MITIGATING PERCEPTIONS OF RETALIATION SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

A policy for prohibiting harassment and retaliation for raising nuclear safety concerns exists and is consistently enforced.

SCUBA Team Conclusion

Based on the integration of all sources of assessment input, the SCUBA Team has concluded that the Preventing, Detecting, and Mitigating Perceptions of Retaliation Safety Culture Component is deficient at NFS-Erwin when compared to commercial nuclear power plant industry norms and, as a result, represents an Area for Improvement (AFI). The SCUBA Team has also concluded that this Safety Culture Component meets minimum regulatory expectations.

In this regard, the SCUBA Team has concluded that NFS:

- Has a Procedure (NFS Procedure Against Harassment and Discrimination, NFS-HR-04-001-A) prohibiting Harassment, Intimidation, Retaliation, and Discrimination (HIRD). Nevertheless, there is evidence of a high tolerance for degraded Safety and Compliance Conscious Work Environment (SCCWE) behavior on the part of the workforce, including management.
- Has a Policy (Overview of Employee Concerns Program Services and Methods, NFS-ECP-001) that identifies the Employee Concerns Program (ECP) as an alternate means of raising concerns.
- Has a Policy (Executive Review Board, NFS-MGT-10-023) that establishes the Executive Review Board (ERB) as an oversight body tasked with reviewing a wide range of organizational activities (employment and discipline decisions, significant changes, ethics issues, etc.) that may have the potential to create a perception of retaliation. ERB began monthly meetings in March 2010; it is too soon to determine effectiveness.
- Trains employees and baseline contractors on company expectations and available reporting processes.
- Discrimination claims are investigated, primarily by Human Resources (HR).
- Union leadership participates in discipline decisions (above a certain level) affecting bargaining unit employees. They are not included on the ERB.
- Is developing a collaborative relationship between ECP and the new HR Manager (acting) to exchange pertinent information about potentially chilling issues. The new HR manager has been in place since April; it is too soon to determine effectiveness.

SCUBA Team Findings and Recommendations

2009/2010 AFI-PDM-01: NFS-Erwin has made progress, but has not demonstrated a zero tolerance for inappropriate behaviors on the part of the workforce, including managers. There is still evidence that employees perceive negative outcomes and retaliation from management and peers for raising concerns and safety issues. In this regard, the SCUBA Team recommends the following:

- Establish a robust supervisory training program for all personnel who supervise employees (i.e., training for the function, not the title), emphasizing effective communication, respect for the individual employee, and timely response to employee issues.
- Include review of inappropriate SCCWE behavior by management and employees as a responsibility of the ERB.
- Make successful completion of the supervisor training recommended in Finding 2009/2010 ANA-ERC-01 a prerequisite for assuming supervisory duties – temporary or permanent – of NFS employees (or contractors). Formalize the expectation by including it in NFS-MGT-04-006, Safety and Compliance Conscious Work Environment Policy.
- Establish a proactive outreach effort to build trust/improve the relationship between HR and the bargaining unit.
- Ensure that the NFS Discipline Policy (revision pending) NFS-HR-04-003-A, Salaried Employees Rules of Conduct (last revised February 22, 1993) includes guidance on how to recognize and mitigate potentially chilling HR decisions or initiatives.
- Revise NFS-HR-04-001-A, Rev. 2, Harassment and Discrimination Policy (last revised June 22, 2005) to increase the degree of rigor and formality of this procedure.
    - It is a general guideline and does not specifically tie its prohibitions to the raising of nuclear safety concerns.
    - Retaliation is narrowly defined
    - There is no requirement for training identified in the procedure; training on this component is not imbedded in initial/continuing training.
    - There is no requirement for collecting and trending data to determine whether or not the policy expectations are being met.
    - Responsibility for ensuring procedure compliance is not clearly defined.
    - The document does not mention the confidential alternate reporting path available through the ECP.
- Develop a process for identifying, retraining, and/or removing those in supervisory roles who are not successful at developing a safety conscious work environment for the employees who report to them.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the rating of the Preventing, Detecting and Mitigating Perceptions of Retaliation component for the NFS-Erwin Site Composite Organization, as perceived by the survey participants, was characterized as an Area in Need of Attention based on industry norms. This rating places the NFS-Erwin Site Composite Organization in the fourth quartile of the commercial nuclear power plant Sites in SYNERGY's industry database. This rating has improved by 5.9% since the August 2007 Safety Culture Survey.

Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area are generally consistent with the actual current work environment.

The Preventing, Detecting and Mitigating Perceptions of Retaliation component of the NRC Regulatory Issue Summary 2006-13 model of the Safety Culture Component consists of three survey questions/cultural attributes. Numerical ratings of the following individual cultural attributes indicate that the workforce perceives a need for improvement:

- Individual belief that harassment, intimidation, retaliation or discrimination against individuals for raising or pursuing potential nuclear safety issues or concerns is not tolerated at the NFS-Erwin Site. (bottom of third quartile)
- Receiving adequate training on the NFS Erwin Safety and Compliance Conscious Work Environment Policy and how it applies to day to day work activities. (fourth quartile)
- Individual confidence that effective methods are in place to detect and prevent harassment, intimidation, retaliation or discrimination against individuals for raising or pursuing potential nuclear safety issues or concerns. (bottom decile)

While the individual attributes still score low relative to nuclear power industry norms, it should be noted that there is a very narrow band of scores for this component. It should also be noted that NFS has seen notable improvement in these areas since the previous survey:

Perceived Areas of Notable Improvement:

- Individual belief that harassment, intimidation, retaliation or discrimination against individuals for raising or pursuing potential nuclear safety issues or concerns is not tolerated at the NFS-Erwin Site. (↑ 6%)
- Receiving adequate training on the NFS Erwin Safety and Compliance Conscious Work Environment Policy and how it applies to day-to-day work activities. (↑ 6%)
- Individual confidence that effective methods are in place to detect and prevent harassment, intimidation, retaliation or discrimination against individuals for raising or pursuing potential nuclear safety issues or concerns. (↑ 5%)

There were only six write-in comments related to the Preventing, Detecting and Mitigating Perceptions of Retaliation. Five were negative in nature, including:

- Two instances where opportunities to prevent perceptions of retaliation were perceived to have been missed when issues were raised through existing programs.
- An instance where mitigation of perceptions of retaliation was not effective. This involved a termination of an employee. This was one of two comments that referred to the need to address or prevent rumors related to retaliation.

Personnel Interviews, Behavioral Observations and Documentation Reviews

The SCUBA Team gained significant insights through personnel interviews, observations, and documentation reviews. NFS has made good progress in addressing issues identified in the 2007/2008 ISCA. The implementation of the ECP and ERB are key steps to bringing NFS into alignment with nuclear power plant industry norms for this component. The SCUBA Team asked specific questions to address the recent regulatory shutdown and its perceived causes and consequences. Insights include the following:

- Investigative responsibility for retaliation claims now resides in ECP. This is viewed as an improvement over the previous process which relied on HR and was perceived as a potential conflict of interest.
- On occasion, NFS utilizes external investigative resources.
- Investigations are now subject to a timeliness expectation, as per the NFS policy Employee Concerns Processing, NFS-ECP-002
- Investigator training requirements are established and the ECP Manager has received training to nuclear power industry norms.
- Expectations for feedback to concerned individuals is now described in policy, as are the processes for tracking corrective actions and for verifying their effectiveness.
- Interviews indicate instances of low management self-awareness when it comes to behaviors that could be perceived as potentially chilling. This is viewed as particularly true for new/young supervisors.
- Most employees regard their relationship with their immediate supervisors as trusting. Generally trust decreases up through middle and senior management, but is variable.
- Interviews, observations, and survey results agree that NFS employees would not let fear of negative reactions or retaliation prevent them from raising nuclear safety issues.
- Some employees believe that there is potential for receiving a negative reaction or retaliation – but they would still report nuclear safety issues and/or situations that posed a clear or imminent threat to personal safety.
- Some employees perceive that negative management reactions (and, in some instances, retaliation) have occurred for concerns that had the potential to interrupt production.
- Some employees indicate they experienced negative reactions for raising safety issues.
- Some employees expressed concern about raising issues that were less significant than nuclear safety. In some cases, the reluctance was based on legacy events.
- The threshold for taking offense remains low for some employees, and terms like "harassment" and "intimidation" are sometimes used improperly to describe behaviors.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed all of the original CSCII PIRCS Commitments listed for the Prevent, Detect, and Mitigate Perceptions of Retaliation Safety Culture component. Five commitments were made in this component; two of the five have been completed and approved. Key observations were as follows:

- C6305 stated in part: "Develop and implement a Potential Chilling Effect Oversight Process - Perform a periodic review of management actions to verify that they are consistent with the prevention of HIRD. Take corrective actions as appropriate." This was closed out by the CARB to the Organizational Change Management (OCM) policy because: "The OCM process includes a step to consider potential chilling effect." That is an inappropriate path to address the issue. The intent was to institute a review process that would occur at regular intervals, such as the ERB. Taking credit for a policy that is only used occasionally and leaves consideration of chilling effect as an option clearly misses the mark. It is symptomatic of a culture of minimal compliance. INEFFECTIVE
- C6306 states: "Ensure that the NFS Discipline Policy includes guidance on how to recognize and mitigate potentially chilling events." The proposed solution (not yet approved by the CARB) is: "The NFS Discipline Policy has been revised to include a

Balance of Error process which directs an investigation down one of two paths of the decision tree. If the process indicates that there was no intent to violate procedure, (no culpability) then discipline is not considered. If it is determined that there is culpability, the standard rules of discipline apply and will be administered appropriately." Misses the point – does not provide guidance on how to mitigate potentially chilling discipline actions. INCOMPLETE/INEFFECTIVE

- C6307 was written to recommend six specific revisions to NFS-HR-04-001-A, Rev. 2 Harassment and Discrimination Policy. The recommendations are also found in the Findings and Recommendations section of this document. It was entered into PIRCS May 18, 2008; the due date is June 30, 2010 and it is 0% complete, indicating a low priority. INCOMPLETE/UNTIMELY

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the SCUBA Team progress review of CSCII conducted in July 2009. Three items were reviewed in total; there are two items of interest:

- C10041 was written to recommend engaging the bargaining unit in preventing HIRD. It was closed out to the release of NFS-MGT10-023, Executive Review Board, which contains the following reference in the Commitment Log: "PIRCS Commitment 10041 – Give the bargaining unit the opportunity to provide input concerning possible perceptions of retaliation and potential methods for mitigating those perceptions." However, the Policy does not allow bargaining unit participation in the ERB process. There is a notation in the Attachment to the Policy which inquires about bargaining unit participation, but it is the last item on the checklist and follows questions that ask if there is a risk of perception of retaliation. It is possible that the ERB could determine that there is no risk and could do so before the bargaining unit has had a chance to offer their opinion. It is recommended that the checklist be revised to engage the bargaining unit before the ERB makes the determination. PARTIALLY EFFECTIVE
- C10237 was written to develop metrics to show ECP performance. PIRCS shows actions 100% complete on March 15, 2010, with due date of April 15, 2010. Not closed out in PIRCS, even though actions are complete. OVERDUE IN PIRCS

NFS Self-Assessment

The Self-Assessment conducted by NFS-Erwin in this component area is rated overall as "Yellow - Sometimes effective, somewhat reactive, requires monitoring," with a positive trend.

- Credit is taken for providing training on SCCWE elements, but no percent of population trained information is provided.
- It noted that anonymous use of PIRCS is low (less than 1% of all safety issues), as was the number of reported ECP concerns that were in the HIRD (Harassment, Intimidation, Retaliation, Discrimination) category: total of six, one substantiated.
- There were no substantiated allegations of discrimination.
- Credit is taken for a Change Management Policy (NFS-MGT-09-016), but the Policy has not been embraced by the organization (see Organizational Change Management component for examples).

The SCUBA Team generally concurs with the self-assessment, but has concluded that this Safety Culture Component represents an Area for Improvement.

III.J ACCOUNTABILITY SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

Management defines the line of authority and responsibility for nuclear safety.

SCUBA Team Conclusions

The SCUBA Team has determined that Accountability is an Area for Improvement (AFI). Performance is considered to be deficient with respect to commercial nuclear power plant industry norms. It does not meet regulatory expectations in that accountability has not been systematically and consistently reinforced, particularly at management and senior management levels.

The above conclusion is based on a number of significant deficiencies noted in NFS's accountability-related management practices:

- NFS management has not consistently demonstrated or promoted a questioning attitude. As a result, there is a reluctance to raise issues or concerns that could potentially impact production or key organizational objectives.
- Management ownership and accountability for regulatory commitments is deficient. Commitments are not consistently executed in a high quality or timely manner. Effective follow through to assure commitment completion and effectiveness of corrective actions does not consistently occur.
- Management does not consistently model high-accountability behaviors regarding execution of commitments. Examples include the failure to meet commitment requirements and/or schedules for the Comprehensive Safety Culture Improvement Initiatives (CSCII), the Excellence Flow-Down & Metrics Program, the NFS-Erwin Safety Culture Self-Assessments, multiple Corrective Action Program Commitments such as the failure to implement NFS-TS-009 in a timely manner, and the failure to implement Effectiveness Reviews for key CSCII commitments. These behaviors undercut organizational and individual accountability.
- Assignment of single-point ownership and accountability is not an institutionalized organizational practice. As a result, lines of accountability for organizational performance can and do become unclear.
- Management has not historically balanced workload and resources. New programs and initiatives frequently displace existing initiatives, and employees are neither encouraged nor obligated to bring these situations to management's attention so that they may be resolved appropriately. This has created an environment where the failure to meet commitments is considered to be routine and acceptable. This undercuts both individual and organizational accountability.
- NFS-Erwin has failed to implement a formal performance management system, including documented objectives and performance appraisals, which is essential to promote organizational and individual alignment and accountability.
- Management oversight and control of decision making processes was inadequate to ensure safe facilities operations and prevent loss events.

Most of the deficiencies noted above were also documented in the 2007/2008 Independent Safety Culture Assessment (ISCA) Results Report.

SCUBA Team Findings and Recommendations

2009/2010 AFI-ACC-01: This is essentially a repeat Finding (AFI-ACC-01) from the 2007/2008 ISCA. Management has not consistently demonstrated and promoted a questioning attitude in that there is (1) a tendency for the organization to make non-conservative decisions when faced with production pressures and (2) there is reluctance to raise safety-related concerns that impact production or key organizational objectives:

- Executive leadership needs to clearly and continuously communicate and reinforce the desired organizational behavior that all employees, especially management, are expected to demonstrate a questioning attitude. (The NFS-Erwin initiatives executed during the recent regulatory shutdown constitute a good start.) This requirement should be part of every employee's annual performance objectives and appraisal.

2009/2010 AFI-ACC-02: This is essentially a repeat Finding (AFI-ACC-02) from the 2007/2008 ISCA. Management ownership and accountability for regulatory commitments is lacking in that commitments are not consistently executed in a high quality or timely manner, and documented corrective action effectiveness reviews are rarely performed. In this regard, the SCUBA Team recommends the following:

- Implement and institutionalize individual management ownership and accountability for regulatory commitments to assure regulatory commitments are fully implemented and effective on a long-term basis. These requirements should be implemented through a formal performance management/appraisal process.

2009/2010 AFI-ACC-03: This is essentially a repeat Finding (AFI-ACC-03) from the 2007/2008 ISCA. Management does not consistently model high-accountability behaviors. Management's failure to follow through on commitments undercuts organizational and individual accountability. In this regard, the SCUBA Team recommends the following:

- Establish an environment where management failure to meet formal commitments is viewed as unacceptable. This should be implemented through a formal performance management/appraisal process.

2009/2010 AFI-ACC-04: This is essentially a repeat Finding (AFI-ACC-04) from the 2007/2008 ISCA. Single-point accountability is not an institutionalized organizational practice. As a result, lines of accountability can become unclear. In this regard the SCUBA Team recommends the following:

- Institutionalize use of single-point accountability for key organizational functions, objectives, and initiatives. Document and enforce these accountabilities through a formal performance management/appraisal process.

2009/2010 AFI-ACC-05: Management does not routinely balance workload and resources, resulting in conflicts between new programs/initiatives and existing commitments. The failure to address these situations routinely results in the failure to meet existing commitments, thereby undercutting individual and organizational accountability.

- Develop and implement a comprehensive project/work management system that balances workload and resources, and encourages employees to identify conflicting programs and initiatives so they can be proactively resolved. (The Three Week Look Ahead/Plan of the Week/Plan of the Day have the potential to fulfill the above requirement if taken to full completion.)
- Develop and implement a resource management process that serves to identify and resolve mismatches in the workloads of individual NFS personnel, particularly white-collar personnel, through effective prioritization of workload, re-distribution of workload as needed, active monitoring of potential mismatches between static and dynamic workloads and expectations and commitments, and communication and resolution of such mismatches as soon as they develop.

2009/2010 AFI-ACC-06: This is essentially a repeat Finding (AFI-ACC-05) from the 2007/2008 ISCA. NFS executive leadership has not institutionalized a formal performance management process. Performance agreements are not routinely required of managers, supervisors, or salaried personnel; and formal performance appraisals are not performed. This results in a lack of organizational and individual alignment with, and progress toward, key safety-related improvement initiatives. Furthermore, up until the time of the regulatory shutdown, management had not regularly interacted with employees to reinforce desired safety culture related behaviors and performance expectations. In this regard, the SCUBA Team recommends the following:

- Develop a comprehensive, documented project plan and schedule to achieve NFS-Erwin safety and compliance objectives. This document should establish an organization-wide standard of excellence, to which all personnel are held accountable.
- Develop and implement a formal performance management system. This system should be utilized to directly tie individual performance objectives and/or commitment contracts to leadership's vision, plans, and objectives.
- Significantly increase management interaction with employees for the specific purpose of communicating and reinforcing safety and compliance standards and expectations. These interactions should (1) include regular reinforcement of performance objectives established through the performance management system and (2) incorporate a much greater presence on the shop floor by both line and support group management.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the overall rating of the Accountability Component for the NFS-Erwin Site Composite Organization, as perceived by the survey participants, was characterized as an "Area of Adequacy/Competency" based on comparisons to industry norms. This rating places the NFS-Erwin Site Composite Organization near the boundary between the second and third quartile of the commercial nuclear power plant Sites in SYNERGY's industry database. Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area, as reflected by the overall rating, are significantly more positive than is justified by actual behaviors and organizational performance. In particular:

- The comparatively high numerical ratings of attributes such as "supervisors and managers demonstrate that nuclear safety is our top priority by walking the talk and leading by example" and "Senior Site Management demonstrates that nuclear safety is our top priority by walking the talk and leading by example" are not consistently supported by information obtained through other sources (i.e., personnel interviews, behavioral observations, and Case Studies).

Based on benchmarking against industry norms, the following Accountability attribute characterizations fall in the fourth quartile ranking:

- Management ensuring effective ownership and accountability for planned actions related to important issues or activities that could affect Nuclear Safety or safe facility operations.
- Supervisors and managers holding individuals appropriately accountable for performance and results.

Based on the lowest mean value ratings provided by the NFS Site Composite Organization itself, the following Accountability attribute characterizations are noteworthy as they were in the lowest 20% of all Safety Culture attribute ratings:

- At our Site, the system of rewards and sanctions encourages behaviors that are consistent with a strong Safety and Compliance Conscious Work Environment.
- For important issues or activities that could affect nuclear safety or safe facility operations, management ensures effective ownership and accountability for planned actions.
- Supervisors and managers in my Functional Organization hold individuals appropriately accountable for performance and results.

There were fifty-seven write-in comments related to Accountability. Thirty-nine were negative, while 18 were positive. The principal negative comments indicated that:

- Some believe there is inconsistent organizational commitment to, and reinforcement of, improvements to the NFS-Erwin Safety Culture.
- Some believe that more needs to be done to positively reinforce those who demonstrate a commitment to safety culture standards and expectations.
- Some believe that individual accountability needs to be improved, and that management should focus on this rather than on continually adding new procedure requirements and/or training when an individual fails to meet expectations.

Personnel Interviews, Behavioral Observations, and Documentation Reviews

The lines of authority and responsibility for nuclear safety are defined through NFS's policies, procedures and organization charts. The organization-wide understanding is that the Regulatory/Safety organization is responsible for assuring that regulatory requirements are adequately defined and incorporated into the organization's policies and procedures; while the balance of the organization has the responsibility to comply with these policies and procedures. Operations has attempted to take increasing ownership for safety performance; however, most of the process-related decision making is made in other parts of the organization (Engineering and Safety), and Operation's understanding and control of these decisions is limited. The SCUBA

Team has identified several other concerns regarding (1) roles and responsibilities and (2) management's reinforcement of safety standards and safety-related behaviors as an overriding priority:

- The organization has not consistently exhibited or reinforced a questioning attitude, particularly when faced with production pressure from senior management. For example, most employees indicated that they would always raise a concern if they felt they were dealing with an issue that presented an "imminent danger" to an individual or the organization; however, a number of individuals, particularly in the white collar organization, expressed reluctance to raise a concern when confronted with production pressures that presented less significant challenges to safe operations.
- Interviews indicate that much of the workforce feels that the white collar organization and management in particular, is not held accountable for bad decisions and/or poor organizational performance.
- Management personnel have not consistently demonstrated or reinforced accountability to articulated standards and expectations, thereby undercutting organizational accountability.
- There is little or no evidence that senior managers have held themselves accountable for NFS-Erwin's poor regulatory performance.
- Management has not effectively balanced workload and resources, has not evaluated the impact of new assignments on existing commitments, and has not encouraged people to speak out when existing commitments are placed in jeopardy by new programs/initiatives. This behavior has created a culture where the failure to meet established commitments is considered to be both routine and acceptable, thereby undermining both individual and organizational accountability.
- Management ownership and accountability for regulatory commitments is deficient. There has been insufficient management oversight and control to assure corrective actions are consistently completed and performed in a high quality and timely manner. Effectiveness reviews have not been performed on a systematic or regular basis. Examples include CSCII commitments identified as "Complete" and "Approved by CARB" and the failure to complete NRC fire damper inspection commitments.
- Assignment of single-point ownership and accountability has not been an institutionalized organizational practice. As a result, lines of accountability (accountability for organizational decisions and the results of same) frequently become unclear – particularly for project activities where multi-department support is required to accomplish a task.
- Management has traditionally not spent a significant amount of time on the shop floor practicing Management by Walking Around (MBWA), thus, it has largely missed an opportunity to reinforce safety objectives and desired safety-related behaviors with employees on a systematic small-group or one-on-one basis -- particularly on backshifts and weekends. (The organization has bolstered management presence on the shop floor since the loss events of late 2009, and the resultant regulatory shutdown. It remains to be demonstrated that this change in behavior will be lasting or effective.)

Other management/organization behaviors that undermine accountability include the following:

- Examples were found where supervisors and/or managers proceeded, without appropriately resolving procedural deficiencies, due to perceived production pressures or

false confidence in their understanding of the basic technical principles involved with the failure event. There are also examples where management does not consistently follow administrative policies and procedures (e.g., Human Resource procedures, MBWA, Self-Assessment, Organizational Change Management, and Performance Management). A more appropriate practice would be to enforce these policies and procedures unless or until appropriate substitutes have been developed. The failure of management to comply with documented policies and procedures feeds the perception that procedural compliance is (1) not a consistent organizational priority and (2) not applicable to management.

- The organization continues to be tolerant of degraded equipment/conditions and the development of workarounds to deal with same. Many of these workarounds become formalized (via changes in operating procedures) in order to avoid procedural noncompliance; thereby, increasing the organization's dependence on administrative controls. The inconsistency between these practices, and management statements that safety is the organization's overriding priority, is not lost on the workforce. A second message is that management does not hold itself accountable for fixing equipment problems and/or flawed defenses. The degraded equipment issue is discussed further in the Resources Safety Culture Component section of this Report.
- There are strong organizational silos that inhibit communication, cooperation, and accountability. This is particularly evident in the project management process, which by industry norms is very informal and rather unstructured. As a result, roles, responsibilities, and the ultimate accountability for safety frequently become unclear.
- Many key decisions, including those related to safe operations, are made by a relatively small group of senior managers. These decisions are frequently not well communicated or explained; and it is not unusual for the workforce to have limited/no input regarding these decisions. Management is also perceived as failing to take responsibility for decisions that result in negative consequences. These behaviors undermine individual ownership and accountability for organizational performance in general, and safety performance in particular. For example, after several two-person rule violations were identified in the 105 Laboratory, senior management unilaterally decided that the corrective action was to post a security guard to enforce the two-person requirement. Not only did this action undermine holding laboratory personnel appropriately accountable for their actions, it resulted in an additional workload and increased overtime for the security force.
- Vertical communication within the organization is poor. There is a tendency to communicate an issue once or twice and assume that communication will cascade throughout the organization without any loss of content or impact. As a result, many employees do not understand where the organization is headed from a safety perspective or why, thus undermining individual employee ownership and accountability. For example, very few employees understand or can explain the CSCII, the key safety culture deficiencies that contributed to the recent loss events and NRC safety concerns, or the most fundamental requirements of the NFS-Erwin Special Nuclear Material (SNM) license.
- NFS does not have an active formal performance management system. Thus, performance objectives and reviews, and the associated reinforcement (rewards/sanctions), are not utilized to reinforce safety objectives or requirements.

Field observations and interviews do indicate that employees are generally safety conscious, and would not knowingly let a fellow employee put themselves, or others, in a position of imminent danger. However, it is highly unlikely that NFS-Erwin will be able to operate without another significant loss event unless/until it can resolve its accountability issues – especially those issues that exist in senior management.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed all of the original CSCII PIRCS Commitments listed for the Accountability Safety Culture Component that were identified as "Complete" and "Approved by CARB." Ten commitments were identified as "Complete" and "Approved by CARB." The SCUBA Team does not concur that any of these items have been fully/effectively implemented. Specific results are described below.

- PIRCS 13680 Commitment C6308 – Executive leadership to clearly communicate and reinforce that all employees, especially management, are to demonstrate a questioning attitude. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13680 Commitment C6309 – C6308 should be part of every employee's annual performance objectives and appraisal. Performance reviews are not performed. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13684 Commitment C6311 – Institutionalize individual management ownership and accountability for regulatory commitments to assure they are fully implemented and effective on a long-term basis. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13684 Commitment C6312 – C6311 should be implemented through a formal performance management/appraisal process. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13685 Commitment C6313 – Establish a zero-tolerance environment for management deviation from procedures – including administrative procedures. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13685 Commitment C6314 – C6313 should be implemented through a formal performance management appraisal/process. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13686 Commitment C6315 – Institutionalize use of single-point accountability for key organization functions, objective and initiatives. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13686 Commitment C6316 – Document and enforce C6315 through a formal performance management/appraisal system. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13688 Commitment C6317 – Develop a living strategic plan for safety and compliance. An organizational strategic plan was developed, a component of which dealt with safety and compliance issues. Execution of this plan was lacking. IMPLEMENTATION PARTIALLY EFFECTIVE
- PIRCS 13688 Commitment C6319 – Significantly increase management interaction with employees for the specific purpose of communicating and reinforcing safety and compliance standards and expectations. These interactions should (1) include regular reinforcement of performance objectives established through the performance management system and (2) incorporate a much greater presence on the shop floor by both line and support group management. Increased communication with the shop floor did not occur coincident with this corrective action; but has occurred post-shutdown.

NFS-Erwin does not utilize a formal performance management system. IMPLEMENTATION PARTIALLY EFFECTIVE

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the SCUBA Team Progress Review conducted during July 2009.

- PIRCS 13686 - Commitment C10022 established a requirement to stress single point accountability by January 1, 2010. This initiative was side-tracked by the issuance of the Confirmatory Action Letter but is now complete and takes credit for the "Plan of the Day." COMPLETE – EXCEEDED ORIGINAL DUE DATE
- PIRCS 13686 - Commitment C10023 established an expectation to conduct effectiveness reviews following apparent cause evaluations. This initiative was side-tracked by the issuance of the Confirmatory Action Letter but is now indicated as complete and takes credit for the "Plan of the Day," as opposed to actually performing effectiveness reviews. REQUIREMENT NOT SATISFIED – ACTION INEFFECTIVE
- PIRCS 13688 - Commitment C10024 established an expectation to review the quality of PEP agreements that are to serve a part of the annual evaluation process by March 1, 2010. Performance evaluations are not being performed for calendar year 2010. NOT COMPLETE – OVERDUE (EXCEEDED ORIGINAL DUE DATE)
- PIRCS 13680 - Commitment C10025 established an expectation to develop an appropriate level of sponsorship for safety culture components by 1 November 2009. The CARB approved it in November. Although sponsors have been named, the management's sponsorship behaviors have not changed, and are largely ineffective. COMPLETE – INEFFECTIVE.
- PIRCS 13685 - Commitment C10230 established an expectation for a metric that would measure the quality and timeliness of finished products by 1 January 2010. The work was completed on January 5, 2010. COMPLETE – METRICS DEVELOPED BUT NOT IDENTIFIED IN THE CORRECTIVE ACTION DESCRIPTION– COMMITMENT NOT COMPLETE

NFS Self-Assessment

NFS-Erwin management's overall self-assessment was that accountability is an area that is sometimes effective, somewhat reactive, requires monitoring, but is improving. Key NFS observations were as follows:

- There are programs that provide guidance for decisions to be made with safety as a priority.
- There are recent examples of inappropriate weight being given to production schedules including the CDL fire (PIRCS 22097) and the decision to load Al fines into the bowl cleaning station (PIRCS 21570).
- A recent reduction in pay for management and other salaried employees is believed to have reinforced management accountability.
- No effective performance evaluations were completed in 2009.
- Little coaching or peer reinforcement has been observed.

The Safety Culture Self-Assessment roadmap was not followed; hence, previously documented SCUBA concerns (e.g., the 2007/2008 ISCA AFIs), component metrics, performance gaps, and the status of current and/or planned corrective actions were not discussed.

The SCUBA Team's believes NFS's self-assessment of Accountability is excessively optimistic, and that a more appropriate assessment is "Red" requiring attention: ineffective, unsatisfactory, and poor understanding of requirements. As noted above, the insights gained from the safety culture survey, personnel interviews and behavioral observations indicate that accountability has not been systematically and consistently reinforced at the workforce, supervisor, management or senior management levels; and there a numerous examples where accountability has been weak or non-existent.

III.K CONTINUOUS LEARNING ENVIRONMENT SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

The licensee ensures that a learning environment exists.

SCUBA Team Conclusions

Based on the integration of all sources of assessment input, the SCUBA Team has concluded that the Continuous Learning Environment component of the NFS-Erwin safety culture is deficient when compared to commercial the nuclear power industry norms and represents an Area for Improvement (AFI). The Site does not meet regulatory expectations in that the organization is insular and not fully engaged in activities to promote a continuous learning environment and Safety Culture improvement. In this regard, the SCUBA Team has concluded that:

- Continuous Improvement
  - Benchmarking plans have been developed; however, these plans are not fully supported, documented, and implemented. Benchmarking efforts other than those associated with the regulatory shutdown have been suspended. Any impact upon the organization from benchmarking activities is extremely limited or unknown.
  - The strategic planning process, "One-Page-Planning," has been ineffective. Plans have not been consistently developed and followed. Initiatives to progress safety culture and performance have struggled.
  - Focused and concerted efforts to implement the Comprehensive Safety culture Improvement Initiative (CSCII) in a timely manner have not been forthcoming resulting in the status quo being considered as acceptable. There has been insufficient leadership and attention including ownership and accountability of the CSCII.
  - Individual organizations and departments are autonomous. This contributes to silo thinking and individual organizational priorities hampering change and or safety culture improvement initiatives.
  - The Training organization does not have the resources to support continual improvement.
- Training
  - Training efforts are primarily focused on the technical education of Operations personnel in support of manufacturing.
  - The toolbox training method does reach the intended population but does not assure standardization because the quality of instruction varies with supervisor and venue.
  - Prerequisites for key positions have not been fully determined or defined. A training program to support such requirements is not available.
  - There is a lack of in-house training and funding for maintaining and developing technical competence.
  - There is variability between the work practices taught in the classroom and those observed at the work site once the technicians are qualified and comfortable with their job. On-the job experience is allowed to replace procedural reference – a practice that goes uncorrected by supervisors.

  - Operators generally contact supervision during process upsets as normally stated in procedures. Recognition and response to these off-normal situations could be improved within the workforce, particularly new or inexperienced supervision.
  - The limited operating experience and self- and independent assessment information being utilized in the training program is the result of commitments associated with the regulatory shutdown.
- Development of Supervision and Management
  - Leadership development for supervision and management has not been a focus point; it is currently a voluntary program without direction or expectations from senior management.
  - Supervision's expectations are primarily focused on the technical aspects of the operation.
  - The Leadership Development and Succession Planning Processes are ineffective and inadequate for attaining and sustaining capable professionals.
  - Performance agreements are not used. Consequently, managers do not consistently carry through with their own plans for professional growth through education and do not adequately mentor their subordinates through the same process.
  - Performance agreements were also intended to serve as the basic document for outlining the knowledge transfer expected to occur when an individual accepts a new position. This expectation is not uniformly applied or enforced and allows the potential for critical information to depart with the employee.

SCUBA Team Findings and Recommendations

2009/2010 AFI-CLE-01: This is essentially a repeat Finding from the 2007/2008 Independent Safety Culture Assessment (ISCA). Management has not consistently utilized or promoted the strategic planning process for continuous improvement.

The NFS management team should re-dedicate efforts to actively monitor and manage safety culture with a focus to modify behaviors such that safety is the overriding priority. Management should lead by example; they should manage the required change effort, but not every decision. This would result in the delegation of decision making and increased organizational/individual accountability.

NFS presently operates and manages primarily within organizational silos. The senior management team can work more efficiently and leverage lessons learned and best practices across the organization by eliminating silo thinking and transitioning the NFS organization to a team environment. This would leverage resources and promote standardization. Middle level managers should be expected to manage initiatives across the organization via a strategic planning process in addition to managing their individual unit. This will require new expectations, delegation of decisions to a lower level, and responsible and accountable managers.

Management must assess individual performance in light of these expectations and deal with those who are not equipped or committed. This effort will impact managers throughout the organization. They will require convincing, guidance and support. This should be a top priority of the management team. The 2007/2008 ISCA (AFI-CLE-02) provided recommendations to

establish a review process to drive continual organizational improvement. Those recommendations continue to be pertinent today. A focus and recommitment to a Strategic Planning Process combined with proactive management and subordinates accountable for achieving intermediate goals and overall results, is recommended. Individual performance should be tracked through performance agreements with intermediate goals developed jointly by supervision and the individual. Periodic performance reviews should be conducted to review performance and to identify opportunities for improvement and development.

2009/2010 AFI-CLE-02: This is essentially a repeat Finding from the 2007/2008 ISCA. The training program for first line supervision is deficient. It is recommended that a leadership development effort for first line supervision be initiated. Resources should be provided for implementation as soon as possible and the effort should be closely monitored. Senior management should be involved with the development and the delivery of this training. The desired leadership culture cannot become a reality without senior management setting and reinforcing expectations and leading by example. Delivery of off-the-shelf training courses will not be sufficient to achieve excellence in leadership. Any initiative of this nature will require ongoing support, reinforcement and management involvement to be successful. This effort has the potential for improvement in a number of safety culture components.

2009/2010 AFI-CLE-03: There is no focused effort to teach the basics of production to the general workforce. "Basics of production" training should be provided and should include instruction on the technical principles and reasoning behind the various operations and equipment designs the workforce encounters. Applicable precautions, potential error traps, and likely problematic situations should be discussed and emphasized to attain a comprehensive understanding of the production processes. (There have been instances where abnormalities in the field were not recognized, component troubleshooting efforts were not carried through to successful system restoration, and workforce gaps cannot be closed because there was inadequate cross-qualification. It is not always reasonable to assume that any given individual could be assumed to be an adequate backup for a teammate in an off-normal situation.) The training should include basics of production for the appropriate operation. The program should include the management of core training requirements not only for operators, but supervision and key management positions to ensure individual competency and safe operations.

2009/2010 AFI-CLE-04: The basics of chemical engineering processes are not well understood by the workforce. Training on fundamental chemistry and chemical engineering principles and their relationship to the NFS safety basis is needed. Recent events involving unplanned energy releases infer that, while operators may be capable of following procedures in routine circumstances, operators are not conversant with the first principles needed to ask reasonable questions and to challenge unusual results. The "basics of production" training discussed above in Finding 2009/2010 AFI-CLE-03 would provide a broad foundation of basic knowledge throughout the organization; however, it is important to also develop a cadre of resident experts who are competent in chemical engineering processes and system design, who are capable of conducting meaningful field observations, and who are sufficiently knowledgeable in chemical engineering to reinforce standards and expectations in the field. This technical discipline needs as much attention as the nuclear criticality safety technical discipline. A personnel development effort and a corresponding training program focused on providing a trained and qualified chemical engineering safety function is recommended.

2009/2010 AFI-CLE-05: Knowledge and experience prerequisites for key positions have not been fully determined and established at NFS; based on historical hiring practices, questions exist regarding the technical competency of the NFS white-collar organization. There currently is a lack of in-house and or outside training, management of requirements, and funding for maintaining and developing technical competence.

It is recommended that a program to support technical competence and continual improvement be established and supported.

It is further recommended that NFS:

- Identify the technical capabilities/knowledge and experience required/desired for each positional assignment at the NFS-Erwin Site, particularly for the white-collar workforce. Identify the technical capabilities/knowledge and experience of the incumbents of each positional assignment. Develop individual development plans to systematically close any identified gaps. NOTE: This will likely identify the need for specific technical training, professional development training, and continuing training programs.
- Identify necessary continuing technical training/developmental needs for each positional assignment/job category. This will likely identify the need for specific training programs.
- Obtain advice and counsel from INPO on suggested approaches to identify and respond to technical training needs, and on how best to construct a technical training and development program.

2009/2010 AFI-CLE-06: In recognition of the recommended broader role and scope of responsibility of the NFS Training organization, the SCUBA Team recommends that the NFS Training organization's reporting relationship and management chain be moved out from under the Operations organization. NFS needs much more in the way of training and development programs than the existing programs that are primarily focused on operations and maintenance training. The fact that the Training organization reports through the production chain of command has resulted in a disproportionate emphasis toward production training while diluting the support for other necessary training objectives. If NFS wishes to follow a proven approach used in the commercial nuclear power plant industry, NFS could modify the current organizational structure by moving the NFS Training organization under the NFS Assurance organization and renaming the Assurance organization as the NFS Performance Improvement organization. Alternatively, NFS could establish another NFS Training Program reporting elsewhere than to Operations (e.g., to Engineering).

2009/2010 AFI-CLE-07: The NFS leadership development and succession planning program should include a process to specifically identify high-potential future leaders and key individual contributors, and to establish multi-year personnel development plans for such individuals. Development plans should include identification of future work assignments and the training activities necessary to prepare identified personnel for their future roles. These plans should be a contract by management to provide opportunities, and a contract by the individual to complete identified training. Such a program would increase the strength/depth of the organization.

2009/2010 AFI-CLE-08: Management of programs supporting continual learning, training development, and technical/professional competence should be specifically assigned within the

NFS organizational structure. The current situation limits the ability of the Training organization to continual learning and the development and maintenance of the technical/professional competence of the entire organization... Senior management must endorse, support, promote, and review progress of the Training organization's expanded agenda to achieve the learning objectives of NFS-Erwin. In this regard, it is recommended that the Training organization be assigned responsibility and accountability for Training Programs to include the following:

- Benchmarking for continual learning/improvement and training programs and incorporation of industry best practices into the Training organization.
- Maintenance of curricula and development of new curricula in support of new initiatives.
- Training support for the CSCII.
- Inclusion of appropriate information from the Problem Identification Resolution Correction System (PIRCS), human performance event evaluations, root cause evaluations, Safety Culture Implications Reviews, and Self- and Independent Assessments into training programs.
- Management of training programs supporting manufacturing.
- Development and maintenance of curricula for personnel and management development.
- Develop and maintain prerequisites for positions and key job assignments. (In conjunction with appropriate management).

2009/2010 AFI-CLE-09: The Organizational Change Management (OCM) Process was considered to be deficient in the delivery of training. It is recommended that the Training Organization develop a program in support of the OCM component – refer to Finding 2009/2010 AFI-OCM-02. The training is to include the philosophy behind the need, the relationship to a Safety Conscious Work Environment (SCWE), expectations of personnel, the potential safety and performance returns if used properly, formal T&Q assignments, and position requirements for individuals assigned to key areas in the future.

2009/2010 AFI-CLE-010: An aspect of the training for first line supervision should be the recognition of the appropriate workforce behaviors in the field as well as performance deficiencies. Training and the application of these attributes must be consistent and uniformly reinforced across the organization.

2009/2010 ANA-CLE-01: Benchmarking plans are not fully supported, documented, and implemented. A review process to support and manage initiatives is recommended. Initiatives should be consistently entered into PIRCS for determination of status. A timetable of who, what, and when should be monitored and managed to accomplish the intended goals of the plan.

2009/2010 OFI-CLE-02: This is essentially a repeat Finding from the 2007/2008 ISCA. A focus to improve the delivery of toolbox training is recommended. The quality of toolbox training is highly variable as some training has been to simply read the information and to sign off that the training has been completed. This is not demonstrative of excellence in the delivery of training.

Supporting Information

Workforce Survey Results

The overall rating of the Continuous Learning Environment Component for the NFS-Erwin Site Composite Organization, as perceived by the survey participants, is characterized as an "Area of Adequacy/Competency" based on industry norms. This rating places the NFS-Erwin Site Composite Organization at the top of the third quartile of the commercial nuclear power plant sites in SYNERGY's industry database.

Based on benchmarking against industry norms, the following Continuous Learning Environment attribute characterizations are noteworthy:

1. Opportunities for Improvement
   - Supervisors and managers in my Functional Organization are personally involved in ensuring that the workforce receives high quality training.
2. Areas in Need of Management Attention
   - Having an environment where individuals feel safe to voice their opinions and ideas.
   - Effectively utilizing individual and group performance goals to achieve improvements.
   - Within my Functional Organization, we are effective in developing people through coaching, training and mentoring.
   - Conducting benchmarking visits that are effective in improving our nuclear safety and performance.
3. Areas for Improvement
   - Supervisors and managers being receptive to input and feedback.
   - Within my Functional Organization, we place importance upon actively seeking out new ideas and best practices from other nuclear and chemical industry facilities.

NFS-Erwin workforce perceptions associated with some survey ratings/rating characterizations appear to be artificially high due to the lack of an adequate frame of reference or adequate understanding of a particular cultural attribute. Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area, as reflected by the overall rating characterization, are more positive than is justified by actual performance. For example, the strategic planning process has been ineffective in driving continual improvement.

The survey write-in comments indicate that some feel that management and supervision do not sufficiently solicit and act upon input from the workforce, and that they need to better recognize the knowledge and experience of the workforce.

Personnel Interviews, Behavioral Observations and Documentation Reviews

The Strategic Planning Process ("One Page Plans") has not been effectively used to drive continuous learning and/or a significant improvement in safety culture. With few exceptions, improvement initiatives defined by NFS management in response to the 2007/2008 ISCA have been slow in development and/or implementation. In a number of cases, schedule delays have occurred to schedules that were not particularly aggressive in the first place. The need for a

Human Performance (HuP) Program was one of the first safety culture efforts sponsored by NFS management. Efforts initially started in January 2007, but were slower than anticipated due to the time necessary to identify and establish key positions, recruit a HuP Manager, obtain INPO membership, and deal with a returning workforce that had been engaged in a prolonged work stoppage. After completion of the foundational work, a formal kick-off of the HuP Program Event Clock occurred in the summer of 2008. Immediate actions to address procedural deficiencies as recommended by SCUBA were abandoned in favor of the issues being addressed by HuP, while procedural compliance issues remain. In addition, the implementation of enhancements and requirements for the management observation program were delayed until mid-2010. NFS management appears to be content both with the current state of the safety culture at the NFS Site and with its rate of progress in implementing initiatives to improve safety culture and safety-related performance. This reflects a weakness in management standards and expectations, including a lack of sufficient understanding of what improvements are needed, of the time frame in which they are needed, and of how to effect meaningful improvements. The loss events experienced in late 2009 can be linked to multiple safety culture component deficiencies.

This is compounded with what appears to be an inherent resistance to change at NFS-Erwin that exists at all levels of the organization. Information from observations and interviews indicate many believe the plant has operated with the current frame of reference for multiple decades without a significant incident. This led to a false sense of security. Standards and expectations have recently been elevated in response to public opinion and regulatory interest and concern.

- Many, including management personnel, appear to have been content with the adequacy of the status quo, even to the extent of apparent denial in the face of evidence to the contrary. The priority and quality of NFS efforts associated with the conduct of the NFS 2009 NFS Safety Culture Self-Assessments (SCSA) attests to the comfort level of the status quo for safety culture. These self-assessments were delivered late and also were incomplete. The quality of the assessment components was highly variable, the roadmap/guidance not consistently followed, and the results not reviewed by management prior to submission. Only after the SCUBA Team suggested a review for completeness and consistency did management place a priority on the assessment. The SCSA was re-issued on or about January 16, 2010 – approximately six weeks after the committed due date. Even then, the roadmap for the assessment was not consistently followed and the quality only improved marginally.
- Many appeared to believe that existing standards, expectations, management controls, programs and processes are sound – based on a belief that they have served the organization well in the past. Management made this argument in a presentation to the NRC as a basis for restart of the fuel process after the events in late 2009.
- Many, including management, appeared to believe that recent operational events represent inopportune anomalies rather than indicators of fundamental weaknesses in safety culture, standards and expectations, management controls, programs and processes. Multiple employees including management made these statements in SCUBA interviews. This presents a significant challenge to the assimilation of higher organizational standards and expectations and to the conduct of sufficiently self-critical assessments of the adequacy and effectiveness of management controls, programs, and processes.

In some areas in which the SCUBA Team had previously identified high priority needs for improvement, NFS scheduled actions to effect the necessary improvements in the too distant future with few, if any, intermediate milestones defined. At the same time, NFS management has not sufficiently focused on identifying and acting upon opportunities to implement actions to achieve intermediate improvements in these areas. Items have been considered closed and effective by the issuance of a policy or procedure. Reinforcement and follow-up by senior management is necessary to set the expectations and achieve the appropriate behaviors.

A benchmarking plan was established for 2009 and 2010. Five external efforts were planned for 2009 and all visits did occur. Corrective actions and improvement initiatives associated with these trips have not been fully defined, completed or anticipated actions fully documented. The effectiveness and / or impact of these efforts are nil or unknown. Benchmarking activities other than those associated with commitments concerning the regulatory shutdown have been suspended. A 2010 benchmarking plan has been developed. Three activities are planned; however, activity has not commenced.

Leadership skills have not been emphasized or developed, especially with first line supervision. Technical competence associated with operations has been the primary focus of NFS training activities. This was identified in the 2007/2008 ISCA (AFI-CLE-03) and action is not currently scheduled for implementation until mid-2010.

A disconnect currently exists between existing training programs and the ability to address operational upsets. Operators generally contact supervision during process upsets – a typical procedure requirement. If the causality portion of the procedure is ineffective, the supervisor must rely upon his/her knowledge and experience to resolve the issue. Supervisors are recruited from the workforce where the standard practice is to defer to supervision in off-normal situations; which, by definition, limits development of experience and knowledge associated with trouble shooting. Therefore, when an inexperienced supervisor faces an off-normal situation not specifically addressed by the operating procedures, the ability to assess and address the situation is limited. Furthermore, there is evidence that procedure reference is not an organizational strong point. Training, based upon first principles of the operation, would enhance the workforce's ability (supervision as well as operators) to acknowledge and respond to off normal situations.

The training organization has been focused largely upon delivery of technical training in support of the operating areas and business objectives. This is a key area; however, training for broader issues and safety culture initiatives is lacking in timely support of needed change. This was discussed in the July 2009 SCUBA progress review. Examples include:

- HuP training resources were limited impacting the implementation schedule.
- Training for an improved management observation program was scheduled in the NFS 2008 Comprehensive Safety Culture Improve Initiative (CSCII) for mid-2010.
- HuP Training for the security forces was initially scheduled for mid- 2010. This initiative was pulled forward after the July 2009 SCUBA progress review.
- A program for maintaining and developing technical competence is not available.
- NFS currently only encourages professional development and does not proactively manage development of future talent.

The Fire Damper Case Study reveled that Industrial Safety training was not provided for a professional position involving a complex and constantly evolving set of regulatory requirements.

A succession planning process has been developed and documented; however, the process is not formally or uniformly utilized. The intentional development of leaders and key personnel is a requirement for the on-going success of the organization.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed the original CSCII PIRCS Commitments listed for the Continuous Learning Environment Safety Culture Component that were identified. Key observations were as follows:

- PIRCS 13689 - Commitment C6320 (2007/2008 AFI-CLE- 01): – Benchmarking Plan. A formal benchmarking plan has been developed including internal and external assessments and INPO assists. This effort is managed by the Nuclear Safety Officer. Planned benchmarking visits did occur; however, actions and follow-up have been sporadic. Benchmarking efforts were shifted in support of plant restart. Impact upon the organization is nil or unknown. INCOMPLETE – INCONCLUSIVE
- PIRCS 13689 - Commitments C6321: Schedule INPO Assist visits, participate in external assessments, and engage external peers. This commitment was closed and approved with the development of a plan. COMPLETE; however, FOLLOW-UP: INCONCLUSIVE.
- PIRCS 13689 - Commitment C6322: Adopt and reinforce an environment where minimum levels of regulatory compliance are not considered acceptable. The commitment was closed and approved with the issue of a memorandum with the expectation to reinforce the standards in routine meetings, CAP screening meetings, staff meetings, and NRC out-briefs. COMPLETE – ACTION INEFFECTIVE.
- PIRCS 13689 - Commitment C6323: Create an environment of proactive self criticism where management and the workforce hold itself accountable for compliance with all operational and administrate procedures. This commitment was closed and approved with the issue of a memorandum and a procedure to assess progress via one of the strategic planning process plans. COMPLETE – ACTION INEFFECTIVE.
- PIRCS 10631 (2007/2008 AFI-CLE- 01): Complete effectiveness review of AFI-CLE-01. Action due June 1, 2010. SCHEDULED.
- PIRCS 13690 (2007/2008 AFI-CLE-02): Drive performance improvement by goal setting and management reviews. This commitment was closed and approved. It was concluded that an effectiveness review of the associated two commitments was not needed. The implementation of the strategic planning process has been ineffective in setting appropriate goals and driving safety culture and performance improvement. The entire process has largely been abandoned. INCOMPLETE
- PIRCS 13690 - Commitment C6324: Conduct periodic management review meetings. This commitment was closed with the implementation of One-Page-Plans. COMPLETE-INEFFECTIVE

- PIRCS 13690 - Commitment C6325: Establish challenging goals and progress curves. Develop performance indicators and metrics based on industry best practices. INCOMPLETE – INEFFECTIVE
- PIRCS 13691 - Commitment C6326 (2007/2008 AFI-CLE-03): Create and sustain a leadership development program for supervisors and managers. This commitment was closed on February 8, 2010 and considered complete with availability of Development Dimensions International (DDI) courses with two certified instructors. Enrolment in this training is voluntary and targeted for first line supervision. The training of first line supervision in the HuP Program Coaching and Positive Reinforcement Program is considered complementary to the DDI courses. Leadership development across the organization (Mid -Management and Sr. Management) is not addressed. COMPLETE - INEFFECTIVE.
- PIRCS 13691 - Commitment C6327: Perform a critical assessment of the current management/supervisor team to assure reinforcing sponsorship and alignment for safety culture initiatives and programs. Such an assessment by executive management was completed in the Spring of 2008 and was considered by NFS to be final. Alignment of the organization was also considered satisfactory. Coaching and reinforcement of expectations did not occur to any appreciable degree. It became clear to the SCUBA Team in mid-2009 that certain NFS managers were not aligned with respect to taking the CSCII seriously. The assessment and alignment activities have proven ineffective as the result of events in late 2009. COMPLETE - INEFFECTIVE.
- PIRCS 13692 (2007/2008 ANA-CLE-01): Commitment 6328: Increase emphasis and acting upon input from the workforce. This commitment was considered to be complete in May of 2008 with the challenge to each supervisor and manger to increase PIRCS entries year over year and with the documented goal for each salaried manager to complete at least two walk-arounds per month. This is minimal approach at addressing the concern of employee involvement. Additionally, the commitment was considered closed for all practical purposes with the establishment of a goal for walk-arounds that was not enforced. COMPLETE - INEFFECTIVE
- PIRCS 13692 - Commitment C6329: Appropriately reflect in performance evaluations expectations for supervisors and managers. This commitment is considered to be 95% complete with a final completion date of May 31, 2010. The Performance Evaluation Program (PEP) has been evaluated to be ineffective to date. INCOMPLETE – INEFFECTIVE.
- PIRCS 13693 - Commitment C6330 (2007/2008 ANA-OFI-01): Establishment a Curriculum Review Committee and Training Review Council. This commitment was closed to the perceived adequacy of a procedure, NFS-TN-008. This procedure allows for a collegial review, but does not require one. Duties are directed to the training manager and negate the intended purpose of the recommendation. REJECTED - INEFFECTIVE
- PIRCS 13693 - Commitment C6331: An INPO assist to evaluate the NFS training program is not scheduled for completion until June 30, 2011. SCHEDULED - UNTIMELY
- PIRCS 13693 - Commitment C6332: Implement of a basic site qualification process to establish a fundamental level of understanding of all aspects of the work at NFS. This commitment is not scheduled for completion until June 30, 2011. SCHEDULED - UNTIMELY

- PIRCS 13693 - Commitment C6333: The administration of instructional methods training to subject matter experts in order to standardize the quality of toolbox training is not scheduled for completion until June 30, 2011. SCHEDULED - UNTIMELY
- PIRCS 13693- Commitment 6334 - The development of classroom training for occasional instructors is not scheduled for completion until June 30, 2011. SCHEDULED-UNTIMELY
- PIRCS 13693 - Commitment C6335 - The training of managers and selected supervisors in self assessment skills in not scheduled for completion until June 30, 2011. The manager previously assigned to complete this task has been reassigned without replacement. The training of instructors skilled in configuration management has been successfully completed. PARTIALLY COMPLETE - SCHEDULED
- PIRCS 13693 - Commitment C6336: Develop instructors skilled in Configuration Management. COMPLETE

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the July 2009 SCUBA Team progress review. NFS considered recommendations to be addressed in the existing commitments and additional PIRCS entries were not developed.

NFS Self-Assessment

The NFS Safety Culture Self-Assessment (SCSA) of the Continuous Learning Environment Safety Culture Component (SCC) was sufficiently self-critical in that it identified systemic problems supported by analysis. However, there were several instances where the conclusions drawn in CLE did not align with other SCCs. For example, the performance evaluation process is criticized in Accountability but not in CLE and resource availability is an acknowledged issue in Resources but not in CLE. Better alignment among SCCs is warranted.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend of performance. Within the context of the rating characterization protocol used by NFS, the overall rating is reasonable and roughly equivalent to the SCUBA Team's rating of this SCC; i.e., as an Area for Improvement.

The SCUBA Team suggests several steps to improve the product. It would be more appropriate to take credit for completed actions rather than citing new initiatives and citing a positive trend. For example, crediting training for subject matter experts in toolbox skills that will not be performed until mid-2011 seems premature. In other cases, the information provided in the comments section is interesting but not actionable. As an example, NFS emphasizes membership in professional societies yet there are no associated expectations, goals, or results included as part of the self-assessment.

III.L ORGANIZATIONAL CHANGE MANANGEMENT SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

Management uses a systematic process for planning, coordinating, and evaluating the safety impacts of decisions related to major changes in organizational structures and functions, leadership, policies, programs, procedures, and resources. Management effectively communicates such changes to affected personnel.

SCUBA Team Conclusions

Based on the integration of all sources of assessment input, the SCUBA Team has concluded that the Organizational Change Management (OCM) Safety Culture Component is deficient at NFS-Erwin when compared to commercial nuclear power plant industry norms and, as a result, represents an Area for Improvement (AFI). The SCUBA Team has also concluded that Organizational Change Management does not meet regulatory expectations. In this regard, the SCUBA Team has concluded that:

- A formal OCM process was developed and documented; however, the process was not consistently utilized, even for significant change.
- Training and qualification requirements for management have not been developed or established.
- A training program in support of the OCM process is not available.
- Reasons for and/or explanations of significant changes and decisions are not consistently or always effectively communicated to the workforce.
- The thresholds for recognition of change and the need for application of the OCM process are too high.
- Recent (May 2010) organizational structure changes utilized the principles of OCM, including the development of an extensive communication plan.

SCUBA Team Findings and Recommendations

2009/2010 AFI- OCM-01: NFS-Erwin has undergone and continues to undergo significant organizational and positional change. According to the information available to the SCUBA Team, NFS management has not rigorously and consistently complied with its established policy, procedure, and process for planning, coordinating, and evaluating the safety impacts of decisions related to major changes in organizational structures and functions, leadership, policies, programs, procedures, and resources. An effectiveness review of the OCM process was conducted by NFS in September 2009; eight significant changes were identified where the OCM process was not utilized as required. Since that review, four changes have been processed and documented per the defined policy. Principles of the OCM policy were reportedly considered in dealing with changes associated with the January 2010 Confirmatory Action Letter (CAL) and the resulting Standing Order. A communication plan was developed and delivered. Senior management was aware of the OCM policy and utilized the principles in the May 2010 reorganization with a detailed communication plan including details and reasoning for the reorganization. Other significant issues and changes, discussed in detail in the supporting information, did not receive the benefit from the rigors of the OCM policy resulting in a negative

impact upon the organization. The SCUBA Team acknowledges that awareness and consideration of the OCM process and principles have entered management's decisions -- particularly in the May 2010 reorganization. However, the breadth of understanding and utilization across the organization is limited.

The SCUBA Team recommends that NFS management apply additional breadth, rigor, and consistency in the application of the OCM policy.

2009/2010 AFI-OCM-02: NFS-Erwin conducted an effectiveness review of the implementation of its OCM policy, procedure, and process in September 2009 and subsequently conducted a Self-Assessment of the conformance by NFS to the expectations as set forth in or as implied by NRC Regulatory Issue Summary (RIS) 2006-13 related to the OCM Safety Culture Component. Both of these NFS assessments identified deficiencies and included recommended corrective actions and/or improvement initiatives to address those deficiencies. Follow-up and actions from the results of the assessment have not been rigorously pursed. Deficient areas that were identified included (but were not limited to): implementation of a training program on the OCM policy, procedure, and process and on associated OCM-related expectations; and establishment and use of performance metrics to monitor the effectiveness of the implementation of the OCM policy, procedure, and process. The SCUBA Team recommends that NFS management address and resolve all of the deficiencies identified through those two assessments.

2009/2010 ANA-OCM-01: The 2007/2008 Independent Safety Culture Assessment (ISCA) emphasized the importance of a formal process to develop communication plans for explanation of reasons for significant change. This recommendation has not and is not consistently utilized in the communication of significant changes. The adequacy of "management's communication to the workforce on the reasons for major changes" was identified as an Area in Need of Attention in the 2009 NFS Safety Culture survey. Communication was also identified as a deficiency in the 2009 NFS self assessment of the OCM safety culture component, along with the statement: "Expectations and standards for the details of an implementation plan, to include communications, have not been effectively communicated, nor are they enforced." The SCUBA Team recommends that NFS address and resolve the deficiencies associated with communication and the explanations given for management decisions.

Supporting Information

Workforce Survey Results

The overall rating of the Organizational Change Management Component for the NFS-Erwin Site Composite Organization, as perceived by the survey participants, is characterized as an Area of Competence based on industry norms. This rating places the NFS-Erwin Site Composite Organization in the second quartile of the commercial nuclear power plant Sites in SYNERGY's industry database.

Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area, as reflected by the overall rating characterization, are significantly more positive than is justified by actual performance. The NFS-Erwin organization

appears to have an inadequate frame of reference with respect to standards of excellence in this area.

Based on benchmarking against commercial industry norms, the following Organizational Change Management attribute rating characterizations are noteworthy:

1. Areas in Need of Management Attention
   - Management's effectiveness in communicating to the workforce the reasons for major changes.
2. Areas for Improvement
   - Within my Functional Organization, we are effective in planning and implementing changes in the way we do business.
   - Supervisors and managers in my Functional Organization obtain workforce input before implementing significant changes.
   - Management effectively addresses the potential safety impacts of major changes in organizational leadership and or organizational structure and functions.

The paucity of survey write-in comments related to Organizational Change Management suggests that this Safety Culture Component may not be well understood by the workforce and that there is an overall lack of awareness of NFS-Erwin organizational change management practices. Additional information available to SCUBA confirms that understanding of this safety culture component is not widely dispersed and that management has neither widely communicated expectations for the use of the OCM process nor utilized the documented process as specified.

Personnel Interviews, Behavioral Observations, and Documentation Reviews

A formal Organizational Change Management (OCM) process has been developed and documented; however, the expectations and training to effectively utilize the OCM process have not been reinforced or completed. Individual management responsibility for the process has been assigned, but accountability for implementation and utilization is deficient. The lack of effective transfer of responsibilities and accountabilities related to the Fire Damper Case Study is a prime example of what the NFS should be looking to prevent: making changes that result in safety-related responsibilities and accountabilities falling short and/or becoming unattended. An effectiveness review was completed in September, 2009 identifying eight instances where the process was not utilized; but corrective actions have not been vigorously pursued. Major organizational changes have occurred without consideration of the OCM principles since the September 2009 policy review. The following examples are provided:

- Major change occurred as a result of the transition in ownership of NFS-Erwin. Information obtained through observations and interviews indicate the change in benefits associated with new ownership had a chilling impact upon the organization. Explanation and justification for the changes and the associated detailed information were lacking and not forthcoming. One example recanted in a number of personnel interviews was that benefit coverage for employees' dependents was inadvertently eliminated without explanation and/or assurance that this was a mistake. Answers to questions concerning benefits changes were neither readily available nor forthcoming. An appropriate

communication plan could have provided a clearer picture of the planned changes, as well as the business case for the benefits changes.

- The decision to implement a pay reduction for salaried employee was not processed via the OCM policy, and communication of the decision was hastily prepared and executed.
- The reorganization of the project management function was processed and documented via the OCM policy prior to the September 2009 effectiveness review. However, the execution details changed considerably prior to implementation. These changes were not evaluated in accordance with the OCM policy.
- Consideration and documentation for a December 2009 workforce layoff did not utilize the OCM Policy. Certain individual employees were notified by mid-level management that they would be included in a layoff, and were subsequently informed that the layoff was not to occur.
- A decision to modify the union contract was executed, but middle management was not informed of the change. Middle management only became aware of the change after several weeks had passed. A formal communication of the decision/contract change did not occur.
- The decision to change the policy concerning inclement weather and employees absences was not vetted via the OCM process. Some middle management had significant concerns regarding the policy change, some of which were safety related. However, little or no consideration was given these concerns, and there was no communication as to the bases for the changes that were made in the inclement weather policy.
- The restructuring and the reduction in the levels of management in the manufacturing organization in late 2009 were not processed through the OCM process.
- Four proposed changes were processed and documented via the OCM process after the September 2009 effectiveness review: NFS Smoking Policy, Establish Landlord/Tenant Resource, Reorganize the Health & Safety Organization, Start Local Section of North American – Young Americans in Nuclear.
- The management team used the principles of the policy in dealing with the Standing Order associated with the Confirmatory Action Letter and the regulatory shutdown, i.e. implementation of the Senior Engineering Watch and the "New Rhythm" meeting structure. A communication plan was developed, documented and executed.
- Senior management utilized the principles in the May 2010 reorganization, resulting in the development, documentation, and execution of a detailed communication plan. The Health and Safety Organization and HR were involved in the vetting of changes of this reorganization.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

PIRCS 13694 - Commitment 6338 (Finding 2007/2008 AFI-OCM-01): A formal process for the OCM process was developed and considered complete as of April 4, 2009 with a formal introduction/presentation in a management review meeting. Further communication concerning the process was limited and training and qualification (T&Q) requirements were not specified. An assessment of the effectiveness of the actions taken was conducted by NFS in September, 2009. The assessment concluded that the OCM process had been utilized on several occasions, but not on a systematic or consistent basis. It appears that the principles of the OCM process are beginning to be applied more frequently by NFS management since the September 2009

assessment. However, consistent application of the policy remains problematic. COMPLETE – PARTIALLY EFFECTIVE

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the SCUBA Team progress review conducted during July 2009.

- PIRCS 13694 - Commitment C10032: Established an expectation to document and communicate expectations by January 1, 2010 but extended to June 1, 2010. A policy has been issued but awaits T&Q sign-off. Reportedly, the commitment is 50% complete. NOT COMPLETE – EXTENDED
- PIRCS 13694 - Commitment C10233: Established an expectation to develop a metric for this component by December 1, 2010. A performance indicator is in the process of development and is reported to be 90% complete. This commitment is considered 90% complete with only the identification of proposed metrics without an implementation process established. NOT COMPLETE - NOT YET DUE
- PIRCS 13694 - Commitment C10234: Established an expectation to conduct a periodic effectiveness review by January 1, 2010 but was extended to April 1, 2010. Although the PIRCS report considers this issue closed, there are remarks indicating that several document changes have escaped formal control practices. This item is closed without any expectation for action to rectify findings. COMPLETE – EXTENDED
- PIRCS 13694 - Commitment C10698: Reassign duties for the OCM process because of job function reassignment with concurrence of Corrective Action Review Board (CARB) on April 4, 2010. Completion date of June 1, 2010. NOT COMPLETE – NOT YET DUE

NFS Self Assessment

The NFS Safety Culture Self Assessment (SCSA) of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The NFS Self-Assessment of the Organizational Change Management Safety Culture Component was not sufficiently self-critical in that it evaluated all key areas as "Yellow" or "Green" with optimistic comments specifically regarding the effectiveness of the OCM Council. The SCUBA Team has not seen any measurable impact on site performance from this organization. Additionally, the repeated problems, leading to a suspension of production following serious errors encountered during operations of new processes, would indicate that change management is a significant issue. The critique does not reflect this mindset.

The NFS assessor posed reasonable questions but failed to follow through with the answers or to cite a PIRCS report that was (or could have been) written to obtain the answer. For instance, effectiveness evaluations are just beginning to be used to evaluate changes and a recent one discovered eight changes that occurred without using a formal process. The assessor posed the question "why" but did not follow through with an answer or a commitment to find out. Several major organizational changes were noted and none was found to have been adequately communicated. Once discovered, there is no documentation that would indicate any corrective action was taken or a PIRCS report written. The OCM process was developed a year ago and yet neither formal training nor a T&Q sign-off process has been used to verify that the employees understand the particulars. Corrective actions via PIRCS were assigned for the distant future.

The static nature of these deficiencies makes it difficult to assess this safety culture component as having a positive trend.

Within the context of the rating characterization protocol used by NFS, the overall rating is neither reasonable nor roughly equivalent to the SCUBA Team's rating of this Safety Culture Component as an Area for Improvement. The SCUBA Team does not believe that performance has been sufficient to warrant an improving trend.

III.M SAFETY POLICIES SAFETY CULTURE COMPONENT

RIS 2006-13 Component Description

Safety policies and related training establish and reinforce that nuclear safety is an overriding priority.

SCUBA Team Conclusions

Based on the integration of all sources of assessment input, the SCUBA Team has concluded that the Safety Policies Safety Culture Component is at NFS-Erwin is deficient when compared to commercial nuclear power plant industry norms; and, as a result, represents an Area for Improvement (AFI). The SCUBA team has also concluded that this Safety Culture Component partially meets regulatory expectations in that NFS-Erwin has established adequate safety policies, but has not deployed them effectively. In this regard, the SCUBA Team has concluded that NFS-Erwin senior management:

- Has established policies that adequately address nuclear safety and the Safety Conscious Work Environment (SCWE).
- Provides adequate introductory training regarding its Safety and Compliance Conscious Work Environment (SCCWE) Policy, Nuclear Safety and Compliance Culture Policy, and "Safety Strong" Program.
- Has not provided consistent communication regarding, and reinforcement of its Nuclear Safety and Compliance Culture Policy and the "Safety Strong" concept and the associated principles.
- Needs to take additional action to effectively deploy and reinforce its key Safety Policies including:
    - Improved management and senior management accountability for Comprehensive Safety Culture Improvement Initiative (CSCII) implementation
    - Improved oversight of the CSCII implementation process
- Has placed too much reliance on policy statements as opposed to modeling and reinforcing appropriate values, standards, and expectations. As a result, safety policy related activities have not delivered significant improvements in organizational safety performance. Furthermore, many employees now view "Safety Strong" as a "flavor of the month" program, and are likely to view future "Safety Strong" initiatives (or whatever program replaces it with respect to safety culture expectations) with a "wait and see" attitude.
- Has failed to model the way, thereby making it likely that the organization remains vulnerable to the potential translation of production pressures into inappropriate behaviors regarding questioning attitude and decision making. This is particularly true for the white collar area where resources are short, and NFS-Erwin is continuing to implement new production processes.
- Has provided limited opportunities for middle and first level management involvement in decision making, thereby inhibiting ownership of, and accountability for, implementation of NFS-Erwin's safety policies and initiatives. This is of particular concern regarding the cultivation of a robust questioning attitude on the part of the management team.

- Has not implemented a consequence-based reinforcement system, but instead relies too heavily on antecedents such as training, e-mail communication, etc.

The SCUBA Team has observed that NFS-Erwin management has spent considerable time during the recent regulatory shutdown to improve communication and reinforcement of key safety culture attributes including questioning attitude, stopping when uncertain, and improved safety culture related communications. Although initial results appear to be positive, it is premature to predict long-term safety culture performance given the organization's previous regulatory history and ability to resist change.

SCUBA Team Findings and Recommendations

2009/2010 AOA-SP-01: NFS has established safety policies that adequately address Nuclear Safety and Safety Conscious Work Environment

2009/2010 AFI-SP-01: Senior management must model the way and consistently demonstrate that they truly believe in the values, standards, and expectations they verbalize. Failure to do so will likely lead to additional loss events and disillusionment of the workforce as it is recognized that management does not really believe what it espouses. Management actions will speak louder than words in this regard (i.e., "walk the talk").

2009/2010 AFI-SP-02: Senior management needs to make a concerted effort to solicit and utilize input from middle and first level management. A participative management approach should be utilized to (1) cultivate ownership of, and sponsorship for, NFS-Erwin safety culture improvement/initiatives; and (2) develop a robust questioning attitude among the members of the management team.

2009/2010 AFI-SP-03: Improve senior management accountability for, and oversight of, the CSCII implementation process. Adequate sponsorship has not been provided for NFS-Erwin's CSCII activities – particularly given the fact that the CSCII was intended to strengthen safety culture and safe facilities operation; and was a commitment made to the NRC, which in return, agreed not to pursue a number of pending escalated enforcement issues. NFS-Erwin should also assure the standards documented in Conduct of Operations, NFS-OPS-01, are applied to all CSCII PIRCS Commitments:

- "Signing that an action was complete when it was not …are examples of falsification and/or fraudulent behavior that are unacceptable at NFS….."
- "The integrity of a signature, initials, or electronic signoff is an integral part of the standard of excellence at NFS."

2009/2010 AFI-SP-04: There is a need to reinforce workforce understanding of key NFS safety policies. Objectives should include ensuring that the workforce (1) understands the underlying concepts associated with NFS safety policies and (2) appreciates how their day-to-day work activities relate to proper application of these underlying concepts. Specific actions that can be taken to accomplish these objectives include:

- Systematic use of "daily safety message" discussions at all Site meetings, including daily briefings by supervisors and shift turnovers. Multiple (five to ten) discussion

themes/topics could be developed in advance for each of the 13 principles used in the "Safety Strong" concept, thereby creating a matrix of themes/topics for use (on a rotational basis) in daily safety messages across the Site.

- Systematic use of periodic (e.g., weekly) messages focused on individual principles of the "Safety Strong" concept, including providing examples of recent events, decisions, etc. that demonstrate and reinforce the proper application of NFS standards and expectations for "Safety Strong," as a means to reinforce the importance of safety.
- Increased management and senior management presence on the shop floor via the systematic use of informal face-to-face communications with the workforce, and formal observation programs. These techniques would also provide management with an opportunity for "live" training versus "read and take test" training.
- Timely communication relative to the bases for key decisions, particularly those that could be interpreted by the workforce as compromising nuclear safety or safe facilities operations. These communications should demonstrate that organizational decisions and actions are consistent with safety policies.
- Development and implementation of safety culture measures/metrics, based in part on mini-surveys and behavioral observations, to monitor the effectiveness of the safety policy reinforcement processes so that adjustments can be made as necessary and/or appropriate.

Supporting Information

Workforce Survey Results

Based on the workforce survey numerical ratings, the overall rating of the Safety Policies Component for the NFS-Erwin Site Composite Organization was characterized as an "Area of Competence" based on comparisons to industry norms. This rating places the NFS-Erwin Site Composite Organization in the second quartile of the commercial nuclear power plant Sites in SYNERGY's industry database. Based on information obtained through other sources of input, the SCUBA Team believes that workforce perceptions in this area, as reflected by the overall rating, are generally significantly more optimistic than the demonstrated performance of the organization.

Numerical ratings of individual cultural attributes indicate that the workforce perceives that the following attribute represents an Areas of Strength:

- Workforce understanding that individuals have the right and the responsibility to identify and pursue resolution of potential nuclear safety issues or concerns.

Numerical ratings of individual cultural attributes indicate that the workforce perceives the need for improvement in the following areas:

- Consistently conducting nuclear-safety related activities in accordance with procedures and regulatory requirements (bottom of third quartile).
- Senior Site management communicating frequently and consistently to reinforce the message that nuclear safety is the highest priority (fourth quartile).
- Providing adequate training on the NFS-Erwin Safety and Compliance Conscious Work Environment Policy and how it applies to day to day work activities (fourth quartile).

There were a total of 50 write-in comments made relative to the Safety Policies Sub-Component. Twenty-two comments were positive in nature 25 were negative, and three were neutral. The positive comments focused on increased management/organizational attention on safety. The negative survey write-in comments related to the perceptions that:

- Production is, at times, given priority over safe facilities operation
- Many of the safety initiatives/programs are for show/appearance
- Some parts of the organization do not value safety and its importance as much as they should
- There is excessive dependence on administrative controls

Personnel Interviews, Behavioral Observations and Documentation Reviews

The SCUBA Team reviewed the NFS Policy Statements and NFS Procedures related to nuclear safety culture. In this regard, the following are the highest level policies related to nuclear safety, the SCWE, and organizational safety culture:

- NFS Safety and Compliance Conscious Work Environment Policy, NFS-MGT-04-006
- NFS Safety and Compliance Culture Policy, NFS-MGT-05-007
- Core Values, NFS-MGT-08-014

SCUBA Team members also reviewed the training performed regarding NFS safety policies including:

- General Employee Training, including Radiation Worker Training.
- Annual General Employee Refresher Training.
- Training provided by the President of NFS and the Vice-President of Operations regarding the loss events and the related breakdown in core values.
- Training provided to members of the workforce returning from the shutdown, which included focused training on selected Safety Culture Components such as Decision Making.

NFS-Erwin's safety policies were determined to be adequate, as was the general training given to the workforce. As indicated below, however, the SCUBA Team has concluded that additional actions are needed to effectively deploy and reinforce these policies.

In 2007, the NFS Safety Culture leadership Team (SCLT) established the following Vision Statement related to organizational safety culture: "Within the next four years, all NFS employees will demonstrate excellence in everyday safety resulting in an organizational Safety Culture recognized by stakeholders as a standard in the nuclear industry." The NFS SCLT also established a Mission Statement related to organizational safety culture: "Safety Strong: Every Thought, Every Act, Every Time." In July 2007, the NFS SCLT adopted a set of 13 key principles, which were collectively described as "Safety Strong," to articulate its value system related to safety culture. NFS-MGT-05-007 was revised accordingly to reflect this change. Actions were subsequently taken to communicate "Safety Strong" to the NFS workforce, which included employee meetings led by the NFS-Erwin General Manager and the deployment of a variety of "cultural artifacts," such as banners, computer screen savers, and ball caps. These actions served to introduce the workforce to the new "Safety Strong" concept. However, the

concept and its supporting principles have not been systematically and repeatedly reinforced by management actions that would serve to bring these concepts to life in terms of how they translate into day-to-day standards and expectations for the workforce. Based on SCUBA Team observations of meetings at NFS-Erwin, daily safety messages are infrequently utilized to reinforce aspects of safety culture and to help bring those aspects to life. In most of the cases where a safety message was presented at a meeting, it addressed personal safety topics (such as, "Be careful driving....it's deer season") rather than addressing Safety Strong topics.

As discussed in other Safety Culture Component Sections of this Report, the SCUBA Team has also determined that:

- The NFS organization has a number of weaknesses in its safety culture that serve to undercut the values, standards and expectations set forth in "Safety Strong." In this regard, continued acceptance of a "meet minimal regulatory requirements" approach, tolerance of degraded conditions, weaknesses in procedural compliance, lack of thoroughness of Corrective Action Program evaluations, and insufficient focus on self-assessment and the continuous improvement of organizational culture and performance continue to be underlying cultural weaknesses.
- Effective implementation of programs, processes and functions that support the "Safety Strong" concept are adversely affected by, lack of sufficient accountability and ownership (both individual and organizational), lack of effective management oversight, and lack of effective organizational change management.
- There were several occasions when senior management left the impression with members of the workforce that certain issues were not to be entered as PIRCS problems. This was inconsistent with stated values, standards and expectation, and undermined management credibility regarding identification of safety issues.
- Production pressures from senior management produced an environment where a questioning attitude and conservative decision making did not seem to be valued, precipitating a number of loss events and a regulatory shutdown.
- Additional dedicated resources are needed to ensure the effective deployment of specific programs, processes, and functions including the Corrective Action Program (CAP) and the Industrial Safety Program. (These and other areas with additional staffing needs are identified in SCUBA Team Findings AFI-RES-03 and AFI-RES-04.)

The NFS-Erwin safety culture would also be strengthened by increasing the breadth of organizational knowledge and understanding of the licensing and safety bases (including the Integrated Safety Analysis). At the present time, such knowledge and understanding resides primarily in the Safety and Regulatory organization. It is recommended that NFS begin to systematically transfer this knowledge and understanding to other parts of the organization, particularly to the Operations and Engineering organizations, through defined training programs. In doing so, a graded approach would be appropriate such that the extent of knowledge transferred is correlated to the needs and desires of individual organizations.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Reviews

The SCUBA Team reviewed all "Complete" and "Approved by CARB" PIRCS Commitments listed for the Safety Policies Safety Culture Component (SCC). Four commitments were

reviewed; one was determined to be effective, one was determined to be partially effective, and two were determined to be ineffective. Key observations were as follows:

- PIRCS 13695 – Commitment C6339 recommended systematic use of daily safety messages relative to the thirteen (13) principles used in the Safety Strong concept. Daily safety messages were performed, but few were utilized to promote understanding and reinforcement of the thirteen principles. The lack of understanding of the key principles was reinforced during the SCUBA interviews. IMPLEMENTATION NOT EFFECTIVE
- PIRCS 13695 – Commitment C6340 recommended systematic use of weekly safety messages relative to the thirteen (13) principles used in the Safety Strong concept. Weekly messages were performed, but they failed to systematically promote understanding and reinforcement of the thirteen principles. The lack of understanding of the key principles was also discovered during the interviews performed by the SCUBA Team. IMPLEMENTATION PARTIALLY EFFECTIVE
- PIRCS 13695 – Commitment C6342 recommended that timely communication on the bases/reasons for key decision that could potentially be interpreted by the workforce as compromising safety as a top priority. This issue was closed by referencing communication requirements in the ODM procedure. Many more decisions that have the potential to affect safe facility operations are made by management than are performed via the ODM process. Examples include the production decisions that led to the BLEU Processing Facility Bowl Cleaning Station and Commercial Development Line Sublimation events. Communication of the bases for these types of decisions rarely occurs as determined by SCUBA Team interviews. IMPLEMENTATION NOT EFFECTIVE

The SCUBA Team also reviewed the status of NFS-Erwin's PIRCS Entries/Commitments related to the SCUBA Team Progress Review conducted during July 2009. Four (4) items were reviewed in total. One (1) was indicated as complete, one (1) was incomplete and overdue, and two (2) were incomplete and extended. Details were as follows:

- PIRCS 13696 - Commitment C10033 established an expectation to develop better site-wide appreciation for safety. C10033 was closed, but was replaced with C11360 and C11362, both of which are 0% complete. OFI-SP-01 pertains. NOT COMPLETE - OVERDUE
- PIRCS 13696 - Commitment C10034 established an expectation to conduct more face-to-face communications during Management by Walking Around (MBWA) observation by January 1, 2010. However, this commitment has been extended until January 22, then March 5, and finally April 30, 2010. The MBWA program is being revised and replaced with fewer, targeted senior management observations. NOT COMPLETE – EXTENDED
- PIRCS 13696 - Commitment C10035 established an expectation for more hands-on training by January 1, 2010, but it was extended until June 30, 2010. NOT COMPLETE - EXTENDED
- PIRCS 13696 - Commitment C10036 established an expectation to conduct mini-surveys by April 30, 2010. These surveys have been administered and lessons learned applied. COMPLETE – ON TIME

NFS Self-Assessment

NFS rated the Safety Policies Safety Culture Component as "sometimes effective, somewhat reactive, requires monitoring" when compared to the attributes identified in NRC Regulatory Issue Summary 2006-13. The discussion of the bases for the overall rating (and the individual attribute ratings) indicates that the identified needs for improvement in key NFS safety policies are primarily related to policy deployment and reinforcement rather than to the policies themselves. The NFS-Erwin self-identified needs for improvement included:

- Further improvement in the environment that encourages employees to raise safety-related issues.
- Involving employees in the actual resolution of issues.
- Improvements in evaluating the effectiveness of training, communications, and the reinforcement methods associated with key safety policies, including implementation of adequate tracking/monitoring metrics.
- Reinforcement of safety policies by using specific examples and "walking the talk."
- Improvements in how senior management spends time "in the field" performing assessments, MBWAs, formal observations, and providing positive reinforcement.
- Changing the perception held by many employees that production, cost and schedule objectives are of higher importance than safety.
- Changing the perception held by many employees that things tend to get "repaired" so that production can continue without fixing the actual problem or cause of the problem.

The SCUBA Team believes the Safety Policies self-assessment was sufficiently self-critical, and that it recognized the need for improvements in the deployment and reinforcement of NFS-Erwin policies related to Safety Culture. The NFS Assessor also did a good job of identifying attributes that can be utilized to define excellence in this area. The challenge that remains is to convert these attributes into meaningful performance metrics.

Within the context of the different rating characterization bases used by the NFS SCLT, and those used by SCUBA, the overall rating assigned by the NFS SCLT is reasonable and roughly equivalent to the SCUBA Assessment Team's rating of this Safety Culture Component as an Area for Improvement. The SCUBA Team does not believe, however, that the performance has been sufficient to warrant an improving trend"

IV. ASSESSMENT RESULTS – ADDITIONAL SCOPE

As previously indicated in Section I.B of this Report, the scope of the 2009/2010 Independent Safety Culture Assessment (ISCA), included coverage of the following additional assessment areas:

1. As was the case for the 2007/2008 ISCA, the scope of the 2009/2010 ISCA also included specific coverage of the following additional assessment areas:

    - A discrete additional programmatic assessment of the NFS-Erwin nuclear material security programs.
    - Assessment of the adequacy of an NFS internal Self-Assessment of NFS-Erwin's current status with respect to the Safety Culture Components and associated attributes set forth in NRC RIS 2006-13.

2. The scope of the 2007/2008 ISCA included specific coverage of the following additional assessment areas:

    - Assessment of the adequacy of the corrective actions taken (or planned) by NFS-Erwin in response to the issues identified in Sections V.1 and V.2 of the NRC Confirmatory Order for Program Improvements dated February 21, 2007.
    - Assessment of the adequacy of the actions taken (or planned) by NFS-Erwin with respect to the commitments made by NFS at the management meeting with the NRC on September 18, 2006.

    In this regard, the scope of the 2009/2010 ISCA:

    - Included an assessment of the NFS-Erwin Configuration Management Program (one of the primary commitments made by NFS on September 18, 2006) as was the case for the 2007/2008 ISCA.
    - Expanded the scope of the SCUBA Team's review of the adequacy of NFS responses to NRC Notices of Violation beyond those NOVs specified in the NRC Confirmatory Order for Program Improvements dated February 21, 2007 by also including a sample of NFS responses to more recent NRC NOVs.
    - Expanded the scope of the SCUBA Team's review of the adequacy of NFS Regulatory Commitments/Commitment Management by expanding beyond the commitments made by NFS on the September 18, 2006 to include a sample of more recent regulatory commitments, including the closure of commitments made to the NRC in the NFS CSCII.

The results of the SCUBA Team's assessment of these areas are summarized below. Additional information is provided in Attachments A through D to this Report. The SCUBA Team prepared a separate, classified Report on the results of its assessment of NFS-Erwin nuclear material security. That Report is available for review at the NFS-Erwin Site by those with both the appropriate security clearance and a demonstrated need-to-know.

IV.A NFS Responses to NRC Notices of Violation

Attachment A to this Report presents the results of the SCUBA Team's independent assessment of the adequacy of corrective actions taken (or planned) by NFS in response to NRC Notices of Violation (NOV).

This assessment was accomplished through (1) a review of PIRCS data and commitment tracking spreadsheets (including the NRC Inspector Resolution Tracking Log), (2) interviews with the NFS Assurance Director, the Quality, Safety and Safeguards Director, the Regulatory Senior Advisor, the Corrective Action Program (CAP) Manager, the Nuclear Safety and Licensing Section Manager, the Licensing and Integrated Safety Analysis (ISA) Manager, an Engineering Licensing Specialist and a Safety Analyst Specialist, and (3) review of NFS responses to NOVs selected from the NRC's Agency-wide Document Access and Management System (ADAMS) and the Fire Damper NOV response event.

The SCUBA Team's conclusions are stated in the context of the following Finding:

2009/2010 AFI-NOV-01: This is essentially a repeat Finding from the 2007/2008 ISCA. NFS provides responses to the specifics identified in NRC Notices of Violations, but does not adequately address the underlying causes and associated cultural issues. There was one incident where NFS did not take adequate corrective action in response to an NOV, and then provided inaccurate information to the NRC in its response document. There are occasional due date extensions and, on at least one occasion, an NOV response missed its due date. This represents a deficiency when compared to commercial nuclear power plant industry norms. It also may indicate satisfaction with minimum regulatory compliance.

In this regard, the SCUBA Team recommends that NFS:

- Improve NOV response tracking: critical elements are not consistently assured
- Increase accountability and management review of NOV responses
- Until such time as NFS can demonstrate a consistent track record of performance: increase oversight from Assurance Director
- Improve quality of root cause and apparent cause products
  - Obtain additional training from industry experts in root cause techniques

IV.B NFS Regulatory Commitments/Commitment Management

Attachment B to this Report presents the results of the SCUBA Team's independent assessment of the adequacy of the actions taken (or planned) by NFS-Erwin with respect to the regulatory commitments and the adequacy of the NFS Commitment Management Program. Based on the integration of all sources of assessment input, the SCUBA Team has concluded that the Configuration Management topical area at NFS-Erwin is basically acceptable when compared to commercial nuclear power industry norms and represents an Area in Need of Attention (ANA).

On September 18, 2006, NFS committed to 14 items during a management meeting with the NRC. All of those commitments have been closed out in PIRCS.

The SCUBA Team also assessed 38 commitment responses generated by NOVs and allegations in the period May 2009 through May 2010.

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This assessment was accomplished through (1) a review of a random sample of PIRCS commitment data and the NRC Inspector Issue Resolution Tracking Log and (2) interviews with the NFS Assurance Director, the Quality, Safety and Safeguards Director, the Regulatory Senior Advisor, the CAP Manager, the Nuclear Safety and Licensing Section Manager, the Licensing and ISA Manager, an Engineering Licensing Specialist and a Safety Analyst Specialist.

The SCUBA Team concluded that NFS standards and practices for regulatory commitment closure do not meet industry norms or regulatory expectations. As such, this area is considered to represent an Area for Improvement. In this regard, the SCUBA Team's has identified the following Findings:

2009/2010 AFI-RCC-01: There have been lapses in timely close-out. Closure has been attributed to work not actually completed. There are also occasions when an internal commitment may not be recognized as also a commitment to the NRC (NFS commitments to conduct Safety Culture Self-Assessments did not meet the committed due dates). Oversight and approval of commitment closure is somewhat subjective, relying on individual judgment rather than review and approval by a committee. The current commitment management process does not require an evaluation of the effectiveness of corrective actions that have been taken to meet commitments. The current process lacks a regular, systematic, independent third party (e.g., Quality Assurance) review. In this regard, the SCUBA Team recommends the following:

- Develop a process to evaluate commitment closure that verifies completion and adequacy. This process should specify a committee or panel review prior to closure.
- Revise commitment closure guidelines to include a prohibition against closing commitments to a scheduled event or task; that is, the work required to meet the intent of the commitment must be completed.
- Engage senior management in the closure approval process.
- Revise commitment closure guidelines to include an effectiveness review, unless clearly not warranted.
- Establish periodic quality reviews of commitment closure process by an independent review source (e.g., Quality Assurance).
- Ensure identification of all commitments by using PIRCS to document and track upon receipt.

2009/2010 ANA-RCC-01: The regulatory response program is under-resourced when it comes to handling a surge of regulatory commitments, like those experienced as a consequence of recent site events. In this regard, the SCUBA Team recommends the following:

- Expedite issuance of the draft Regulatory Agency Communication Procedure. Provide sufficient resources to allow implementation of the policy.
- Develop additional bench strength for processing regulatory documents.
- Develop a contingency plan to permit accelerated processing of regulatory commitments when a surge in activity is experienced.

IV.C Configuration Management Program

Attachment C to this Report presents the results of the SCUBA Team's independent assessment of the adequacy of corrective actions taken by NFS in response to the issues identified in Section V.2 (Configuration Management) of the NRC Confirmatory Order for Program Improvements dated February 21, 2007.

In summary, as discussed in Attachment C, the SCUBA Team has concluded that this is an Area in Need of Attention (ANA).

The SCUBA Team has concluded that the Configuration Management (CM) Program has made noteworthy progress in meeting regulatory commitments and has an adequate plan of action to complete LINC software documentation of all production processes in 2010. The CM Manager and two principal CM specialists have further directed the efforts of the Site as well as the Change Control Board (CCB) to ensure that design modifications are contemporaneously entered into the database in order to accurately preserve the design basis as the business of full conversion to LINC continues. However, there are additional aspects of configuration management that will need attention in order to make the program more responsive, such as the inclusion of several important systems where design flaws could impact safety (e.g., fire protection, electrical schematics, bulk chemical storage). These needs have been recommended for action but have not been fully resourced for completion. Accordingly, this situation represents an Area in Need of Attention.

In addition to fully populating the database, the most significant challenge to NFS in this topical area is better differentiating between configuration management and configuration control. The former is fully the job of the CM organization but the Change Control Board does not appear to be the optimal venue for executing that responsibility. Instead of controlling the administrative details associated with matching the as-built condition to the design basis, the CCB has become an unchartered design modification review board. There have been occasions when design errors arose because of a disconnect between the engineering design modification process and the Safety and Safeguards Review Council approval, potentially attributable to their mutual reliance on the CCB as a middleman. Control of the site configuration must remain firmly within the design/project engineering organization and the current structure of the CCB can blur those lines.

The SCUBA Team has developed the following Findings related to the NFS Configuration Management Program:

2009/2010 AOA-CM-01: NFS-Erwin has continued to meet the committed timetable for database entry and validation of the as-built configuration for all fuel manufacturing processes. The NRC Confirmatory Order for Program Improvements dated February 21, 2007 resulted in the Site's establishing a commitment to train the workforce on the fundamentals of the software chosen for configuration management (LINC) and to complete database entry of the full range of information (e.g., schematics, procedures, Letters of Authorization) needed to maintain the design basis and licensed condition of the fuel manufacturing processes The commitment called for completion of this task by December 31, 2010 and represented over 26 man-years of effort. To date, that project remains on track for timely completion.

2009/2010 AFI-CM-01: NFS needs to expand the scope of the CM Program because there are continuing instances of design flaws attributable to systems, processes, or components that will

be excluded from the database. Current plans would not provide complete, accurate, and up-to-date design documentation to support future operation.

The SCUBA Team recommends the following:

- Expand the CM documentation to include safety-significant support systems such as security, bulk chemicals, and fire protection as well as the body of components included in electrical schematics. Current plans do not call for inclusion but recent events argue otherwise. For instance, the loss of safety related equipment functionality due to unexpectedly de-energizing three components when modifying a power panel in Building 137 underscores the need to shift priorities to ensure technical design accuracy is assured in addition to schematic fidelity.
- Establish a crosswalk process to connect security systems and site design documents within the limits allowed by the classification protocols.

2009/2010 ANA-CM-01: Expectations for the CCB are not matched by the degree of authority assigned. Design changes originate within the engineering organization and are approved by the Safety and Safeguards Review Council (SSRC). The CCB serves as a waypoint between these two organizations, empowered only to review the preliminary design, make non-binding suggestions, and track administrative progress. Sponsoring managers are not expected to attend CCB reviews and participation by the Industrial Safety group is cursory. Additionally, only one member serves on the quorum of both CCB and SSRC. As a result, the product vetted by the CCB is not necessarily the product that is submitted to the SSRC for approval.

The SCUBA Team recommends the following:

- Establish a protocol that requires engineering design changes receive formal CCB approval prior to allowing the modification package to proceed to the SSRC for final approval. Further, consider substituting the CCB for the SSRC and eliminate an unproductive step in the review chain during the next license revision submittal.
- Consider eliminating the absolute requirement for the CCB to vet every procedure change and Minor 2 Work Request in order to better balance risk and consequence against available resources.

2009/2010 ANA-CM-02: The process for configuration control in the field is cumbersome and not well aligned with the work control or lock-out/tag-out process in use for routine site work. It is important that these two processes be aligned.

The SCUBA Team recommends the following:

- Meld the process for operations tagging with configuration control tagging. Both use yellow locks/tags but the latter process is not recognized during work planning. Consequently, work is delayed, tags are reissued, work orders are changed, and clearance/return to service responsibility is not transferred in a direct manner. These represent human error traps that should be eliminated. Additionally, the return to service process is not particularly well aligned with safety tagging (yellow CM locks shift to red and blue Maintenance locks and back to yellow Operations locks), introducing further opportunity for error as well as the potential for personal injury or equipment damage.

2009/2010 OFI-CM-01: This is essentially a repeat Finding from the 2007/2008 ISCA. Manpower allocations continue to be a challenge in the face of economic strictures. Compliance with the current plan of action remains on track, but the SCUBA Team recommends expanding this scope in order to prevent recurrence of errors attributable to variations between the design basis and as-built condition.

The SCUBA Team recommends the following:

- Provide adequate resources to continue the positive momentum established in populating the CM database. One option would be to develop a career path for engineers that includes some dedicated time spent in the CM organization. New hires, co-op students, and the rotational assignment of seasoned engineers are sources of needed talent and man-hours that offer the dual benefit of site improvement and individual education.

2009/2010 OFI-CM-02: Although the engineering design change process has been aligned to provide linkage with the CM Program, the confidence placed in the process is not borne out by the results observed by the SCUBA Team or by the self-revealing events that have recently highlighted systemic weaknesses. For instance, BLEU Processing Facility design modifications that precipitated the exothermic event were accurately documented but system schematics for the fire prevention system were not sufficient to support a preventive maintenance program that serviced all fire dampers, leading to a regulatory violation.

The SCUBA Team recommends the following:

- Review a significant sample of those design changes authorized during the developmental phase of the CM process. Prior to the recent establishment of the CCB, there existed a greater possibility for faulty logic to have crept into system design without adequate checks-and-balances.
- The heavy workload associated with entering all major production processes and procedures into the LINC database might have allowed errors to go undetected. It is appropriate to thoroughly review the technical accuracy of supporting documentation when fieldwork is found to be at variance with existing records. Check for opportunities to improve design margin during these second checks.
- Check for administrative gaps in converting Letters of Authorization from paper to a digital record of temporary change.

2009/2010 OFI-CM-03: When all production processes and support systems have been incorporated into LINC database, it would seem appropriate to then address margin management. In particular, items relied on for safety (IROFS) and safety related equipment (SRE) setpoints are theoretically predicated on system performance and component design parameters. Current accuracy and future change can be managed by software tools to ensure consistency as well as to optimize the design margin to continue to conform to the licensing basis.

- Ensure that as-built design parameters for all IROFS and SRE are reviewed for accuracy and completeness.
- Benchmark the nuclear industry to find a working system that would support a process to track engineering modifications and equipment obsolescence issues. Control the as-built configuration in a fashion that coordinates integrated system operation in order to maintain (and potentially improve) the operating margin for all components covered by

the operating license.

- Consider expanding this treatment for all safety related components in order to assist with future parts replacements or system improvements.

IV.D NFS-Erwin Self-Assessment of Safety Culture (December 2009/January 2010)

Attachment D to this report presents the SCUBA Team's evaluation of the Safety Culture Self-Assessment (SCSA) performed by the NFS Safety Culture Leadership Team (SCLT) during the second half of 2009 and culminating in January 2010. Based on the integration of all sources of assessment input, the SCUBA Team has concluded that this topical area is deficient when compared to commercial nuclear power industry norms and represents an Area for Improvement (AFI). As part of its assessment of the NFS safety culture, the SCUBA Team requested the SCLT to conduct its own self-assessment of the NFS safety culture as compared against the cultural attributes set forth in NRC Regulatory Issue Summary 2006-13. This is identical to the work that the SCUBA Team requested during the 2007/2008 ISCA because it believed that:

- In order for the NFS SCLT to design and implement effective initiatives to improve the safety culture, the SCLT needed to understand and acknowledge its current status.
- It would be another opportunity for the SCUBA Team to obtain information on the extent to which the SCLT demonstrated the ability to be sufficiently self-critical.
- The insights, findings, and conclusions of the NFS self-assessment would be a source of valuable input to the SCUBA Team.

The overall accuracy of the NFS SCSA was negatively impacted by the laxity of the site's evaluation of progress since the first self-assessment (which was reviewed during the 2007/2008 ISCA). The original NFS SCSA was generally self-critical with respect to identifying problem areas and weaknesses, but evaluations were too forgiving, giving credit for action taken rather than progress made. The SCUBA Team believes that this practice has continued. For example:

- NFS created an acceptable roadmap for performing the 2009 SCSA but this model was not faithfully followed, resulting in a non-uniform product generally lacking useful metrics.
- The organization's overall willingness to assign a nominal grade of "Yellow/Improving" indicates a continued inadequate frame of reference for nuclear industry norms and provides a misleading standard for improvement. Additionally, it was not clear if an improving trend was compared to industry norms or historic NFS performance.
- PIRCS was not used to record each SCSA finding. On some occasions, the first NFS SCSA was simply extended but in other cases there were no condition reports written.
- The time frame for conducting this assessment was extended by NFS on several occasions; a six week delay resulted.
- It was evident that the final assessment grades were lowered from the preliminary assessment in most categories (apparently in order to demonstrate resolve to the NRC in anticipation of looming regulatory challenges) without any significant rationale provided for such downgrading.

The NFS SCSA was considered as not being sufficiently self-critical for the Resources, Work Practices, Corrective Action Program, Self- and Independent Assessments, Accountability, and Organizational Change Management Safety Culture Components.

The SCUBA Team recommends that NFS perform an annual SCSA, using the existing roadmap as a starting point and including external assessment team members in order to maintain a higher degree of objectivity in grade assignment and performance trending. (Refer to SCUBA Team Finding 2009/2010 AFI-SA-05.)

IV.E NFS-Erwin Nuclear Material Security

The NRC identified three nuclear material security violations in Section V.1 of the NRC Confirmatory Order for Program Improvements dated February 21, 2007. The SCUBA Team reviewed NFS responses and associated corrective actions to fulfill the NRC Confirmatory Order.

The SCUBA Team also conducted an overall assessment of NFS Nuclear Material Security Program and its relationship to the overall safety culture work environment at the NFS-Erwin Site. The Nuclear Material Security Program includes the broad area of security disciplines (i.e., physical, protective forces, personnel) and Material Control and Accountability.

The SCUBA Team concluded that the NFS Nuclear Material Security Program represents an Area for Improvement when compared to industry norms. This program has improved from a period of degraded condition.

The SCUBA Team has provided NFS senior management a separate Nuclear Material Security Assessment Report, which documents the results of its assessment of the NFS Nuclear Material Security Program. This classified Report contains Confidential National Security Information as identified in the Department of Energy Classification Guide for Safeguards and Security Information, CG-SS-4. Consequently, the Report is available for review at the NFS-Erwin Site by personnel with appropriate personnel security clearances and a demonstrated need-to-know.

IV.F SCUBA Team Case Studies

Several Case Studies were conducted by the SCUBA Team in order to evaluate the adequacy of the NFS response to a significant problem or event that occurred while the 2009/2010 Independent Safety Culture Assessment (ISCA) was in progress. Case Studies placed particular emphasis on the manner in which NFS identified and addressed potential safety culture implications associated with operational problems or loss events. As such, Case Studies were intended to obtain information related to the NFS safety culture that would augment information obtained through other sources of assessment input (i.e., the workforce safety culture survey numerical results, the workforce safety culture survey write-in comments, personnel interviews, behavioral observations, and documentation reviews).

Four Case Studies were performed during the course of the 2009/2010 ISCA, the details of which are provided in Appendix G:

- G-1: Fire Damper Inspection Program
- G-2: BLEU Processing Facility (BPF) Bowl Cleaning Station Event
- G-3: Commercial Development Line (CDL) Sublimation Station Event
- G-4: PSL Phase 4 Project

2009/2010 NFS-Erwin Independent Safety Culture Assessment
SCUBA Team Results Report

The SCUBA Team Findings associated with these Case Studies were as follows:

Fire Damper Inspection Program

- AFI-CS/FD-01: Based on personnel interviews, the SCUBA Team discovered that some Industrial Safety personnel felt that they had been instructed by their upper management not to enter problems into PIRCS. Additional interviews revealed that some NFS managers believe that the threshold for the entry of issues into PIRCS is a matter of Departmental policy. This belief and/or practice is not consistent with published NFS Policy. NFS needs to investigate this matter, document its findings, document its PIRCS data entry policy (policies, if Department dependent), train all of its employees regarding this policy (policies), and rigorously enforce them.
- AFI-CS/FD-02: The RCA methodology utilized by NFS needs to be modified to ensure that it includes "Management Effectiveness" and "Management Errors," as well as "Organizational and Programmatic Deficiencies" as potential root or contributing causes. The methodology also needs to systematically consider Extent of Condition from both a management effectiveness/management error and a safety culture perspective. The Safety Culture Implications Review is a good start. However, there is currently no formal guidance as to how an SCIR it to be performed, although the requirements as to when an SCIR should be performed are defined in NFS-GH-918 and NFS-GH-922. Implementation of a formal RCA grading system would better define organizational expectations for RCA content and quality level, and provide constructive feedback to team leaders and members.
- AFI-CS/FD-03: A number of safety culture weaknesses/failures contributed to this loss event. Weaknesses/failures were manifested in the following Safety Culture Components (SCC): Decision Making, Resources, Corrective Action Program, Operating Experience, Accountability, Continuous Learning Environment, and Organizational Change Management. The SCUBA Team believes the single most important cultural area requiring attention is Accountability, as a lack of management oversight and control, and a lack of single-point management accountability were the major contributors to this loss event.

BLEU Processing Facility (BPF) Bowl Cleaning Station Event

- AFI-CS/BPF-01: The RCA methodology utilized by NFS needs to be modified to ensure that it includes "Management Effectiveness" and "Management Errors," as well as "Organizational and Programmatic Deficiencies" as potential root or contributing causes. It also needs to systematically consider Extent of Condition from both a management effectiveness/management error and a safety culture perspective. The SCIR is a good start. However, there is currently no formal guidance as to how an SCIR it to be performed, although the requirements as to when an SCIR should be performed are defined in NFS-GH-918 and NFS-GH-922. Implementation of a formal RCA grading system would better define organizational expectations for RCA content and quality level, and provide constructive feedback to team leaders and members.
- AFI-CS/BPF-02: A number of Safety Culture Component (SCC) weaknesses/failures contributed to the event. Components requiring management attention include Decision Making, Resources, Work Practices (professionals/management), Corrective Action Program, Self- and Independent Assessments, Operating Experience, Accountability, and

Safety Policies. It is also the SCUBA Team's belief that Decision Making (consistently non-conservative), Work Practices (persistently proceeding in the face of uncertainty), and Accountability (a lack of management oversight and control and/or single-point accountability) were key contributors to this loss event.

Commercial Development Line (CDL) Sublimation Station Event

- AFI-CS/CDL-01: The RCA methodology utilized by NFS needs to be modified to ensure that it includes "Management Effectiveness" and "Management Errors," as well as "Organizational and Programmatic Deficiencies," as potential root or contributing causes. The methodology needs to systematically consider Extent of Condition from both a management effectiveness/management and a safety culture perspective. The SCIR is a good start. However, there is currently no formal guidance documented as to how an SCIR it to be performed, although the requirements as to when an SCIR should be performed have been recently defined in NFS-GH-918 and NFS-GH-922. Implementation of a formal RCA grading system would also better define organizational expectations for RCA content and quality level, and provide constructive feedback to team leaders and members.
- AFI-CS/CDL-02: A number of Safety Culture Component (SCC) weaknesses/failures contributed to the event. Components requiring management attention include Decision Making, Resources, Work Control, Work Practices (professionals/management), Self- and Independent Assessments, Operating Experience, Accountability, and Safety Policies. It is the SCUBA Team's belief that Decision Making (consistently non-conservative), Work Practices (persistently proceeding in the face of uncertainty), and Accountability (a lack of management oversight and control and/or single-point accountability) were the key contributors to this loss event.

PSL Phase 4 Project

- AFI-CS/PSL-01: The design process does not provide the safeguards needed to ensure that configuration management conforms to all necessary requirements i.e. design documentation. Code compliance requirements need to be blended into the design basis, documented, reviewed, and approved. The project management process and or the change management processes should be modified to require documentation of decisions concerning the design basis, any modifications, the reasoning for the decisions/modifications, and any necessary considerations or actions as a result. (CM)
- AFI-CS/PSL-02: The evaluations to resolve design issues and the resolutions are not rigorously conducted and documented as noted above; therefore, the specific reasoning and decisions for the PSL Phase 4 Project design are not currently documented. These should be re-evaluated, any appropriate measures implemented, and the design basis documented. The extent of condition for units of similar design and function should also be evaluated and documented. (CM)
- AFI-CS/PSL-03: The ISA process considered only static failure mechanisms and did not explore dynamic or all potential hazards for chemical processes in a rigorous manner. The Integrated Safety Analysis (ISA) process should be evaluated and amended to ensure adequate consideration is given to the identification and mitigation of all potential hazards (nuclear, chemical, and personal). (SP)

- AFI-CS/PSL-04: The observed approval process for changes is largely focused at accomplishing the intended result of the evolution. The Change Control Board (CCB) and the Safety and Safeguards Review Council (SSRC) are the two committees primarily involved in the approval process for change, Letters of Authorization (LOA), work requests (WR), procedural changes, projects, etc. The goal is to manage and accomplish change in an efficient, safe, and compliant manner. The approvals are normally based upon individual reviews before calling a meeting to approve the particular issue. It is recommended that the approval processes for change be amended to include a collegial challenging discussion and defense of the safety basis and the mitigating actions for any change by subject matter experts. (DM)
- AFI-CS/PSL-05: The Root Cause Analysis (RCA) methodology employed by NFS needs to be modified to include management effectiveness and management errors, as well as organizational/programmatic deficiencies. It also needs to consider extent of condition from both a management effectiveness/management error and safety culture perspective. (The Safety Culture Implication Review (SCIR) is a good start but has not, as yet, been formalized.) Implementation of a RCA grading system would better define organizational expectations for RCA content and quality level. This AFI is also identified in other case studies. (CAP)
- AFI-CS/PSL-06: Field testing and demonstrated proficiency should be a basic part of any project prior to declaring operational readiness. The decision to not defer implementation of PSL Phase 4 pending improved training and equipment response was non-conservative. Although startup and process flow did not occur, the act of accepting a substance for which adequate emergency response measures had not been demonstrated did not reflect conservative decision making. (WP)
- AFI-CS/PSL-07: A number of SCC weaknesses/failures contributed to the issues identified in this case study. Components requiring attention include Decision Making, Work Practices, Corrective Action Program, Operating Experience, and Accountability. The most important components requiring attention are Decision Making, Work Practices and Accountability as a lack of attention to detail, a lack of questioning attitude, and management oversight and control were the major contributors to this study.
- AFI-CS/PSL-08: The organization did not recognize deficiencies until Case Study talking points were issued to management. This is an oversight in the internal processes and behaviors to identify issues. The station has failed to concentrate these weaknesses/failures into an overarching analysis along the lines of SCUBA Team's case study despite regulatory intervention that challenged the station to improve their performance in situations such as these and resulted in the issuance of a second Confirmatory Action Letter.

Although 15 total Findings are listed for the four Case Studies listed above, there was one Finding that was common to all (AFI-CS/FD-02, AFI-CS/BPF-01, AFI-CS/CDL-01, and AFI-CS/PSL-05). Thus, there were 12 unique total Findings generated by the four Case Studies. Eleven of the 15 Findings were incorporated into the 13 Safety Culture Component Findings provided in Section III of this Report (AFI-CS/FD-01, 02, and 03, AFI-CS/BPF-01 and 02, AFI-CS/CDL-01 and 02, and AFI-CS/PSL-03, 05, 07, and 08). Four of the 15 Findings are related to Process Design, Safety Basis analyses and documentation, and Project/Process implementation. These Findings (AFI-CS/PSL-01, 02, 04, and 06) are documented in Appendix G, but are not incorporated into the main body of the Report.

V. OUTLIER ORGANIZATIONS BASED ON WORKFORCE SURVEY NUMERICAL RATINGS

Introduction

Based on the 2009 NFS Safety Culture Survey results, four individual NFS-Erwin Functional Organizations were identified by SYNERGY as "organizational outliers" due to (1) having provided low or declined numerical ratings for key cultural characteristics (i.e., Overall Nuclear Safety Culture and/or Overall Safety Conscious Work Environment ratings), or (2) showing high negative response pockets (percentages) for those key cultural characteristics. These organizations are:

- Analytical Services – Priority Level 1
- Health Physics – Priority Level 3
- Transportation and Waste Management – Priority Level 3
- Corporate Services – Priority Level 3

BLEU Complex Security was identified as a Priority Level 3 "organizational outlier" based on notably declined ratings, but also had a very low survey participation level – 10% (1 out of 10). That organization was further evaluated as a "low responding organization."

SYNERGY's definition of these priority levels is as follows:

- Priority 1 = There is a potential need to take localized remedial action in the immediate future.
- Priority 2 = There is a potential need to take localized remedial action in the near-term.
- Priority 3 = Further investigation of causative factors for this localized situation is potentially needed.

SCUBA Team Evaluation

In accordance with the 2009/2010 Independent Safety Culture Assessment (ISCA) Plan, the SCUBA Team conducted confidential interviews with personnel from these five organizations to determine the underlying reasons for these ratings. Personnel interviewed were randomly selected. These interviews revealed the following:

- Survey results and interview results were in alignment with the exception of Analytical Services
- The issues driving the ratings vary substantially from group to group, and are described in confidential reports that the SCUBA Team has provided to NFS senior management.
- Based on its evaluation of these five organizations, the SCUBA Team developed four Localized Findings (LOC). These Findings are presented below.

2009/2010 AFI-LOC/AS-01: The Analytical Services Laboratory organization was identified as a Priority Level 1 outlier organization in both 2007 and 2009. NFS-Erwin management did not act with the required level of urgency regarding the Analytical Services Laboratory, to reverse this trend. This level of inaction was inconsistent with NFS policy of zero tolerance regarding harassment, intimidation, retaliation, and discrimination. NFS senior management needs to take the steps necessary to assure an adequate level of attention is given to these types of problems/issues, and needs to do so in a timely manner.

2009/2010 AFI-LOC/HP-01: Health Physics was identified as a Priority Level 3 outlier organization. Although the manager of the Health Physics program is seen as being unresponsive to the concerns of some of the technician staff, this did not contribute to any issue with the Safety Conscious Work Environment. However, harassment for whatever reason is unacceptable. The SCUBA Team recommends that NFS take action to ensure that individuals who worked during the 2006 strike are not harassed by peers as a consequence.

2009/2010 ANA-LOC/HP-01: Health Physics was identified as a Priority Level 3 outlier organization. A major issue identified in the 2007 Safety Culture Survey relative to changes in the radioactive material survey program remains. Since the issues with changes in the radioactive material survey frequency are interpretive in nature, the analyses are essentially differing professional opinions (DPO). The SCUBA Team recommends that NFS resolve these matters through the NFS DPO process, perhaps by using external experts, and communicate the results to the radiation technician staff.

2009 /2010 OFI- LOC/CS-01: Corporate Services was identified as a Priority Level 3 outlier organization. While interviews conducted by the SCUBA Team do not indicate near-term action is required, action to rectify the current environment in Corporate Service is recommended to achieve the desired future state of excellence. Any work environment where efforts and recommendations are not acknowledged can lead to morale issues and dissatisfaction. Management of Corporate Services and senior management should be made aware of the prevailing sentiment, should make concerted efforts to reinforce individual and group efforts, and should better explain the reasons for decisions affecting this organization. Acknowledgement, reinforcement, and recognition of successful work would go a long way in overcoming the frustrations of perceived rejections of workforce input.

Additional detail is provided in the above-mentioned confidential reports.

The SCUBA Team recommends that management take localized remedial action with two of these organizations to proactively surface and resolve issues identified through the survey and the personnel interviews performed by the SCUBA Team.

VI. REPORT ATTACHMENTS

Additional information related to the 2009/2010 Integrated Safety Culture Assessment (ISCA) results is provided in several Attachments to this Report. These are listed below:

Attachment A: SCUBA Team Assessment of the Adequacy of NFS Responses to NRC Notices of Violations

Attachment B: SCUBA Team Assessment of the Adequacy of NFS Regulatory Commitment Management

Attachment C: SCUBA Team Assessment of the Adequacy of the NFS Configuration Management Program

Attachment D: SCUBA Team Assessment of Quality of the NFS Safety Culture Self-Assessments Performed in 4Q 2009/1Q 2010

Attachment E: SCUBA Team In-Process Recommendations provided to NFS Management

- E-1: Report on the SCUBA Team's Assessment of the Adequacy and Appropriateness of the NFS CSCII, dated November 21, 2008
- E-2: Report on the SCUBA Team's Assessment of NFS Progress on the NFS CSCII, dated November 26, 2008
- E-3: Report on the SCUBA Team's Assessment of NFS Progress on the NFS CSCII, dated September 25, 2009
- E-4: Preliminary Take-offs from the Four Case Studies Conducted by the SCUBA Team, dated December 21, 2009.

Attachment F: SCUBA Team Personnel Interviews Tables and Behavioral Observations Tables

Attachment G: Reports on the Four Case Studies Conducted by the SCUBA Team

- G-1: Fire Damper Inspection Program
- G-2: BPF Bowl Cleaning Station Event
- G-3: Commercial Development Line (CDL) Sublimation Station Event
- G-4: PSL Phase 4 Project

Attachment H: Key Insights Derived from SCUBA Team Behavioral Observations through May 1, 2010.

Attachment I: Abbreviations and Acronyms used in the 2009/2010 ISCA Results Report

VII. ADDITIONAL INFORMATION PROVIDED SEPARATELY

Detailed information related to the 2009 NFS Safety Culture Survey was provided separately to NFS senior management by SYNERGY Consulting Services Corporation (SYNERGY) on December 7, 2009. That information was provided in electronic format on a series of CD-ROM disks.

- A non-proprietary, non-confidential CD-ROM disk
- A proprietary CD-ROM disk[17]
- A confidential CD-ROM disk[18]

The following additional confidential information has been provided separately by the SCUBA Team to NFS senior management on a CD-ROM disk:

- Results summaries of the SCUBA Team's confidential interviews with personnel in NFS Functional Organizations that were identified as "outlier organizations" based on the 2009 NFS Safety Culture Survey results.

[17] This CD-ROM disk contains SYNERGY Proprietary Information related to cultural assessment methodologies and practices.

[18] This CD-ROM disk contains the Confidential Redacted Survey Write-In Comments that were obtained with the promise that the comments provided would be protected both by redaction of information that could potentially reveal the identity of the comment providers and by limited distribution to personnel with a genuine "need-to-know."

ATTACHMENT A
ADEQUACY OF NFS CORRECTIVE ACTIONS IN RESPONSE TO NRC NOTICES OF VIOLATION

Introduction

Attachment A of the 2007/2008 Independent Safety Culture Assessment (ISCA) Results Report presented the results of the SCUBA Team's independent assessment of the adequacy of corrective actions taken (or planned) by NFS in response to the issues identified in Section V.1 (Notices of Violation), Section II, items A, C, and E of the NRC Confirmatory Order for Program Improvements dated February 21, 2007.

A subsequent assessment of the adequacy of corrective actions taken by NFS in response to Notices of Violation (NOV) was conducted for the 2009/2010 ISCA. In this regard, the SCUBA Team expanded the scope of the SCUBA Team's review of the adequacy of NFS responses to NRC NOV beyond those NOVs specified in the NRC Confirmatory Order for Program Improvements dated February 21, 2007 by also including a sample of NFS responses to more recent NRC NOVs.

This assessment was accomplished through (1) a review of PIRCS data and commitment tracking spreadsheets (including the NRC Inspector Resolution Tracking Log), (2) interviews with the NFS Assurance Director, the Quality, Safety and Safeguards Director, the Regulatory Senior Advisor, the CAP manager, the Nuclear Safety and Licensing Section Manager, the Licensing and Integrated Safety Manager (ISA Manager), an Engineering Licensing Specialist and a Safety Analyst Specialist, and (3) review of NFS responses to NOVs selected from the NRC's Agency-wide Document Access and Management System (ADAMS) and the Fire Damper NOV response event.

SCUBA Team Conclusion: Area for Improvement (AFI)

SCUBA Team Findings and Recommendations

2009/2010 AFI-NOV-01: This is essentially a repeat Finding from the 2007/2008 ISCA. NFS provides responses to the specifics identified in NRC violations, but does not adequately address the underlying causes and associated cultural issues. There was one incident where NFS did not take adequate corrective action in response to an NOV and then provided inaccurate information to the NRC in its response document. There are occasional due date extensions and, on at least one occasion, an NOV response missed its due date. This represents a deficiency when compared to commercial nuclear power plant industry norms. It also may indicate NFS satisfaction with minimum regulatory compliance.

In this regard, the SCUBA team recommends the following:

- Improve NOV response tracking: critical elements are not consistently assured
- Increase accountability and management review of NOV responses
- Until such time as NFS can demonstrate a consistent track record of performance: increase oversight from Assurance Director
- Improve quality of Root Cause and Apparent Cause products

- Obtain additional training from industry experts in root cause analysis
- Use improved analytical tools for root cause analysis, extent of condition analysis, extent of cause analysis, etc. Utilize root cause analytical techniques that include human performance and management performance as possible root causes or contributing causes.

Supporting Information

The SCUBA Team used ADAMS to review NFS replies to three NRC Notices of Violation associated with recent routine NRC inspection reports. It also reviewed the NOV relative to the Fire Damper and an in-depth analysis of that review is contained in a SCUBA Team Case Study (refer to Appendix G of this report).

- NOV No. 70-143/2009-002-01 was issued in a timely manner. It concerned the failure of two mechanics to follow the current Lock-out/Tag-out Procedure, NFS-GH-36, Rev. 7, requiring the installation of locks/tags on all identified energy isolation points when working on equipment. On April 27, 2009, the mechanics failed to affix locks or tags on the disconnected breakers of blowers while performing preventive maintenance. In response, NFS stated that the mechanics used the wrong revision, Rev. 6, of the procedure that allowed energy isolation within arm's reach without a permit or lock-out/tag-out. NFS stated that full compliance was achieved on August 5, 2009, when the reinstruction of the maintenance mechanics was complete. There was no indication by NFS as to why the mechanics used the wrong procedure and whether there were generic implications in the event. Additionally, it is not clear why NFS delayed changing the "arm's reach" protocol for a year after the 2007/2008 ISCA pointed out the deviation from industry norms in the area of electrical safety.

- NOV No. 70-143/2009-003-01 was issued for the failure for NFS to ensure IROFS FIRE-15 and IROFS FIRE-28 would perform their intended safety function when needed to comply with the performance requirements. The cause was the failure of the initiator of the Major Work Order to have received adequate training in the identification of items relied on for safety (IROFS) although SOP 392, Work Request Procedure, states that the initiator is responsible for reviewing IROFS that will be affected by the proposed change. NFS stated that the current training and qualification job qualification for initiators does not require training for specific IROFS. A review of PIRCS 20557 associated with the discovery of this problem, the associated investigation and established corrective actions shows that NFS did an in-depth analysis of this event. There were a number of corrective actions. Corrective action associated with the root cause, the lack of knowledge of IROFS on the part of the initiator, is not due for completion until July 17, 2010. This date has been extended seven times since November 15, 2009. The response to the NRC stated that full compliance was achieved on November 20, 2009, when only five of the seven corrective actions were completed. This was accurate for a narrow focus on FIRE-IROFS. The response did state that among steps to prevent future violations, actions would be taken to review SOP 392 and identify who should be responsible for identifying IROFS that may be impacted by work requests (WR). Subsequently, NFS had a near miss event, PIRCS 23257, on a work request generated on January 20, 2010, in which a work request initiator improperly classified a work request as a Minor 2 when, if executed, it could have disabled safety related equipment (SRE) and IROFS. People from several

organizations reviewed and signed off on this WR without identifying the IROFS problem. Clearly, corrective action for the earlier event failed to prevent this later near miss.

- NOV No. 70-143/2009-004-01 was issued for what SCUBA has identified as the Commercial Development Line (CDL) event: see SCUBA Case Study G-3. The NFS response to this NOV was narrowly focused and corrective actions stated are a fraction of the corrective actions identified in PIRCS 22021. Root cause and generic issues are not discussed. The NFS reply to the NRC was late and the NRC Resident Inspector had to remind NFS that the response was not timely.

- NFS submitted a response to NOV No. 70-143/2008-003-02 (Fire Damper) indicating all actions had been closed out. The NRC discovered that some fire damper inspections were not conducted: see SCUBA Case Study G-1. There were three failures by NFS in connection with this NOV response: (1) failure to perform required fire damper safety inspections, (2) failure to take adequate corrective action in response to an NRC Notice of Violation, and (3) failure to provide correct information to the NRC regarding an NOV (PIRCS 20984).

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SCUBA Team Results Report

ATTACHMENT B
ADEQUACY OF NFS COMMITMENT MANAGEMENT

Introduction

Attachment B to the 2007/2008 Independent Safety Culture Assessment (ISCA) Results Report presented the results of the SCUBA Team's independent assessment of the adequacy of the actions taken (or planned) by NFS-Erwin with respect to the commitments made at the management meeting with the NRC on September 18, 2006. Those commitment actions remaining open at the conclusion of the 2007/2008 ISCA were reviewed for this report.

In addition, the SCUBA Team expanded the scope of the SCUBA Team's review of the adequacy of NFS Regulatory Commitment Management by expanding beyond the commitments made by NFS on September 18, 2006 to include a sample of more recent regulatory commitments, including the closure of commitments made to the NRC in the NFS Comprehensive Safety Culture Improvement Initiative (CSCII). In this regard, a random sample of commitments made to the NRC in 2009/2010 was also assessed and the results are contained in this Attachment.

On September 18, 2006, NFS committed to 14 items during a management meeting with the NRC. All of those commitments have been closed out in PIRCS.

The SCUBA Team assessed 38 Commitment responses generated by Notices of Violation (NOV) and allegations in the period May 2009 through May 2010. The SCUBA Team concluded that NFS standards and practices for regulatory commitment closure do not meet industry norms or regulatory expectations.

This assessment was accomplished through (1) a review of a random sample of PIRCS commitment data and the NRC Inspector Issue Resolution Tracking Log and (2) interviews with the NFS Assurance Director, the Quality, Safety and Safeguards Director, the Regulatory Senior Advisor, the Corrective Action Program Manager, the Nuclear Safety and Licensing Section Manager, the Licensing and Integrated Safety Analysis Manager, an Engineering Licensing Specialist and a Safety Analyst Specialist.

SCUBA Team Conclusion: Area for Improvement (AFI)

SCUBA Team Findings and Recommendations

2009/2010 AFI-RCC-01: There have been lapses in timely close-out. Closure has been attributed to work not actually completed. There are occasions when an internal commitment may not be recognized as also a commitment to the NRC (e.g., commitments to conduct self-assessments did not meet due dates). Oversight and approval of commitment closure is somewhat subjective, relying on individual judgment rather than review and approval by a committee. The current commitment management process does not require an evaluation of the effectiveness of corrective actions that have been taken to meet commitments. The current process lacks a regular, systematic, independent third party (e.g., Quality Assurance) review.

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SCUBA Team Results Report

The SCUBA Team recommends the following:

- Develop a process to evaluate commitment closure that verifies completion and adequacy. This process should specify a committee or panel review prior to closure.
- Revise commitment closure guidelines to include a prohibition against closing commitments to a scheduled event or task; that is, the work required to meet the intent of the commitment must be completed.
- Engage senior management in the closure approval process.
- Revise commitment closure guidelines to include an Effectiveness Review, unless clearly not warranted.
- Establish periodic quality reviews of the commitment closure process by an independent review source (e.g., Quality Assurance).
- Ensure identification of all commitments by using PIRCS to document and track upon receipt.

2009/2010 ANA-RCC-02: The regulatory response program is under-resourced when it comes to handling a surge of regulatory commitments, like those experienced as a consequence of recent site events. In this regard, the SCUBA Team recommends the following:

- Expedite issuance of the draft Regulatory Agency Communication Procedure. Provide sufficient resources to allow implementation of the policy.
- Develop additional bench strength for processing regulatory documents.
- Develop a contingency plan to permit accelerated processing of regulatory commitments when a surge in activity is experienced

Supporting Information

Commitments reviewed from 2009/2010 PIRCS records:

- PIRCS 20556: The corrective actions for VIO2007-009-03 (rigor of tollgate process) included Commitment C9952 - a review of the current process for updating open PIRCS assignments contained the following reference in Actions Taken: Planned introduction of Department Performance Improvement Coordinators in First Quarter of 2010. Commitment closed November 17, 2009. CREDIT FOR ACTION NOT YET TAKEN
- Commitment C10162, Corrective Action (PIRCS 9954) received six due date extensions. NOT TIMELY
- Three NRC allegations (PIRCS 23986, 23985, 19781) referred to site for investigation during the evaluation period. All three were given due date extensions. NOT TIMELY

Interviews revealed a lack of bench strength for processing regulatory commitments.

Interviews indicate a significant backlog (500+) of commitments closed but not reviewed for completeness and accuracy of closure.

Comprehensive Safety Culture Improvement Initiative self-assessment updates were due on December 1, 2009. Updates were completed in January 2010.

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SCUBA Team Results Report

As documented in the Executive Summary of the 2009/2010 ISCA Results Report, NFS management apparently had not understood or sufficiently recognized that the NFS CSCII commitments were commitments to the NRC, as opposed to commitments to the SCUBA Team. Based on a review by the SCUBA Team of those CSCII commitments/actions determined by NFS to be complete/closed (based on the assigned individual having declared through the NFS Corrective Action Program that the action was completed and on the NFS Corrective Action Review Board having endorsed the action as completed), the SCUBA Team has concluded that approximately 50% of such "completed" actions did not meet appropriate standards for considering an action to have been completed. (Refer to Summary Finding 2009/2010 AFI-SUM-09)

ATTACHMENT C
ADEQUACY OF NFS CORRECTIVE ACTIONS IN RESPONSE TO SECTION V.2 (CONFIGURATION MANAGEMENT) OF NRC CONFIRMATORY ORDER DATED 02/21/07

Introduction

This attachment presents the results of the SCUBA Team's independent assessment of the adequacy of corrective actions taken by NFS in response to the issues identified in Section V.2 (Configuration Management) of the NRC Confirmatory Order for Program Improvements dated February 21, 2007.

This evaluation differentiates between maintaining an accurate as-built database (configuration management), which is the responsibility of the Configuration Management (CM) group, and a technically accurate design basis (configuration control) that belongs to Engineering.

Topic Description

The CM Program should (1) exhibit the ability to track each plant modification that could affect safety, (2) not degrade the performance capabilities of items relied on for safety (IROFS) or other safety controls that are part of the safety design basis, and (3) effectively identify and document the effects of plant modifications on IROFS and other safety controls, processes, equipment, computer programs, and activities of personnel.

SCUBA Team Conclusion: Area in Need of Attention (ANA)

The SCUBA Team has concluded that the CM Program improvement initiatives have been adequately resourced to ensure that regulatory commitments were met. However, there remain additional tasks that could represent a threat to the overall accuracy of the design basis.

There is sufficient documentary evidence to confirm that the programmatic elements necessary to meet regulatory expectations and comply with the stated objectives of the CM program are in place. The Change Control Board (CCB) is the most obvious manifestation of progress and has been fully loaded – perhaps over-loaded. Site-wide training has been completed as required. Most individuals are comfortable with their personal skills, although there is heavy reliance on the few subject matter experts in the CM organization.

The most significant shortcomings are the limited horizon for full inclusion of all site systems in the CM program and the tendency to infer that configuration control is principally the responsibility of the CM group (with insufficient responsibility for design accuracy assigned to the Engineering organization), and the work controls in place for configuration tagging.

SCUBA Team Findings and Recommendations

2009/2010 AFI-CM-01: NFS needs to expand the scope of the CM Program because there are continuing instances of design flaws attributable to systems, processes, or components that will be excluded from the database. Current plans would not provide complete, accurate, and up-to-date design documentation to support future operation.

The SCUBA Team recommends the following:

- Expand the CM documentation to include safety-significant support systems such as security, bulk chemicals, and fire protection as well as the body of components included in electrical schematics. Current plans do not call for inclusion but recent events argue otherwise. For instance, the loss of safety related equipment functionality due to unexpectedly de-energizing three components when modifying a power panel in Building 137 underscores the need to shift priorities to ensure technical design accuracy is assured in addition to schematic fidelity.
- Establish a crosswalk process to connect security systems and site design documents within the limits allowed by the classification protocols.

2009/2010 ANA-CM-01: Expectations for the CCB are not matched by the degree of authority assigned. Design changes originate within the engineering organization and are approved by the Safety and Safeguards Review Council (SSRC). The CCB serves as a waypoint between these two organizations, empowered only to review the preliminary design, make non-binding suggestions, and track administrative progress. Sponsoring managers are not expected to attend CCB reviews and participation by the Industrial Safety group is cursory. Additionally, only one member serves on the quorum of both CCB and SSRC. As a result, the product vetted by CCB is not necessarily the product that is submitted to the SSRC for approval.

The SCUBA Team recommends the following:

- Establish a protocol that requires engineering design changes receive formal CCB approval prior to allowing the modification package to proceed to the SSRC for final approval. Consider substituting the CCB for the SSRC and eliminate an unproductive step in the review chain during the next license revision submittal.
- Consider eliminating the absolute requirement for the CCB to vet every procedure change and Minor 2 Work Request in order to better balance risk and consequence against available resources.

2009/2010 ANA-CM-02: The process for configuration control in the field is cumbersome and not well aligned with the work control or lock-out/tag-out process in use for routine site work. It is important that these two processes be aligned.

The SCUBA Team recommends the following:

- Meld the process for operations tagging with configuration control tagging. Both use yellow locks/tags but the latter process is not recognized during work planning. Consequently, work is delayed, tags are reissued, work orders are changed, and clearance/return to service responsibility is not transferred in a direct manner. These represent human error traps that should be eliminated. Additionally, the return to service process is not particularly well aligned with safety tagging (yellow CM locks shift to red and blue Maintenance locks and back to yellow Operations locks), introducing further opportunity for error as well as the potential for personal injury or equipment damage.

2009/2010 OFI-CM-01: This is essentially a repeat Finding from the 2007/2008 Independent Safety Culture Assessment. Manpower allocations continue to be a challenge in the face of economic strictures. Compliance with the current plan of action remains on track, but the SCUBA Team recommends expanding this scope in order to prevent recurrence of errors attributable to variations between the design basis and as-built condition.

The SCUBA Team recommends the following:

- Provide adequate resources to continue the positive momentum established in populating the CM database. One option would be to develop a career path for engineers that includes some dedicated time spent in the CM organization. New hires, co-op students, and the rotational assignment of seasoned engineers are sources of needed talent and man-hours that offer the dual benefit of site improvement and individual education.

2009/2010 OFI-CM-02: Although the engineering design change process has been aligned to provide linkage with the CM Program, the confidence placed in the process is not borne out by the results observed by the SCUBA Team or by the self-revealing events that have recently highlighted systemic weaknesses. For instance, BLEU Processing Facility design modifications that precipitated the exothermic event were accurately documented but system schematics for the fire prevention system were not sufficient to support a preventive maintenance program that serviced all fire dampers, leading to a regulatory violation.

The SCUBA Team recommends the following:

- Review a significant sample of those design changes authorized during the developmental phase of the CM process. Prior to the recent establishment of the CCB, there existed a greater possibility for faulty logic to have crept into system design without adequate checks-and-balances.
- The heavy workload associated with entering all major production processes and procedures into the LINC database might have allowed errors to go undetected. It is appropriate to thoroughly review the technical accuracy of supporting documentation when fieldwork is found to be at variance with existing records. Check for opportunities to improve design margin during these second checks.
- Check for administrative gaps in converting Letters of Authorization from paper to a digital record of temporary change.

2009/2010 OFI-CM-03: When all production processes and support systems have been incorporated into LINC database, it would seem appropriate to then address margin management. In particular, IROFS and safety related equipment (SRE) set-points are theoretically predicated on system performance and component design parameters. Current accuracy and future changes can be managed by software tools to ensure consistency as well as to optimize the design margin to continue to conform to the licensing basis.

- Ensure that as-built design parameters for all IROFS and SRE are reviewed for accuracy and completeness.
- Benchmark the nuclear industry to find a working system that would support a process to track engineering modifications and equipment obsolescence issues. Control the as-built configuration in a fashion that coordinates integrated system operation in order to maintain (and potentially improve) the operating margin for all components covered by

the operating license.

- Consider expanding this treatment for all safety related components in order to assist with future parts replacements or system improvements.

Supporting Information

Workforce Survey Results

The NFS-Erwin workforce survey included two survey questions related to configuration management:

- "I am confident that members of my work group understand their responsibilities related to Configuration Management" was rated among the lowest 25% of all safety culture attributes rated.
- The response to "Procedures, drawings and calculations are maintained to be consistent with operational practices and the physical configuration of our facilities" improved by 5% since the last survey and was noted as an area of notable improvement.

There were few (17) survey write-in comments directly related to configuration management. The comments were generally positive, noting that the Configuration Improvement Program is improving and is on the road to being an area of strength. The negative comments generally noted the cumbersome nature of the process and the need for the entire staff to address configuration management changes.

Personnel Interviews, Behavioral Observations, and Documentation Reviews

The SCUBA Team gained significant insights during interviews, observations, and documentation reviews. Some examples:

- There were several examples of faulty configuration management in the field observed during SCUBA Team visits. For instance, hardware replacement often occurred ad hoc when fasteners were lost or damaged; security cameras were replaced with upgraded models as Minor 1, not Minor 2, jobs; work packages were approved at weekly maintenance planning meetings without benefit of proposed drawing changes in hand.
- Most individuals interviewed expressed concern for the speed and volume of procedure changes. This bow wave of work passes directly through the CCB and is obviously a widespread cause of concern. The CCB, for its part, meets more often than planned, diverting resources in areas not envisioned when organizational responsibilities were devised and resources allocated.
- CM Program documents are relatively new and each has undergone some form of revision since their creation. They are generally acceptable, but in many cases, attachments are annotated with a note that the CM Manager or Engineering Director may approve modifications to this form without requiring a procedure modification. This laxity invites a loss of discipline.
- The procedure for developing a technical basis, NFS-TS-009, was promulgated but not applied to the business of design modification/configuration management because it was erroneously omitted from the Training Department's "read-and-sign" program.

- The most significant observation regarding CM Program documentation is the lack of an over-arching roadmap. The guidance documents do not flow from policy to process to procedure. Instead, overlapping documents and requirements exist within the body of work created by individual departments, inviting error in execution of work that crosses department lines.
- Project engineers report frustration that projects are not planned well and that continuity has been a problem. Safety reviews are usually scheduled late, when pressure to get the project complete is mounting. One example is the project for force on force enhancements, where the project was identified in April, not assigned a manager until October, and scheduled to be completed in February. A second is the Commercial Development Line project, which had four different project engineers with little experience at NFS and even less continuity. These conditions persist.
- The most recent self-assessment of CM was an accurate representation of program status but none of the comments were simultaneously entered into the CAP for better tracking of resolution.
- Commitments written in response to the SCUBA Team's progress review of the Comprehensive Safety Culture Improvement Initiative conducted in July 2009 are being tracked but the logged status is not accurate and all are incomplete. PIRCS is not being used an effective tool for tracking progress in the CM topical area.

Comprehensive Safety Culture Improvement Initiatives (CSCII) and CSCII Progress Review

The SCUBA Team reviewed all of the CSCII PIRCS Commitments originally listed for the CM topical area. Fourteen of the 15 condition reports were reported as complete and most had been adequately closed. Most commitments were met on time with a few notable exceptions. Key observations were as follows:

- PIRCS 13700 C6356 required establishment of CM as a major project; two months late in completing but the outcome was acceptable. IMPLEMENTATION EFFECTIVE
- PIRCS 13701 C6362 required establishing a PIRCS code that would allow designation of CM as a cause to facilitate common cause analysis. The task was three months late in completion but has not led to effective trending in order to analyze and improve performance. IMPLEMENTATION INEFFECTIVE
- PIRCS 13701 C6364 committed to a self-assessment that was performed, but there were no subsequent condition reports written to document findings resulting from that activity. IMPLEMENTATION INEFFECTIVE
- PIRCS 13701 C6367 established a commitment to audit the Letter of Authorization database. This effort was completed on time but the commitment did not carry with a requirement to complete the transition from paper to digital records. That effort remains in progress. IMPLEMENTATION INCOMPLETE
- PIRCS 13702 C6368 established a requirement to complete LINC software training for all CM users. The task was effectively completed but was one year overdue when closed. IMPLEMENTATION EFFECTIVE
- PIRCS 13700 C6359 established a commitment to devise a system to manage design margin. This significant task is due for completion on June 30, 2010 and shows 5% progress. NOT OVERDUE – SLOW PROGRESS

NFS Self-Assessment

NFS-Erwin management's overall self-assessment was that CM is an area that is "sometimes effective, somewhat reactive, requires monitoring," but improving. Key observations:

- The self-assessment was an accurate portrayal of the status of the Configuration Management Program.
- The self-assessment evaluated the entire topical area as a whole. It would have been more helpful to have sub-divided the grading and recommended actions to match the five attributes evaluated.
- The PIRCS system was not used as a means to document deficiencies but lacked suggestions for improvement.

The Safety Culture Self-Assessment roadmap was not followed in that PIRCS documents were not generated in response to issues identified, but the self-assessment was a thorough analysis in most other ways. The SCUBA Team believes that NFS's self-assessment of CM is accurate.

ATTACHMENT D
SCUBA TEAM EVALUATION OF THE NFS SELF-ASSESSMENT (DEC 2009/JAN 2010)

Introduction

This attachment presents the results of the SCUBA Team's evaluation of the Safety Culture Self-Assessment (SCSA) performed by the NFS Safety Culture Leadership Team (SCLT) during the fourth quarter of 2009 and culminating in January 2010. As part of its assessment of the NFS safety culture, the SCUBA Team requested the SCLT to conduct its own self-assessment of the NFS safety culture as compared against the cultural attributes set forth in NRC Regulatory Issue Summary 2006-13 (RIS). This is identical to the work that the SCUBA Team requested during the previous Independent Safety Culture Assessment (ISCA) because it believed that:

- In order for the NFS SCLT to design and implement effective initiatives to improve the safety culture, the SCLT needed to understand and acknowledge its current status.
- It would be another opportunity for the SCUBA Team to obtain information on the extent to which the SCLT demonstrated the ability to be sufficiently self-critical.
- The insights, findings, and conclusions of the NFS self-assessment would be a source of valuable input to the SCUBA Team.

In conducting the SCSA, NFS assigned each of the 13 NRC RIS Safety Culture Components (SCC) plus Security and Configuration Management topical areas to individual members of the SCLT. After completing these component-level self-assessments, the SCLT (executive sponsors) validated the findings and conclusions for each of the components. However, the response was not timely and the initial results did not demonstrate sufficient insight or effort in preparing the self-assessment. Specifically:

- The SCUBA Team advised NFS management of the expectation for a SCSA in the fourth quarter of 2008. NFS management agreed to conduct such an assessment and so informed both the SCUBA Team and the Nuclear Regulatory Commission (NRC) in the first quarter of 2009, setting a deadline of August 2009.
- In June 2009, the SCUBA Team recommended deferring the SCSA until November 2009 to minimize the gap in time between the SCSA and ISCA. NFS management concurred with this recommendation, reinforcing the expectation of the self-critical nature of the assessment as well as including findings from the 2007/2008 ISCA during the review. The due date became November 30, 2009 and NFS so informed both the SCUBA Team and NRC of this change.
- In October 2009, NFS issued a roadmap specifically outlining the process for self-assessment as well as expectations for content. The SCUBA Team considered this guidance acceptable and NFS meeting minutes reflect consistent emphasis on this expectation. However, most components were not reviewed per this guidance.
- Approximately half of the self-assessments were completed by the deadline; all but one was considered complete by December 15th. However, there was no effort to conduct a horizontal review to check for adequacy and accuracy.
- On December 16th, the SCUBA Team reported that an initial review of the product revealed that significant improvements were required and NFS management concurred. For example, the self-assessment was found to be lacking in consistency and quality, including such details as (1) not following the guidance provided, (2) not effectively

using metrics, (3) not using metrics that result from the "flow-down of excellence" approach, (4) describing actions taken or planned versus offering a critique of the status and effectiveness of those actions already taken. An across-the-board review was scheduled to begin on December 28th. On December 24th, as the result of pending regulatory action in response to a series of significant operational events, NFS management elected to postpone corrective action until January 2010 and informed the SCUBA Team of this change.

- On January 8, 2010, NFS commissioned a small management team to review all self-assessment components for completeness, consistency, and accuracy with a dual-purpose of uncovering re-start issues. In general, the executive sponsors did not participate.
- The final SCSA was reviewed and re-issued on or about January 16, 2010. Organizational Change Management was not re-issued because it was deemed adequate by NFS in its original form.

It is important to note that the critique, findings of fact, and opinions contained in this Attachment were developed in January 2010 when accelerated completion of the 2009/2010 ISCA was contemplated. Actions taken in response to SCUBA Team comments are not reflected in these remarks, nor is there any credit/discredit given to follow-up actions or events.

Bottom line: There is no apparent appreciation for the value of a self-assessment as a means to performance improvement. While it is worth noting that the final SCSA submitted for SCUBA Team review was significantly more self-critical than any of the several products developed prior to the issuance of the Confirmatory Action Letter (CAL) in January 2010, there is no apparent basis for this action. In most cases, windows that migrated from "Yellow" to "Red" were not adequately supported by facts, metrics or anecdotes to justify the changes, and it appeared that they were made simply to reflect regulatory concern. In other cases, it appears as though many findings occurred in direct response to SCUBA Team activities rather than taking an independent view of the problem. The SCUBA Team believes that the self-assessment was not performed rigorously or with the level of detail needed to effect real improvement. It appears that NFS has approached the self-assessment assignment with a checklist mentality that has offered few recommendations that would lead to problem resolution.

SCUBA Team Conclusion: Area for Improvement (AFI)

Definition of Terms

The SCUBA Team, using the following characterizations, identified areas of strength and weakness in the NFS safety culture as follows:

- *Area for Improvement*: A component or attribute of the NFS-Erwin safety culture that is considered to be deficient when compared to industry norms. Such components or attributes require corrective action.
- *Area in Need of Attention*: A component or attribute of the NFS safety culture that is considered to be only marginally effective when compared to industry norms. Such components or attributes are significant candidates for continuous improvement.
- *Opportunity for Improvement*: A component or attribute of the NFS-Erwin safety culture that is considered to be generally effective when compared to industry norms, but that is a noteworthy candidate for continuous improvement.

- *Area of Adequacy*: A component or attribute of the NFS-Erwin safety culture that is considered to almost always meet industry norms.
- *Area of Strength*: A component or attribute of the NFS-Erwin safety culture that is considered to almost always exceed industry norms.

The NFS SCLT, using the following characterizations, identified areas of strength and weakness in the NFS safety culture:

- Green: Usually effective, proactive, meets expectations, eliminates problems, acceptable
- Yellow: Sometime effective, somewhat reactive, requires monitoring
- Red: Ineffective, unsatisfactory, poor understanding of requirements requires action

In order to avoid the apparent default selection of "Yellow/Improving" performance levels, the SCUBA Team recommends that two additional color codes be established and the existing categories be modified as follows:

- Blue: Almost always meets industry standards and expectations of excellence by demonstrating better than acceptable performance; highly proactive culture
- Green: With few exceptions, effective, proactive, meets expectations, eliminates problems, acceptable
- White: Generally effective and acceptable
- Yellow: Sometime effective, somewhat reactive, requires management attention
- Red: Ineffective, unsatisfactory, poor understanding of requirements; requires action - too frequently does not meet management expectations

The SCUBA Team further recommends that the definition of an improving trend be based upon the comparison of performance changes over a shorter period of time than the current two-year standard. Six months would seem to be a more appropriate interval. Twelve months should be the longest interval until a consistent trend of improvement, confirmed by a program of scheduled self-assessment, is established.

It should be noted that the NFS SCLT determined SCC ratings on the basis of comparison against the NRC RIS 2006-13 attributes, while the SCUBA Team determined ratings on the basis of comparison against commercial nuclear power industry norms. Accordingly, it is expected that the ratings provided by the SCUBA Team will continue to be more conservative (i.e., lower) than the ratings provided by the NFS SCLT.

Summary of the SCUBA Team's Evaluation of the NFS SCSA

The failure to conform to the roadmap provided and the pressure of time apparently superseded the pressure for a comprehensive vertical and horizontal review that would have improved the overall adequacy of the NFS SCSA. Specifically:

- The time frame for meeting this commitment was unnecessarily extended by NFS on several occasions, completing only after a CAL was issued in January 2010.

- It was evident that the final grades were lowered from the preliminary assessment in most categories (apparently in order to demonstrate resolve to the NRC in anticipation of looming regulatory challenges) without any significant rationale for downgrading.
- Self-assessments are not stand-alone documents. Previous PIRCS numbers have filtered their way into the verbiage but there is no description of the stated problem or committed action beyond a condition report number. General statements of intent are not backed up with examples or anecdotal evidence. Programs or processes are cited as beneficial without providing concrete examples of effectiveness.
- PIRCS entry is not a routine part of documenting a path of resolution for identified issues. In some cases, the problem was described without writing a PIRCS report; in some cases, the problem response was simply extended by reference to a two-year old condition report/commitment without modification.
- The organization's overall willingness to assign a nominal grade of "Yellow/Improving" indicates a continued inadequate frame of reference for nuclear industry norms and provides a misleading standard for improvement. Additionally, it was not clear if an improving trend was compared to industry norms or historic NFS performance.
- The roadmap called for evaluating the gap between performance and excellence. This was not consistently followed. For example, although some metrics were developed (or have been recently developed), assessors did not prescribe a path to excellence.
- The roadmap specifies questioning the working process for obtaining feedback. The lack of such feedback or a formal process is often cited but it would seem reasonable that the problem would have been corrected rather than simply noted to meet a checklist question.
- The roadmap challenges evaluators to consider manpower and operating experience over the next five years. None of the self-assessments encompass this long-range view.
- The roadmap calls for evaluating latent organizational weaknesses. This term is not a part of the language of the self-assessments.
- The roadmap calls for evaluating progress against the 2007 Self-Assessment. That evaluation is often missing. In some areas, comparison with SCUBA Team findings is substituted as a comparative standard.
- The site does not have a uniformly acceptable frame of reference for excellence. For instance, satisfaction with the decision to delay full implementation of Corrective Action Program (CAP) initiatives until late 2010 has impacted all other areas of performance improvement. Additionally, delays of six more months have recently been accepted in completing CAP actions and others are simply not on track.
- Many improvement initiatives are credited as effective despite the fact the policies are only being developed rather than actually being in place or metrics have been crafted but it is too soon to evaluate results. This practice offers a shallow basis for confidence.
- Due dates have consistently slipped in PIRCS commitments. There is no mention of this laxity in any self-assessment.
- The SharePoint site contains a folder labeled "2009 Self-Assessment Support Data." None of the component owners have populated this folder. Some of the NFS self-assessors have posted performance indicators, others have not; none of the posted metrics are complete representations of the measures of effectiveness in use.
- Most components include a list of documents reviewed; none make mention of the currency of the biennial review required.
- Letters of Authorization have been a consistent problem and have been tied to some

recent operational problems. None of the components have included an evaluation of the effect of this administrative tool nor is there an action plan proposed to phase out use of these temporary changes in their paper form.

- Effectiveness Reviews are not a routine part of doing business at NFS. This shortcoming is not identified and, consequently, there is not a wholesale plan for improvement.
- PIRCS was not used to record each SCSA finding. On some occasions, the 2007 NFS SCSA was simply extended but in other cases there were no condition reports written.
- *In order to reinforce the commitment for continued improvement as well as to enhance NFS's understanding of its own problems, the SCUBA Team recommends that NFS perform an annual SCSA, using the existing roadmap as a starting point and including external assessment team members in order to maintain a higher degree of objectivity in grade assignment and performance trending.*

Detailed Results

Human Performance

Decision Making

The NFS SCSA of the Decision Making SCC was sufficiently self-critical following a re-evaluation after the issuance of the CAL in January 2010. However, it did not adequately address deficiencies in using conservative assumptions in decision making or the use of effectiveness reviews to evaluate the process. Despite a revised "Red" rating, none of the comments provide suggestions for improvement or even cite the faulted performance that led to an unsatisfactory rating.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Red" with a stable trend. It would be more reasonable to evaluate performance in this area as having a negative trend.

The SCUBA Team suggests several steps to improve the product. Many of the key areas appear to have been evaluated through the lens of how the assessor would like the component to function rather than how it currently does. For example, the PIRCS Screening Committee and Change Control Board are credited with improving the decision making process; both are merely conduits. The Emergency Response Organization (ERO) is cited as an effective tool for use in the event of unusual events; site practice avoids invoking the ERO and there is essentially only one trained team. The NFS assessor criticizes the PIRCS Oversight Committee as having an overly negative outlook; it would be more appropriate to confront the reality of performance over the past several years and acknowledge the urgent need for improvement.

The metrics reflect "Green" and "Yellow" levels of performance for this "Red" SCC. It is appropriate to review the selection and criteria for measuring effectiveness.

Within the context of the different rating characterization bases used by the NFS SCLT and those used by the SCUBA Team, the overall rating assigned by the NFS SCLT is roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement.

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Resources

The NFS SCSA of the Resources SCC was not sufficiently self-critical despite a re-evaluation of the self-assessment after the issuance of the CAL in January 2010, which cited many issues within this component area. Additionally, the NFS assessor took credit for Configuration Management improvements that are more appropriately segregated to that component. Finally, the report for this SCC lacks a list of references or documents reviewed as required by the NFS roadmap for conducting these self-assessments.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests several steps to improve the product beyond the coarse re-appraisal of performance in this component area. Ratings of several key areas were downgraded after the issuance of the CAL despite a lack of critical comments to support the downgrading. Consequently, it will be difficult to improve if the problem is not adequately framed. The equipment replacement plan is coded "Green" despite shortcomings such as improving the security infrastructure or adequately designing new projects. It seems inappropriate to evaluate preventive maintenance (PM) tracking as "Green" when the site was recently issued a Notice of Violation for failing to properly test fire dampers; this shortcoming was evidently not considered. The entire ERO was evaluated as "Green" despite a lack of a back-up team and the inability to commence PSL Phase 4 operations due to a lack of equipment and personnel preparation in the event of an emergency.

Within the context of the different rating characterization bases used by the NFS SCLT and those used by the SCUBA Team, the overall rating assigned by the NFS SCLT is neither reasonable nor roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement. The SCUBA Team also does not believe that progress has been sufficient to warrant an improving trend.

Work Control

The NFS SCSA of the Work Control SCC was sufficiently self-critical in that it identified and discussed a number of generic opportunities for improvement.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests several steps to improve the product. The evaluation of risk management is too optimistic. Although this key area is coded "Yellow," there are no substantive suggestions for improvement and meeting observations made by the SCUBA Team do not support NFS's conclusions regarding their effectiveness. Additionally, expectations for actions taken in key areas such as pre-job briefings and maintenance scheduling suffer from a frame of reference that does not yet match nuclear industry norms.

The SCUBA Team believes that the NFS self-assessment was more optimistic than objective, in that it focused on planned actions as opposed to actual completed commitments and accomplishments; an example being the most recently released schedule for implementation of Work Management. The SCUBA Team does not believe that progress has been sufficient to warrant an improving trend.

Work Practices

The NFS SCSA of the Work Practices SCC was not sufficiently self-critical in that it seems unreasonable to evaluate this area as "Yellow" when half of the key areas are rated as "Red." Additionally, it is incongruous that many of the SCUBA Team field observations are not mirrored in the NFS self-assessment.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests several steps to improve the product.

- Use of lock-out/tag-out practices was an identified source of concern during the 2007/2008 ISCA, during subsequent SCUBA Team field observations, and again during the SCUBA Team's July 2009 progress review of NFS's implementation of its Comprehensive Safety Culture Improvement Initiative. However, there are no related comments in this review.
- NFS takes credit for initiating a Human Performance program yet there is no serious discussion of improvements noted or plans for further progress.
- There have been many SCUBA Team field observations that have revealed procedure deviations or maintenance errors; the self-assessment is silent on these deficiencies.
- The skill of the craft continues to serve as the standard of performance, yet this performance has resulted in errors that have gone uncorrected and are not mentioned in the self-assessment.

Within the context of the rating characterization protocol used by NFS, the overall rating is neither reasonable nor roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement. The SCUBA Team does not believe that progress has been sufficient to warrant an improving trend.

Problem Identification and Resolution

Corrective Action Program

The NFS Self-Assessment of the Corrective Action Program SCC was not sufficiently self-critical in that the evaluation was predicated on process controls and system throughput rather than on assessing the value of the product, including the effectiveness of corrective actions. The self-assessment lacks a formal statement of the path to excellence and conceptually lacks such a vision as well. There is no mention made of the recent shutdown despite re-performing the self-assessment in response to it.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests several steps to improve the product. Accelerate the assignment of Department Performance Improvement Coordinators; only one is currently assigned (contrary to the optimistic report). Evaluate the role of CAP in failing to prevent and adequately remediate the issues associated with the loss events that led to a temporary suspension of production activities. Allow CAP to permeate the site's daily business and assess it as such: lessons learned, operating experience, common cause analyses, and effectiveness evaluations should all be part of

the equation with qualitative measures of effectiveness established rather than the rudimentary metrics currently employed. Assign performance indicators that address outcome plus output.

Within the context of the rating characterization protocol used by NFS, the overall rating is neither reasonable nor roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement. The SCUBA Team does not believe that progress has been sufficient to warrant an improving trend.

Operating Experience

The NFS SCSA of the Operating Experience SCC was sufficiently self-critical in that it recognized the virtual lack of progress since the previous self-assessment in 2007 and the dearth of formal communication tools needed to process and promulgate lessons learned from operating experience.

The NFS SCSA of this SSC resulted in an overall assessment rating of "Red" with a level trend in performance.

The SCUBA Team suggests several steps to improve the product. Critically evaluate the process that digests and disseminates NRC-related information, since that is the lone key area evaluated as "Green." If that area really sets an appropriate standard, then the other four "Red" areas should be evaluated against it and corrective action should be documented in PIRCS with a due date prior to December 31, 2010 as currently planned.

Within the context of the rating characterization protocol used by NFS, the overall rating is reasonable and roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement.

Self- and Independent Assessments

The NFS SCSA of the Self- and Independent Assessments SCC was not sufficiently self-critical. This evaluation is primarily based on the fact that NFS set down qualitative and quantitative expectations for assessments during the past year but did not take steps to hold the appropriate managers accountable when they delivered at approximately a 40% rate. The further value of such assessments must be considered in light of this statistic. However, the SCUBA Team notes that this component was evaluated in close conformance with the assessment roadmap developed by NFS and made the best use of limited data in evaluating performance.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests several steps to improve the product. This component should have been treated as the collection point for a common analysis of the self-assessment of each SCC conducted in preparation for the 2009/2010 ISCA. Common standards, accountability, timeliness, and gaps to excellence were all available for review – and should have been reviewed as a body of work. Additionally, the SCUBA Team suggests revising the assessment approach to focusing on results rather on the steps taken to obtain them. There are too many unfulfilled promises without documented solutions or hard commitments: "This item requires additional monitoring" appears to be the default solution.

Within the context of the rating characterization protocol used by NFS, the overall rating is reasonable and roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement. However, the SCUBA Team does not agree that there is an improving trend in performance. Although the site began with no program for self- or independent assessments and any activity could be seen as progress, there was no positive intervention by any self- or independent assessment to prevent, or even mitigate, the many loss events that have confronted the site.

Safety Conscious Work Environment

Environment for Raising Concerns

The NFS SCSA of the Environment for Raising Concerns SCC was sufficiently self-critical. Metrics used to evaluate performance are considered effective and align with the overall evaluation of the SCC.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests some steps to improve the product.

- Establish a commitment for an Effectiveness Review of the program. It has been in place long enough to allow for trend analysis and/or the use of mini-surveys to assess employee support.
- Investigate the SCUBA Team's sense that PIRCS submittal is controlled by the supervisors' individual preference and that, consequently, the generation rate varies across the organization.

Within the context of the rating characterization protocol used by NFS, the overall rating is reasonable and roughly equivalent to the SCUBA Team's rating of this SCC as an Area in Need of Attention.

Preventing, Detecting, and Mitigating Perceptions of Retaliation

The NFS SCSA of the Preventing, Detecting, and Mitigating Perceptions of Retaliation SCC was sufficiently self-critical and stipulated a path to excellence not found in other components. However, credit was assumed by NFS for several initiatives that are still in the formative stage (e.g., 4C meetings and the Executive Review Board).

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests some steps to improve the product. Accelerate and increase the focus on the Executive Review Board. It seems to represent many things to many people and can become over-committed quickly. Consider Human Performance in the same light. The process is sound but the concept needs to be accepted site-wide; evaluate the success of that enterprise.

Within the context of the rating characterization protocol used by NFS, the overall rating is reasonable and roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement. The SCUBA Team does not believe that progress has been sufficient to warrant an improving trend.

Other Safety Culture Components

Accountability

The NFS SCSA of the Accountability SCC was not sufficiently self-critical and is inconsistent with a finding of "Red" performance in the directly related area of Decision Making. More to the point, the delay in producing a SCSA in response to an NRC commitment and the poor track record in meeting PIRCS due dates speak volumes about the decision making process that goes into setting priorities and meeting them. Re-writing the self-assessment following the recent spate of operational events did not improve the clarity or quality of the document.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance. The SCUBA Team believes that "Red" would have been a more appropriate rating.

The SCUBA Team suggests several steps to improve the product. Begin by expanding the comments section beyond "see above." The document does not stand alone and essentially sets no requirements beyond those established elsewhere. Establish a commitment to immediately put into place a functional performance evaluation system. It is difficult to understand how this process went untended in 2009 when it is designed to serve as the foundation for pay, promotion, and performance. Evaluate the frame of reference that considers Employee Identified Safety Items as "Green." The CAP SCC is silent on the issue and the SCUBA Team learned that PIRCS generation rate is strongly influenced by the individual supervisor's valuation of the process.

Within the context of the rating characterization protocol used by NFS, the overall rating is neither reasonable nor roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement. The SCUBA Team does not believe that progress has been sufficient to warrant an improving trend.

Continuous Learning Environment

The NFS SCSA of the Continuous Learning Environment (CLE) SCC was sufficiently self-critical in that it identified systemic problems supported by analysis. However, there were several instances where the conclusions drawn in CLE did not align with other SCCs. For example, the performance evaluation process is criticized in Accountability but not in CLE, and resource availability is an acknowledged issue in Resources but not in CLE.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend of performance.

The SCUBA Team suggests several steps to improve the product. It would be more appropriate to take credit for completed actions rather than to cite proposed initiatives as a positive trend. For example, crediting training for subject matter experts in toolbox skills that will not be performed until mid-2011 seems premature. In other cases, the information provided in the comments section is not ready for action. As an example, the site emphasizes membership in professional societies yet there are no expectations, goals, or results included as part of the self-assessment.

Within the context of the rating characterization protocol used by NFS, the overall rating is reasonable and roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement. The SCUBA Team does not believe that progress has been sufficient to warrant an improving trend.

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SCUBA Team Results Report

Organizational Change Management

The NFS Self-Assessment of the Organizational Change Management (OCM) SCC was not sufficiently self-critical in that it evaluated all key areas as "Yellow" or "Green" with optimistic comments specifically regarding the effectiveness of the OCM Council. The SCUBA Team has not seen any measurable positive impact on site performance from this organization. Additionally, the repeated problems, leading to a suspension of production following serious errors encountered during new operations, would indicate that change management is a significant issue. The NFS self-assessment does not reflect this mindset.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests several steps to improve the product. In particular, the assessor posed reasonable questions but failed to follow through with the answers or to cite a PIRCS report written to obtain the answer. For instance, effectiveness evaluations are just beginning to be used to evaluate changes, and a recent one discovered eight changes that occurred without using a formal process. The assessor posed the question "why" but did not follow through with an answer or a commitment to find out. Several major organizational changes were noted, and none was found to have been adequately communicated. Once discovered, there is no documentation that would indicate any corrective action was taken or a PIRCS report written. The OCM process was developed a year ago and yet neither formal training nor a training and qualification sign-off process has been used to verify that the employees understand the particulars. PIRCS corrective actions were assigned for completion in the distant future. In addition, the OCM procedure is posted on the NFS website, but despite this very public display, it is not being consistently used to evaluate organizational/personnel changes. The static nature of these deficiencies makes it difficult to assess this SCC as having a positive trend, contrary to the NFS assessor's opinion.

Within the context of the rating characterization protocol used by NFS, the overall rating is neither reasonable nor roughly equivalent to the SCUBA Team's rating of this SCC as an Area for Improvement. The SCUBA Team does not believe that progress has been sufficient to warrant an improving trend.

Safety Policies

The NFS Self-Assessment of this Safety Policies SCC was sufficiently self-critical in that it identified and discussed the need for improvements in the deployment and reinforcement of NFS policies related to safety culture. Most significantly, the self-assessment recognized the need for significant improvement in reinforcing nuclear safety as an overriding priority by ensuring that organizational decisions and actions at all levels of the organization are consistent with articulated NFS safety policies.

The NFS SCSA of this SSC resulted in an overall assessment rating of "Yellow" with an improving trend.

The SCUBA Team suggests several steps to improve the product. The four key areas appear to have been given equal weight in reaching an overall assessment of "Yellow". It would have been more appropriate to assign an increased (disproportionate) weight to the evaluation element of "the alignment of production, cost, and schedule goals". (Note: This element was downgraded to

a rating of "Red" after the issuance of the CAL in January 2010.) Additionally, the assessor's perception of the effectiveness of communications in convincing the employee body of the site's placing safety first is not borne out by 2009 workforce survey results and should be reviewed in this context. Finally, several comments in the self-assessment optimistically recount the effectiveness of actions taken, such as a safety stand-down, without any factual basis for this optimism. It would be appropriate to develop metrics designed to analyze the effectiveness of the desired outcome and use them as the basis for unbiased review.

Within the context of the different rating characterization bases used by the NFS SCLT and those used by the SCUBA, the overall rating assigned by the NFS SCLT is reasonable and roughly equivalent to the SCUBA Assessment Team's rating of this SCC as an Area for Improvement. The SCUBA Team does not believe that progress has been sufficient to warrant an improving trend.

Miscellaneous Safety Culture Components

Security

The NFS Self-Assessment of the Security topical area was sufficiently self-critical but the metrics used to support the findings were more focused on output rather than outcome.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests one specific step to improve the product and that would be to prepare an unclassified version of the self-assessment. The document could then be reviewed by the entire site management team in order to maximize understanding of the challenges facing the security organization, to better coordinate the response, and to align those organizations or committees that normally cooperate to solve problems elsewhere.

Within the context of the rating characterization protocol used by NFS, the overall rating is reasonable and roughly equivalent to the SCUBA Team's rating of this topical area as an Area for Improvement.

Configuration Management

The NFS Self-Assessment of the Configuration Management topical area was sufficiently self-critical, however all key areas were covered by one single status evaluation grade and that lack of granularity can detract from the focus of the response.

The NFS SCSA of this SCC resulted in an overall assessment rating of "Yellow" with an improving trend in performance.

The SCUBA Team suggests several steps to improve the product. It is worth noting, and correcting, the fact that the report did not contain any suggestions for improving the deficiencies noted. For instance, it is reasonable to consider expanding the scope of systems, structures, and components envisioned for inclusion in the configuration management process such as the fire header system, bulk chemical storage, and auxiliary power since the reliability of each undoubtedly contributes to safe site operation. Additionally, there were few metrics posed and none reflected a quality factor (e.g., output versus outcome).

Within the context of the rating characterization protocol used by NFS, the overall rating is reasonable and roughly equivalent to the SCUBA Team's rating of this topical area as an Area in Need of Attention.

ATTACHMENT E
SCUBA TEAM IN-PROCESS RECOMMENDATIONS TO NFS MANAGEMENT

Introduction

As was the case for the 2007/2008 Independent Safety Culture Assessment (ISCA), the SCUBA Team committed to document any significant recommendations, suggestions or observations that it made to NFS senior management during the conduct of the 2009/2010 ISCA in an Attachment to the 2009/2010 ISCA Final Report. The information provided in this Report Attachment meets that commitment.

It should be noted that the SCUBA Team also provided recommendations and suggestions to NFS senior management during the time period between the end of the 2007/2008 ISCA in February 2008 and the beginning of the 2009/2010 ISCA in September 2009. These were in the context of SCUBA Team assessments of either the adequacy of NFS Comprehensive Safety Culture Improvement Initiatives (CSCII) or progress achieved in NFS implementation of the CSCII. The SCUBA Team conducted three such assessments. These assessments included a significant number of SCUBA Team recommendations, suggestions, and observations. The documented results of those three assessments are provided as Attachments E-1, E-2, and E-3.

It should also be noted that, prior to the commencement of the 2009/2010 ISCA, the SCUBA Team repeatedly expressed concern to NFS senior management regarding the lack of appropriate safety culture performance measures at NFS-Erwin. The February 21, 2007 Confirmatory Order specifically required NFS to develop performance-based metrics to measure the success of the NFS Safety Culture Improvement Plan and Program. The SCUBA Team repeatedly advised NFS senior management of their failure to establish appropriate performance metrics for safety culture. The SCUBA Team went so far as (1) to meet with each NFS Safety Culture Component Lead and NFS senior management in March 2009 to describe how to develop such metrics based on the concept of "flow down from a characterization of what excellence would look like in each Safety Culture Component" and also to provide representative examples of what such metrics might look like and (2) to formally request in June 2009 that NFS management develop and use safety culture metrics based on either this approach (or some other equally rigorous approach preferable to NFS). While commitments were made by NFS to develop a comprehensive set of safety culture metrics based on the "flow down from excellence" approach by October 1, 2009, this commitment was not met and, from the SCUBA Team's perspective, remains open.

In-Process Recommendations, Suggestions, and Observations

1. September 2009: The SCUBA Team reiterated its concern to NFS management that the NFS maintenance work schedule did not provide for assigning supervisors to routine weekend maintenance (when most maintenance work was performed). Maintenance Supervisors were not assigned to weekend work teams unless special work permits were in force – and even then, Plant Superintendents normally performed the pre-job briefings and the work site walk-downs. This standard practice was invoked because of the lack of supervisors available to assign to weekend work combined with a lack of resolve by the management team to assign individuals to a rotating backshift assignment. Additionally, union rules result in assigning the more junior (i.e., inexperienced) craftsmen to the backshift and weekend work assignments.

2. September 2009: The SCUBA Team expressed concern that, based on its observations of work in the field, the assignment of a supervisor did not typically improve the quality of the work product. Pre-job briefs were cursory (when used) and post-job briefs did not occur; supervisors did not serve as subject matter experts, nor did they supplement the Industrial Safety organization to improve the work environment. It was the SCUBA Team's observation that Maintenance Supervisors were most helpful as parts expediters and agents for procedure revisions. Neither of these tasks contributed to a more effective product in such instances as roof work, crane supervision, post-maintenance testing and component restoration.

3. September 2009: The SCUBA Team reiterated its long-standing concern to NFS management regarding the lack of depth in the Corrective Action Program organization. In particular, only one assistant was currently assigned and Department Performance Improvement Coordinators had not yet (and still have not) been assigned.

4. September, 2009: As a result of multiple personnel interviews it became apparent that there were a number of areas where NFS did not meet OSHA requirements. It also became apparent the executive management was not aware of these issues. The NFS Chief Nuclear Safety Officer was informed and was encouraged to have a detailed interaction with the NFS Industrial Safety Manager. This interaction occurred and led to additional interactions with the Vice-President of Operations and the lead B&W Safety Officer.

5. September 2009: During a field observation of Area 800, a number of operators expressed concern relative to the dusty conditions generated by the insulation utilized in the area furnaces. This situation had been identified as a gap by the Area 800 Human Performance (HuP) Program Implementation Team; however, the issue had not been resolved, and was not receiving any engineering attention. The SCUBA Team brought this situation to the attention of both area and HuP management, the latter of which indicated that the Material Safety Data Sheet for this material indicated that the long-term health effects of prolonged exposure were unknown. (Note: Resolution of this issue remains a high priority for the HuP Implementation Team.)

6. September/October 2009: As a result of a number of field observations and interviews, it was determined that the Industrial Safety (IS) function did not believe that they were expected to enter safety problems into the NFS Corrective Action Program (PIRCS). This was discussed with both the NFS Chief Nuclear Safety Officer and the NFS Vice-President of Operations. The issue was later confirmed by the NFS Safety Culture Implications Review (SCIR) Team that evaluated the Fire Damper Inspection Root Causes. The NFS Vice-President of Operations subsequently met with the members of IS to assure them that it was appropriate to enter safety problems into PIRCS. The SCUBA Team also recommended to the NFS Chief Nuclear Safety Officer that this matter be investigated through the NFS Employee Concerns Program.

7. October 2009 through December 2009: In the course of reviewing the NFS evaluation of four Case Studies, at the request of NFS, the SCUBA Team provided comments and suggestions on the quality of the NFS root cause analyses of these events. Early on in this process, during its initial review of the NFS analysis of the "Fire Damper Inspection" event, on October 13, 2009, the SCUBA Team suggested to NFS senior management that

the root cause analyses of this event and of any other significant events occurring in the future should include a specific evaluation of the safety culture implications of such events. As part of this recommendation, the SCUBA Team provided information to NFS on the process used at commercial nuclear power plants to conduct Safety Culture Implications Reviews. NFS accepted this recommendation and began to conduct SCIRs of significant events. Applicable NFS procedures were eventually modified to institutionalize this review process. In December 2009, the SCUBA Team recommended that the NFS Chief Nuclear Safety Officer should be the final reviewer/approver of SCIRs.

8. November 2009: In light of development problems associated with the Commercial Development Line, the SCUBA Team reiterated to NFS senior management its concern regarding the organizational distractions that result from an NFS imperative to expand the business – that is, how it adversely impacts focus on safe production.

9. November 2009: The SCUBA Team pointed out to NFS management the continuing lack of a safety message at the beginning of each meeting and the lack of a strategy to coordinate long-range themes for safe operation. Safety messages were neither effective nor routinely delivered. When presented, they frequently referred to medical events, traffic safety, home and car safety or some other safety issue not relating to either NFS or the nuclear industry.

10. December 2009: The SCUBA Team advised the NFS Chief Nuclear Safety Officer that it had significant concerns regarding the NFS Policy that some NFS Development Laboratory activities were not subject to the NFS Quality Assurance Program (specifically internally driven process changes, as opposed to those that are contractually driven). The SCUBA Team noted, that in its opinion, this was not only inappropriate, but that 10 CFR Part 70.62(d) and NUREG 1520, Chapter 11, Management Measures required the auditing or assessment of Development Laboratory activities that are used to support production activities and the design of production activities for Special Nuclear Material.

11. December 2009: The SCUBA Team Leader briefed the NFS Board of Directors on the results of the 2009 NFS Safety Culture Survey. Noteworthy observations provided at that time were as follows:

    - The Overall Nuclear Safety Culture numerical rating had only shown nominal improvement since the 2007 NFS Safety Culture Survey.
    - The Survey results reflect the perceptions of the NFS workforce based on a frame of reference that is much less than fully developed.
    - The reliance that can be placed on the numerical results of the 2009 NFS Safety Culture as an indicator of the current safety culture at the NFS-Erwin Site is compromised somewhat since the Survey was administered in August 2009, which was prior to the operational loss events at NFS-Erwin during the fourth quarter of 2009. It is reasonable to assume that the Survey numerical ratings would have been lower if the Survey had been administered after the workforce had become aware of the facts associated with that series of operational loss events.

12. December 2009: NFS management had committed to complete the NFS self-assessment of the NFS safety culture by December 1, 2009; however, on that date only 50% of the NFS Self-Assessments were available for review. A complete set of self-assessments was made available to the SCUBA Team on December 15, 2009. Based on a preliminary review of that information, on December 16, 2009, the SCUBA Team informed NFS senior management that most of the self-assessments were sub-standard and had not been conducted in accordance with the guidelines that NFS had established for the conduct of those self-assessments. The SCUBA Team recommended that additional attention be provided to improving the quality of the self-assessments before they were formally reviewed by the SCUBA Team. NFS accepted this recommendation and the final versions of the self-assessments were made available to the SCUBA Team on or about January 16, 2010. This delayed the schedule for commencement of the SCUBA Team's formal personnel interview program.

13. December 2009: As it became evident to the SCUBA Team that the issuance of an NRC Confirmatory Action Letter (CAL) was imminent, on December 21, 2009, the SCUBA Team provided NFS senior management documents providing the key preliminary take-offs from the four SCUBA Team Case Studies so that they could be factored into the NFS Action Plan for response to the CAL. These documents pointed out significant deficiencies in the areas of questioning attitude, decision making, management oversight and control, management accountability, Corrective Action Program effectiveness, and the effective use of Operating Experience. The information provided to NFS senior management at that time is included in Attachment E-4.

14. January 2010: During the week of January 4, 2010, the SCUBA Team recommended to the Chairman of the NFS Board of Directors and to NFS senior management that the SCUBA Team's 2009/2010 ISCA activities be truncated after the SCUBA Team's review of the NFS Self-Assessments and that the SCUBA Team should issue a Report documenting the results of its independent assessment up to that point in time. It was further recommended that a comprehensive assessment of the lasting effects on the NFS-Erwin safety culture of any changes taken by NFS in response to the CAL should be conducted approximately 12 months after those changes had been successfully effected and restart of production activities had been authorized by the NRC.

    The bases for those recommendations included the following: (1) the SCUBA Team believed that it would be in the best long-term interests of all involved parties and stakeholders for all of the information developed by the SCUBA Team on the then current NFS safety culture become available as soon as possible for consideration in responding to the CAL and in determining readiness for restart of production activities; (2) the SCUBA Team believed that it would be very difficult if not impossible to determine within a few months the lasting effects on safety culture of any changes undertaken by NFS in response to the CAL; (3) the actual date for authorization of the restart of NFS production activities was indeterminate and it appeared to be unlikely that the SCUBA Team would have much, if any, time to observe even the short-term impact on the NFS safety culture of any changes made in response to the CAL in the context of the conduct of actual production activities; and (4) in light of the NFS organization's focus on responding to the CAL and on obtaining authorization to restart production

activities, NFS did not believe that it would be able to simultaneously support the implementation of the SCUBA Team's personnel interview program.

On January 7, 2010, NFS accepted these recommendations and agreed to seek to obtain NRC approval to truncate the conduct of the 2009/2010 ISCA activities. The SCUBA Team agreed to defer implementation of its formal personnel interview program pending input from the NRC and to focus on documenting the results of assessment activities conducted to date.

Subsequently, on January 21, 2010, NFS senior management informed the SCUBA Team that the NRC had rejected the truncation of the 2009/2010 ISCA activities, and that the NRC wanted the SCUBA Team to complete its assessment activities in accordance with the previously-agreed schedule. At that point, the SCUBA Team indicated that it would redirect its focus accordingly, but that there would be an impact on the schedule for completion of the 2009/2010 ISCA due to the impacts of (1) the delay in receipt of the NFS Self-Assessments; and (2) the delay in commencing the SCUBA Team's personnel interview program. The SCUBA Team also advised NFS senior management that, while the SCUBA Team would try to consider the NFS safety culture both "before" and "after" any changes made in response to the CAL, it would be extremely difficult (if not impossible to do so) in a meaningful, substantiated manner.

15. February 2010: The SCUBA Team cautioned the NFS Security Director that stationing a security guard at the 105 Laboratory to enforce the two-person rule was abrogating laboratory personnel's accountability.

16. February 2010: The SCUBA Team stated its concern to the NFS Security Director concerning the negative impact a Murray Guard manager was having on guard force morale.

17. February 2010: The SCUBA Team recommended to the NFS Vice-President of Operations that a self-assessment should be performed of the entire development process, from the research work in the Development Laboratory through production, to ensure that there were no missing steps in the process. (Note: The SCUBA Team now believes that this should be an external independent assessment performed by qualified experts.)

18. February 2010/March 2010: The SCUBA Team recommended that the same process used by NFS for processing NRC generic communications on Operating Experience be used for all external Operating Experience obtained by NFS.

19. March 2010: A meeting with SCUBA Team members was requested by the NFS Acting Safety and Regulatory Manager, the pending Safety and Regulatory Manager, and the Nuclear Criticality Safety Manager. The intent of the meeting was to discuss the readiness (or lack thereof) of the NFS organization for the restart of operations. A two-hour meeting was held where a number of SCUBA Team concerns were discussed including the Safety Culture deficiencies identified in the Case Studies, senior management's role regarding production pressures (production versus safety), and the fragile nature of questioning attitude – particularly in the white collar organization. These concerns were relayed by the SCUBA Team to the new President of NFS in a meeting two days later and in a telephone conversation with the SCUBA Team Leader.

20. March 2010: The above-mentioned meeting and telephone conversation were held with the new President of NFS to communicate the SCUBA Team's concern relative to production pressures, and the distinct possibility that the white collar organization (e.g., Process Engineering, Project Engineering, Safety, and Maintenance) would not push back if safe facilities operation was in jeopardy. The SCUBA Team recommended providing increased internal (but independent from Operations) oversight to closely monitor this situation when production activities resumed. Several other potential solutions (e.g., an ombudsman program) were identified by the President of NFS. The President of NFS indicated he would take some action, and subsequently did meet with many of the white collar organizations to explain his expectations. SCUBA Team members observed several of these meetings.

21. April 2010: The SCUBA Team cautioned the NFS senior management that the debriefing schedule established for Senior Engineering Watches was interfering with their ability to fulfill the expectations of their assignment due to timing conflicts.

22. May 2010: On May 24, 2010, at the request of the NFS President, the SCUBA Team Leader met with the NFS President, the Director of the newly-formed NFS Assurance Organization, and the recently-appointed NFS Manager of Nuclear Safety and Licensing Compliance. The purpose of the meeting was for NFS senior management to obtain advance information on the results of the 2009/2010 ISCA to assist NFS senior management in its preparations for a meeting with the NRC Commissioners later that week – that is, the Commission's annual Agency Action Review Meeting.

    The information provided at that meeting was that the SCUBA Team was likely to conclude that:

    - NFS had made only nominal progress in improving the safety culture at NFS since the 2007/2008 ISCA and that the vast majority of the 2009/2010 ISCA Findings would essentially be Repeat Findings.
    - While the SCUBA Team acknowledges the positive efforts recently taken and/or planned by NFS senior management, there was insufficient run time to provide a meaningful assessment of their potential lasting effects on the NFS safety culture. However, the SCUBA Team would characterize those efforts as initial steps in the right direction.
    - NFS had not taken the results of the 2007/2008 ISCA seriously enough and, self-admittedly, had not taken the implementation of the NFS Comprehensive Safety Culture Improvement Initiative (CSCII) seriously enough. This situation was adversely affected by insufficient ownership and involvement on the part of NFS leadership, by insufficient attention to individual accountability, and by insufficient attention to management of resources; i.e., work prioritization and workload management.
    - NFS apparently had not understood or sufficiently recognized that the NFS CSCII commitments were commitments to the NRC, as opposed to commitments to the SCUBA Team.
    - Based on a review by the SCUBA Team of those CSCII commitments/actions determined by NFS to be complete/closed (based on the assigned individual

having declared through the NFS Corrective Action Program that the action was completed and on the NFS Corrective Action Review Board's having endorsed the action as "completed"), the SCUBA Team has concluded that approximately 25% of such "completed" actions did not meet appropriate standards for considering an action to have been completed.

- To the best of the SCUBA Team's knowledge, NFS has not yet performed any effectiveness reviews for "completed" CSCII commitment/action items.
- NFS has continued to demonstrate that actions/commitments processed through the NFS Corrective Action Program are all too often inappropriately closed out based on future actions/promises that, in turn, are all too frequently not rigorously followed-up.

ATTACHMENT E-1

2009/2010 ISCA RESULTS REPORT

Report on the SCUBA Team's Assessment of the Adequacy and Appropriateness of the NFS CSCII

Report Dated
November 21, 2008

DRAFT REPORT

November 21, 2008

Mr. Tim Lindstrom
Executive Vice President and General Manager
Nuclear Fuel Services
1205 Banner Hill Road
Erwin, TN 37650

Subject: SCUBA Team Assessment of the Adequacy and Appropriateness of the NFS-Erwin Comprehensive Safety Culture Improvement Initiative

Dear Mr. Lindstrom:

As you know, the SCUBA Team has been chartered by the NFS Board of Directors to provide periodic assessments on the progress that is being made on the implementation of the NFS-Erwin Comprehensive Safety Culture Improvement Initiative (CSCII).

The SCUBA Team was also originally chartered to advise the NFS Board of Directors on the adequacy and appropriateness of the CSCII prior to its submission to the NRC on May 15, 2008. As you know, a variety of considerations, primarily schedule-related in nature, did not support the conduct of such an assessment at that time. Since NFS desired the SCUBA Team's input on the adequacy and appropriateness of the CSCII, we recently conducted such an assessment in conjunction with our first progress review (4Q 2008).

We have been informed that the NFS Board of Directors will be unavailable to meet with the SCUBA Team until 1Q 2009. At the request of NFS senior management, we are providing the results of our recent assessment activities as Draft Reports to ensure that documented results are available to NFS line management in a timely manner.

The SCUBA Team met with senior members of your staff on October 22, 2008 to discuss the preliminary results of its assessment of the adequacy and appropriateness of the CSCII Plan. The purpose of this letter and its attachment is to provide you a Draft Report on the results of that assessment. The first CSCII Plan implementation progress review has also been completed, and a Draft Report of the results of that review will be provided to you under separate cover.

In its assessment of the adequacy and appropriateness of the CSCII Plan, the SCUBA Team evaluated the following attributes of the CSCII:

- Coverage/Completeness: Are all SCUBA Team findings and recommendations addressed in the Plan? If not, was adequate justification provided for non-inclusion?
- Alignment/Accuracy: Are the actions/activities defined to address each SCUBA Team finding and recommendation consistent (aligned) with the intent of the SCUBA Team's findings and recommendations? That is, is NFS headed in the right direction?
- Schedules: Are schedules for the conduct and completion of the actions/activities to address each SCUBA Team finding and recommendation clearly defined and documented? Have there been any significant changes since the NFS CSCII was approved on May 15, 2008? If so, was adequate justification provided for such changes?

- Priority/Timeliness: Are the priorities/schedules for the actions/activities defined to address each SCUBA Team finding and recommendation consistent with the recommended priorities provided by the SCUBA Team? If not, is adequate justification provided for the differences in priorities as reflected by the NFS CSCII schedules?

- Assignments of Responsibility: Are the assignments of responsibility for the actions/activities defined to address each SCUBA Team finding and recommendation clear and appropriate? Are the right people involved – both level of expertise and level of authority? Do they know what is expected of them?

- Resources: Are the actions/activities defined to address each SCUBA Team finding and recommendation adequately/appropriately resourced for success? (Note: This includes both staffing and funding.)

- NFS Oversight of Plan Implementation: Is the management oversight of the implementation of the CSCII (as defined in the CSCII) adequate/appropriate? Are the right personnel involved (expertise and level of authority? Is the frequency appropriate? Are the results documented? Is there evidence of corrective actions?

- Communications: Has the workforce been adequately informed on the NFS CSCII? Are they provided updates/progress reports (appropriate content and frequency of communications)?

- Performance Based Metrics: Are the performance based metrics defined in the CSCII clear, sufficiently comprehensive and appropriate? That is, are they measuring the best indicators of effectiveness and have they selected indicators that are readily measured?

Based on its evaluation, the most significant concerns identified by the SCUBA Team are presented below.

1. During the course of its evaluation, the SCUBA Team identified that:

   - NFS does not plan to use the CSCII as a "living plan" document that would be updated to reflect changes during the course of plan implementation.
   - The "flow-down" documentation of the planned activities to implement individual elements of the CSCII into "one-page" plans and supporting action plans varies considerably and, in some cases, does not appear to currently exist.
   - The degree of documented specificity (e.g., schedule milestones) for the implementation of CSCII activities varies considerably and in some cases does not include key milestones (e.g., the anticipated date when the implementation of the integrated self-assessment plan will commence).

   This situation makes it difficult for external organizations (e.g., the SCUBA Team) to evaluate both the status and the effectiveness of implementation of the safety culture improvement initiatives on either an integrated or individual basis. This situation is also likely to adversely affect the ability of NFS management to optimize its internal oversight and management of CSCII implementation.

2. During the course of its evaluation, the SCUBA Team identified that NFS appears to be tracking (and managing) the implementation of individual safety culture improvement initiatives through PIRCS. The SCUBA Team believes that it is appropriate to document

the safety culture improvement initiatives in PIRCS. However, we believe that (1) the PIRCS entries suffer from the same lack of specificity issues as noted in item 1 above; and (2) this approach should neither substitute for nor serve as the primary integrated management and communications tool for the overall CSCII.

In this regard, the SCUBA Team is concerned that the use of PIRCS as a primary management tool could lead to a compartmentalized, punch-list approach to CSCII implementation. As indicated in the SCUBA Team's 2007 ISCA Results Report, many of the SCUBA Team Findings are inter-related. The potential danger of a punch-list approach is that too much focus may be placed on the completion of activities rather than on the achievement of desired results.

3. The most significant concerns that the SCUBA Team has related to the priorities (including schedule and resources) for individual safety culture improvement initiatives are with the relatively low priority assigned to initiatives:

   - To improve the effectiveness of the Corrective Action Program. Specifically, we suggest a higher priority be placed on addressing SCUBA Team Finding AFI-CAP-03 and, by association AFI-NOV-01, AFI-RES-04 (partial) and AFI-OE-02.
   - To address procedural compliance deficiencies. Specifically, we suggest a higher priority be placed on addressing SCUBA Team Finding AFI-WP-02.
   - To improve the effectiveness of the existing NFS Management Observation Program. Specifically, we suggest a higher priority be placed on addressing the applicable sub-parts of SCUBA Team Finding AFI-SA-01.

4. The SCUBA Team identified that the NFS workforce is not sufficiently aware of the purpose, content and schedule of the CSCII. Increased communications is warranted.

5. The SCUBA Team determined that there is a need for the development of an integrated and multi-tiered set of performance measures and metrics for monitoring nuclear safety culture and performance and the effectiveness of CSCII implementation. In this regard, Mr. Jim von Suskil of the SCUBA Team met with NFS personnel during the week of November 17, 2008 to evaluate this area in further detail. Within the next few weeks, the SCUBA Team will provide additional suggestions for improvement in this area.

6. The SCUBA Team determined that there is a need for a systematic, documented process to ensure that effectiveness reviews are performed for each completed CSCII Plan initiative. The key questions that need to be addressed by these effectiveness reviews are: (1) have the actions specified in the action plan for the initiative been fully implemented? , (2) have appropriate performance metrics been established to measure and monitor the effectiveness of the initiative in terms of desired and lasting results? , and (3) are the performance metrics being effectively used to identify further improvements or refinements?

   In this regard, it is important to view the completion of the implementation of an improvement initiative as the initial step in the cycle of continuous improvement and as a means to an end rather than as the end itself. It should be anticipated that the effectiveness reviews and the use of the performance metrics will identify "lessons learned" and the associated need for mid-course corrections and refinements.

The attachment to this letter provides additional observations and recommendations.

The SCUBA Team has also reviewed the actions planned and, in some cases, taken by NFS to address the SCUBA Team's Findings related to nuclear material security & safeguards issues. The results of that review have been documented in a classified report, which has been provided to Mr. Kris Weir of your staff.

We look forward to further dialogue with NFS management on the above-mentioned areas of concern. In this regard, please let us know if you have any questions or comments.

Best Regards,

John Guibert
SCUBA Team Leader

Attachment: As stated

ATTACHMENT 1
ADDITIONAL SCUBA TEAM OBSERVATIONS & RECOMMENDATIONS

This attachment provides several additional recommendations that were generated during the course of the SCUBA Team's assessment of the adequacy and appropriateness of the NFS CSCII. These recommendations are as follows:

1. NFS management should look for opportunities to pull initiatives forward in time, either partially or in whole, as resources allow. This would help to mitigate some of the risks identified in the 2007 Independent Safety Culture Assessment, and to avoid organizational overload at the back end of the initiative schedules. Early startup of the formal Employee Concerns Program is an example.
2. "Responsible Managers" should be assigned for all major programs and/or initiatives, particularly where interdepartmental effort and cooperation is required. The overall program for improving Procedure Compliance is an example.
3. A process should be established and documented to assure progress is made against the Overarching Issues on an integrated basis. Assignment of a Responsible Manager for each of the Overarching Issues would be appropriate.
4. Formalized documentation of the organization's policy regarding management accountability needs to be developed. The Conduct of Operations document is expected to address this in part, but it has not been issued as yet and there is no apparent commitment schedule to do so.
5. The process for cascading CSCII objectives and initiatives into employee performance objectives/evaluations needs to be improved. In many cases department objectives were cascaded in their entirety into individual performance objectives -- the end result being a performance management process where everyone is responsible for everything. A performance management process is much more effective in assuring personal accountability when individuals understand both the organization's high level objectives/initiatives and their specific role in assuring these objectives/initiatives are achieved.
6. The CSCII presently includes a number of "open items". Examples are: (1) references to a Conduct of Operations document that has not been issued and for which no commitment date exists, (2) items identified as requiring discussions with or information from SCUBA, and (3) initiatives with "metrics undetermined, will be considered during monthly review." The CSCII should be thoroughly reviewed to make sure all open items are either closed or have commitment dates for resolution.

ATTACHMENT E-2

2009/2010 ISCA RESULTS REPORT

Report on the SCUBA Team's Assessment Of NFS Progress on the NFS CSCII

Report Dated
November 26, 2008

DRAFT REPORT

November 26, 2008

Mr. Tim Lindstrom
Executive Vice-President and General Manager
Nuclear Fuel Services
1205 Banner Hill Road
Erwin, TN 37650

Subject: SCUBA Team Assessment of NFS-Erwin's Progress on the Comprehensive Safety Culture Improvement Initiative (CSCII)

Dear Mr. Lindstrom:

As you know, the SCUBA Team has been chartered by the NFS Board of Directors to provide periodic assessments on the progress that is being made on the implementation of the NFS-Erwin CSCII.

We have been informed that the NFS Board of Directors will be unavailable to meet with the SCUBA Team until 1Q 2009. At the request of NFS senior management, we are providing the results of this assessment as a Draft Report to ensure that documented results are available to NFS line management in a timely manner.

The first such progress review (4Q 2008) has been completed, and the key results of that review are summarized below. By definition, progress on implementation of the CSCII is dynamic in nature. In general, this Report presents the SCUBA Team's assessment of progress through November 14, 2008.

In its assessment of progress in the implementation of the CSCII Plan, the SCUBA Team:

- Sought to answer the following two questions:
  - Is implementation progress for each individual initiative "on track" with the schedule set forth in the CSCII Plan?
  - Is implementation progress for each individual initiative "on track" to support NFS's stated goal of achieving excellence in nuclear safety culture within 3-4 years?
- Assessed the implementation progress for each individual CSCII initiative within the context of the Safety Culture Component with which it aligns
- Collectively assessed the implementation progress of CSCII initiatives within the context of the Overarching Issues with which they align (if applicable)
- Collectively assessed progress in addressing the following key management challenges:
  - Convincing the organization of the need to change
  - Developing and implementing an effective action plan
  - Ensuring that appropriate resources are made available, effectively deployed, and steadfastly reinforced by NFS management.

The SCUBA Team utilized a simplified grading system (Yes or No) to characterize whether or not implementation progress is "on track". Where appropriate, the SCUBA Team has also identified noteworthy positives, negatives and concerns related to implementation progress.

It should be noted that the SCUBA Team encountered three types of situations that, to some extent, impacted its ability to effectively conduct this initial progress assessment:

- As indicated in the separately-provided SCUBA Team Draft Report on the Adequacy and Appropriateness of the NFS CSCII: "The degree of documented specificity (e.g., schedule milestones) for the implementation of CSCII activities varies considerably and in some cases does not include key milestones."
- As indicated in the separately-provided SCUBA Team Draft Report on the Adequacy and Appropriateness of the NFS CSCII: "NFS does not plan to use the CSCII as a "living plan" document that would be updated to reflect changes during the course of plan implementation" and "NFS appears to be tracking (and managing) the implementation of individual safety culture improvement initiatives through PIRCS." Based on its review of PIRCS information reports related to implementation of the CSCII initiatives, the SCUBA Team identified a few initiative completion dates that had been changed (e.g., the completion dates for initiatives associated with AFI-SA-01). The possibility exists that other implementation date changes may have been made that the SCUBA Team did not identify.
- In some cases, NFS personnel were not available to meet with SCUBA Team members.

The SCUBA Team's assessment of progress against the individual safety culture components is shown in Figure 1. Overall, the SCUBA Team has concluded that CSCII initiative implementation progress is:

- Generally "on track" with the schedules identified in the CSCII and/or PIRCS. A few initiatives are behind the originally planned CSCII schedule. In this regard, NFS management has approved the schedule changes.
- "Mixed" with respect to achieving excellence in nuclear safety culture within the next 3-4 years. In this regard, the SCUBA Team's concerns are related either to the priority/schedule that NFS has placed on certain initiatives or to the as yet unproven effectiveness of certain initiatives.

Figure 1
SCUBA Assessment of NFS-Erwin Progress Relative to Safety Culture Components

Safety Culture Component	*"On Track" with CSCII Plan?*	*"On Track" to Achieve Safety Culture Excellence?*
Human Performance		
Decision Making	Yes	Yes
Resources	Yes	Yes
Work Control	Yes	Yes
Work Practices	Yes	Yes
Problem Identification and Resolution		
Corrective Action Program	Yes	No
Operating Experience	Yes	No
Self/Independent Assessments	Yes	No
Safety Conscious Work Environment		
Environment for Raising Concerns	Yes	Yes
Prevent, Detect, & Mitigate Perceptions of Retaliation	Yes	No
Other		
Accountability	Yes	Yes
Continuous Learning Environment	Yes	Yes
Organizational Change Management	Yes	No
Safety Policies	Yes	No

The most significant SCUBA Team observations are provided below.

- A number of initiatives are identified as "completed" in PIRCS. The criteria/standards for considering an initiative as "completed" are not clear and may not be set at a uniformly high enough standard. For example, it appears that the "one time only" initiative to address OFI-OE-01 was closed without the development of a "lessons learned" document that can/will be used for future major projects.
- With respect to initiatives that establish or improve "long-term processes or programs", the SCUBA Team has provided comments and suggestions related to the conduct of "effectiveness reviews" in its separately-provided SCUBA Team Draft Report on the Adequacy and Appropriateness of the NFS CSCII. Effectiveness Reviews for completed CSCII initiatives have not, as yet, been planned or performed.
- As indicated in the separately-provided SCUBA Team Draft Report on the Adequacy and Appropriateness of the NFS CSCII, "NFS management should look for opportunities to pull initiatives forward in time, either partially or in whole, as resources allow." Examples include early implementation of the Employee Concerns Program and establishing an interim process to capture and evaluate external Operating Experience.
- Noteworthy progress is being made in certain aspects of Human Performance (i.e., Decision Making, Resources, Work Control, and Work Practices).
  - Organizational resource additions, development of a work management implementation plan, and progress in efforts to improve human performance are noteworthy positives.
  - Measures needed to improve procedural compliance do not appear to be receiving sufficient organizational priority. Specifically, there has been a lack of sufficient progress in implementing:
    - Priority and coordination of procedural compliance initiatives
    - Communication and understanding of procedural compliance expectations
    - An appropriate reinforcement system, including a formal observation program
    - Antecedents including a program to improve PPE availability
- The SCUBA Team is concerned regarding the lack of progress in (1) augmenting resources for implementation and support of Corrective Action Program (PIRCS) improvements, (2) establishing a lead individual for the Operating Experience Program and (3) establishing an appropriate policy for working hours and overtime that addresses Fitness for Duty fatigue considerations.
  - With respect to (2) above, due to workload concerns, the SCUBA Team recommends assigning someone else to lead the Operating Experience Program other than the lead individual for the Corrective Action Program.
  - With respect to (3) above, it is noteworthy that the SCUBA Team would have considered this issue to be an AFI (versus an ANA) if it had known that the implementation of such a policy was going to be delayed this long.
- Although "on track" with respect to the CSCII schedules, limited progress has been made in the area of Problem Identification (i.e., Corrective Action Program, Operating Experience, and Self/Independent Assessments). This is primarily due to the priorities reflected in the CSCII schedules for these initiatives. As indicated in the separately-provided SCUBA Team Draft Report on the Adequacy and Appropriateness of the NFS CSCII, initiatives in this area should be assigned earlier due dates because they provide the tools that are fundamental to successful organizational safety culture improvement. The lack of organizational focus in this area is noteworthy, and represents a key SCUBA concern.

- There has been a lack of sufficient progress in improving the Corrective Action Program (CAP). Several examples of areas in need of improvement follow:
  - Quality of Causal Analyses
  - Quality of Corrective Actions
  - Performance of Effectiveness Reviews
  - Performance of Common Cause Analyses
  - Granularity of Cause codes for tracking and trending
  - Assignment of Departmental Improvement Coordinators
  - Establishing a One Page Plan for the CAP. The published schedule calls for its development in January 2009.
- While noteworthy progress has been made in upgrading PIRCS to accept anonymous Problem Reports and to provide feedback to Problem Report originators, the effectiveness of these improvements needs to be monitored and evaluated to ensure that the desired objectives are being attained.
- Noteworthy progress has been made in ensuring management attention to the screening, prioritization and assignment of responsibility for incoming Problem Reports. While the direct involvement of senior management in these activities/functions has been appropriate up to this point, the SCUBA Team believes that these activities/functions should be transitioned to a lower level of management (i.e., equivalent to a Management Review Board at commercial nuclear power plants) so that senior management can focus on establishing high standards for the quality of investigations/evaluations and effectiveness reviews (i.e., equivalent to a Corrective Action Review Board at commercial nuclear power plants). The SCUBA Team recommends the development and implementation of a transition plan, including teaching and mentoring on organizational standards and expectations.
- As indicated above, an interim process to capture and evaluate external Operating Experience should be established soon, with a designated program leader.

- Progress in the area of Safety Conscious Work Environment (i.e., Environment for Raising Concerns and Prevent, Detect & Mitigate Perceptions of Retaliation) is currently "on track" with respect to the CSCII schedule. Early implementation of the Employee Concerns Program should be sought to the maximum extent possible.
  - Continued progress is expected in this area now that an Employee Concerns Program (ECP) Manager has been identified and a detailed plan & schedule have been established to get the ECP up and running.
  - As noted above, a process for anonymous reporting of issues has been developed and implemented.
  - The Chief Nuclear Safety Officer is showing good ownership of these two components.
  - The General Manager's all hands meeting and discussion of the recent employee termination event is a significant step in the direction of supporting "Prevent, Detect & Mitigate Perceptions of Retaliation."

- Progress for the "Other Safety Culture Components (i.e., Accountability, Continuous Learning Environment, Organizational Change Management, and Safety Policies) is generally "on track" with respect to the established CSCII schedules.
  - Noteworthy progress has been made in establishing measures to improve management accountability.
  - The organization is taking clear steps, via benchmarking and development of its relationship with INPO, to improve its performance in the area of Continuous Learning.
  - The organization is in the process of developing an Organizational Change Management program, using the organizational Decision-Making Policy as the guiding document.
  - The lack of truly effective communications in the Safety Policies area is evident, as reflected by (1) the paucity of information reaching the shop floor, and (2) the lack of workforce understanding of both the CSCII and the Safety Strong program. The SCUBA Team also believes that, while good communications are taking place via e-mail, increased emphasis should be placed on face-to-face, interactive communications with the workforce.
  - As indicated in the separately-provided SCUBA Team Draft Report on the Adequacy and Appropriateness of the NFS CSCII, the SCUBA Team determined that there is a need for increased attention to the development of an integrated and multi-tiered set of performance measures and metrics for monitoring nuclear safety culture & performance and the effectiveness of CSCII implementation.
- The Configuration Management program has made commendable progress in attaining early goals and has established a process that is comprehensive in protecting the design margin. However, the scope of this project calls for continued emphasis over the next two years, and it is important to assure that resource availability does not become an issue.

The SCUBA Team's assessment of progress against the nine "Overarching Findings" is shown in Figure 2. Overall, the SCUBA Team has concluded that CSCII initiative implementation progress is:

- Generally "on track" with the schedules identified in the CSCII and/or PIRCS. A few initiatives are behind the originally planned CSCII schedule. In this regard, NFS management has approved the schedule changes.
- "Mixed" with respect to achieving excellence in nuclear safety culture within the next 3-4 years. In this regard, the SCUBA Team's concerns are related either to the priority/schedule that NFS has placed on certain initiatives or to the as yet unproven effectiveness of certain initiatives.

Figure 2
SCUBA Assessment of Progress Relative to Overarching Findings

Overarching Findings	***"On Track" with CSCII Plan?***	***"On Track" to Achieve Safety Culture Excellence?***
Organizational Values, Standards & Expectations		
- Questioning attitudes	Yes	Yes
- Barriers to problem identification	Yes	No
- Conservative decision making	Yes	Yes
Communication of Values, Standards & Expectations		
- Reinforce "Safety Strong"	Yes	No
- Communicate basis for decisions	Yes	No
- Management Model High Accountability Behaviors	Yes	No
Human Performance Challenges		
- Comprehensive Human Performance Program	Yes	Yes
- Procedural Compliance	Yes	No
Emphasize Ownership & Accountability		
- Single Points of Accountability	Yes	Yes
- Personnel Performance Evaluation process	Yes	Yes
- Goal Setting & Management Review	Yes	Yes
Resourcing for Success		
- Resource to meet higher performance standards	Yes	Yes
Enhance Effectiveness of Programs & Processes		
- Operational Decision Making	Yes	Yes
- CAP scope	Yes	No
- CAP quality & effectiveness	Yes	No
- Employee Concerns Program	Yes	Yes
Eliminate Tolerance for Degraded Conditions		
- Top Ten Lists	Yes	No
- Site Infrastructure Improvement Plan	Yes	Yes
Expand the Frame of Reference		
- Benchmarking	Yes	Yes
Focus on Continuous Improvement		
- Performance Indicators & Metrics	Yes	No
- Self- & Independent Assessments	Yes	No

The most significant SCUBA Team observations are provided below.

- Organizational Values, Standards and Expectations: There appears to be greater organizational attention to (1) cultivating a questioning attitude and (2) assuring more conservative decision making. It is not yet clear that identified barriers to problem identification have been addressed effectively. For example, although anonymous condition reporting is now available, there is little data to suggest that such reports are receiving much attention beyond data recording.
- Communication of Values, Standards and Expectations: Vertical communication remains a noteworthy challenge for the organization.
- Human Performance Challenges: Good progress is being made regarding implementation of a Human Performance Program; however, procedural compliance initiatives are progressing relatively slowly.
- Emphasize Ownership and Accountability: Progress has been made in identifying single points of accountability, and implementing both a performance evaluation system and a management goal setting/review process. Refinement of these processes needs to continue over time. As noted above, additional attention to the development and effective use of an integrated and multi-tiered set of performance measures and metrics for monitoring nuclear safety culture & performance and the effectiveness of CSCII implementation is needed.
- Resourcing for Success: While noteworthy progress has been made in resolving the organization's manpower issues, additional attention is required – particularly with respect to the CAP.
- Enhance Effectiveness of Program and Processes: An Operational Decision Making Instruction (ODMI) process is under development. Limited progress has been made in improving the Corrective Action Program, largely due to manpower constraints and CSCII priorities and schedules. An ECP manager has been identified, and an improvement plan has been developed.
- Eliminate Tolerance for Degraded Conditions: A "Top Ten" list has been developed. The CSCII indicates that there will be three independent top ten lists (operational burdens and work-arounds with nuclear safety implications, operational burdens and work-arounds with industrial/personnel safety implications, and recurring equipment problems). NFS-Erwin needs to assure that focus is retained on each of the above areas, particularly since the existing "Top Ten" list has a number of infrastructure items, which represents a dilution of the original intent of AFI-RES-01.
- Expand the Frame of Reference: Substantial effort has been expended in this area in terms of both benchmarking and developing NFS-Erwin's relationship with INPO. NFS-Erwin management needs to assure that these learning opportunities both continue and are fully leveraged by the organization.
- Focus on Continuous Improvement: As noted above, more comprehensive performance indicators and metrics need to be defined. There has been no significant progress in the area of self- and independent assessments.

With respect to the significant challenges that NFS-Erwin management must address to successfully implement the desired safety culture improvements, the SCUBA Team offers the following observations:

- Time: Sufficient time must be allocated for implementation of the CSCII initiatives and the associated management sponsorship activities if NFS-Erwin is to truly achieve excellence in its regulatory and compliance performance. This appears to be a key challenge to the success of the CSCII at this point due to the time required to pursue other business priorities, including the potential sale of NFS.
- Sponsorship: Visible commitment of the management team at all levels of the organization must continue. This commitment should include expressed commitment (communication), modeled commitment (behaviors), and reinforced commitment (resource allocation and consequence management).
- Communication: Effective communication of goals and the rationale for same at every level of the organization must continue to improve.
- Involvement: People are more likely to support and commit to changes in which they are involved in the planning and implementation. This must be an area of continuing focus.
- Resources: It will also be important for the NFS-Erwin management team to perform the organizational planning and prioritization necessary to assure adequate human and financial resources exist to support all of the planned 2009 initiatives.

The SCUBA Team has also reviewed the actions planned and taken by NFS to address the SCUBA Team's Findings related to nuclear material security and safeguards issues. The results of that review have been documented in a classified report, which has been provided to Mr. Kris Weir of your staff.

We look forward to further dialogue with NFS-Erwin management regarding the items discussed above.

Best Regards,

John Guibert
SCUBA Team Leader

ATTACHMENT E-3

2009/2010 ISCA RESULTS REPORT

Report on the SCUBA Team's Assessment of NFS Progress on the NFS CSCII

Report Dated
November 25, 2009

September 25, 2009

Mr. David L. Kudsin
President
Nuclear Fuel Services
1205 Banner Hill Road
Erwin, TN 37650

Subject: SCUBA Team Progress Review Report – Week of July 20, 2009

Dear Mr. Kudsin:

As you know, the SCUBA Team has been chartered by the NFS Board of Directors to provide periodic assessments on the progress that is being made on the implementation of the NFS-Erwin Comprehensive Safety Culture Improvement Initiative (SCII).

In this regard, during the week beginning July 20, 2009, the SCUBA Team met with NFS personnel to review the status of activities designed to improve the Safety Culture at the NFS-Erwin Site. Prior to this week of meetings and other assessment activities, the SCUBA Team provided NFS an agenda for the week's activities, requested a specific set of information and documents from NFS, and reviewed the responses to that information request.

The week's activities included:

- Presentations by NFS management personnel on topics of particular interest to the SCUBA Team
- Highly interactive working meetings between NFS/SCUBA Safety Culture Component Leads/Teams
- Behavioral Observations (i.e., meetings and field activities) and casual interviews conducted by the SCUBA Team
- A SCUBA Team presentation of the preliminary results of the week's activities to NFS management on July 24, 2009

Subsequently, on September 9, 2009, the SCUBA Team Leader provided the NFS Board of Directors a summary-level briefing on the results of that progress review.

The purpose of this letter is to provide a Report that documents the results of that progress review. Please forward the attached Report to the members of the NFS Board of Directors.

It should be noted that this progress review represents a "snapshot" assessment based on the set of information reviewed and on activities conducted within a specific time frame. A significantly more comprehensive assessment will be provided through the 2009/2010 Independent Assessment.

Please let us know if you have any questions or comments.

Best Regards,

John Guibert
SCUBA Team Leader

Attachment: As stated

SCUBA TEAM REPORT ON SAFETY CULTURE ASSESSMENT ACTIVITIES PROGRESS REVIEW CONDUCTED DURING THE WEEK OF JULY 20, 2009

Introduction & Background

During the week beginning July 20, 2009, the SCUBA Team met with NFS personnel to review the status of activities designed to improve the Safety Culture at the NFS-Erwin Site. Prior to this week of meetings and other assessment activities, the SCUBA Team provided NFS an agenda for the week's activities, requested a specific set of information and documents from NFS, and reviewed the responses to that information request.

The week's activities included:

- Presentations by NFS management personnel on topics of particular interest to the SCUBA Team, including:
  - Changes made to the CSCII Plan based on the SCUBA Team's comments provided in November 2008 – e.g., project management features, initiative priorities/schedules, conduct of effectiveness reviews, etc.
  - Summary of CSCII Plan implementation to date – including noteworthy successes and significant challenges.
  - Summary of development, implementation and use of performance measures/metrics related to Safety Culture.
  - Summary of NFS operational and safety performance since October 2008 – including noteworthy successes, significant challenges and reportable events.
  - Summary of industry benchmarking activities conducted since October 2008.
  - Summary of significant items/issues resulting from interactions with NRC personnel (e.g., meetings, inspections, correspondence, etc.) since October 2008.
  - Summary of significant items/issues resulting from any other external/independent assessments of NFS-Erwin since October 2008 (e.g., McDermott Company/BWXT assessments).
- Highly interactive working meetings between NFS/SCUBA Safety Culture Component Leads/Teams
- Behavioral Observations (i.e., meetings and field activities) and casual interviews conducted by the SCUBA Team
- Scuba Team presentation of preliminary results of the week's assessment activities to NFS management on July 24, 2009

It should be noted that this SCUBA Team progress review represents a "snapshot" assessment based on a set of information evaluated and on activities conducted within a specific time frame. A significantly more comprehensive assessment will be provided through the 2009/2010 Independent Assessment.

SCUBA TEAM REPORT ON SAFETY CULTURE ASSESSMENT ACTIVITIES PROGRESS REVIEW CONDUCTED DURING THE WEEK OF JULY 20, 2009

Summary of Over-Arching Findings, Conclusions and Recommendations

- Management of the NFS CSCII Plan has improved significantly over the past few months. This is largely attributed to the assignment of an NFS full-time Project Manager for the NFS CSCII Plan and to the efforts of that individual.
- Understanding/acceptance by NFS Safety Culture Component Leads of expectations related to their roles and their associated responsibilities (i.e., long-term "global" stewardship) has improved significantly over the past few months. This is an area that requires continued management attention and support.
- Understanding of the need for development of meaningful descriptions/articulations of the attributes and characteristics of a "world class" Safety Culture has improved over the past few months. There is, however, much remaining to be accomplished in this area, particularly with respect to the development and use of performance measures and metrics based on such descriptions and articulations.
- Development of meaningful performance measures/metrics for Safety Culture has improved over the past few months. However, as noted above, there is much remaining to be accomplished in this area. Increased emphasis is also recommended on developing performance metrics that measure "outcomes" versus "outputs."
- A good process/mechanism to facilitate information flow from NFS to SCUBA has been established recently. The establishment of the SharePoint website for Safety Culture information is proving to be a very positive development. The SCUBA Team requests that it be routinely provided additional information on significant upcoming events that may represent good opportunities for conduct of behavioral observations (e.g., emergency planning drills or exercises).
- There are a number of indications of improvement in the NFS-Erwin Safety Culture. Perhaps most notable among these are (1) the actions taken to address previously-identified examples of degraded conditions and operator workarounds, (2) progress in implementing the Human Performance Program, (3) progress in implementing the Configuration Management Program, and (4) establishment of the Employee Concerns Program.
- Several instances were identified where positive interim actions are being taken prior to completion of specific initiatives. In many of these instances, governing procedures need to be updated to reflect these actions.
- There have been a number of positive steps taken to improve the organization's overall frame of reference with respect to industry standards of excellence/best practices (e.g., external hires, benchmarking). Nonetheless, there is much remaining to be accomplished in this area, particularly in communication and reinforcement to the working level.
- There appear to be steps planned or in progress that should help to address long-standing issues related to accountability for completion of improvement initiatives (e.g., actions related to resource loading and reduction of business development related "diversions"). NFS has advised the SCUBA Team that (1) B&W has reassigned/is reassigning business development activities to other groups, (2) B&W is helping NFS to improve its focus on accountability in a variety of areas including Project Management, and (3) a formal Performance Evaluation process has been/is being instituted at NFS. Continued attention to and focus on improving accountability (by building it into processes and the general conduct of business) is highly recommended.

In addition, there were a number of concerns/issues identified by the SCUBA Team that are considered to be programmatic in nature. These "cross cutting issues" are identified below:

- Need to maintain focus on the longer-term goal – to achieve and maintain a world class Safety Culture. In this regard:
  - Don't be misled due to potentially inaccurate/inappropriate "frame of reference" considerations.
  - Don't be misled by the de-facto "standards of acceptability" used by the NRC. These are not indicative of "world class standards."
  - Don't overemphasize the positive side of external feedback when there is also a negative side.
  - If you are not focused on continuous improvement, you will quickly find yourself going backwards.
- Need to ensure that Safety Culture Component leads are supported by the entire organization/management team. There are some indications that this is not uniformly the case.
- Management of Safety Culture components has shifted from a department focus to an organizational focus. This shift to a broader perspective by component owners will require support and attention from the entire management team to achieve the desired results.
- Need to establish the CSCII as a "living plan" that will remain in place (i.e., that will continue to be augmented) over the longer-term to support the quest to achieve and maintain the longer-term goal of a world-class Safety Culture. (Or, alternatively, to ensure that is replaced/transitioned to a similar Safety Culture improvement plan.)
- Need to establish and to systematically use effectiveness reviews for completed improvement initiatives – an important feedback loop to support continuous improvement. To date, there have been no effectiveness reviews of completed CSCII improvement initiatives.
- Need to ensure that you have the best possible performance measure/metrics – once you finalize these and begin to populate them, it may be difficult to change them.
- Need to consider use of alternative vehicles (e.g., mini-surveys) to define and populate certain Safety Culture metrics.
- Need to increase face-to-face communication between senior management and the workforce to reinforce Safety Culture.
- Need to take a hard look at management controls for changing (i.e., slipping) "due dates."
- Need to move towards a more strategic approach for planning and scheduling of benchmarking and assessment activities (i.e., a multi-year approach that both ensures adequate coverage of key programs and processes and that retains the flexibility for adding activities to address emerging needs/challenges).
- Need to take a hard look at acceptance criteria for closing out issues/concerns/commitments. There are continuing indications of closure being approved based on planned actions and/or without effectiveness reviews.
- Need to keep a close eye on Chemical Safety. This is inherently an area of risk at the Site.

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Summary of Behavioral Observations

- NFS personnel were open and interested in interacting with SCUBA Team members.
- Many of the specific equipment issues that were identified in the 2007/2008 ISCA Report have (or appear to have) been addressed.
- A number of items requiring additional SCUBA evaluation were identified, including a few potential instances of "patching" versus "fixing."
- Meetings were conducted in a professional manner and generally demonstrated an improved "questioning attitude."
- Use of "safety culture messages" at the start of meetings was mixed and, where used, could be improved by providing illustrative examples.
- There was an excessively long time delay in providing information on the fire alarm that occurred on Thursday, July 23, 2009.

Additional Findings, Conclusions and Recommendations for Individual Safety Culture Components/Topical Areas

See below

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Decision Making Safety Culture Component

Indications of progress were noted in the following areas:

- The site has issued an Operational Decision Making Instruction (ODMI) and has used it in three instances: (1) BPF Caustic In-line Monitor Failure, (2) Glass Rupture in BPF Column Two, and (3) Fan Outage.
- The PIRCS review board makes an assessment of Decision-Making by reviewing input.

NFS faces the following significant challenges to excellence:

- Effectiveness reviews have not been accomplished for this component. It is important, especially during the period of early implementation of ODMI, to determine how well the site is using this new process.
- There are indications that the application of "Decision-Making" to PIRCS entries, during Review Board assessment of Safety Culture Components, is sometimes confused with "Questioning Attitude." Examples include: RT challenge of contractor's improper use of ladders, proactive look-ahead after pump problems, questioning the integrity of a storage drum, and operator reporting discovery of an unidentified clear liquid under the condensate (tested and found to be high PH)

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Adopt performance metrics that assess the loss of aggregate margin: examples include items like LOAs, operator work-arounds, etc. The objective is to establish thresholds for cumulative margin loss, so that a determination can be made that an action (that decreases margin incrementally) is safe to perform.

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Resources Safety Culture Component

Indications of progress were noted in the following areas:

- Numerous activities have been performed to improve the availability of key resources. These activities include new hires, better defined roles/responsibilities for both individuals and departments, improvements in business processes, resource augmentation via contractors, and leverage of synergies with BWXT (e.g. technical expertise via subject matter experts)
- Executive management has provided, and continues to provide, sponsorship for the resolution of the organization's key resource needs

NFS faces the following significant challenges to excellence:

- A comprehensive long-term resource plan needs to be developed that supports all of the organization's planned projects/programs. This plan needs to assure resource availability where and when needed.
- Limited engineering resource availability exists to support unexpected and/or unplanned issues, i.e. there is little or no surge capacity.
- Timely, coordinated support needs to be provided for the Tollgate process in order to assure steady, systematic progress on key projects.
- There is limited ability for the engineering organization to support small projects. This category of small projects includes improvement projects recommended by area Human Performance (HuP) implementation teams to eliminate operator burdens, operator work-arounds, and flawed defenses.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Provide the resources necessary to achieve and maintain a world class level of safety performance. The Resources steward (Gene Athon) should have input from the other Safety Culture component areas, on an on-going basis, in order to achieve this goal.
- NFS should provide dedicated resources to assure the success of the HuP Program. This support should systematically address (1) HuP Event Evaluation corrective actions, (2) HuP implementation teams' efforts to address latent organizational weaknesses (e.g. procedure deficiencies) and flawed defenses (e.g. operator error traps), and (3) provide backlog tracking and trending for items (1) and (2) above.
- Assure individual working hours continue to be monitored and managed appropriately to prevent excessive overtime hours and potential safety problems.

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Work Control Safety Culture Component

Indications of progress were noted in the following areas:

- The implementation of the Maximo Work Control software is well underway.
- Work Orders are being executed in a timely manner.
- Many degraded equipment issues have been addressed since the SCUBA Team's first comprehensive Safety Culture Assessment.

NFS faces the following significant challenges to excellence:

- Completion of the Maximo implementation by the end of November. It will take substantial organizational focus to avoid further schedule slippages.
- Industrial Safety oversight needs to be improved for both shop floor and contractor activities.
- There is significant potential for the list of degraded equipment/processes to undergo substantial expansion. This expansion will be driven by two programs: (1) the Work Management Deficiency Tag Program will provide a new vehicle for issue visibility; and (2) the HuP Program implementation teams will continue to identify issues that have been previously accepted and accommodated by the workforce.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Resource the Maximo implementation as necessary to prevent any further schedule slippage.
- Formally document the Preventive Maintenance deferral process, including defined grace periods and associated management approvals.

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Work Practices Safety Culture Component

Indications of progress were noted in the following areas:

- The Human Performance (HuP) Program is being implemented across the site. The program has gained acceptance with the workforce and enthusiasm appears to be good. A supervisory and positive reinforcement observation program is under development with implementation planned for August.
- A Human Performance Manager has been assigned who demonstrates enthusiasm for the program.

NFS faces the following significant challenges to excellence:

- Metrics for the WP component remain under development. The focus has been primarily the implementation of the HuP Program. A challenge is to not lose sight of the varied aspects of the WP component and to develop a concise set of measures to monitor results and adjust as necessary to achieve the desired performance in all aspects. In addition, the management of SC components has shifted from a department focus to an organizational focus. This shift to a broader perspective by component owners will require support and attention from the entire manage chain.
- The organization continues to have a multiple initiatives and priorities which can dilute support for HuP Teams. A priority in support of workforce issues must be maintained to reinforce and maintain progress.
- The HuP Program is an extensive effort which requires timely and effective training. The implementation schedule has slipped as the result of training support. The observation program to reinforce the HuP Program is somewhat delayed and requires training and support. Human performance training implement (% complete) is less than 25 percent and the remaining effort will task training resources.
- The risk of a human performance issue in the high profile areas of procedural compliance and security performance are significant. The emphasis and attention to detail for these important areas can be diluted with implementation demands and competing priorities. Implementation of the HuP Program in the security area is late in the schedule and will be a challenge to move forward.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- The focus to date has largely been implementation of the HuP Program. Development of a concise and comprehensive statement of excellence and supporting metrics for the WP component will assist the organization in monitoring progress and identifying results.
- Assure items identified by HuP Teams are supported and retain the priority set by the workforce. Examples include: procedure revisions and elimination of work burdens, work-arounds, and error traps. Inattention to these issues can be demoralizing and hinder progress.
- Assure the quality of advocates in support of the HuP Teams. Advocates have largely been successful; however, the one experience with a poor advocate has reportedly hindered progress and the effort may require a restart. This not only impacts schedule and resources, but also can hinder the quality and enthusiasm for the effort.

- Assure the quality of the observation program supporting the HuP Program. The observation program is a reinforcement tool for the entire effort and is essential in maintaining progress after initial implementation. This requires fully engaged sponsorship by supervisors and managers, and provides the opportunity to answer questions, set expectations, identify workforce issues, and gauge progress.
- Accelerate some of the early HuP activities for the security area. A number of human performance issues are clustering in the area of security. This is a high profile area and priority to medicate HuP issues is warranted.
- Historically procedural compliance has been identified as an area of concern, and the HuP Program is being relied upon to address the issues. It is recommended a metric be developed specifically for procedure compliance and procedural issues be tracked in PIRCS. This will maintain a focus and serve as a management tool to ensure performance in this high profile area.
- Develop a routine (at least monthly) audit program for Lock-out/Tag-out (LOTO) performance. A new procedure has recently been implemented with several new performance requirements. It is understandable that questions and performance issues could be prevalent. Without any formal reinforcement, behaviors and performance can migrate toward previously unacceptable norms. A routine audit program will serve as an indicator of performance as well as a mechanism to answer questions and set expectations. LOTO issues should also be tracked in PIRCS.

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Corrective Action Program Safety Culture Component

Indications of progress were noted in the following areas:

- NFS has begun to establish affiliations with outside organizations, particularly the CAP Users' Group. This relationship has improved the frame of reference, offered suggested areas for action, and provided industry points of contact for reference in establishing a robust program.
- The Problem Identification and Resolution (PI&R) inspection recently conducted by the Nuclear Regulatory Commission resulted in no significant findings or violations. The participation of the employee body was cited as a positive attribute, and the NRC Team believed that the site's practice of proactively providing electronic feedback to PIRCS originators is yielding beneficial results.
- The recent establishment of the Corrective Action Review Board offers an opportunity to evaluate finished CAP products, request additional information when necessary, and educate the management team on the basic expectations for the closure of corrective action items.

NFS faces the following significant challenges to excellence:

- There is much yet to be accomplished in upgrading PIRCS to more effectively support trending, evaluation of operating experience (both internal and external), searching by categories/buckets, supporting performance metrics, etc. It appears that the support level for accomplishing the necessary software modifications in a timely manner is currently insufficient.
- Success demands a full-time commitment across the site. Recently, an experienced Health and Safety Department employee has been assigned as the first Department Performance Improvement Coordinator in order to provide local support for the CAP Manager. Although it is not mandatory to assign one individual to this job on a full-time basis, this is certainly one workable solution. An alternate choice would be to assign specific projects to certain individuals but, in either case, full commitment to delivering a thorough product will be critical to success.
- Effective reviews are not a standard part of the PIRCS closure process and this practice needs to change. The site has conducted some informal reviews, and the process should be proceduralized.
- NFS managers need to establish a commitment to meeting due dates. Historically, this has not always been the practice and, due to large bow wave of work, it will be important to keep the work flowing. The initial evaluation of importance versus urgency by the PIRCS Screening Committee should serve as a guide that is not easily changed.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- NFS established July 2009 through December 2009 as the season for completing CAP actions. It would be appropriate to front-end load the schedule in order to allow time for analysis of data collected.
- The PI&R report should be reviewed in its entirety. Although there were laudatory comments, it would be imprudent to fail to note that the NRC suggested improvement

was needed in the areas of recurring events, extent of condition analysis, and entry of self-assessment findings.

- NFS is on the verge of defining cause codes for use with tracking and trending, rather than relying on keyword searches. This action is needed to improve the quality of common cause analysis, measuring event recurrence, and defining the range of potential. The CAP Manager plans to implement this policy in early August, but it would be wise to check with other subject matter experts to verify that the categorization is as accurate as possible.

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Operating Experience Safety Culture Component

Indications of progress were noted in the following areas:

- As was reported in the first SCUBA Safety Culture report, NRC Generic Communications are formally reviewed after being received and are sent to cognizant organizations.
- Some work is in progress in the identification and review of external and internal operating experience. One manager informed a SCUBA team member that operating experience in the nuclear criticality area was incorporated into their procedures for criticality reviews.
- Metrics have been developed but are still evolving. Metrics for "excellence" are due later in this year.

NFS faces the following significant challenges to excellence:

- Operating Experience is very much a work-in-progress. All SCUBA items remain open. However, initiation of work on operating experience actions was not scheduled to begin until mid-2009. Since initiation of action on this program did not start until mid-2009, there will be a challenge to complete the items in the plan by the end of 2010 including the required reviews.
- Although there are initial metrics in place, they track outputs. There is a need to develop outcome indicators (i.e. indicators of effectiveness) and to perform effectiveness reviews of the program.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- NFS needs to develop a procedure or policy to define the operating experience program, how it interfaces with other programs such as CAP, self- and independent assessments and how new information will be incorporated into the training program.
- NFS needs a system for capture and retrieval to ensure that operating experience, even positive and successful experience, remain within the organization's experiential knowledge base. This concept is called Knowledge Management and has been addressed in IAEA and INPO reports.

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Self-Assessment/Independent Assessment Safety Culture Component

Indications of progress were noted in the following areas:

- The Safety Culture component Self- Assessment and Independent Assessments is a work-in-progress for which a number of items appear to be complete and many others have been initiated. The NFS Project Management page for this component showed that 8 of 13 actions had been completed and 7, as of the date of this report, have been approved by the Corrective Action Review Board (CARB). However, to date, no effectiveness reviews have been initiated.
- Metrics have been developed but they are still in an evolutionary stage. Metrics for "Excellence" are due for identification by the end of this year.
- NFS procedure NFS-MGT-08-013, "Organizational Excellence Policy" states as a policy that a living multi-year plan will be developed regarding benchmarking, and internal and external (including peer-trips), and independent assessments.
- SCUBA was presented with a 2009 Comprehensive Assessment Plan which included benchmarking, Internal Independent Audits, External Independent Audits, INPO Assist visits, Visiting Peer Assessments and Focused-Self Assessments. Also included were NRC inspections and DOE reviews. On the NFS internal web site a 2010 Comprehensive Assessment Plan was shown as under development and beginning to be populated.
- The 2009 Comprehensive Plan was in the form of a color coded spreadsheet and showed what assessments had been completed, those that were underway and those that were planned but not started. NFS had completed a number of these assessments across the spectrum of assessment types. SCUBA was also presented with the results of a recent OSHA Recordkeeping Review.

NFS faces the following significant challenges to excellence:

- One of the challenges of this area is the need to establish an appropriate definition of an "assessment." Previous interviews indicated different views on this subject. Some considered self-checking of a calculation or of a personal action to be a self-assessment. NFS procedure NFS-GH-945 places a considerable level of detail on Management by Walking Around (MBWA) as a form of self-assessment. NFS is required to perform QA audits of a number of activities by the NRC and by DOE. These can be restricted to purely compliance audits to meet regulatory or customer requirements. However, they can be structured to do more. To become a "Center of Excellence," NFS will need to adjust its "frame of reference," the term SCUBA uses, by looking outside and having outside peers critically review what NFS is doing in various areas.
- NFS needs to integrate all the various forms of self- and independent assessments that it plans to perform in such a fashion as to reinforce its goals. For example, if human performance is an area of focus, benchmarking trips should focus on this area, an INPO assist might be scheduled, human performance elements might be added to QA audits, a special check sheet might be developed for MBWA and NRC and DOE reports might be scrutinized for observations relative to human performance. A program of line-organization self-assessments needs to be included.
- Outside interactions may identify programs that are just too much for NFS to undertake at this time or at the time of the assessment. PIRCS may not be the place to track a major

program that might be undertaken 18 months or even 3 years from now. There needs to be a process to prioritize actions and even a parking lot for good ideas that time and resources do not permit to be undertaken in the near future.

- While much has been done to develop metrics in this area, there is a significant difference between "output metrics" (that is how many actions get done, how fast and how many actions are identified and completed) and "outcome metrics" (that is, has my program actually improved as a result of these activities). Metrics of "excellence" should ideally measure outcomes.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- There is a planned revision of NFS-GH-945 over the next several months. This presents NFS with the opportunity to properly structure the overall assessment program. The revised procedure should describe the process used to ensure the various types of assessment will be scheduled and integrated to reinforce specific program improvements. Although, there is uncertainty in what assessments may be done in the out years based on events and causes, required audits, standard self-checks like MBWA and NRC and DOE inspections and audits are regularly scheduled annual or periodic events even if their exact date is uncertain. A program of line-organization self-assessments needs to be included.
- NRC violations are already included in the metrics program and are clearly outcome metrics. It would be helpful if 2-4 addition outcome metrics could be developed.
- NFS should develop and populate a living three-year Comprehensive Assessment Program.

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SCWE Environment for Raising Concerns Safety Culture Component

Indications of progress were noted in the following areas:

- A number of programmatic elements have been launched. The Employee Concern Program (ECP) communication plan was robust, with posters, banners, pens, etc. Safety Conscious Work Environment (SCWE) guidance documents were developed and training was conducted on behavioral expectations.
- Early and frequent interface with the bargaining unit leadership has enhanced program acceptance.
- The ECP program has begun to get traffic from employees and contractors.

NFS faces the following significant challenges to excellence:

- There are a number of recently-appointed supervisors that have not received "soft-skill" training. For the most part, the supervisors are young and inexperienced.
- The current metrics focus on process. It is also useful to track and trend management response and effectiveness of response.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Establish a proactive interface between HR and ECP. There is a concern about establishing a "no-fly zone" approach instead of a collaborative one.
- Publish a document that outlines the NFS discipline process in greater detail than the current "Rules" guideline.
- Consider interim soft skill initiatives such as providing new supervisors with *Crucial Conversations* as a starting point for developing communication skills.

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SCWE Prevent, Detect and Mitigate Perceptions of Retaliation Safety Culture Component

Indications of progress were noted in the following areas:

- The Executive Review Board (ERB) program/process is ready for roll-out. This will provide oversight of potentially destabilizing management actions.
- Policies and training on Harassment, Intimidation, Retaliation, and Discrimination (HIRD)

NFS faces the following significant challenges to excellence:

- The activation of the ERB faces potential delays
- Supervisor threshold for recognizing activities that may create a perception of retaliation may not be properly calibrated, especially among new supervisors.
- There is a long-standing antagonism between bargaining unit leadership and HR that is not being mitigated

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Initiate a proactive role on the part of HR to mitigate issues that have potential to create perceptions of retaliation
- Engage the bargaining unit when there are issues that may undermine confidence in upper management decisions

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Accountability Safety Culture Component

Indications of progress were noted in the following areas:

- Numerous activities to improve organizational accountability are being pursued. Two of the best examples are (1) reinforcing Questioning Attitudes even when the potential exists for negative impacts on production, and (2) executive management is addressing resource dilution issues driven by the pursuit of new business initiatives.

NFS faces the following significant challenges to excellence:

- Development of Accountability metrics (e.g. the Management Accountability Index) that consider "quality of execution" as well as timeliness.
- Implementation of single point accountability, especially in those situations where objectives and activities are distributed across multiple departments and organizations.
- Quality execution of the Performance Evaluation Process (PEP), including documented face-to-face meetings to (1) establish performance objectives, and (2) review progress against those objectives at mid-year and end-of-year. Formal linkage of the organization's Comprehensive Safety Culture Improvement Initiatives (CSCII) with individual performance objectives and performance evaluations should be a significant activity in the PEP process.
- It is important that an appropriate level of executive and mid-level management sponsorship be developed to support each individual Safety Culture component, as well as the Leader of said component. At present the degree of management sponsorship, advocacy, and implementation support varies greatly from component to component. This sponsorship should be committed to formally in the PEP.
- An "effectiveness review" process needs to be developed for and applied to the Accountability component.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Systematically address the challenges above. Progress against these challenges should be tracked via the CSCII and PIRCS.

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Continuous Learning Environment Safety Culture Component

Indications of progress were noted in the following areas:

- The format for the Benchmarking & Assessment Plan is a good start. A suggestion was offered to think strategically about groupings of themes requiring the most need of attention.

NFS faces the following significant challenges to excellence:

- Metrics for the CLE component remain under development. A challenge to the organization is to not lose site of the resource requirements and the varied aspects of this component. It will be a continuing challenge to develop a concise set of metrics, monitor results, and adjust as necessary to achieve the desired performance.
- Management of Safety Culture components has shifted from a department focus to an organizational focus. This shift to a broader perspective by component owners, especially in CLE, will require support and attention from the entire management chain to achieve the desired results.
- The effectiveness of CLE is essential to support excellence in safety culture. The organization is challenged by the lack of effectiveness reviews. CLE is a dynamic and diverse component requiring performance feedback to support continuous improvement and excellence in safety culture.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Develop a concise statement of excellence and associated metrics for the CLE component. A comprehensive set of metrics can be a guide for effectiveness as efforts progress and adjustments are warranted.
- CLE supports initiatives for a number of SC components. Development of a set of component goals to maintain management's focus on the diverse objectives to be managed across the organization is recommended.
- Secure and reinforce management's support for this diverse component. This component requires action from a number of managers which must have an outlook for the progress of the overall organization. An individual unit's objectives cannot be prioritized to the determent of the support for this component. Support for CLE must be appropriately balanced with an individual unit's objectives to achieve the desired result.
- Assess the present schedule for training activities to support Safety Culture Implementation Initiatives. Certain training is not scheduled until late in 2010, e.g. supervisors and managers leadership training and MBWA training. It is recommended the proposed schedule of all training to support and reinforce safety culture be assessed and adjustments implemented.
- Conduct timely effectiveness reviews as developing issues will require support for a learning organization. Quality effectiveness reviews are essential; otherwise, a Continuous Learning Environment cannot be achieved.

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Organizational Change Management Safety Culture Component

Indications of progress were noted in the following areas:

- A formal OCM process has been developed, documented, and initiated.

NFS faces the following significant challenges to excellence:

- While the formal process is defined, supervision and management must embrace and effectively utilize the process. Metrics for the OCM component remain under development. It will be a continuing challenge to develop a concise set of metrics, monitor results, and adjust as necessary to achieve the desired performance.
- The formal process is only productive if appropriately implemented and utilized. The effectiveness of the recently implemented OCM process is a remaining challenge, which will be evaluated by SCUBA in the future.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Develop a concise statement of excellence and associated metrics for the OCM component. A comprehensive set of metrics can be a guide for effectiveness as efforts progress and adjustment are warranted.
- Document, communicate, and reinforce expectations for utilization of the OCM process with supervisors and managers. Clear expectations and reinforcement will likely be required to ensure the process is embraced.
- The OCM process is new and has the potential to be refined as experience is gained. It is recommended that routine effectiveness reviews be conducted to achieve the desired result.

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Safety Policies Safety Culture Component

Indications of progress were noted in the following areas:

- Improved face-to-face training on key policies
- Increased communications to improve understanding of safety policies (but primarily through e-mails, posters and newsletters)

NFS faces the following significant challenges to excellence:

- Ensure that the workforce understands how their jobs and functions relate to the elements of the safety policies.
- Ensure that the workforce "sees" how the underlying standards and expectations of safety policies are being consistently demonstrated and reinforced by supervision, management and senior management.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Increase face-to-face management communications with the workforce on Safety Culture values and principles. Use both structured and unstructured (e.g., MBWA) opportunities to improve understanding.
- Safety Culture Policy training should be conducted on a face-to-face basis versus on a "read and take a test" basis. Illustrative examples, case studies and interactive discussions are important elements of a program to ensure that the workforce understands how their jobs and functions relate to the elements of the safety policies.
- Ensure that contractors are not left behind in training, reinforcement and understanding.
- Consistent use of "safety messages" at start of all meetings on site. Use illustrative examples to bring the messages alive.
- Use performance measures/metrics based on mini-surveys where needed.

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Configuration Management Safety Culture Topical Area

Indications of progress were noted in the following areas:

- NFS has recently established performance measures for the CM Program but they are few in number (i.e., two) and quantitative in nature. It would be better to assign a qualitative aspect to counting PIRCS reports, for example, by assessing the safety aspects of configuration changes as a measure of effectiveness rather than using a simple arithmetic total.
- The CM permanent staff has been increased from two to eight individuals. Additionally, NFS has shifted from principally using contractors for data evaluation and entry to assigning experienced personnel between project assignments elsewhere as well as new engineers who spend a tour in the CM organization for personal training and program improvement before proceeding to their first permanent assignment.
- The mid-point milestones have been met. Most notably, CDL components have been entered into the LINC data base, the EB software program has been qualified for use on the confidential network (C-Net), and operating procedures pertinent to Navy fuel, CDL, and BPF projects have been incorporated into the LINC data base.

NFS faces the following significant challenges to excellence:

- PIRCS is not capable of efficiently bucketing potential CM events due to the lack of comprehensive cause codes. This deficiency deprives the site of a simple method of generating a task list as well as developing a data base for tracking and trending to allow analyzing the health of the program.
- The concept of design margin is not universally understood despite an initial round of site-wide training. It is particularly important to ensure that the process engineering community be given advanced training and tools to track margin erosion, beginning with safety-related equipment (SRE).
- NFS management should define the equilibrium state of acceptability. For example, non-safety related systems, structures, and components should be specifically excluded from data base entry and project plans submitted to the Configuration Change Control Board should be considered as acceptable for installation without duplicate review by the CM organization before a modification can be accomplished.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- NFS should benchmark good CM practices that preserve design margin at other nuclear facilities. For example, the ability to hyperlink critical SRE data with engineering calculations is used as a tool elsewhere and could be reviewed for applicability and implementation.
- Engineering and CM procedures (NFS-CM-02) should be coordinated to allow the modification review process to proceed in parallel for reasons of efficiency as well as consistency. The Configuration Change Control Board can serve as a clearinghouse for both reviews simultaneously.

- The Site's policies for replacement of "like for like" components should be relaxed to recognize that similar form, fit, and function can exist without the expectation of using identical replacement parts.

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Commitment Management/NOV Response Safety Culture Topical Area

Indications of progress were noted in the following areas:

- Indications of improved tracking and management control of both NOV responses and regulatory commitments. This will be further evaluated through the conduct of the 2009/2010 Independent Assessment.

NFS faces the following significant challenges to excellence:

- Impact of higher priority challenges (i.e., License Renewal), has delayed development of greater formality into the response/management processes.
- Continued signs of closing some issues based on planned (but not yet completed) actions (i.e., closing to paper) and without formal QA or effectiveness reviews.
- No guidance document is in place for either process

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Develop and implement formal programs for managing these regulatory interactions, including acceptance criteria for closing out issues.
- Develop and trend metrics in order to provide management with insights on the causes and location of violations so that compensatory measures are outcome-based (i.e., change behaviors)

SCUBA TEAM REPORT ON SAFETY CULTURE ASSESSMENT ACTIVITIES PROGRESS REVIEW CONDUCTED DURING THE WEEK OF JULY 20, 2009

Security and Safeguards Safety Culture Topical Area

Indications of progress were noted in the following areas:

- Facilities and Equipment: Security initiatives are currently being tracked in PIRCs. Engineering resources have been dedicated to security capital improvement projects. A phased approach to improving the off-site training facility is in progress.
- Personnel: The contractor Security Force is utilizing the NFS Employee Concerns Program. Due to management initiatives, Security Force overtime and attrition have been reduced. A security department fatigue policy has been implemented and appears to be accepted by the security force. The Security Department has implemented a professional development plan. The Material Controls and Accountability (MC&A) Department now has a written succession plan.

NFS faces the following significant challenges to excellence:

- Facilities and Equipment: Maintenance and repair of aging components continues to be problematic. Funds for the capital improvement plan are not allocated. Safety deficiencies have limited the off-site firing range availability. Security components are not in Configuration Management Program.
- Personnel: Implementation of the Human Performance Program (HuP) for security is not planned until 2010. Based on recent events, there is an indication that some members of the security force do not fully understand that nuclear security is different.
- Program Planning: An impending NRC rule could significantly raise the costs and complicate logistics of Force-on-Force performance testing. The Security Department is primarily in the reactive mode due to persistent emerging issues.
- MC&A: Although the MC&A Department has contact with B&W Lynchburg, there are few benchmarking activities and sharing of best practices. MC&A performance metrics are implemented to only meet regulatory requirements and not designed for effecting improvements.

The SCUBA Team offers the following recommendations for incorporation in NFS's Comprehensive Safety Culture Improvement Initiatives (CSCII):

- Facilities and Equipment: Metrics for deteriorated/failed equipment should be developed and tracked to determine component weaknesses and future corrective action. Assistance should be requested from B&W personnel on equipment issues. A capital improvement funding back-up plan should be developed as a contingency. NFS needs to reestablish its full firing range capability and availability as soon as possible. The Security Department should be included in the Configuration Management Program sooner rather than later. Continue to provide and improve engineering resources to security.
- Personnel: NFS should accelerate HuP implementation for security personnel at the earliest opportunity. Contractor security management should formalize a security force staffing plan.
- MC&A: The MC&A Department should benchmark with B&W, determine best practices, and then employ those best practices. Additional MC&A performance metrics should be developed and implemented to achieve excellence.

ATTACHMENT E-4

2009/2010 ISCA RESULTS REPORT

SCUBA TEAM IN-PROCESS SUGGESTIONS TO NFS SENIOR MANAGEMENT

PRELIMINARY TAKE-OFFS FROM SCUBA TEAM CASE STUDIES

December 21, 2009

Introduction

The information presented in this Attachment was provided to NFS senior management on December 21, 2009 so that this information could be factored into an NFS Action Plan to respond to an anticipated Confirmatory Action Letter from the Nuclear Regulatory Commission.

Case Study Talking Points

- **BPF Bowl Cleaning Station Event findings**
  - **Questioning Attitude lacking/Decision Making was consistently non-conservative**
    - 6 samples were taken from some 840 containers; 4 different results obtained from 6 samples; no further characterization was performed prior to the event
    - The ISA Team Leader did not consider the process change to be significant enough to have the expert Integrated Safety Analysis (ISA) analyst review it - a violation of existing procedures
    - Changes were expedited and implemented on a backshift with minimal technical and safety support
    - Process changes were implemented based on informal communication from the Development Laboratory
    - There are a number of additional examples on non-conservative decision making provided in the root cause analysis timeline
  - **Schedule pressures negatively influenced decision making processes**
    - There was management pressure to process the materials before the upcoming inventory,
  - **Management Oversight and Control of decision making processes was lacking**
    - Management was not adequately engaged in ensuring decision making processes were consistently robust and conservative
  - **Operating Experience not leveraged**
    - Procedure NFS-TS-009 was developed as a result of a previous problem/corrective action dating back several years, but was never assigned in T&Q; thus, almost no one in the organization knew that there were documented guidelines for implementing process changes.
  - **Corrective Action Program not consistently effective**
    - **The Root Cause Analysis (RCA) and Corrective Actions were not comprehensive**
      - The RCA was narrow in scope in that it was focused solely on the specifics of the event
      - The RCA did not investigate extent of condition
      - Cultural issues/drivers were not addressed
      - No consideration was given to management's role (what did management do/not do that promoted/exacerbated the problem)
      - Corrective actions were focused only on the technical factors identified in the RCA. Since extent of condition, cultural issues, and management's role is not investigated, there were no corrective actions for these items.
      - The Development Laboratory does not have formal QA requirements for internally driven process changes. This issue was not addressed in the RCA.
      - The independent safety culture analysis was insightful; but the process has not been formalized, and it is unclear under what conditions it will be applied going forward. It is also unclear

what actions will be taken regarding recommended corrective actions.

- **Corrective Actions are not consistently effective**
  - Several of the corrective actions recommended by the RCA team appear to have been compromised during implementation
    - The failure of the ISA Team Leader to require a review by the expert analyst was determined to be a causal factor. Despite this fact, ISA Team Leaders continue to do screening of changes after procedure changes were made to allow same. (As long as an individual, who is not a technical expert in all of the ISA discipline areas, continues to act as a screener, there is a high likelihood of a repeat mistake.)
    - It was noted in the RCA that effective implementation of NFS-TS-009 would have prevented this event. However, discussion at the SSRC review indicated that this procedure would be applied selectively due to resource issues. Selective application is not consistent with the RCA recommendation and results in a corrective action that cannot be expected to be robust enough to prevent recurrence of similar problems/events in the future.
    - The corrective action identified for failing to implement NFS-TS-009 (a corrective action from a previous PIRCS issue that was not effectively implemented) was to "revise the Corrective Action Program (CAP) to establish requirements for the development and implementation of corrective actions." This is an administrative fix that does not address the real issue: lack of management oversight of, and commitment to, the CAP
    - Workload, production pressure, and competing priorities were identified as contributing causes; but the only identified corrective action was to "review the working environment of the process engineers."

- **Fire Damper Event**
  - **Operating Experience was not leveraged**
    - The first SCUBA report noted that satisfying regulatory commitments was an issue. Effective corrective action was not taken.
    - At one point in the RCA review process it was stated that there were no similar historical events, which reemphasizes the fact that past problems in executing regulatory commitments was not recognized.
  - **Management Oversight and Control was lacking**
    - Management did not adequately review the response in that there was no verification that the supporting information existed or was of adequate quality. Responsibility for performing the required inspections was transferred from one organization to another without any communication that a change in responsibility had occurred, and without any consideration of existing operating procedures.
  - **Management Accountability was lacking**
    - There was no individual accountability for this regulatory commitment – contrary to the recommendation made in the first SCUBA assessment
  - **Questioning Attitude lacking/Decision Making non-conservative**
    - Several members of the organization knew the required inspections had not been completed, but did not raise the issue to upper management for resolution/prioritization. One of these individuals who reviewed the response to NRC had reason to believe that some of the required inspections had not been completed, but failed to notify management.
  - **Schedule pressures negatively influenced decision making processes**
    - The Industrial Safety function's understanding from upper management was that support for new projects, e.g. RFS, was more important than any of their other activities – including equipment inspections
  - **Corrective Action Program not consistently effective**
    - **The Root Cause Analysis (RCA) and Corrective Actions were not comprehensive**
      - The RCA is narrow in scope in that it is focused solely on the specifics of the event and the event itself was defined only as providing incorrect information to NRC
      - Extent of condition was not considered in the RCA, although there were some efforts to review IROFS/SRE inspection requirements outside the scope of the RCA
      - Cultural issues/drivers were not addressed
      - No consideration given to management's role (what did management do/not do that promoted/exacerbated the problem)
      - Failure to provide adequate training to Industrial Safety Specialists was discussed as a contributing issue at the SSRC review, but no corrective actions were identified to address this issue.

- The independent safety culture analysis was insightful; but the process has not been formalized, and it is unclear under what conditions it will be applied going forward.

- **Corrective Actions are not consistently effective**
  - Corrective actions are focused only on the technical factors identified in the RCA. Since extent of condition, cultural issues, and management's role were not investigated, there are no corrective actions regarding these items.
  - Many of the organization failures noted in the RCA are a direct result of a lack of management oversight and control of business processes, and management accountability for same. There are no corrective actions in place to address these issues.
  - It is unclear whether the corrective actions identified by the Safety Culture Implication Review will be pursued. Executive leadership was supposed to review the proposed corrective actions after SSRC had completed its review. The executive review has not as yet occurred. In fact, this commitment was not documented in PIRCS until SCUBA made an inquiry into the status of the corrective actions proposed by the safety culture evaluation team.
  - Although it was acknowledged that Industrial Safety personnel were instructed to limit entries in PIRCS, no corrective actions were recommended in the Safety Culture Implication Review Fire Damper Inspection Problems (PIRCS 20984) document. There was also no effort identified to determine if this situation extended to other departments; and it appears that no consideration was given to referring the allegations associated with this issue to the ECP for further investigation.

- **<u>CDL Sublimation Station Fire</u>**
  - **Questioning Attitude lacking/Decision Making non-conservative**
    - A precursor event occurred the previous day, but was not investigated in detail. An operator opened a valve on a UF6 cylinder (in the process of verifying its position), and immediately observed a chemical reaction that traveled down a clear tube. This was reported as an "ember" in the PIRCS report. The Fire Brigade was activated as a precautionary measure. The damaged tubing was replaced with one having a different material of construction. The next time the UF6 cylinder was opened, a small explosion and fire resulted. (We have not as yet investigated the decision making process and documentation, but the Operations Supervisor who briefed us indicated that the decisions were made by the Process Engineering organization.)
    - When John Nagy discussed the above with Gene Athon, the latter minimized the significance of the first event; however, the RCA acknowledged that it was a precursor.
  - **Schedule pressures appear to have negatively influenced decision making processes**
    - Processing of the subject UF6 cylinders was behind schedule and there was pressure to start the sublimation process.
  - **Management Oversight and Control appears to be lacking**
    - This conclusion is presumptive at the moment; but my opinion is based on the observation that the organization had just experienced several significant events, yet the same types of cultural issues that led to the previous events (lack of a questioning attitude, non-conservative decision making, and short-cuts resulting from schedule pressures) appear to have permeated the present event.
  - **Operating Experience was not leveraged**
    - The organization did not consider available operating experience when designing the facility. (The RCA hypotheses are based on information provided by DOE experts.)
  - **Corrective Action Program is not consistently effective**
    - **The Root Cause Analysis (RCA) and Corrective Actions were not comprehensive**
      - The entire Causal Factor evaluation is speculative in nature, with little or no supporting information, data, or experimental information to support said hypotheses other than others' operating experience
      - The RCA acknowledged the precursor event but did not investigate the decision making processes. This was questioned at the SSRC review meeting, the response was that the decision making process was not investigated by the RCA team.
    - **Corrective Actions are not consistently effective**
      - The effectiveness of the technical Corrective Actions for this event are by definition presumptive, as the causal factors are speculative.

- The only corrective action related to the precursor event is to implement a new and/or improved HuP tool regarding Questioning Attitude. It is not at all clear how this addresses deficiencies in the CDL Process Engineering decision making process, or the related organizational culture issues.

- **Global Conclusions/Summary**
  - **Questioning Attitude lacking/Decision Making non-conservative, particularly when there are production/schedule pressures**
  - **Management Oversight and Control is lacking**
    - **Lack of Questioning Attitude**
    - **Non-conservative Decision Making**
    - **Lack of Formality and Discipline**
    - **Effectiveness Reviews not routinely planned or performed**
    - **Poor Corrective Action implementation history**
    - **An inability/unwillingness to be self-critical**
  - **Management Accountability for organizational performance is lacking, particularly at the executive level**
    - Item of Note: Executive management has reportedly decided that middle management is blocking communication between the top and bottom of the organization, and is the primary source of the recent events. It is interesting that none of the RCA's performed indicated identified communication blockage as an issue. The above information suggests that executive management may be looking for scapegoats as opposed to taking responsibility for the organization's performance, and identifying and resolving the true root causes of these performance problems.
  - **Operating Experience is not leveraged**
    - **Internal**
    - **External**
  - **Corrective Action Program not consistently effective**
    - **Causal analyses are not comprehensive**
    - **Corrective Actions are not consistently robust or effective**

- **PSL Phase 4 Event findings**
  - **Questioning Attitude lacking/Decision Making was consistently non-conservative**
    - The reactor system for this project is processing hazardous gaseous materials. All design considerations and decisions impacting the safety basis for the system were not rigorously evaluated and documented. The decision making process resulted in a system which did not conservatively address or mitigate dynamic process conditions. The decision to eliminate a vent and/or relief path was not conservative in nature. Adequate compensating actions were not considered (i.e., insular frame of reference). The design pressure was increased to a nominal 50 psig (without relief) and this value was eventually exceeded shortly after startup.
    - The examples cited below also demonstrate a lack of questioning attitude and/or even the recognition of potential concerns.
    - The extent of condition for the above design issues has not been extensively evaluated; however, similar issues appear to be present in processing units of similar function.
  - **Management Oversight and Control of decision making processes was lacking**
    - The process for final design decisions was not documented and/or reviewed. During the investigation, it could not accurately be determined who or how the final design decision was made.
    - It was determined during operational check-out that welds in the hazardous gas system which had previously been tested and approved had failed. The process tubing welds were repaired, re-tested, and accepted with the identical procedure previously utilized. It was not recognized the test did not adequately demonstrate the integrity of the system.
    - The process was shutdown for plugging problems shortly after the initial run. A Letter of Authorization (LOA) and Major Work Request (WR) were initiated and approved to address the problem. The LOA did not address any potential safety hazards. The LOA content focused totally on instructions to address the blockage by applying heat. (This was a system plugged, without a vent/relief path, containing a hazardous gas in which additional heat was to be applied.) Recognition of the potential for over-pressurization was missed and any discussion of potential mitigating actions did not occur.
    - Approvals for the LOA, the WR and an SWP to address the plugging problems were obtained individually. The WR and SWP did specify certain safety requirements; however, considerations of all potential hazards were not discussed i.e. recognition of the potential for over-pressurization did not occur. The design pressure of the system was exceeded during the evolution of the LOA, and a SWP was required to open the system to relieve the pressure and address the plugging.
  - **Insular Frame of Reference for chemical design considerations**
    - Consideration of a design pressure in excess of the final value of 50 psig (i.e. 500 psig) would have not been overly costly or difficult. This would have provided a mitigating circumstance in evaluating potential over-pressurization

hazards. Design standards are not consistent with chemical industry best practices.
    - The decision to pressure test the hazardous gas system at a nominal 10% greater than design pressure is inconsistent with chemical industry standard practices of at least 150%.
    - The ISA process for this project addressed static scenarios only and did not address dynamic situations that can occur with chemical processes. A traditional chemical Hazop is not a part of the current ISA process.
  - **Cost/Schedule pressures negatively influenced decision making processes**
    - The complication of design issues concerning a relief path and cost considerations influenced the final design decision.
    - Operator training was initiated and a number of procedural pen and ink changes were required. Operators were being asked to certify through the T&Q system. Schedule pressures potentially influenced the procedure development process to be compressed without due input from all concerned other disciplines and the workforce) resulting in poor quality procedure.
    - The organization is production oriented greatly influenced by cost and schedule issues. The philosophy and attitude to accomplish the task at hand is prevalent throughout the review and approval processes. The failure to see the deficiency of the pressure test (discussed under management oversight and control) is an artifact of a production oriented organization.
  - **Corrective Action Program not consistently effective**
    - The operators were concerned with the quality of the procedures being utilized for training and a PIRCS entry was made, 20807. The response did not address the issue other than to review the process for procedure change and indicate changes were the responsibility of the initiator. It did acknowledge some lack of diligence by all those involved in the approval process (i.e., management accountability). This not only disillusioned the workforce but potentially compromised the quality of the training.
    - The over-pressurization of system during the evolution of the LOA was not recognized as a significant issue and a PIRCS entry has not been identified.
  - **Management Accountability was lacking**
    - Management is not held accountably for the quality of decisions, reviews, or approvals. The effectiveness of decisions, reviews, and approvals is never discussed. The current management philosophy rewards accomplishment of production, cost, and schedule goals. This is very obvious in the details of the LOA to address plugging.
    - PIRCS entry 20807, concerning procedure quality acknowledged a lack of diligence on the part of procedure approves; however, no action was undertaken.
    - Management does not recognize the deficiencies noted in this case study. An investigation and or corrective actions to address issues in this case study have not been undertaken.
- **Global Conclusions/Summary (including all case studies)**
  - **Questioning Attitude lacking/Decision Making non-conservative, particularly when there are production/schedule pressures**
  - **Management Oversight and Control is lacking**
  - **Management Accountability for organizational performance is lacking**

- **Corrective Action Program not consistently effective**
  - **Causal analyses are not comprehensive**
  - **Corrective Actions are not consistently robust or effective**
- **Operating Experience is not leveraged**
  - **Internal**
  - **External**
- **Insular Frame of Reference for Chemical Process Design**

2009/2010 NFS-Erwin Site Independent Safety Culture Assessment
SCUBA Team Results Report

ATTACHMENT F
PERSONNEL INTERVIEW TABLES AND BEHAVIORAL OBSERVATION TABLES

F.1 Introduction

In implementing the 2009/2010 Integrated Safety Culture Assessment (ISCA) of the NFS-Erwin Site, the SCUBA Team conducted numerous personnel interviews and behavioral observations.

The SCUBA Team's formal personnel interview program began in early February 2010 and continued through the beginning of May 2010. Additional informal interviews were conducted throughout the conduct of the 2009/2010 ISCA in a variety of contexts, including (but not limited to) during the conduct of behavioral observations, SCUBA Team Case Studies, and documentation reviews.

The SCUBA Team's formal behavioral observation program began in early September 2009 and continued through the beginning of May 2010. Approximately 65% of the formal behavioral observations were conducted during the period from September 1, 2009 through December 31, 2009. Additional informal behavioral observations were conducted throughout the conduct of the 2009/2010 ISCA in a variety of contexts, including (but not limited to) during the conduct of SCUBA Team Case Studies.

The purpose of this Attachment is to provide detailed information on the number and distribution of the formal personnel interviews and the formal behavioral observations that were conducted by the SCUBA Team.

Personnel Interviews

The SCUBA Team has developed a set of Tables that present the distribution of the personnel interviews by worker category and by organizational affiliation. This information is provided separately for the each of the three distinct types of formal personnel interviews that were conducted by the SCUBA Team. For the 2009/2010 ISCA, the SCUBA Team conducted three types of formal interviews[1] with NFS personnel and NFS contractor personnel. The following three types of formal personnel interviews were utilized:

- Subject Matter Expert (SME) Interviews: These interviews were targeted[2] interviews with personnel who were most knowledgeable of the NFS programs, policies, procedures, performance measures/metrics, and improvement initiatives related to each of the thirteen NRC RIS 2006-13 Safety Culture Components and to each of the other topical areas to be evaluated through the ISCA. These interviews were primarily (but not exclusively) with management and supervisory personnel, including the NFS-designated Safety Culture Component Leads and Executive Sponsors. These interviews included a combination of structured and non-structured interview questions, and SMEs responded to questions related to their area of expertise, to a set of five generic safety culture questions, and to a set of nine questions aimed at gaining insight into safety culture-related changes at NFS-Erwin following the issuance of the January 7, 2010 Confirmatory Action Letter.

[1] As was the case for the 2007/2008 ISCA, both general and specific guidance for the conduct of personnel interviews were developed and utilized by the SCUBA Team, including question interview checklists.
[2] In this context, "targeted" means that the individuals selected to be interviewed were selected by the SCUBA Team based on the knowledge of the interviewees rather than on a random basis.

- Random Interviews: These interviews were with members of the NFS-Erwin workforce (including hourly employees, salaried employees, and contractors) who were randomly selected by the SCUBA Team. Supervisory and non-supervisory personnel were included in the population base for the random selections. The random selection process was applied such that the distribution of those selected was representative of the population base of each NFS-Erwin functional organization. The random selection process was applied such that approximately 20% of the NFS-Erwin supervisory and non-supervisory population was interviewed. These interviews were primarily structured in nature and used a set of pre-established core questions related to safety culture.

- Survey-Driven Interviews: These interviews were dictated by the 2009 NFS Safety Culture Survey participation levels and the survey results for individual NFS Functional Organizations. If survey participation was particularly low within a specific NFS-Erwin Functional Organization, personnel from that organization were randomly selected for personnel interviews. If a specific NFS-Erwin Functional Organization provided significantly low ratings and/or notably declined ratings of key cultural metrics based on the survey numerical results, it was characterized as an "outlier organization" and was subject to personnel interviews intended to obtain additional insights into the underlying reasons for the low and/or declined survey numerical ratings. Personnel from such organizations were randomly selected for personnel interviews. Management and supervisory personnel from those organizations were also selected to be interviewed. The number of interviews conducted within each such organization was in accordance with the criteria specified in the Assessment Plan and the specific personnel interviewed were selected using random methods. Interviews of personnel from identified outlier organizations and low-responding organizations were more non-structured or open-ended in nature, as they were intended to obtain insights on the underlying reasons for the low and/or declined survey numerical ratings. The SCUBA Team used a specific set of interview questions that were augmented with questions based upon the analysis of the survey results, including the analysis of the write-in comments, for each identified outlier organization.

Examples of the structured personnel interview questions used by the SCUBA Team are provided in Section F.4 of this Attachment.

Behavioral Observations

Similarly, the SCUBA Team has also developed a set of Tables that present the distribution of the behavioral observations conducted by the SCUBA Team. This information is provided separately for the each of the three general categories of behavioral observations that were conducted by the SCUBA Team:

- Meetings Observations
- Field Work Activity Observations
- Training Activity Observations.

F.2 Personnel Interview Tables

The SCUBA Team conducted a total of 430 formal personnel interviews during the conduct of the 2009/2010 ISCA.

SME Personnel Interviews

The SCUBA Team conducted 161 confidential personnel interviews with NFS SMEs, who represented across a broad spectrum of the organization. The distribution of the SME interviews by worker category is provided in Table F.1.

Table F.1

INTERVIEW CATEGORY	NUMBER
Executive/Director	29
Manager	105
Supervisor	9
Salaried Employee	16
Hourly Employee	2
Total	**161**

The distribution of the SME interviews by Major Functional Organization is provided in Table F.2.

Table F.2

MAJOR ORGANIZATION	NUMBER
NFS Executive/Director	14
HEU Fuel Production	19
BLEU Operations	1
BPF Operations	2
Operations Support/Assurance	5
Human Performance & Learning/CAP	12
Security/MC&A	31
Licensing & Regulatory	16
Integrated Safety/Criticality Safety	14
Engineering	12
Site Services/Support	14
Analytical Services	7
Health Physics/Radiation Monitoring	3
Maintenance/Work Control	8
Facilities/Decommissioning	3
Total	**161**

The distribution of the SME interviews by Safety Culture Component is provided in Table F.3.

Table F.3

SAFETY CULTURE COMPONENT	NUMBER
Decision Making	11
Resources	10
Work Control	9
Work Practices	10
Corrective Action Program	12
Operating Experience	11
Self- and Independent Assessments	12
Preventing, Detecting, Mitigating Retaliation/Environment Raising Concerns	9
Accountability	7
Continuous Learning Environment	8
Organizational Change Management	5
Safety Policies	5
Security	22
Special Topical Areas	30
Total	**161**

Random Personnel Interviews

The SCUBA Team conducted 230 Random confidential personnel interviews.

The distribution of the Random Personnel interviews by worker category is provided in Table F.4.

Table F.4

INTERVIEW CATEGORY	NUMBER
Manager	3
Supervisor	25
Salaried Employee	92
Hourly Employee	110
Total	**230**

The distribution of the Random Personnel interviews by Major Functional Organization is provided in Table F.5.

Table F.5

MAJOR ORGANIZATION	NUMBER
Analytical Services	14
Business Services	12
Fuel Operations	25
BLEU Operations	7
BPF Operations	22
Applied/Business Development	5
Facilities/Decommissioning	27
Health Physics/Radiation Monitoring	13
Engineering	19
Maintenance/Work Control	12
Supply Chain	2
Quality/Assurance	8
Security/MC&A	28
Integrated Safety/Criticality Safety	18
Training	4
Corrective Action/Human Performance	1
Licensing/Regulatory	5
Transportation and Waste Management	8
Total	**230**

Survey-Driven Personnel Interviews

The SCUBA Team conducted 39 Survey-Driven confidential personnel interviews.

The distribution of the Survey-Driven Personnel Interviews by worker category is provided in Table F.6.

Table F.6

INTERVIEW CATEGORY	NUMBER
Executive/Director	0
Manager	8
Supervisor	1
Salaried Employee	10
Hourly Employee	20
Total	**39**

The distribution of the Survey-Driven Personnel Interviews by Major Functional Organization is provided in Table F.7.

Table F.7

MAJOR ORGANIZATION	NUMBER
Analytical Services	11
Business Process Improvement/Corporate Services	4
Health Physics/Radiation Monitoring	9
Nuclear Measurements	3
Transportation and Waste Management	4
BLEU Security (Low Participating Organization)	6
Total	**39**

The distribution of the Survey-Driven Personnel Interviews by organizational characterization is provided in Table F.8.

Table F.8

ORGANIZATIONAL CHARACTERIZATION	NUMBER
Low Participating Organizations	6
Identified "Outlier Organizations"	33
Total	**39**

F.3 Behavioral Observations

The SCUBA Team conducted 270 behavioral observations, including:

- 119 observations of NFS-Erwin meetings ranging from Safety and Safeguards Review Council meetings to work planning meetings to shift turnovers.
- 131 observations of fieldwork activities ranging from conduct of facility operations to product packaging and transportation.
- 20 observations of training activities ranging from craft technical training to human performance training to site drills.

The distribution of the 119 Meeting observations is provided in Table F.9.

Table F.9

TYPE OF OBSERVATION	NUMBER
Meetings	
Board of Directors	3
President & CEO Staff	8
General Manager Staff	6
Executive Review Board	1
CSCII Council Meeting	3
Various Department Staff Meetings	11
Organizational Change Mgmt Review Council	1
Configuration Control Board	4
Daily Facility Operations Turnover Meetings	9
Daily Facility Operations Staff Meetings	11
Maintenance Turnover Meetings	6
Safety and Safeguards Review Council	4
Human Performance Implementation Meetings	5
PIRCS Oversight Committee	2
PIRCS Review Committee	12
Corrective Action Review Board	6
Work Planning & Scheduling	5
Project Engineering Portfolio Management	2
Operational Rhythm Meeting	3
NRC Briefings/Meetings	3
Miscellaneous Meetings	16
Subtotal	**119**

The distribution of the 131 Field Work Activity observations is provided in Table F.10.

Table F.10

TYPE OF OBSERVATION	NUMBER
Field Work Activities	
Senior Engineering Watch Observations	7
Supervisory Management Observer Observations	8
Facility Operations	26
Facility Maintenance	17
General Site Maintenance	11
Operations Shift Turnovers	4
Chemistry/Radiation Protection Operations	13
Security-Related Work	19
Waste Processing	6
Transportation and Waste Management	6
Industrial Safety Support	8
Operations – Root Cause Reviews	6
Subtotal	**131**

The distribution of the 20 Training Activity observations is provided in Table F.11.

Table F11

TYPE OF OBSERVATION	NUMBER
Training Activities	
Site drills	6
Human Performance Training	5
Configuration Management Training	2
Craft Toolbox Training	2
Reactive Training	3
Security Training	2
Subtotal	**20**

F.4 Examples of Structured Personnel Interview Questions

Structured Interview Questions for Subject Matter Experts Interviews

The following five "generic interview questions" were asked of all SME interviewees on a safety culture component-by-component basis, particularly the NFS-designated Safety Culture Component Lead and Executive Sponsor:

1. If you were gifted the ability to instantaneously put in place three completed actions to improve safety culture and safety performance in your area of cognizance, what would those three completed actions be?
2. What is holding you back from instantaneously putting those actions into effect?
3. Do current plans and schedules adequately reflect these three priorities? If not, why not?
4. What is your vision of excellence in safety culture for your area of cognizance? That is, what would excellence look like – not just in terms of performance, but in terms of organizational values, attitudes and behaviors?
5. Where do you stand in establishing and using performance measures/metrics that flow down from your vision of excellence? If applicable, what is holding you back from establishing and using such performance measures/metrics today?

The following nine "specific interview questions" were asked, to the extent practicable, of a specifically designated set of SME interviewees.

1. In your opinion, what led to the NFS facility shutdown and the NRC Confirmatory Action Letter?
2. In your opinion, what were the key safety culture issues that led to and/or exacerbated the NFS loss events in 4Q 2009, and to the NRC Confirmatory Order?
3. In your opinion, what safety culture issues have NFS focused on improving during the facility shutdown?
4. What are the bases/justifications for deferring certain remedial actions (e.g., two items from the "Post-Restart List" of the CAL) until after the restart of production operations?
    - Evaluate the cause(s) by June 15, 2010, and implement specific corrective actions for NFS' failure to complete the root cause analysis, extent of condition review and extent of cause review following the Bowl Cleaning Station Incident without significant prompting from the NRC.
    - Identify and evaluate the cause(s) of NFS's decision to propose restart of operations the week of November 30, 2009, prior to completion of the root cause investigation, extent of condition review by June 15, 2010, and implementation of appropriate corrective actions.
5. What changes have occurred in the way NFS manages safety culture improvement?
6. What corrective actions have been taken to improve safety culture?
7. How will NFS measure performance in these areas going forward?
8. How will NFS communicate and reinforce safety culture performance standards going forward? How will accountability be applied?
9. What is your specific role regarding safety culture improvement?

NOTE: Question 4 above should only be asked of senior NFS Managers.

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Structured Interview Questions for Random Personnel Interviews

NOTE: If the interviewee had nuclear material security job responsibilities, the interviewer substituted the term "nuclear safety" or "nuclear material security" for the term "safety."

1. Did you take the 2009 NFS Safety Culture Survey?
   - If "no":
     - Were you given ample opportunity to take the survey?
     - Why didn't you take the survey?
   - If "yes":
     - Did you identify your correct organizational affiliation?
     - If not, why not?
2. If you identified a potential safety issue or concern, what would you do? Are there any conditions under which you would be hesitant to raise a safety issue or concern? If so, please elaborate.
3. Do you know how to use PIRCS to identify a potential nuclear safety issue or concern? Have you ever used PIRCS to do so? If so, were you satisfied with the manner in which your concern was treated and resolved? If not, please elaborate. If not, what did you do?
4. Have you ever received a negative reaction (from peers, supervision, management or senior management) for having raised or pursued a nuclear safety or quality-related issue or concern? If so, please elaborate. [Note: need to determine whether any example given is "current" or "old/legacy."]
5. Do you know of anyone else at NFS who has received a negative reaction for having raised or pursued a nuclear safety or quality-related issue or concern? If so, please elaborate. [Note: need to determine whether any example given is "current" or "old/legacy."]
6. Have standards and expectations for safety and safety performance been effectively communicated to the workforce? Are they well understood by the workforce? Are these standards and expectations high enough?
7. Do supervisors, managers and leaders consistently demonstrate and reinforce these standards? If not, please elaborate. [Note: need to determine whether any example given is "current" or "old/legacy."]
8. Do you believe that nuclear safety is the top priority at NFS? Please elaborate. Are you aware of any situations where nuclear safety has been compromised at NFS? If so, please elaborate. [Note: need to determine whether any example given is "current" or "old/legacy."]
9. Do the attitudes, behaviors and actions of (see list below) consistently demonstrate that safety and safe facility operations actually are the over-riding priorities at NFS Erwin? Examples?
   - Your peers
   - Your supervisor
   - Your management
   - Senior management
10. If you had the authority to make three changes to improve safety culture/safety performance at NFS, what would they be?
11. Have you seen any significant changes in the safety culture at NFS over the past few months? Positive, Negative? If so, please elaborate.
12. If the response to Q.11 is positive, do you believe that these changes will be sustained? Please elaborate.

13. Have you received adequate training to effectively perform your assigned work activities and carry out assigned responsibilities? If not, please elaborate.
14. Do you have sufficient time to perform your day-to-day work activities in a high quality manner? If not, please elaborate.
15. Have you experienced any difficulties in meeting your safety-related or quality-related job responsibilities? If so, have they been satisfactorily resolved? Please elaborate.
16. Do you feel that you have to compromise the quality of your work in order to cut costs or to meet deadlines or schedules? How frequently does this occur? Please elaborate.
17. Are you experiencing any difficulties in adhering strictly with the procedural requirements that apply to your day-to-day work activities? If so, please elaborate.
18. Do you believe that you and your co-workers are being appropriately held accountable for your/their performance? If not, please elaborate.
19. What happens when someone makes a mistake? Are people at NFS willing to self-identify their errors? Are you? Please elaborate.
20. Do you believe that your organization is sufficiently self-critical of its performance? Yes or no, please provide examples. [Note: Need to determine whether any example given is "current" or "old/legacy."]
21. Does you organization periodically perform a self-assessment of its performance to identify ways to improve? If so, has this been effective in improving performance? Please elaborate.
22. Does your organization value the recommendations and suggestions that it receives from the Quality Assurance and Quality Control organizations? Please elaborate.

Structured Interview Questions for Survey Driven Interviewees

1. Did you take the 2009 NFS Safety Culture Survey?
   - If "no":
     - Were you given ample opportunity to take the survey?
     - Why didn't you take the survey?
   - If "yes":
     - Did you identify your correct organizational affiliation?
     - If not, why not?
2. Would you be surprised to learn that the survey ratings provided by personnel from your organization were low (or significantly declined since 2007)? If so, why? If not, why not?
3. What do you think are the most significant underlying reasons/drivers for the low or declined ratings provided by personnel from your organization?
4. Do you believe that your organization has any significant issues that are nuclear-safety-related? If so, what are they?
5. Do you believe that your organization has any significant issues that are SCWE-related? If so, what are they?
6. What are the top five things that need to be done to improve your organization's attitudes, behaviors and performance?

The interviewer also constructed and used organization-specific questions to probe areas identified in the numerical survey results and in the organization's survey write-in comments if those issues did not come up in the discussion of questions 2-6. The interviewer also used the core questions used for the Random Personnel Interviews to the extent that time permitted.

ATTACHMENT G
SCUBA CASE STUDIES

Introduction

Several Case Studies were conducted by the SCUBA Team in order to evaluate the adequacy of the NFS response to a significant problem or event that occurred while the 2009/2010 Independent Safety Culture Assessment (ISCA) was in progress. Case Studies placed particular emphasis on the manner in which NFS identified and addressed potential safety culture implications associated with operational problems or loss events. As such, Case Studies were intended to obtain information related to the NFS safety culture that would augment information obtained through other sources of assessment input (i.e., the workforce safety culture survey numerical results, the workforce safety culture survey write-in comments, personnel interviews, behavioral observations, and documentation reviews).

Four Case Studies were performed during the course of the 2009/2010 ISCA, the results of which are listed in the Attachments listed below:

- G-1: Fire Damper Inspection Program
- G-2: BLEU Processing Facility (BPF) Bowl Cleaning Station Event
- G-3: Commercial Development Line (CDL) Sublimation Station Event
- G-4: PSL Phase 4 Project

ATTACHMENT G-1
FIRE DAMPER INSPECTION PROGRAM

Introduction:

Case Studies may be conducted by the SCUBA Team in order to evaluate the adequacy of the NFS response to a significant problem or event that occurs while the 2009/2010 Independent Safety Culture Assessment (ISCA) is in progress. Case Studies will place particular emphasis on the manner in which NFS identifies and addresses any potential safety culture implications associated with the problem or event. As such, Case Studies are intended to obtain information related to the NFS safety culture that will augment information obtained through other sources of assessment input (i.e., the workforce safety culture survey numerical results, the workforce safety culture survey write-in comments, personnel interviews, behavioral observations, and documentation reviews).

As information first became available regarding the discovery by NRC inspectors that NFS had failed to perform required fire damper safety inspections, contrary to information provided by NFS to the NRC in response to a Notice of Violation, the SCUBA Team decided to evaluate the NFS response to this situation as a Case Study. In this regard, the SCUBA Team was in a position to observe NFS response-related activities almost as soon as the problem was initially discovered. The SCUBA Team evaluation continued until the end of calendar year 2009.

Executive Summary:

NFS recently experienced a loss event where there was a failure to perform required fire damper inspections over a multi-year period. This issue was identified by the NRC in October 2008, which issued a Notice of Violation (NOV). Following the NOV, NFS failed to complete all of the required fire damper inspections, although it formally notified the NRC that all of the required inspections had been successfully completed in a letter issued during December 2008. A follow-up NRC inspection performed during October 2009 determined that a number of fire damper inspections had not been completed and that inaccurate information had been provided to the NRC by NFS in its response to the original NOV.

A Root Cause Analysis (RCA) performed by NFS in October 2009 revealed that an Industrial Safety Specialist had provided incorrect information in the NOV response to the NRC. It also determined that there were a number of additional contributing factors, including an inadequate review/tracking process for regulatory commitments. A Safety Culture Implications Review (SCIR), completed by NFS in November 2009, identified Decision Making, Corrective Action Program, and Accountability as safety culture deficiencies that contributed significantly to the loss event. Both the RCA and SCIR were narrowly focused in that they dealt with the specifics of the loss event, as opposed to its broader implications.

The SCUBA Team's evaluation of this loss event concluded that there were three major Areas for Improvement (AFIs) that warrant corrective action. These are summarized below; additional details are provided in the "SCUBA Team Findings" section of this report.

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1. AFI-CS/FD-01: Based on personnel interviews, the SCUBA Team discovered that some Industrial Safety personnel felt that they had been instructed by their upper management not to enter problems into PIRCS. Additional interviews revealed that some NFS managers believe that the threshold for the entry of issues into PIRCS is a matter of Departmental policy. This belief and/or practice is not consistent with published NFS Policy. NFS needs to investigate this matter, document its findings, document its PIRCS data entry policy (policies, if Department dependent), train all of its employees regarding this policy (policies), and rigorously enforce them.

2. AFI-CS/FD-02: The RCA methodology utilized by NFS needs to be modified to ensure that it includes "Management Effectiveness" and "Management Errors," as well as "Organizational and Programmatic Deficiencies" as potential root or contributing causes. The methodology also needs to systematically consider Extent of Condition from both a management effectiveness/management error and a safety culture perspective. The Safety Culture Implications Review is a good start. However, there is currently no formal guidance as to how an SCIR it to be performed, although the requirements as to when an SCIR should be performed are defined in NFS-GH-918 and NFS-GH-922. Implementation of a formal RCA grading system would better define organizational expectations for RCA content and quality level, and provide constructive feedback to team leaders and members.

3. AFI-CS/FD-03: A number of safety culture weaknesses/failures contributed to this loss event. Weaknesses/failures were manifested in the following Safety Culture Components (SCC): Decision Making, Resources, Corrective Action Program, Operating Experience, Accountability, Continuous Learning Environment, and Organizational Change Management. The SCUBA Team believes the single most important cultural area requiring attention is Accountability, as a lack of management oversight and control, and a lack of single-point management accountability were the major contributors to this loss event.

Background Information:

This case study deals with three significant operational deficiencies: a failure to perform required fire damper safety inspections, a failure to take adequate corrective action in response to an NRC NOV, and a failure to provide correct information to the NRC regarding an NOV (PIRCS 20984). The sequence of events was a follows:

- Prior to May 2005, Industrial Safety was responsible for conducting fire damper inspections. The last documented inspection prior to this date was in 2003.
- A new revision of procedure NFS-GH-22 became effective approximately two months after the originator (the site's Fire Protection Specialist) had resigned. The revision transferred fire damper inspection responsibilities to Maintenance but this change of responsibility was neither noted in the record of revision, nor assigned to anyone in the Maintenance organization via the Training and Qualification (T&Q) system.
- A new Industrial Safety Specialist (ISS) was hired in October 2005; however, NFS-GH-22 was not assigned to the ISS by the T&Q system.

- NRC conducted a fire protection inspection during August 2008. It was noted during the inspection that the fire damper inspection forms for the fourth quarter of 2006 could not be located. This was noted as an apparent violation during the inspection close-out meeting; and became the subject of a NOV in October 2008.
- Immediately following the NRC closeout, the Industrial Safety Manager (ISM) assigned an Industrial Safety Specialist (ISS#1) to inspect the fire dampers per NFS-GH-22. ISS#1 was new to the position (March 2008) and had no previous experience as an ISS. He had not had any formal training on the fire dampers
- When ISS#1 and a maintenance mechanic began the inspection using Attachment C of NFS-GH-22, it was quickly observed that not all dampers were listed in the attachment, the location description of some dampers was vague, and that some dampers could only be inspected visually due to a lack of accessibility. Inspection results and problems were documented via an electronic spreadsheet and multiple e-mails. No PIRCS issues were generated. After approximately one week's effort, seven or eight fire dampers still required testing. At that point ISS#1 was told by ISS#2 that he (ISS#2) had made arrangements to complete the required inspections. ISS#1 assumed his fire damper inspection responsibilities had been completed.
- On September 2008 the ISM transitioned to a new position (Human Performance Manager) and was told to focus only on his new position and not any of his previous IS responsibilities. When the fire damper inspection NOV was received in October 2008, it was assigned to the interim ISM.
- ISS#2 prepared NFS's response to the fire damper inspection NOV. In that response he stated that all fire dampers had been tested and passed. ISS#2 also committed to revising NFS-GH-22 to include fire dampers in the safety related equipment (SRE) and preventive maintenance (PM) programs. Full implementation was committed by December 31, 2008. The draft response was reviewed by ISS#1, the interim ISM, and the previous ISM for comment. Only minor editorial comments were made.
- A PIRCS report was generated to track the revision of NFS-GH-22, but no PIRCS report was generated relative to including the fire dampers in the SRE and PM programs. There was no means of tracking the latter corrective actions and they were never completed.
- NRC attempted to close the NOV during an inspection performed during September 2009. It was determined that:
  - The electronic spreadsheet information had not been transferred accurately to Attachment C of NFS-GH-22.
  - Multiple fire dampers had not been inspected, contrary to NFS's response.
  - Incorrect information had been reported to the NRC in NFS's reply to the NOV.
- The remaining fire dampers were inspected by the end of September 2009.
- A Root Cause Analysis was completed in early October 2009. The loss event was described as "Incorrect information reported to the NRC in Reply to NOV and failure to inspect the fire dampers prior to September 2008."

Methodology:

The SCUBA Team utilized a combination of documentation reviews (e.g., root cause documents and references), interviews with personnel who were part of the event or participated in performing or reviewing the causal analysis, and behavioral observations (e.g., Safety and

Safeguards Review Council (SSRC) meetings and discussions) to conduct this Case Study. Some of the interviews that were originally planned were not performed due to NFS's regulatory-related shutdown, and the resultant temporary curtailment of the SCUBA Team's 2009/2010 Safety Culture Self-Assessment (SCSA) activities. The SCUBA Team has concluded, however, that additional interviews would not modify the conclusions reached in this evaluation.

NFS Findings:

The NFS Root Cause Team appointed to perform the investigation of this event was competent and well qualified. One team member was part of the Regulatory and Safety Department, but was not a member of the Industrial Safety (IS) function that was directly involved in the event. The timeline established by the team was very detailed and captured most of the relevant information. (The one exception, IS personnel's perceived instructions not to enter issues in PIRCS, will be discussed later in this Case Study.) The NFS Root Cause Team utilized the TapRoot methodology. It did not consider factors such as management ineffectiveness, management errors, organizational deficiencies, or programmatic deficiencies. Several of the proposed corrective actions (CA) recommended further evaluations and benchmarking, but did not include implementation of corrective actions based on these future evaluation/benchmarking activities.

The NFS Root Cause Team identified five causal factors for this event. The proposed CAs are noted under each causal factor:

- ISS#2 included inaccurate information in the letter to NRC
  - CA: Conduct benchmarking on review processes for controlling accuracy of regulatory correspondence
  - CA: Evaluate having responses to NOVs reviewed by the SSRC
- Maintenance had not conducted fire damper inspections since 2003
  - CA: Add NFS-GH-22 to the Maintenance Supervisors' job in T&Q
  - CA: Develop a formal records management system for the Industrial Safety Department
- ISS#1 did not conduct the fire damper inspection in accordance with NFS-GH-22 R6, and did not make a PIRCS entry for dampers that could not be inspected
  - CA: Add NFS-GH-22 to the Industrial Safety Specialist job in T&Q
  - CA: Revise NFS-GH-22 to require a PIRCS entry when a fire damper cannot be tested or fails an inspection
  - CA: Incorporate language into the PM system to notify the ISS when conducting fire damper tests so that he/she can verify completion
  - CA: Add a line item to the SRE testing documentation to notify the ISS when conducting SRE tests so that he/she can verify completion
- SRE/PM damper implementation was not being tracked as a separate item in PIRCS
  - CA: Implement fire dampers that are items relied on for safety (IROFS) into the SRE system
  - CA: Implement fire dampers that are not IROFS into the PM system
  - CA: Revise the Internally Authorized Change safety analysis for fire safety to include a procedure review of relevant GH procedures into Section 7
- There was a lack of job knowledge transfer to the ISSs

- CA: Conduct benchmarking on a formal job knowledge transfer process

The NFS Root Cause Analysis team noted the following lessons learned:

- The Industrial Safety Department experienced significant personnel turnover during the past five years and the department had too often been functioning without a full complement of experienced staff members.
- NFS has had numerous new production/business projects during the same five-year period (e.g., BLEU Processing Facility, South Africa, Commercial Development Line) and the support provided by Industrial Safety for these projects was described at various times as "job one." There was a difficult balancing act between routine support (fuel production, maintenance, decommissioning, regulatory requirements) and these projects.
- Job expectations for new-hires were not well defined
- Job responsibilities for Industrial Safety staff professionals were not well defined due to a lack of succession planning and the absence of a formalized orientation/mentoring period.

No corrective actions were identified for the above items.

NFS did have a separate team perform a SCIR of the identified causal factors/root causes. The SCIR Team determined that deficiencies in three SCC caused/significantly contributed to the majority of the identified causal factors:

- Decision Making
  - The process for reviewing and approving regulatory correspondence was flawed
  - The change in fire damper inspection responsibility was not properly communicated (The SCUBA Team considers this to be an Organizational Change Management (OCM) issue.)
  - Inappropriate decisions were made regarding communication of problems and corrective actions associated with performing the fire damper inspections
  - The transfer of the ISM without a full-time replacement was not evaluated (The SCUBA Team considers this to be an OCM issue.)
- Corrective Action Program
  - Corrective actions associated with fire damper inspections were not properly identified, fully evaluated, or completed in a timely manner
  - Effectiveness evaluations were not conducted in a timely manner
  - Effectiveness evaluations are not scheduled or performed for regulatory commitments
  - Industrial Safety personnel were allegedly instructed to limit entries into PIRCS
- Accountability
  - Inconsistent safety priorities were communicated to the Industrial Safety staff in that they believed project work had the highest priority
  - Specific responsibility for providing inaccurate information to the NRC was never admitted by involved personnel
  - An ISS who reviewed the NRC violation response knew the information was incorrect but did not raise the issue to management

The NFS SCIR Team recommended the following to the SSRC and upper management:

- Add an "Objective Evidence" tab to documentation packages for NRC violation responses
- Require Quality Assurance (QA) Effectiveness Reviews for regulatory responses including an aggressive and timely schedule for same
- Clarify the company position on safety priorities to the Industrial Safety Staff and include them in Performance Agreements. Insure these positions on safety priorities are included in General Employee Training (GET) and the Annual Refresher Training
- Conduct a survey to establish other departments' opinions of the Industrial Safety Program and staff to aid in improving relations with customer organizations

The SCIR process is now established as a requirement in both NFS-GH-918 and NFS-GH-922, however guidance for the performance of an SCIR is under development and not yet available. The requirement is to conduct SCIR evaluations for Full Team Root Cause Investigations or when specified by the PIRCS Problem Review Group Chairman during problem screening. The Corrective Action Review Board (CARB) will review and approve SCIRs when performed.

Extent of Condition issues identified by NFS in PIRCS were as follows:

- Review BLEU Complex fire damper inspection paperwork required by BLEU-GH-22, and validate all fire damper inspections have been completed. Note deficiencies in PIRCS and correct same
- Perform plant drawing and field reviews of all fire dampers at NFS and compare that list of fire dampers with the list of fire dampers in NFS-GH-22 to determine and validate that what is installed in the field is correctly reflected in plant drawings and correctly identified in NFS-GH-22. Identify inconsistencies in PIRCS
- Perform plant drawing and field reviews of all fire dampers at the BLEU Complex and compare that list of fire dampers with the list of fire dampers in BLEU-GH-22 to determine and validate that what is installed in the field is correctly reflected in plant drawings and correctly identified in BLEU-GH-22. Identify inconsistencies in PIRCS
- Perform a review of all other fire equipment to validate that fire equipment is being properly inspected per procedural requirements
- Conduct a review to determine if there are any other safety areas where inspections are informal, undocumented or incomplete. Areas reviewed included Radiation Monitoring, Health Physics, Nuclear Criticality Safety, Environmental Safety, and Emergency Preparedness.
- Review IROFS plant-wide to identify any additional equipment that should be added to the SRE program
- Review PIRCS 20566 to determine whether similar inspections have been conducted by Industrial Safety where the findings/observations were not entered into PIRCS
- Review the replies to NOVs submitted to the NRC, specifically those for which an Effectiveness Review by QA has not been completed, and those involving the originator of the reply in C7689. Review other regulatory reports to state/local agencies for accuracy
- Determine if fire dampers or other equipment at the BLEU Complex should be added to the SRE system

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An Extent of Cause Review was performed by NFS to examine the root causes identified by the TapRoot investigation, assess these root causes with regard to their impact across other plant disciplines and organizations, and determine if identified corrective actions would prevent the occurrence of similar or related events. The review focused on processes, equipment and human performance; and identified two additional corrective actions:

- Consider assigning a team to review SNM-124 and other regulatory commitment documents for flow down to and compliance with operating procedures. A special focus of the review should be on required inspections and documentation. The purpose should be to identify inspections and/or documentation that are not currently being completed but may be commitment items.
- Develop a formal training program for new Industrial Safety Specialists. Benchmarking should be conducted at the Lynchburg facility to review their training program for ISS.

Extent of Condition evaluations related to safety culture or management deficiencies were not performed by NFS.

SCUBA Team Findings:

The SCUBA Team's collective review of the event timeline, root cause analysis, SCIR analysis, SSRC review, documented corrective actions, and personnel interviews has led it to identify the following Areas for Improvement:

1. AFI-CS/FD-01: There is a need to define and reinforce NFS policy regarding the entry of problems into PIRCS.

   The event timeline defined by the NFS Root Cause Team was detailed and well-documented, but it did not include the fact that Industrial Safety personnel felt that they had been instructed not to enter issues in PIRCS. This issue was acknowledged in the SCIR analysis and discussed at the SSRC review. However, no investigative action was taken to determine how this instruction/perception came about and no corrective action was taken within the chain of command to prevent recurrence of this situation. There was also no effort to look at extent of condition to determine if other departments at NFS-Erwin shared similar perceptions regarding entry of problems into PIRCS. This extent of condition question is particularly important since multiple interviews conducted by the SCUBA Team suggest that some management personnel believe that the "threshold strategy" for PIRCS entries is a departmental decision that is not solely and/or strictly controlled by the corrective action program procedures. If this perception were correct, one would expect to see PIRCS entry guideline strategies documented in many department procedures. Since there only seem to be few documented departmental procedures in this area, it appears that there may be a lack of formality, discipline, and consistency regarding the entry of PIRCS problems.

2. AFI-CS/FD-02: There is a need to improve the NFS investigative processes

   A. The NFS RCA methodology does not systematically consider:

   - Management Ineffectiveness and/or Management Errors, e.g.

- Unawareness
- Strategic Planning
- Management Expectations
- Oversight and Control
- Technology Acquisition
- People Cultivation

- Organizational and Programmatic Deficiencies, e.g.
  - Programmatic
  - Organizational
  - Program-to-Program Interface
  - Organization-to-Organization Interface
  - Organization-to Program Interface

It is recommended that NFS consider augmenting their existing RCA methodology (TapRoot) to assure management, organizational, and programmatic issues are identified and addressed. An example of an appropriate methodology is that developed by Performance Improvement International (PII) – an RCA methodology that also incorporates human performance principles.

B. Extent of Condition issues related to the above areas

It is recognized that Extent of Condition (EOC) reviews are performed, but these are focused on plant processes, equipment, and human performance in order to prevent the occurrence of similar/related events in other plant disciplines/organizations. These EOC reviews do not attempt to identify systematic management issues/problems.

C. Safety Culture Implications Reviews

It is also recognized that NFS is now performing Safety Culture Implications Reviews. However, there is currently no formal guidance for the SCIR process, and the SCIR documents reviewed to date have not addressed management issues/problems in a consistent manner.

3. AFI-CS/FD-03: There is a need for augmented corrective actions to address the safety culture implications associated with this event.

Although the SCIR determined that several SCCs contributed to the majority of the event causal factors, its analysis and proposed corrective actions were event focused. From a broader perspective, the SCUBA Team believes each of the following SCCs was a significant factor in this event; but each of them also is an extent of condition issue that could lead to and/or enable future events if effective corrective action is not taken:

- Decision Making: Production pressures negatively influenced organizational priorities in that support for new projects compromised fundamental safety/regulatory related activities.

- Resources: There was significant turnover in the IS department, insufficient resources, resource demands from new projects, and no apparent plan to manage this situation.
- Corrective Action Program (CAP): Committed corrective actions were not implemented. There was no verification process in place and effectiveness reviews were not performed.
- Operating Experience: Previous operating experience was not recognized in that the failure to satisfy regulatory commitments and the importance of single-point accountability was identified in the SCUBA Team's ISCA.
- Accountability: Management Oversight and Control was lacking in all of the following areas:
  - Implementation of NFS-GH-22, a required fire safety inspection procedure
  - Implementation of changes to and organizational responsibilities relating to NFS-GH-22
  - Effective implementation of CAP/regulatory commitments
  - Formality and discipline in verifying and documenting completion of assigned responsibilities
  - Failure to identify PIRCS issues and the related organizational culture that led to same
  - Resource management failures including project and position responsibility for setting priorities
  - Expectations and training for new Industrial Safety Specialists
  - Implementation of single-point accountability for key organizational commitments
- Continuous Learning Environment: Industrial Safety training was not provided for a professional position involving a complex and constantly evolving set of regulatory requirements.
- Organizational Change Management: The effect of changes to procedures (NFS-GH-22), personnel (Industrial Safety), management (Industrial Safety), and multiple projects/position responsibilities was not evaluated, documented, or acted upon to assure safety/regulatory requirements were satisfied.

ATTACHMENT G-2
BPF BOWL CLEANING STATION EVENT

Introduction:

Case Studies may be conducted by the SCUBA Team in order to evaluate the adequacy of the NFS response to a significant problem or event that occurs while the 2009/2010 Independent Safety Culture Assessment (ISCA) is in progress. Case Studies will place particular emphasis on the manner in which NFS identifies and addresses any potential safety culture implications associated with the problem or event. As such, Case Studies are intended to obtain information related to the NFS safety culture that will augment information obtained through other sources of assessment input (i.e., the workforce safety culture survey numerical results, the workforce safety culture survey write-in comments, personnel interviews, behavioral observations, and documentation reviews).

As information first became available regarding the nitrous oxide (NOx) release and resultant facility shutdown, the SCUBA Team decided to evaluate the NFS response to this situation as a Case Study. In this regard, the SCUBA Team was in a position to observe NFS response-related activities within a few days of the event. The SCUBA Team evaluation continued until the end of calendar year 2009.

Executive Summary:

NFS recently experienced a loss event where a process change involving the dissolution of U-Al fines in the BPF Bowl Cleaning Station (BCS) led to an unexpected exothermic reaction, a NOx release, physical damage to the BCS ventilation system, plant evacuation, activation of the Emergency Response Organization, and a protracted regulatory shutdown. A Root Cause Analysis (RCA) performed by NFS revealed three causal factors, two contributing factors, and three lessons learned. The causal factors were as follows:

- Failure to implement NFS-TS-009, Configuration Management of Process Changes, which had been developed (but never implemented) as a corrective action for a previous event
- A decision was made by an Integrated Safety Analysis (ISA) Team Leader to not have a chemical analyst review the process change as required by NFS-GH-911 and NFS-HS-A-67
- The technical basis for the process change did not adequately describe the fundamental change to the process

Key contributing causes were workload, production pressure, and competing priorities which contributed to the development, approval, and implementation of a major process change without appropriate attention to detail

A Safety Culture Implication Review (SCIR) Team identified three cultural issues that were contributing factors.

- Decision Making

- Accountability
- Operating Experience

The RCA was narrowly focused in that it dealt with the specifics of the loss event, as opposed to its broader implications. The SCIR looked more broadly at the event and evaluated organizational safety culture issues in considerable detail. Major areas of concern identified by the SCIR were Decision Making, Accountability, and Operating Experience.

The SCUBA Team's evaluation of this loss event concluded that there were two major Areas for Improvement (AFIs) that warrant corrective action. These are summarized below, additional details are provided in the "SCUBA Team Findings" section of this Report.

1. AFI-CS/BPF-01: The RCA methodology utilized by NFS needs to be modified to ensure that it includes "Management Effectiveness" and "Management Errors," as well as "Organizational and Programmatic Deficiencies" as potential root or contributing causes. It also needs to systematically consider Extent of Condition from both a management effectiveness/management error and a safety culture perspective.

   The SCIR is a good start. However, there is currently no formal guidance as to how an SCIR it to be performed, although the requirements as to when an SCIR should be performed are defined in NFS-GH-918 and NFS-GH-922. Implementation of a formal RCA grading system would better define organizational expectations for RCA content and quality level, and provide constructive feedback to team leaders and members.

2. AFI-CS/BPF-02: A number of Safety Culture Component (SCC) weaknesses/failures contributed to the event. Components requiring management attention include Decision Making, Resources, Work Practices (professionals/management), Corrective Action Program, Self- and Independent Assessments, Operating Experience, Accountability, and Safety Policies. It is also the SCUBA Team's belief that Decision Making (consistently non-conservative), Work Practices (persistently proceeding in the face of uncertainty), and Accountability (a lack of management oversight and control and/or single-point accountability) were key contributors to this loss event.

Background Information:

This case study deals with an unplanned exothermic reaction in the BPF bowl cleaning station resulting in physical damage to the ventilation system, an NOx release, evacuation of the facility, activation of the Emergency Response organization, and an extended regulatory shutdown (PIRCS 21448). The sequence of events leading to the loss event was as follows:

- The first U-Al dross and floor sweeping material analyzed in Technical Development and Commercialization (TD&C) in December 2008
  - NFS Failed to assign responsibility for the implementation of NFS-TS-009, which required representative sampling, establishment of the process outline, technical reviews, etc. for a new project **(Causal Factor 1)**
  - NFS-TS-009 was made effective in 2007, but was not assigned in the Training and Qualification (T&Q) system and thus was not implemented.

  - An interim report was completed on April 24, 2009 regarding the dissolution of U-Al floor sweepings and dross. It recognized a wide variation in container contents.
- An Internally Authorized Change (IAC) Request for processing of U-Al dross and floor sweepings was made on May 5, 2009
- On May 12 2009, a decision was made by the Integrated Safety Analysis and Licensing functions that processing (based on an interim report from TD&C) that dross and floor sweepings did not need to be processed as an IAC. This limited the process to U-Al materials to be processed in the same manner as previous U-Al ingots.
- Operators were trained on the visual differentiation of dross and floor sweeping materials on July 31, 2009. Five types of material/processing were identified:
  - Clinkers, flashing, and U-Al captured on the sieve – to be dissolved
  - Fines (primarily graphite) captured in the pan -- to be placed in a small container (<500 ml)
  - U-Al ingots – to be dissolved
  - Metallic filings and shavings (primarily U-Al) – not to be processed
  - Foreign material (bolts, nuts, ceramic material, etc.) – to be placed in a 2L bottle for discard
- SOP 409 Section 10, Rev. 24 was made effective July 31, 2009, based on an interim TD&C report, to enable the processing of U-Al dross and floor sweepings. Included were:
  - Instructions to keep shiny metallic filings separate and to send to the Applied Development Lab (ADL) if directed by supervision
  - Direction for material captured on the screen to be dissolved in the U-Al dissolver
  - Fines (generally defined as graphite material) to be placed into separate containers for discard or analysis in the ADL
- The first input of dross material into the U-Al dissolvers occurred July 31, 2009
- SOP 409 Section 10, Rev. 25 became effective September 9, 2009. Changes included:
  - Directions for material captured on the screen to be dissolved in the U-Al dissolver
  - The option for minimal quantities of fines to be placed into a waste container for discard
  - The requirement that fines (generally defined as graphite material) to be placed into a separate container for discard or analysis in the ADL when full
  - Instructions for handling shiny metallic filings separately were inadvertently deleted from the procedure. No material was processed despite this inadvertent deletion. (The deletion is suspected to have happened as part of the file manipulation in the LINC software system.) **(Lessons Learned 1)**
- TD&C issued a final report on the dissolution of U-Al floor sweepings and dross on September 16, 2009
  - A large variation in container contents was noted: six of 840 cans were analyzed; three cans of dross and three cans of floor sweepings; four discrete material types were identified from the six cans
  - Further testing was recommended if additional material types were identified

- A 2L bottle containing graphite fines was unable to be discarded due to having high U-235 values. Fines (<1mm) from a container of sieved dross material were sent to TD&C for recovery in nitric acid analysis and development on September 22, 2009
- Residual material remaining from dissolution of the dross material (BLEU Processing Facility (BPF) centrifuge waste material) was also sent to TD&C on September 23, 2009 to determine if dissolution in nitric acid could be used for uranium recovery
- The final batch of dross material was loaded into the BPF dissolvers on September 24, 2009
- The first batch of floor sweepings was loaded into the BPF dissolvers on September 28, 2009
- An Enterprise Change Request (ECR) for SOP 409 Section 10, Rev.26 was initiated on October 1, 2009. The ECR was expedited to facilitate the input of graphite fines that passed through the screen into baskets for dissolution in the bowl cleaning station
  - The change was based on verbal communications from the TD&C chemist who performed the dissolution studies
  - An expedited ECR did not go through Change Control Board (CCB) prior to performance
  - Per NFS-CM-004, ECRs are to be expedited for issues that adversely affect personnel safety or significantly impact operations
  - Workload, production pressures, and competing priorities contributed to the development, approval, and implementation of a major process change without appropriate attention to detail
- The TD&C chemist discussed test results from dissolving graphite fines in nitric acid informally with the BPF organization on October 5, 2009. It was found that fines (graphite) dissolved in nitric acid generate NOx, but have no vigorous reaction. The analysis was completed on October 9, 2009
- SOP 409 Section 10, Rev. 26 was developed during the day of October 12, 2009. Rev. 26 accomplished the following:
  - Restored the direction to separate shiny metallic fines from other material and send it to the ADL if directed by supervision
  - Included directions to take material captured on the screen to caustic dissolution; and directed that fines were to be placed into strainer baskets for dissolution in the BCS, disposed of as waste, or sent to the ADL
  - The ISA Team Leader reviewed, but did not send the change to the chemical analyst for review as it was not viewed as significant
    - This decision is inconsistent with NFS-GH-911 **(Causal Factor 2)**
    - ISA Team Leaders do not satisfy the qualifications outlined in NFS-HS-A-67
- Communications between TD&C and BPF relative to the processing of granular aluminum in nitric occurred on or about October 12, 2009 due to confusion on identifying metal filings versus graphite fines.
- SOP 409 Sect. 10, Rev. 27 was developed during the day of October 12, 2009
  - This SOP was revised to add a step to package fines in 2L bottles with the addition of cheesecloth to lower density and deleted the separate handling of shiny metallic material

  - A change was made to allow all material (including granular aluminum) to be screened through the sieve and all fines to be either loaded into 2L bottles or processed in nitric acid inside of the BCS. The change to the process to include granular aluminum in the fines to be processed in nitric acid inside of the BCS was outside of the established process parameters **(Causal Factor 1).**
  - 2L bottles of fines could be sent for disposal, or sent to the ADL if directed by supervision
  - There were conflicting requirements affecting which container (1L or 2L) in which to load fines waste
  - The ECR was expedited **(Contributing Cause 1)**
  - The ECR technical basis lacked detail **(Causal Factor 3)**
  - All but four Safety and Safeguards Review Committee (SSRC) concurrences were obtained by phone after hours
  - All safety review and approval signatures were obtained by phone after hours
  - The ISA team leader incorrectly concluded that the procedure change involving nitric acid was bounded by the safety basis
  - It was difficult to determine the actual change to the as-routed procedure (e.g., deleted items were not displayed). The Record of Revision was vague. **(Lessons Learned 2)**
  - The BPF Process Engineer was responsible for multiple systems undergoing frequent changes. **(Contributing Cause 1)**
  - The organization failed to implement NFS-TS-009, which required detailed analyses of the change in process parameters **(Causal Factor 1)**
  - Operator aids were modified to delete the note to not process metal fines
  - The change was expedited and implemented on the off-shift **(Lessons Learned 3)**, due to the perceived need to complete the 741 campaign, and the need to complete processing for inventory. **(Contributing Cause 1)**
  - Subjective criteria were utilized to differentiate between materials
- A decision was made to process material inside of the BCS on October 12, 2009
- Screened material was loaded into the bowl on October 13, 2009
  - There was confusion relative to the intent to process or trash/dispose of fines material
  - Processing fines as waste would generate excessive number of waste containers
  - Operations did not clearly understand the option for 2L bottles with cheesecloth
- Dissolution was initiated in BCS2 on October 13, 2009 (at 0415)
  - A significant process change implemented on 3rd shift
  - The process change was not perceived as significant
- The first indication of a greater than expected exothermic reaction occurred on October 13, 2009 (at 0417)
  - Operators noticed bowl vibration, green solution, and NOx
  - A vigorous NOx and heat-producing reaction occurred in Bowl Cleaning Station #2
  - Heaters were turned off and recirculation stopped on October 13, 2009 (at 0420)
  - NOx levels and solution temperatures monitored (190° F observed) on October 13, 2009 (from 0420-0435)
  - Operators noticed degraded condition of wet off-gas (WOG) line

  - Operators turned on recirculation pump for five to ten minutes on October 13, 2009 (at 0425)
  - NOx alarm sounded on October 13, 2009 (at 0435)
  - Personnel evacuated building on October 13, 2009 (at 0435)
  - Emergency recovery processes implemented
- A Root Cause Analysis was completed on November 12, 2009.

Methodology:

The SCUBA Team utilized a combination of documentation reviews (e.g., root cause documents and references), interviews with personnel who were part of the event or participated in performing or reviewing the causal analysis, and behavioral observations (e.g., SSRC meetings and discussions) to conduct this Case Study. Some of the interviews that were originally planned were not performed due to NFS's regulatory-related shutdown, and the resultant temporary curtailment of SCUBA's 2009/2010 ISCA activities. The SCUBA Team has concluded, however, that additional interviews would not modify the conclusions reached in this evaluation.

NFS Findings:

The NFS Root Cause Team appointed to perform this investigation was competent and well-qualified. The timeline established by the team was very detailed and appeared to have captured all of the relevant information. The Root Cause Team utilized the TapRoot methodology. It did not consider factors such as management ineffectiveness, management errors, organizational deficiencies, or programmatic deficiencies. Several of the proposed corrective actions recommended evaluations and benchmarking but did not include implementation of corrective actions (CA) based on these evaluation and\or benchmarking activities.

The NFS Root Cause Team identified three causal factors, two contributing factors, and three lessons learned for this event. The proposed corrective actions are noted under each factor:

- Causal Factor 1: Failed to implement training and assignment of NFS-TS-009, which allowed process change outside of established parameters to process granular Al fines inside of the BCS.
  - CA: 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.
  - CA: Develop and implement a process to ensure formal communications between BPF Operations and the TD&C Laboratory to minimize confusion of technical information.
  - CA: Revise the Corrective Action Program to establish the requirements for the development and implementation of corrective actions.
  - CA: Revise the CM Program to provide the requirements for a technical basis with sufficient technical detail to facilitate the risk and hazard assessments of process changes.
- Causal Factor 2: The ISA Chemical Analyst did not review process change as required in NFS-GH-911 and NFS-HS-A-67.
  - CA: Enforce the requirements of NFS-GH-911 and NFS-HS-A-67.

- Causal Factor 3: Technical basis did not adequately describe the fundamental change to the process.
  - CA: Revise the Configuration Management Program to provide the requirements for a technical basis with sufficient technical detail to facilitate the risk and hazard assessments of process changes.
- Contributing Cause 1: Workload, production pressure, and competing priorities contributed to the development, approval, and implementation of a major process change without appropriate attention to detail.
  - CA: 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.
- Contributing Cause 2: The option to process waste (fines) was put in place to prevent generating what was perceived to be a large number of waste containers.
  - CA: Evaluate waste handling capability and the impact on production processes. Ensure that waste handling is considered as an integral part of project management and proposals are reviewed by responsible engineers and project managers.
- Lessons Learned 1: Received reports of problems with the LINC system resulting in unexpected changes to the word processing documents. Errors requiring additional changes to SOP 409 Section 10 are similar in nature.
  - CA: Review and evaluate the LINC software and implementation to eliminate the possibility of unexpected changes occurring in documents and processes controlled by the software.
- Lessons Learned 2: Routing marked-up copies of the procedure as part of the change package would facilitate a more thorough review and reduce errors.
  - CA: Require routing of "mark-ups" with copies of procedures and documents for approval of changes.
- Lessons Learned 3: Significant changes to the process should not be implemented on an off-shift schedule without ensuring adequate technical support.
  - CA: Write and implement a document providing guidelines to help ensure process changes made on off-shifts have adequate technical support and oversight.

NFS also performed a Safety Culture Implications Review of the identified causal factors/root causes. The SCIR was comprehensive and well documented. The SCIR Team determined that three Safety Culture components caused/significantly contributed to the loss event:

- Decision Making
  - Systematic processes for developing, reviewing, and approving technical changes for processing U-Al material floor sweeping and dross were not followed:
    - NFS-TS-009 was not followed
    - NFS-GH-911 was not followed
    - NFS-HS-A-67 was not followed
  - Assumptions used in decision-making were not conservative

        - The ISA Team Leader incorrectly decided that an ISA Chemical Analyst review of the NOx generation rate was not warranted for the chemical process changes to dissolve graphite fines in nitric acid
        - Insufficient items relied on for safety (IROFS) were in place to meet the performance criteria of 10 CFR 70.61
        - The ISA Team Leader did not meet the minimum technical qualifications of NFS-HS-A-67 to perform the safety review of the chemical process changes to dissolve graphite fines in nitric acid
        - Decision making was informal and based on interim reports and verbal communications of process development (R&D) test results
        - Changes to procedures were made without an adequate technical basis
        - Production pressures, workload, and competing priorities inappropriately influenced decision making through same-day review and approval of several changes. including the approval of a change via telephone after normal working hours
        - Significant processing changes were initiated after normal working hours without adequate technical support and oversight
        - Lack of a questioning attitude. Salary staff involved did not question the:
            - Adequacy of the technical information used to justify the processing of first-of-a-kind nuclear materials
            - Formality of the technical information used to justify the processing of first-of-a-kind nuclear materials
    - The technical basis for decisions was not effectively communicated.
        - Operators were confused about the option to add cheesecloth to the 2L bottle of fines destined for disposal. Therefore, a decision to process material was made since it was more clearly understood.
        - Records of revision for procedural changes were vague and lacking sufficient detail
        - Laboratory personnel who conducted prototype testing and validation of processing methods were not formally involved with how the information they developed was used by Safety, Engineering, or Operations
        - Changes to procedures were not easily identified, complicating review
        - Changes were initiated to process problematic material based on a perception that too many waste containers would be generated
- Accountability
    - Behaviors and outcomes that reflect safety as an overriding priority were compromised
    - Management did not do enough to reinforce safety standards
    - Management oversight of work activities was insufficient to prevent the operation of the BCS outside of the approved safety basis. Management allowed
        - Production pressures to negatively influence decision-making
        - Informality in the communication of information to develop the safety basis
        - Insufficient technical justification for procedural changes
        - Significant processing changes to occur after normal working hours without adequate technical support and oversight

        - A lack of a questioning attitude
- Operating Experience
    - Internal operating experience was not effectively communicated to plant personnel
        - Although NFS-TS-009, Configuration Management of Process Change, was written to prevent the recurrence of shortcomings in managing process development (R&D) activities that occurred in 1999, the procedure was not assigned to any jobs in T&Q. Thus few, if any, employees knew of the procedure's existence and the procedure was not followed.
    - External or internal operating experience was not pursued in advance of a significant processing change
        - The requirement to consider internal and external operating experience is not formalized at NFS.

Resources, Work Control, Work Practices, Continuous Learning Environment, Organizational Change Management, Corrective Action Program and Safety Policies were viewed as secondary/minor contributors to the event.

The NFS SCIR Team recommended a number of corrective actions over-and-above those recommended by the NFS RCA Team:

- Decision Making
    - ISA Team Leader's 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
    - ISA Team Leaders should have a formal procedure or job aid that details how screening should be conducted
    - The administrative changes made to NFS-HS-A-67 to allow the ISA Team Leader to perform technical safety reviews caused NFS-HS-A-67 to be in conflict with NFS-GH-911. Therefore, NFS-HS-A-67 needs to be corrected.
    - Modify daily conduct of operations to enhance plant management; provide timely, accurate and complete communications to appropriate 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 proper decision-making at the appropriate level to address identified issues in a timely and technically sound manner, always keeping safety at the forefront of every decision.
    - Implement a Senior Engineering Watch (SEW), which will provide coverage on the process floor by NFS personnel with technical knowledge of the operations. The SEW will have the sole duty of providing independent technical oversight of process operations to identify potential safety concerns related to procedures, permanent/temporary process changes, and upset conditions. The SEW will report directly to the VP-Operations and possess the authority to stop work as appropriate to address safety concerns.

  - Laboratory personnel should concur in all engineering and safety work products for new or revised processes that rely on laboratory test data. Letter of Authorization LOA-MISC-09-083 will be updated accordingly.
- Accountability
  - Modify daily conduct of operations to (1) enhance plant management, (2) provide timely, accurate and complete communications to appropriate management on concerns, issues or problems, (3) establish a more engaged leadership culture to drive accountability, (4) assist in early recognition of potential problems and, (5) aid in proper decision-making at the appropriate level to address identified issues in a timely and technically sound manner, always keeping safety at the forefront of every decision.
  - Implement a SEW which will provide coverage on the process floor by NFS personnel with technical knowledge of the operations. The SEW will have the sole duty of providing independent technical oversight of process operations to identify potential safety concerns related to procedures, permanent/temporary process changes, and upset conditions. The SEW will report directly to the VP-Operations and the authority to stop work as appropriate to address safety concerns.
  - A top-down face-to-face communication with management on a very clear set of behavior standards will be communicated. Some of these standard expectations will deal with not continuing to pursue operational goals when unanticipated conditions occur; ensuring operations are safe and all legitimate questions regarding safety are fully resolved prior to proceeding; communicating concerns with adequate time to assure commitments do not become overdue; holding employees accountable for providing timely and accurate reports, taking ownership of issues that impact their operations and delivering solutions that keep safety as the top priority; and finally, functioning as a team that does not make quick decisions regarding technical matters, but choosing rather to rapidly marshal resources to address priority problems to ensure the right experts are consulted and concur with regarding the way to proceed.
- Operating Experience
  - 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.

The corrective actions recommended by the NFS SCIR Team have been entered in PIRCS. The SCIR process is now established as a requirement in both NFS-GH-918 and NFS-GH-922; however guidance for the performance of an SCIR is under development and not yet available. The requirement is to conduct SCIR evaluations for Full Team Root Cause Investigations or when specified by the PIRCS Problem Review Group Chairman during problem screening. The CARB will review and approve SCIRs when performed.

Extents of Condition issues identified by NFS in PIRCS were as follows:

- Perform an Extent of Condition evaluation for the Fuel Manufacturing Facility to identify potential areas where similar events might occur

- Perform an Extent of Condition evaluation for BPF operations to identify potential areas where similar events might occur
- Perform an Extent of Condition evaluation for Commercial Development Line (CDL) to identify potential areas where similar events might occur
- Review ISA NOx calculations for all areas of the NFS plant, specifically areas that use nitric acid dissolution of uranium-bearing materials. Verify that the NOx calculations are adequately conservative
- Select a sampling of areas within Fuel, BPF, and CDL and review the associated criticality, radiological chemical and fire safety basis documents. With an integrated team, verify that the safety assumptions and controls match field conditions and current operations

An Extent of Cause Review was performed by NFS to examine the root causes identified by the TapRoot investigation, assess these root causes with regard to their impact across other plant disciplines and organizations, and determine if identified corrective actions would prevent the occurrence of similar or related events. The review focused on processes, equipment and human performance; and identified six additional corrective actions:

- Revise NFS-RM-010 to require document originators to route the T&Q with the associated document as part of the formal review and approval process
- Develop a comprehensive Conduct of Operations document based on guidance from the Institute of Nuclear Power Operations and industry best practices, which will include rules for proper communication of information with safety implications
- Develop a performance-based qualification process to ensure required personnel have a demonstrated capability to prepare technical basis documents
- Validate the ISA process
- Establish procedural guidance for required personnel to have a demonstrated ability to prepare technical basis documents
- Clarify the review requirements for designating IROFS and changing safety bases within the ISA organization

Extent of Condition (EOC) issues related to safety culture or management deficiencies were evaluated in the SCIR.

SCUBA Team Findings:

The SCUBA Team's collective review of the event timeline, root cause analysis, SCIR, SSRC review, documented corrective actions, and personnel interviews has led it to identify the following Areas for Improvement:

1. AFI-CS/BPF-01:

   A. The NFS RCA methodology does not systematically consider:

   - Management Ineffectiveness/Management Errors, e.g.
     Unawareness
     Strategic Planning
     Management Expectations

Oversight and Control
Technology Acquisition
People Cultivation

- Organizational and Programmatic Deficiencies, e.g.
  Programmatic
  Organizational
  Program-to-Program Interface
  Organization-to-Organization Interface
  Organization-to Program Interface

B. Extent of Condition issues related to the above areas

It is recognized that EOC reviews are performed, but these are focused on plant processes, equipment, and human performance in order to prevent the occurrence of similar/related events in other plant disciplines and\or organizations. These EOC reviews do not attempt to identify systematic management issues/problems.

C. Safety Culture Implications Review

It is also recognized that NFS is now performing SCIRs. However, there is no formal guidance for the SCIR process, and the SCIR documents reviewed to date have not addressed management issues/problems in a consistent manner. It is recommended that NFS consider augmenting their existing RCA methodology (TapRoot) to assure management, organizational, and programmatic issues are identified and addressed. An example, of an appropriate methodology is that developed by Performance Improvement International (PII) – an RCA methodology that also incorporates human performance principles.

2. AFI-CS/BPF-02: There is a need for augmented corrective actions to address the safety culture implications associated with this loss event

The SCIR determined that the major contributing Safety Culture Components (SCC) were Decision Making, Accountability, and Operating Experience. The corrective actions identified by the SCIR team were designed to have a plant-wide impact. The SCUBA Team concurs with the SCIR analysis, but would augment and/or emphasize the SCIR findings as follows:

- Decision Making:
  - Decision making was consistently non-conservative
  - Production pressures (preparation for inventory) negatively influenced organizational priorities in that support for new projects compromised fundamental safety/regulatory related activities.
- Resources: There were insufficient resources, resource demands from new projects, and no apparent plan to manage this situation.

- Work Practices (A significant number of errors of judgment were made by members of the Engineering and Safety and Regulatory staffs):
  - There is little/no evidence to demonstrate that error prevention techniques (e.g., peer checks, peer verifications, contingency planning) were used commensurate with the risk of the assigned tasks.
  - The organization proceeded with the first-time processing of new materials without adequate consideration of consequences (proceeding in the face of uncertainty), and without adequate management guidance.
- Corrective Action Program:
  - Committed corrective actions were not implemented. There was no verification process in place to assure adequate implementation of corrective actions, and effectiveness reviews were not performed
  - The SSRC discussions left the effectiveness of two corrective actions in doubt
    - It was stated in the SSRC RCA review meeting that NFS-TS-009 would have to be applied selectively due to implementation costs. No guidance was provided from the SSRC as to how "selectively" should be defined.
    - The ISA function stated that they would have to preserve the Team Leader screening process. There was discussion regarding compliance with all procedures, but no guidance was given as to whether or how the Team Leader review process should be performed to prevent recurrence of a similar event. The SCIR did recommend corrective action in this area, but it is not clear how this issue will ultimately be managed by NFS.
- Self- and Independent Assessments: The Self-Assessment Program did not identify any of the cultural issues in advance of the loss event.
- Operating Experience: Previous operating experience was not recognized in that lack of a questioning attitude (non-conservative decision making), lack of formality/systematic approach, lack of ownership/accountability, and lack of management oversight were identified in SCUBA Team's ISCA as "overarching issues" that affected multiple Safety Culture components. These overarching issues were not effectively addressed.
- Accountability:
  - Management oversight and control was lacking throughout the sequence of events leading up to the loss event, including implementation of previously committed corrective actions (NFS-TS-009).
  - Single-point management accountability has not been effectively implemented.
- Safety Policies: There was insufficient communication and reinforcement of management expectations and standards to prevent the cultural deficiencies that led to the loss event.

It is believed that each of the SCCs discussed played a significant role in contributing to this loss event. Furthermore, each of them represents an EOC issue that could lead to and/or enable future loss events if effective corrective action is not taken.

ATTACHMENT G-3
COMMERCIAL DEVELOPMENT LINE (CDL) SUBLIMATION STATION EVENT

Introduction:

Case Studies may be conducted by the SCUBA Team in order to evaluate the adequacy of the NFS response to a significant problem or event that occurs while the 2009/2010 Independent Safety Culture Assessment (ISCA) is in progress. Case Studies will place particular emphasis on the manner in which NFS identifies and addresses any potential safety culture implications associated with the problem or event. As such, Case Studies are intended to obtain information related to the NFS safety culture that will augment information obtained through other sources of assessment input (i.e., the workforce safety culture survey numerical results, the workforce safety culture survey write-in comments, personnel interviews, behavioral observations, and documentation reviews).

As information first became available regarding the Commercial Development Line (CDL) UF6 sublimation station event, the SCUBA Team decided to evaluate the NFS response to this situation as a Case Study. In this regard, the SCUBA Team was in a position to observe NFS response-related activities within a few days of the loss event. The SCUBA Team evaluation continued until the end of calendar year 2009.

Executive Summary:

NFS recently experienced a loss event when a 5A cylinder valve was opened (in preparation for sublimation), resulting in an immediate chemical reaction and fire. The fire was extinguished via a CO2 suppression system, and the area was evacuated. The Emergency Response organization was activated and the area was placed in safe shutdown. A Root Cause Analysis (RCA) performed by NFS revealed eight causal factors, and four lessons learned. The causal factors were as follows:

- Causal Factor 1: UF6 in cylinders were subjected to 30-60 years of radiolytic decomposition resulting in significant pressure (Hazards Analysis Not Implemented)
- Causal Factor 2: Some cylinders were stored without dust caps (No Standards, Policies, or Administrative Controls)
- Causal Factor 3: Highly reactive chlorine tri-fluoride (ClF3) was commonly used to clear plugs in UF6 cylinders (Hazards Analysis Not Implemented)
- Causal Factor 4: Department of Energy (DOE) certification was accepted without content verification for legacy orphan material and with minimal characterization information (Standards, Policies, Administrative Controls Not Strict Enough)
- Causal Factor 5: 5 A/B UF6 cylinders were not tested; their contents were not sampled (Standards, Policies, Administrative Controls Not Strict Enough)
- Causal Factor 6: Precursor event -- water in a flex hose reacted with process gas resulting in hose failure, PIRCS 20584 (Training/Understanding Not Implemented)
- Causal Factor 7: Precursor event – a glowing ember was observed in an argon supply hose, damaging the PFA Teflon – PIRCS 21999 (Training/Understanding Not Implemented)

- Causal Factor 8: The stainless steel braided hose failed in four locations, multiple kinks were present at the failure points (Training/Understanding Not Implemented)

Subsequently, an NFS Safety Culture Implications Review (SCIR) Team identified three cultural issues that were the primary contributing factors.

- Decision Making
- Accountability
- Work Control

Resources, Operating Experience, Work Practices, Continuous Learning Environment, Organizational Change Management, Corrective Action Program, and Safety Policies were considered by the NFS SCIR Team to be secondary/minor contributing factors.

The NFS RCA was narrowly focused in that it dealt only with the specifics of the loss event, as opposed to its broader implications. The SCIR looked more broadly at the event and evaluated organizational Safety Culture issues in considerable detail.

The SCUBA Team's evaluation of this loss event concluded that there are two major Areas for Improvement that merit additional NFS corrective actions. These are summarized below; additional details are provided in the "SCUBA Team Findings" section of this Report.

1. AFI-CS/CDL-01: The RCA methodology utilized by NFS needs to be modified to ensure that it includes "Management Effectiveness" and "Management Errors," as well as "Organizational and Programmatic Deficiencies," as potential root or contributing causes. The methodology needs to systematically consider Extent of Condition from both a management effectiveness/management and a safety culture perspective. The SCIR is a good start. However, there is currently no formal guidance documented as to how an SCIR it to be performed, although the requirements as to when an SCIR should be performed have been recently defined in NFS-GH-918 and NFS-GH-922. Implementation of a formal RCA grading system would also better define organizational expectations for RCA content and quality level, and provide constructive feedback to team leaders and members.

2. AFI-CS/CDL-02: A number of Safety Culture Component (SCC) weaknesses/failures contributed to the event. Components requiring management attention include Decision Making, Resources, Work Control, Work Practices (professionals/management), Self- and Independent Assessments, Operating Experience, Accountability, and Safety Policies. It is the SCUBA Team's belief that Decision Making (consistently non-conservative), Work Practices (persistently proceeding in the face of uncertainty), and Accountability (a lack of management oversight and control and/or single-point accountability) were the key contributors to this loss event.

Background Information:

This case study deals with an event at the CDL UF6 sublimation station (PIRCS 22021). Operators were preparing a 5A UF6 cylinder for sublimation at station #3. When the cylinder valve was opened to vent the cylinder, a flame started at the collar/base of a stainless steel

braided PTFE hose. The flame formed instantly and ran down the length of the hose. A CO2 fire suppression system was actuated to put out the fire. The system was placed in safe shutdown and Operations evacuated the facility. The sequence of events leading to the loss event was a follows:

- UF6 cylinders were filled at either Portsmouth Gaseous Diffusion Plant or Oak Ridge K-25 in the 1950's – 1980's (exact dates unknown)
  - UF6 cylinders were subjected to 30 – 60 years of radiolytic decomposition
  - UF6 dissociates and forms F2 heel/pressure **(NFS Causal Factor 1)**
  - Some cylinders were stored without dust caps **(NFS Causal Factor 2)**
  - Highly reactive ClF3 was commonly used to clear plugs in UF6 cylinders **(NFS Causal Factor 3)**
- NFS gets contract to store UF6 and non-UF6 solids in 1999
- DOE ships material to NFS for storage in 1999
  - Legacy orphan material with minimal characterization information
  - DOE certification accepted without content verification **(NFS Causal Factor 4)**
- NFS gets contract for laboratory development tests in 2002
- NFS performs laboratory tests on sample-size containers and identifies processing costs (July 2002 – September 2003)
  - 5A/B cylinders not tested, contents not sampled **(NFS Causal Factor 5)**
- NFS updates firm fixed price to process the material (April 2004 – October 2004)
- Portsmouth awards NFS contract for processing (December 2004)
- NFS begins designing/building facility (early 2005)
- CDL input starts August 12, 2009
- 2S cylinders processed in sublimation station #1 (August 12, 2009)
- First 5A cylinder processed October 19, 2009 (10kg yield, 5 kg heel remaining)
- First 5A cylinder re-processed on November 11, 2009
- Second 5A cylinder input on November 12, 2009
  - Water in flex hose reacted with process gas resulting in hose failure, PIRCS 20584 **(NFS Causal Factor 6)**
- Leak test of 5A cylinder on November 13, 2009
  - UF6 cylinder pressure greater than Argon purge bottle pressure
  - Glowing ember observed in argon supply hose damaging PFA Teflon hose, PIRCS 21999 **(NFS Causal Factor 7)**
  - Cylinder valve dust cap had UO2F2 deposit
- Argon supply hose replaced November 13, 2009
- Venting of 5A cylinder performed on November 14, 2009
- When the cylinder valve was opened to vent the cylinder a flame started at the collar/base of a stainless steel braided PTFE hose. The flame formed instantly and ran down the length of the hose.
- Operator activated CO2 fire suppression system and evacuated area
- High pressure release from hose on 5A cylinder (Loss Event)
  - Hose failed in four locations, kinks at fail points **(Causal Factor 8)**
- Plant emergency response ensues

Methodology:

2009/2010 NFS-Erwin Site Independent Safety Culture Assessment
SCUBA Team Results Report

The SCBA Team utilized a combination of documentation reviews (e.g., root cause documents and references), interviews with personnel who were part of the event or participated in performing or reviewing the causal analysis, and behavioral observations (e.g. Safety and Safeguards Review Council (SSRC) meetings and discussions) to conduct this Case Study. Some of the interviews that were originally planned were not performed due to NFS's regulatory-related shutdown, and the resultant temporary curtailment of the SCUBA Team's 2009/2010 ISCA activities. The SCUBA Team has concluded, however, that additional interviews would not substantially modify the conclusions reached in this evaluation.

NFS Findings:

In the opinion of the SCUBA Team, the NFS Root Cause Team appointed to perform this investigation was competent and well qualified. The timeline established by the team was very detailed and captured all of the relevant technical information. The NFS Root Cause Team utilized the TapRoot methodology. It did not consider factors such as management ineffectiveness, management errors, organizational deficiencies, or programmatic deficiencies. Several of the proposed corrective actions recommended evaluations and benchmarking but did not include implementation of corrective actions based on these evaluations/benchmarking activities.

The NFS Root Cause Team identified eight causal factors, and four lessons learned for this event. The proposed corrective actions (CA's) are noted under each identified causal factor. The NFS Root Cause Team identified four additional "Lessons Learned" associated with this loss event; however, no corrective actions were assigned by NFS to address the "Lessons Learned" portion of the RCA:

- Causal Factors 1: UF6 in cylinders were subjected to 30-60 years of radiolytic decomposition (Hazards Analysis Not Implemented)
  - CA: Replace braided PTFE hoses on sublimation stations with solid metal tube, e.g., Cu, Monel
  - CA: Replace PTFE gaskets, o-rings, seats, packing, etc. with metal components
  - CA: Develop/install mineral trap to burp and capture F2/ClF3. Increase temperature sensing and ability to replace the trapping solids
  - CA: Install globe-style bellows metering valves
  - CA: Consider adequacy of Hypalon glovebox gloves as the only personal protection equipment (PPE) protecting personnel from fluorine gas dermal exposure
  - CA: Modify procedure for fluorine venting to require inner heating chamber front door to be closed
  - CA: The presence of fluorine and chlorine trifluoride in UF6 cylinders should be analyzed for safety concerns
- Causal Factor 2: Some cylinders were stored without dust caps (No Standards, Policies, or Administrative Controls)
  - CA: Develop and formalize inspection criteria for caps, covers, and valves. Foreign matter is of particular importance

  - CA: Develop and formalize controlled opening of UF6 cylinder valves. Valves should be opened and closed briefly before proceeding to sublimation. Replace ratchet wrench with solid one for valve positioning.
  - CA: Develop and formalize parts cleaning/handling policy. This is to include parts delivered "cleaned for O2 service" and those cleaned on-site. Policy should include the "how" and the documentation/storage requirements.
  - Identify which sublimation system parts are disposable and develop/formalize the replacement policy (i.e., what to replace each run)
  - CA: Develop and formalize a purge and cleanout procedure using Ar or N2. Purge to be used when system is not in use, and the purge/cleanout would occur after the cylinder is connected.
- Causal Factor 3: Highly reactive CLF3 was commonly used to clear plugs in UF6 cylinders (Hazards Analysis Not Implemented)
  - CA: See corrective actions under Causal Factor 1
- Causal Factor 4: DOE Certification was accepted without content verification for legacy orphan material and with minimal characterization information (Standards, Policies, Administrative Controls Not Strict Enough)
  - CA: Develop policy and formalize contractual language requiring notification of hazards for materials being sent to NFS. If there is a dispute, require a sample for analysis by NFS or independent lab. Also, consider enhancing the NFS-GH-920 "Customer Material Certification Form" to require the shipper to describe any potential hazardous substances.
  - CA: 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.
- Causal Factor 5: 5 A/B UF6 cylinders were not tested; their contents were not sampled (Standards, Policies, Administrative Controls Not Strict Enough)
  - CA: See corrective actions under Causal Factor 4
- Causal Factor 6: Precursor event -- water in a flex hose reacted with process gas resulting in hose failure -- PIRCS 20584 (Training/Understanding Not Implemented)
  - CA: Implement or strengthen Human Performance tool "Self-Check" (STAR) by reinforcing a Questioning Attitude. Develop lesson plan and train.
- Causal Factor 7: Precursor event (note: the day before the loss event) – a glowing ember observed in argon supply hose, resulting in damage to the PFA Teflon – PIRCS 21999 (Training/Understanding Not Implemented)
  - CA: See corrective action under Causal Factor 6
- Causal Factor 8: Hose failed in four locations, multiple kinks were located at the failure points (Training/Understanding Not Implemented)
  - CA: See corrective action under Causal Factor 6
- Lessons Learned 1: There appeared to be time/schedule pressure to operate due to time lost earlier in the week from failed valve checks and the glowing ember in the PFA hose. A questioning attitude in regard to the precursor events might have prevented or mitigated the fire incident.
- Lessons Learned 2: Some first-hand knowledge on UF6 cylinders from both DOE and NFS was available, but not fully used (e.g., solid metal tubing is preferred over a braided hose with PTFE internals)

- Lessons Learned 3: Sample size UF6 cylinders have a vent-hole in the Hoke-brand valves, which could result in a pressurized F2 release pathway resulting in injury of personnel
- Lessons Learned 4: From NASA Public Lessons Learned Entry 0686 – Generally failures in systems using fluorine are caused by: (1) improper choice of materials and/or system components; (2) improper fabrication and assembly practices; and (3) improper system preparation and operating procedures, resulting in the presence of contaminants.

NFS also performed a SCIR of the identified causal factors/root causes. The SCIR was comprehensive and well documented. The SCIR Team determined that three Safety Culture Components (SCC) caused/significantly contributed to the loss event:

- Decision Making
  - Assumptions used in decision making were non-conservative
    - Inadequate investigation of a small fire (precursor event) and a decision to proceed without full understanding of the causes
    - Inadequate investigation of a failed PTFE hose (precursor event) and a decision to proceed with operations without fully understanding causes.
    - Adequate characterization of all materials to be processed was not performed
    - The sublimation station CO2 fire extinguishing system was not designated an item relied on for safety (IROFS)
    - The project was behind schedule and over cost. Production pressures inappropriately influenced the decision to resume operations after the precursor event without an adequate understanding of the causes of the precursor events.
  - A management review of the causes of the precursor events was not performed before the resumption of normal operations. Both precursor events resulted in plant damage.
- Accountability
  - Behaviors and outcomes that reflect safety as an overriding priority were compromised
  - Management did not do enough to reinforce safety standards
  - Management oversight of work activities was insufficient to prevent the operation of the CDL process outside of the approved safety basis. Management allowed
    - Production pressures negatively influenced decision making
    - A lack of a questioning attitude
    - Inadequate design of equipment
    - Inadequate procedures/engineering to address dust/debris in valves
    - Inadequate investigation into the causes of two precursor events
- Work Control
  - The facility was not designed to address the spectrum of operations
    - The facility was not designed to process ClF3 that could be present in cylinders containing UF6
    - The operating procedure did not address dust/debris in valves
    - Equipment installed was not rated for system temperature (PIRCS 20584)
    - Kinking of installed hoses was accepted

- The introduction of fiberglass into the system was not fully evaluated
- The NFS Operational Readiness Review (ORR) process and independent reviews did not identify the design discrepancies
- The knowledge that ClF3 could be present in cylinders containing UF6 was not recognized before processing occurred and was not factored into the design of the facility. DOE Oak Ridge UF6 experts who identified the potential for ClF3 were only consulted to assist with the post-incident investigation.

The NFS SCIR Team viewed resources, Operating Experience, Work Practices, Continuous Learning Environment, Organizational Change Management, Corrective Action Program and Safety Policies as secondary/minor contributors to the loss event.

The SCIR Team recommended a number of corrective actions over-and-above those recommended by the NFS Root Cause Analysis Team. Additional corrective actions recommended by the SCIR Team were as follows:

- Decision Making
  - Investigate the causes of why the NFS review processes (Safety and Safeguards Review Council (SSRC), Corrective Action Review Board (CARB), ORR, basic safety culture, etc.) did not identify the mistakes that led to the event. Review causes against actions NFS is taking to strengthen the design engineering process
  - Investigate the decision making that led to the non-conservative decision to restart operations in spite of precursor events, and evaluate if the identified weaknesses would be prevented from recurring with the additional actions NFS is taking to improve decision making.
  - Develop criteria for when a management review (such as an Effectiveness Review or CARB review) should be performed as a prerequisite for the resumption of normal operations, and include such guidance in NFS Corrective Action Program documents.
  - Evaluate designating the sublimation station CO2 extinguishing system as an IROFS
  - Evaluate the acceptability of the use of fiberglass in the system
- Accountability
  - Evaluate the need for an accountability review for the managers involved
- Work Control
  - Investigate the causes of the design engineering mistakes and why the NFS review processes (SSRC, CARB, ORR, basic safety culture, etc.) did not identify the mistakes. Review these causes against the actions NFS is taking to strengthen the design engineering process
  - Formally document design lessons learned in applicable engineering design guides

The corrective actions recommended by the NFS SCIR Team have been entered into PIRCS.

The SCIR process has recently been established as a requirement in both NFS-GH-918 and NFS-GH-922; however, guidance for the performance of an SCIR is under development and not yet

available. The requirement is to conduct SCIR evaluations for Full Team Root Cause Investigations or when specified by the PIRCS Problem Review Group Chairman during problem screening. The CARB will review and approve SCIRs when performed.

An Extent of Cause Review was also performed by NFS to examine the root causes identified by the TapRoot investigation, to assess these root causes with regard to their impact across other plant disciplines and organizations, and to determine if identified corrective actions would prevent the occurrence of similar or related events. The review focused on processes, equipment and human performance; and identified five additional corrective actions:

- Evaluate the engineering training and qualification process, including benchmarking against similar processes associated with other facilities, and implement any necessary changes
- The Engineering design procedures should be revised to include a more comprehensive hazard identification review. A checklist approach is suggested and draft copies of the approach and checklists are available on the NFS Engineering website
- The elements of NFS-TS-009, Configuration Management of Process Change, which require material characterization of input and output streams, should be incorporated into Engineering design procedures and should address intermediate products and waste streams as well.
- Revise NFS-GH-920 to require a re-evaluation of radioactive materials originally received under the caveat "approved for storage only," prior to further handling or processing.
- Radioactive materials currently in storage, and proposed for future processing, that may have been received under circumstances similar to the UF6 involved in the CDL Fire Event, i.e., materials received without validation of the shipper certification, should be evaluated for characterization of physical and chemical attributes, and a determination made with regard to the extent of the characterization for these streams, prior to processing. This includes, but may not be limited to, any remaining TVA, RFS, 12 Metric Ton, or ISPRA materials in inventory.

Extent of Condition issues related to safety culture or management deficiencies were evaluated as part of the SCIR.

SCUBA Team Findings:

The SCUBA Team's collective review of the event timeline, root cause analysis, SCIR, SSRC review, documented corrective actions, and personnel interviews has lead it to identify the following additional recommended Areas for Improvement:

1. AFI-CS/CDL-01: There is a need to improve the NFS investigative processes.

   A. The NFS RCA methodology does not systematically consider:
   - Management Ineffectiveness/Management Errors, e.g.
     Unawareness
     Strategic Planning
     Management Expectations

Oversight and Control
Technology Acquisition
People Cultivation

- Organizational and Programmatic Deficiencies, e.g.
  Programmatic
  Organizational
  Program-to-Program Interface
  Organization-to-Organization Interface
  Organization-to Program Interface

It is recommended that NFS augment their existing RCA methodology (TapRoot) to assure management, organizational, and programmatic issues are identified and addressed. An example of an appropriate methodology is that which has been developed by Performance Improvement International (PII) – an RCA methodology that also incorporates human performance principles.

B. Extent of Condition Issues related to the above areas

It is recognized that Extent of Condition (EOC) reviews are performed by NFS, but these are focused on plant processes, equipment, and human performance in order to prevent the occurrence of similar/related events in other plant disciplines and\or organizations. These EOC reviews do not attempt to identify systematic management issues/problems.

C. Safety Culture Implications Reviews

It is also recognized that NFS is now performing However, there is no formal guidance for the SCIR process, and the SCIR documents reviewed to date have not addressed management issues/problems in a consistent manner.

2. AFI-CS/CDL-02: Area for Improvement (AFI): There is a need for augmented corrective actions to address the safety culture implications associated with this loss.

The NFS SCIR determined that the major contributing SCCs were Decision Making, Accountability, and Work Control. The corrective actions identified by the SCIR team were designed to have a plant-wide impact. The SCUBA Team concurs with the SCIR analysis, but would augment and/or emphasize the following SCIR Actions:

- Decision Making:
  - Decision making was consistently non-conservative
  - Production pressures (preparation for inventory) negatively influenced organizational priorities in that support for new projects compromised fundamental safety/regulatory related activities.
- Resources: There were insufficient resources, resource demands from new projects, and no apparent plan to manage this situation.
- Work Practices (A significant number of errors of judgment were made by members of the Engineering and Safety and Regulatory staffs:

  - There is little/no evidence to demonstrate that error prevention techniques (e.g., peer checks, peer verifications, contingency planning) were used commensurate with the risk of the assigned tasks.
  - The organization proceeded with the first-time processing of new materials without adequate consideration of consequences (proceeding in the face of uncertainty), and without adequate management guidance.
- Self- and Independent Assessments: The Self-Assessment Program did not identify any of the cultural issues in advance of the loss event.
- Operating Experience: Previous operating experience was not recognized in that:
  - Lack of a questioning attitude (non-conservative decision making), lack of formality and a systematic approach, lack of ownership and accountability, and lack of management oversight were identified in SCUBA Team's ISCA as "overarching issues" that affected multiple SCCs. These overarching issues were not effectively addressed.
  - External UF6 operating experience was not leveraged
  - Internal UF6 operating experience was not leveraged
- Accountability:
  - Management oversight and control was lacking throughout the sequence of events leading up to the loss event, including implementation of previously committed corrective actions (NFS-TS-009).
  - Single-point management accountability has not been effectively implemented at NFS.
- Safety Policies: There was insufficient communication and reinforcement of management expectations and standards to prevent the cultural deficiencies that led to the loss event.

The SCUBA Team believes that each of the SCCs discussed above played a significant role in contributing to this loss event. Furthermore, each of them represents an extent of condition issue that could lead to and/or enable future loss events if effective corrective action is not taken.

ATTACHMENT G-4
PSL PHASE 4 PROJECT

Introduction

Case Studies may be conducted by the SCUBA Team in order to evaluate the adequacy of the NFS response to a significant problem or event that occurs while the 2009/2010 Independent Safety Culture Assessment (ISCA) is in progress. Case Studies will place particular emphasis on the manner in which NFS identifies and addresses any potential safety culture implications associated with the problem or event. As such, Case Studies are intended to obtain information related to the NFS safety culture that will augment information obtained through other sources of assessment input (i.e., the workforce safety culture survey numerical results, the workforce safety culture survey write-in comments, personnel interviews, behavioral observations, and documentation reviews).

The genesis of the PSL Phase 4 Case Study was the recognition of numerous pin and ink procedural changes and tubing weld failures. The follow-up effort in determining the circumstances surrounding these issues uncovered additional events pertinent to safety culture. The SCUBA Team subsequently decided to make the PSL Phase 4 Project a case study. Every effort was made to follow significant events as they occurred. As evolution of the study proceeded, it became apparent evaluation of historical events was appropriate. The SCUBA Team evaluation began with the design phase of the project and concluded with the evolution to open the unit for cleaning during the startup and operation phase.

Executive Summary:

Execution of the PSL Phase 4 Project has evolved from concept to initial operation. NFS has considered the overall business results from the PSL Phase 4 Project to be a success but it is the SCUBA Team's opinion that this judgment is based solely upon production output and/or demonstrated capability. A specific incident or action during the evolution of the project has not resulted in a regulatory reportable event or issue. A study of various phases and events concerning the project provide insight to the behaviors, processes, and type of decisions which exist within the organization. This study does provide feedback as to the implications for achieving an excellent safety culture.

The SCUBA Team's evaluation of the PSL Phase 4 Project concluded that there were eight major Areas for Improvement (AFIs) that merit corrective action. The pertinent Safety Culture Component (SCC) is noted after each:

- AFI-CS/PSL-01: The design process does not provide the safeguards needed to ensure that configuration management conforms to all necessary requirements i.e. design documentation. Code compliance requirements need to be blended into the design basis, documented, reviewed, and approved. The project management process and or the change management processes should be modified to require documentation of decisions concerning the design basis, any modifications, the reasoning for the decisions/modifications, and any necessary considerations or actions as a result. (CM)

- AFI-CS/PSL-02: The evaluations to resolve design issues and the resolutions are not rigorously conducted and documented as noted above; therefore, the specific reasoning and decisions for the PSL Phase 4 Project design are not currently documented. These should be re-evaluated, any appropriate measures implemented, and the design basis documented. The extent of condition for units of similar design and function should also be evaluated and documented. (CM)
- AFI-CS/PSL-03: The ISA process considered only static failure mechanisms and did not explore dynamic or all potential hazards for chemical processes in a rigorous manner. The Integrated Safety Analysis (ISA) process should be evaluated and amended to ensure adequate consideration is given to the identification and mitigation of all potential hazards (nuclear, chemical, and personal). (SP)
- AFI-CS/PSL-04: The observed approval process for changes is largely focused at accomplishing the intended result of the evolution. The Change Control Board (CCB) and the Safety and Safeguards Review Council (SSRC) are the two committees primarily involved in the approval process for change, Letters of Authorization (LOA), work requests (WR), procedural changes, projects, etc. The goal is to manage and accomplish change in an efficient, safe, and compliant manner. The approvals are normally based upon individual reviews before calling a meeting to approve the particular issue. It is recommended the approval processes for change be amended to include a collegial challenging discussion and defense of the safety basis and the mitigating actions for any change by subject matter experts. (DM)
- AFI-CS/PSL-05: The Root Cause Analysis (RCA) methodology employed by NFS needs to be modified to include management effectiveness and management errors, as well as organizational/programmatic deficiencies. It also needs to consider extent of condition from both a management effectiveness/management error and safety culture perspective. (The Safety Culture Implication Review (SCIR) is a good start but has not, as yet, been formalized.) Implementation of a RCA grading system would better define organizational expectations for RCA content and quality level. This AFI is also identified in other case studies. (CAP)
- AFI-CS/PSL-06: Field testing and demonstrated proficiency should be a basic part of any project prior to declaring operational readiness. The decision to not defer implementation of PSL Phase 4 pending improved training and equipment response was non-conservative. Although startup and process flow did not occur, the act of accepting a substance for which adequate emergency response measures had not been demonstrated did not reflect conservative decision making. (WP)
- AFI-CS/PSL-07: A number of SCC weaknesses/failures contributed to the issues identified in this case study. Components requiring attention include Decision Making, Work Practices, Corrective Action Program, Operating Experience, and Accountability. The most important components requiring attention are Decision Making, Work Practices and Accountability as a lack of attention to detail, a lack of questioning attitude, and management oversight and control were the major contributors to this study.
- AFI-CS/PSL-08: The organization did not recognize deficiencies until Case Study talking points were issued to management. This is an oversight in the internal processes and behaviors to identify issues. The station has failed to concentrate these weaknesses/failures into an overarching analysis along the lines of SCUBA Team's case study despite regulatory intervention that challenged the station to improve their

performance in situations such as these and resulted in the issuance of the Confirmatory Action Letter in January 2010.

Background Information

The SCUBA case study for the PSL Phase 4 Project included multiple phases (design, checkout, startup and operation) and events. The sequence of events was as follows:

- Prior to January 2009 a reactor system design was obtained from a vendor. The system design included a relief path with a vessel design pressure of atmospheric pressure.
- The decisions to eliminate the vent path and increase the vessel design pressure to 50 psig were finalized in January 2009.
- Design Tollgate was completed on April 29, 2009: The design basis is firm, Integrated Safety Analysis (ISA) document available with design requirements. ISA remains open until final ISA approval, August 31, 2009.
- ISA Draft "in waiting" (99.9% complete per ISA Engineer) is completed and the Design Tollgate received final approval on July 2, 2009. The documents provided for this Tollgate consist primarily of checklist of items to be completed.
- ISA final approval on August 31, 2009.
- Training started on September 03, 2009.
- An operator entered PIRCS 20807, "Procedure difficulty, procedure unclear" and cited a number of issues on September 10, 2009.
- Construction tubing tests were complete by Lauren on August 06, 2009. Test documentation indicates all systems passed.
- Operators discovered a tubing leak while performing a training evolution on September 10, 2009 (PIRCS 20789)
- Subsequent tests by a supervisor identified another leak (weld failure) on September 13, 2009. Maintenance was approached but could not perform the repairs.
- Lauren was advised on September 14, 2009. The weld failures were confirmed, repaired, and re-tested via the previous test method. The systems were then returned to Operations.
- A hazardous gas release drill was conducted on August 19, 2009. The effort was critiqued and documented in PIRCS (Investigation P9715). "Safety Management did not accept the performance and did not pass the drill." An action plan was developed.
- Additional drills (Scene Response on August 25, 2009 and Emergency Control Center on August 26, 2009) were conducted. The improvements implemented from the previous drill worked well; however, additional work was indicated for the Fire Brigade's Standard Operating Guideline (SOG) and the hazardous gas monitoring procedure. The critique was documented.
- A walk-through response evolution was conducted on September 7, 2009 (mid-watch startup). The Navy Fuels Supervisor opted to excuse Area 800 from participating due to production requirements and advised the Emergency Preparedness Manager. The drill revealed some problems with sensing equipment and emergency response supplies.
- A walk-through response was conducted on September 8, 2009. This drill occurred on day-shift and was more heavily attended/monitored. The same problems with sensing equipment and emergency response supplies were noted but, during this critique, the Plant Superintendent recommended that the PSL Phase 4 Project be deferred pending

improvement/remediation. The VP, Safety and Regulatory Affairs was called to the critique and agreed with this recommendation. Subsequently, the SCUBA Team learned that product delivery was not delayed, but implementation was.

- Delivery of hazardous gas was approved and arrived on September 11, 2009. The gas cylinders were not to be hooked-up.
- Training of the Fire Brigade for the new SOG (September 14, 2009) and for lessons learned (September 21, 2009) were scheduled and conducted.
- A fire alarm (false alarm) occurred on September 19, 2009 at the hazardous gas storage building during an off-shift. Confusion regarding responsibility of Operations for hazardous gas alarms, response, and how to utilize the Erwin Fire Department with a limited number of NFS staff available was observed. Startup was delayed until additional guidance could be developed and implemented. The event critique was documented.
- A hazardous gas release alarm (false alarm) and evacuation occurred on September 25, 2009. The previous improvements proved to be effective; however, some additional items were identified: additional guidance for the Security guards, problems clearing an electronic alarm, Nextel communication issue, and issues with the badge reader. The event critique was documented.
- The memorandum approving startup was issued on September 30, 2009.
- The initial run was begun (3rd shift, October 01, 2009) and continued without incident until the following afternoon (2nd shift) when the process was shutdown normally for the weekend.
- The process was re-started and shutdown on October 07, 2009 due to plugging; PIRCS 21329 pertains.
- An LOA and the WR were approved on October 08, 2009 to apply additional heat to potentially remove the blockage.
- Execution of the LOA and WR were conducted on October 08, 2009 (2nd shift) without a successful conclusion and the system design pressure was exceeded. No entry was made into PIRCS.
- A Special Work Permit (SWP) was approved and executed to open the system and physically remove the restriction on October 13, 3009 without incident.
- As of October 21, 2009 the unit remained shut down.

Methodology:

A case study plan was developed and received approval by the SCUBA Team Leader. The case study team utilized a combination of documentation reviews (e.g., design and checkout documentation, PIRCS entries, ISA analysis, LOAs, and WRs), interviews (e.g., personnel who were a party to the ongoing events), and observations (e.g., SSRC and CCB meetings, discussions, and field observations) to conduct this case study.

SCUBA Team Investigation Results:

Design Phase:

The reactor system for this project is to process a hazardous gaseous material. A decision to eliminate the relief/vent path in the originally proposed design and increase the system design

pressure from atmospheric pressure to 50 psig was undertaken. It cannot be exactly determined what the design considerations and the mediating changes were based upon but, without further justification, it is a significant departure from code practices. Documentation of any evaluations, considerations, and/or conclusions was not developed. It is purported that several discussions considering design alternatives did occur. Reasons cited for the final design were the unacceptability of potentially releasing a hazardous gas into the environment, unacceptability of a hazardous gas mixture in the vent system due to potential reactivity, and the complexity of dealing with a vent/relief path. The ISA process for this project addressed static scenarios only and did not address dynamic situations that can occur with chemical processes. The ISA did not consider all scenarios for the potential of over-pressurization, and did not take into account the potential for a vessel breach in the absence of a relief path. The ISA study did include considerations for the release of one gas cylinder. The SCUBA Team concluded the design cannot be considered conservative without clear identification of all the potential hazards and the resulting mitigating actions understood and documented. The undesirability of a relief/vent path is understood; however, it is not clear what considerations were undertaken and the technical design basis for the elimination of a safety feature such as the relief/vent path.

It can be debated that mitigating action such a substantial increase in design pressure would be conservative in nature considering the decision to eliminate the relief/vent path. In the final evaluation, this is considered to be a moot point in the absence of evidence to document reasoning or the basis for the decision.

The extent of condition for the above design issues has not been evaluated; however, similar issues appear to be present in processing units of similar function.

Operator Training Phase:

Training was initiated with procedures which required numerous pen and ink changes. The operators were concerned with the quality of the information requiring a training and qualification (T&Q) signoff and entered an item into PIRCS. It should be noted that all pen-and-ink procedural changes were incorporated prior to process start-up.

The following summarizes the findings:

- Interviews with a cross section of individuals (managers, engineers, and operators) indicate reasons for the poor quality procedures include: first generation process, final design of ventilation system not complete, project schedule demands, Internally Authorized Changes not fully released, and design issues with gas detectors. Any significant project has schedule conflicts and pressures; however, schedules should consider appropriate time slots for resolution of design and procedural development issues prior to operator training and qualification. Production and/or schedule pressures should not detract from the quality of training and the appropriate schedule changes should be considered to not compromise a quality result. An opportunity to obtain operator input in the design and procedural development phases of the project could enhance the design and operators buy-in.
- The response to the PIRCS entry did not address the concern other than to review the process for procedure change and indicate changes were the responsibility of the initiator.

It did acknowledge some lack of diligence by all those involved in the approval process. The effectiveness of the Corrective Action Program is compromised with replies which do not effectively address the concern or issue, and management must be held accountable for the effectiveness of approval processes.

Construction / Turnover Phase:

The requirements for contractor checks and quality control were minimal; however, four construction tubing tests were completed (one each for four systems) by Lauren. Test documentation indicates all passed a test that is variable within code (25 psig for 10 minutes and then 55 psig. for one hour). Instead of conducting a safer and more effective hydrostatic test with water as the test medium, the undocumented decision was made to use air as the medium for pressure testing at reduced pressure. This variance is allowed by code if justified by engineering but there is no documentation to justify this relaxation and subsequent events would indicate that it would be impossible to defend such a justification. No quality checks of welds were required. Contractors (3) were trained in the Swagelok procedure and a Swagelok weld machine was acquired to complete the task. The systems were turned over to NFS Operations. Subsequently it was determined from a training exercise and discussed in an Operations Readiness Review meeting that welds in the tubing system had failed. Concerns with the system and the readiness of Operations to proceed with the system were purportedly expressed but not documented. Other tests in addition to the tubing failure issue required attention and a supervisor was given permission to proceed with the testing without benefit of a formally revised test procedure. Documentation of the meeting, discussions, or decisions is not available. The concern expressed was appropriate; however, documentation of the concerns with a plan to deal with the deficiencies would have enhanced this result. Additional failures were eventually identified and the contractor repaired and re-tested the systems with the identical original test method. The repairs and test were accepted as sufficient. This evolution failed to recognize the existing tests did not adequately demonstrate the integrity of the tubing systems. The original test was successful and weld failures subsequently occurred. Passing a second test with identical requirements provides little assurance the tubing systems could not fail in the future. This unsatisfactory situation still exists today without any plans for suspension of operations pending code testing despite regulatory intervention that challenged the station to improve their performance in situations such as these and resulted in the issuance of the Confirmatory Action Letter in January 2010.

There is inadequate documentation and procedural control of the welding procedures in the field. It is common industry practice to provide specific weld procedures, test methods, and documentation for welds, especially for critical and or hazardous services. The station does not require these practices and has been committed to a non-rigorous process for some time. It is understood an improvement initiative is underway to increase oversight and control of contractor activities as well as enhanced safety and quality control requirements. This effort should be continued.

The test pressure was specified at 10% greater than design pressure. This is considered to be non-conservative for this service by the SCUBA Team. It is acknowledged that ASME codes allow a pneumatic leak test at 110% of design pressure; however, it also states under hydraulic leak tests that the fluid shall be water unless circumstances prohibit the use and that hydraulic

tests are specified to be conducted at 150% of design pressure. SCUBA Team members are not ASME code experts. It is questionable from interpretation of the available information as to which method is the preferred test. The conservative decision in the opinion of the SCUBA Team is a hydraulic test at 150% of design pressure. Any documentation or information as to reasoning for the pneumatic test as opposed to an hydraulic test is not available.

Drill Phase:

A number of drills and exercises were completed as identified in the timeline. These events overall were well critiqued, documented and appropriate actions initiated. However, final corrective actions were not completed until after product delivery and process implementation was only delayed by the active insistence of the Plant Superintendent following the final drill after a month of evaluating readiness. The Erwin Fire Department was still not adequately trained by the time of the first product delivery and this hampered their response to an actual (false) alarm. The drill evolution did point out behaviors with safety culture implications. The following safety culture issues were noted:

- During a SCUBA Team observation, a supervisor was evidently surprised by the imposition of a drill at the start of the shift, and cited the need to exempt the Area from the drill although the Area is the specific location of hazardous gas piping. The Emergency Preparedness Manager was over-ridden on the mid-watch by the Fuel Supervisor who refused to allow one area to participate since it would delay production. The decision was upheld to exempt the area from the station exercise. This event and the decision did not surface during the critique or in the documentation. The demonstrated behavior reinforces the perception of production having priority over safety.
- The decision to delay implementation of PSL Phase 4 was made only after the Plant Superintendent insisted that the VP, Safety and Regulatory attend the critique and acknowledge the inadequacy of site preparation.
- The decision to allow the delivery of hazardous gas on September 09, 2009 prior to completion of all actions identified as the result of drill critiques was non-conservative even though the gas cylinders were not to be hooked-up.
- The training process was not effectively used to ensure that lessons learned were effectively applied prior to taking those actions for which training was meant to ensure acceptable performance. As late as three days before beginning a new process, the station was still not well enough trained to handle full-speed drills and walk-throughs were still deemed to be unsatisfactory yet project progress continued until direct intervention by the Plant Superintendent. It is reasonable to extrapolate this behavior to presume that this (and other) Operational Readiness Review(s) do not include a provision for a demonstration of adequate performance as verified by training before proceeding.

Initial Startup and Plugging Phase:

Shortly after the initial start-up and operation the process was shutdown due to plugging problems. A meeting was held with Process Engineering Management, the Project Engineer, Development Engineers, Operations Management, and Technology Senior Management to review the situation and formulate a plan of action. The plug was believed to be in the inlet tubing. The recommended approach was to apply heat to the inlet tubing via new heat tape and a

heat gun. An LOA was to be initiated. No documentation of the meeting is available, and purportedly no discussion of potential hazards ensued. It was subsequently decided that heat to the reaction vessel would be applied in a stepwise manner. This was a plugged unit without a vent/relief path. The work was to be accomplished via a WR. The LOA provided only instructions to accomplish the desired task and addressed the issues of how to eliminate the blockage (i.e., apply additional heat via new heat tape, heat gun, and an alteration of the control system). In-depth discussions of potential hazards for the LOA did not occur (i.e., over-pressurization potential). The WR did receive written instructions from the ISA engineer considering the scenarios in the original ISA. It indicated in the event hazardous gas was released, mitigation was provided via the design controls. Industrial Safety (IS) provided no written instructions or considerations, oral input only. IS requirements were documented on the WR and respirators were not required. Any discussion of potential hazards by all parties did not occur and approvals were individually based. The potential hazard of system over-pressurization was not recognized. The LOA and WR received all approvals one day after the meeting to determine a course of action. A pre-job brief was conducted and execution of the approved changes was completed. The evolution did not relieve the plug and the system design pressure was exceeded. No incident or issued arose; however, the pressure was reported to have reached 77 psig (observed on the control panel), exceeding the design pressure. A review of PIRCS entries for 08 thru 09 October did not indicate a PIRCS entry for the pressure excursion. Recognition of an over-pressurization or a meeting to review the evolution and results is not known to have occurred. A SWP was then initiated and executed to open the system and allow the unit to be cleaned per the procedure. Industrial Safety provided additional requirements for the SWP (Radiation Protection Technician present, additional ventilation by an elephant snout, SCBA, Saranex suit, etc.). A Pre-job brief was conducted. The evolution was completed without incident and the blockage removed. Additional actions to remove and clean the unit were executed via the SOP.

A review of all phases of this case study indicates a number of attributes of concern:

- Inadequate application of the Corrective Action Program (CAP) to properly identify and resolve deficiencies as the result of a series of non-conservative decisions and incorrect actions. Furthermore, it appears that NFS failed to respond when problems were identified by an external agency (SCUBA Team) that was not the NRC.
- Lack of management oversight and control.
- Non-conservative decision making.
- Failure of change approval process and persistent use of LOA that have been criticized in the last SCUBA report and recently linked to serious errors in the field.
- Deficient work practices – lack of formality and discipline, lack of potential hazard recognition, no PIRCS entry, lack of recognition of consequences for test failure.
- Deficient work control – use of work instructions written with such leeway that it is possible to make autonomous decisions in the face of uncertainty without violating written guidance. The lack of supervisory oversight eliminates a vital point of control in the execution of work.
- Production pressure to execute the desired evolution (i.e., focus on details of execution versus. safety hazards).
- CAP inefficiencies (i.e., failure to recognize the potential impact of procedure difficulties).

- Accountability of management and engineers for work practices and adherence to company directives and policies.

SCUBA Root Cause Analysis

The SCUBA Team case study team completed root cause evaluations for this case study. Three root cause methodologies were evaluated in determining causes associates with the PSL Phase 4 Case Study. The methodology of Performance Improvement International proved to be most telling in determining factors beyond the technical issues of other methodologies. Out of the many attributed weaknesses identified in the evaluation, Management Oversight and Control, Accountability, and Work Practices across engineering functions (Project and Process Engineering) are in need of improvement initiatives.

The following summarizes the output from the SCUBS evaluation for the PSL Phase 4 Project:

- Executive Management Failure Mode Chart – Management Ineffectiveness or Errors
  - Strategic Planning Errors
    - Inadequate assessment of challenges
      1. Inadequate potential hazard analysis
      2. Inadequate sensitivity to change
  - Management Expectation Errors
    - Inconsistent Expectations
      1. Inadequate oversight
      2. Inadequate implementation process
    - Confusing Expectations
      1. To many expectations
      2. Inadequate communication of expectations
      3. Inadequate reinforcement
    - Expectation Violations
      1. Inadequate enforcement/motivation
      2. Poor communication of expectations
    - Inadequate Accountability System
      1. Poor implementation
      2. Inadequate design of system
  - Control Errors
    - Inadequate Actuation System
      1. Inadequate accountability
      2. Inadequate tracking system for tracking
    - Inadequate Scope of Control
      1. Control not covering right parameters
- Organizational and Programmatic Diagnostic Chart – Organizational and Programmatic Deficiencies
  - Organization to Program Interface Deficiencies
    - Inadequate Program Monitoring or Management
    - Lack of Program Evaluation Process
  - Programmatic Deficiencies
    - Insufficient Detail

1. Inadequate program design
2. Inadequate feedback from the field force

- Inadequate Scope
- Inadequate Self Verification Process

- Organizational Breakdowns
  - Inadequate Attention to Emerging Problems
    1. Lack of self assessment program
    2. Inadequate prioritization of work
  - Inadequate Work Prioritization
    1. Lack of work prioritization process
    2. Lack of understanding of overall mission
  - Inadequate Job Skills, Work Practices or Decision Making (see the Human Error/ Inappropriate Action Chart below)

- Human error/ Inappropriate Action Chart – Human Error or Inappropriate Actions
  - Inattention to detail
    - Unawareness
      1. Inadequate work practice
    - Perceived Pressure to Complete Task
  - Misjudgment
    - Habit Intrusion – performing task mainly based on past experience without fully understanding current situation
      1. Inadequate work practice
    - Mindset
      1. Inadequate supervisory methods
      2. Inadequate work practice
    - Wrong assumptions
    - Lack of Information Validation or Verification
  - Committed Actions Not Carried Out
    - Shortcuts Evoked
      1. Inadequate work practice
  - Inadequate Skills or Knowledge
    - Tunnel Vision
      1. Inadequate Work Practice
  - Inadequate Mental State to Complete to Complete Task
    - Overconfidence
      1. Inadequate Work Practice

NFS Findings

NFS Root Cause Analysis

The SCUBA Team issued Case Study Talking Points to inform NFS management of preliminary findings on December 28, 2009. Issues surrounding this case study had not previously been recognized as a concern by NFS personnel. A TapRoot Investigation, PSL IV Vessel Over-Pressurization, was performed on January 6, 2010.

The Root Cause Team appointed to perform this investigation was competent and well qualified. The team consisted of representatives from Engineering, Quality Assurance, and Nuclear Criticality safety. The Root Cause Team utilized the TapRoot methodology. The timeline established by the team began when the plugging issue was identified and ended when the unit was opened for venting. The timeline was accurate. It did not span the entire period of this case study; however, it did include the following statements:

- The piping design was compliant with process industry standard ASME B31.3.
- Testing of the piping and piping components was performed per ASME B31.3 for Category "D" fluids.
- A bypass or relief path for the vessel was considered during the design, but was not included because of its potentially adding chemical explosion hazards.
- Documentation of design considerations is an improvement opportunity. This is being addressed through a project execution improvement team.
- Documentation of design parameters is an improvement opportunity.

The validity of these engineering judgments needs to be reviewed by NFS in light of the subsequent chain of events.

The RCA did not consider factors such as management ineffectiveness, management errors, organizational deficiencies, or programmatic deficiencies. It also did not consider safety culture implications. Several of the proposed corrective actions recommended evaluations, but did not include implementation of corrective actions based on these evaluation activities. The investigation references the requirement of management accountability for adherence to Standards, Policies or Administrative Controls (SPAC). The effectiveness of such corrective actions has not been a strong point for the organization historically.

The NFS Root Cause Team identified five causal factors (CF) for this event. The proposed corrective actions are noted under each causal factor:

- CF1: LOA Technical Basis stated "A clog was formed in the inlet..." The plug was later found to be in the outlet.
  - CA: Evaluate the need for additional instrumentation, safe venting options or changes to troubleshooting practices.
- CF2: LOA Technical Basis stated "...unit is currently loaded and awaiting the approval of this LOA to provide a means to clear the tubing and allow unit to be unloaded" (Production Pressure)
  - CA: Address cultural issues that allow confusion to exist regarding the importance of safety over production.
- CF3: The LOA technical basis lacked documentation as to why application of heat was acceptable, what impact the heat application may have on the system, system pressure, etc.
  - CA: At the senior management level, evaluate methods to enforce accountability and responsibility at all levels of professional staff and management.
  - CA: Improvements that are needed in the quality of technical bases are effectively covered by corrective actions documented in PIRCS 21448, Investigation I10071 related to the Bowl Wash Cleaning Station.

- CF4: Technical Basis states that the plug resulted in pressure of 45 psig. The LOA does not mention use of jumper to disable high pressure switch.
  - CA: same CAs as for CF3.
- CF5: No safety documentation (on the LOA or Work Request) prompting the pressure switch to be monitored.
  - CA: same CAs as for CF3.

The NFS Root Cause Team identified the four contributing causes (CC) for this event:

- CC1: No comprehensive package was compiled for submittal to CCB/SSRC.
  - CA: Evaluate revising CCB review process to require changes to be presented and reviewed holistically.
- CC2: LOA expedited through CCB – no meeting.
  - CA: Improvements that are needed in the quality of technical bases are effectively covered by corrective actions documented in PIRCS 21448, Investigation I10071 related to the Bowl Wash Cleaning Station.
- CC3: LOA and WR routed separately. (No comprehensive package was presented)
  - CA: same as CC1
- CC4: WR was expedited and routed separately from LOA through CCB.
  - CA: same as CC1

The NFS Root Cause Team identified the three lessons learned (LL) for this event:

- LL1: No documentation for design margin (e.g., heat and material balance spreadsheet).
  - CA: Develop fitness for use requirements for heat and material balance engineering deliverable and require for all process-related projects.
- LL2: No documentation regarding decisions made in the October 7, 2009 afternoon meeting was available.
  - CA: Document meetings with minutes, document significant decisions via Operational Decision Making Issue process.
- LL3: Project Engineering Section Manager assumed technical basis was sound since it was written by ISA contractor.
  - CA: Embrace questioning attitude, and "trust but verify" mentality. See corrective actions from Bowl Wash Station TapRoot (PIRC P21448, Investigation I10071).

<u>NFS Safety Culture Implication Review (SCIR)</u>

The NFS SCIR for the CDL event has defined corrective actions that can be associated with this case study:

- SCIR CDL EVENT - C11117 – A top-down face-to-face communication with management on a very clear set of behavior standards will be communicated. Some of these standard expectations will deal with not continuing to pursue operational goals when unanticipated conditions occur; ensuring operations are safe and all legitimate questions regarding safety are fully resolved prior to proceeding; communicate concerns with adequate time to assure commitments do not become overdue; hold employees accountable for providing timely and accurate reports and for taking ownership of issues that impact their operations and delivering solutions that keep safety as our top priority;

and finally, function as a team that does not make quick decisions regarding technical matters, but choosing rather to rapidly marshal resources to address priority problems to ensure the right experts are consulted and concur with the way ahead. This corrective action was developed as a result of the safety culture implications review.

- SCIR CDL EVENT - New corrective action as a result of the SCIR: Formally document design lessons learned in applicable engineering design guides.
- SCIR CDL EVENT - New corrective action as a result of the SCIR: Investigate the causes of these design engineering mistakes and why the NFS review processes (SSRC, Corrective Action Review Board (CARB), Operational Readiness Review (ORR), basic safety culture, etc.) did not identify the mistakes. Review causes against actions NFS is taking to strengthen the design engineering process.

SCUBA Team Findings

The SCUBA Team's collective review of the event timeline, root cause analysis, documentation, documented corrective actions, observations, and personnel interviews has led it to identify the following Areas for Improvement:

AFI-CS/PSL-01: The design process does not provide the safeguards needed to ensure that the configuration management process conforms to all necessary requirements (i.e., design documentation. Code compliance requirements need to be blended into the design basis, documented, reviewed, and approved). The project management process and/or the change management processes should be modified to require documentation of decisions concerning the design basis, any modifications, the reasoning for the decisions/modifications, and any necessary considerations or actions as a result. Conformance to code, along with a written analysis of the potential impact of deviations should be a part of this documentation. This will provide a sound documented basis for future decisions as any project progresses through detailed design and into operation.

AFI-CS/PSL-02: The evaluations to resolve design issues and any resolutions are not currently rigorously conducted and documented. The specific reasoning and decisions for the PSL Phase 4 Project design are not currently documented. The design basis for the project should be re-evaluated to assure the design is adequately conservative, address any deficiencies, and document the basis for the design in light of this case study. The extent of condition for units of similar design and function should also be evaluated, documented and any correct actions implemented.

AFI-CS/PSL-03: The ISA process for this project considered only static failure mechanisms and did not explore all the dynamic, potential hazards for chemical processes in a rigorous manner. The ISA process should be evaluated and amended to ensure adequate consideration is given to the identification and mitigation of all potential hazards (nuclear, chemical, and personal).

AFI-CS/PSL-04: The observed approval process for changes is largely focused on accomplishing the intended result of the evolution. An LOA was initiated and approved to address a plugging problem and focused totally on instructions to address the blockage by applying heat. This was a system plugged, without a vent/relief path, containing a hazardous gas in which additional heat was to be applied. The WR did specify general safety requirements and

work instructions were based on individual input. Recognition of the potential for over-pressurization was not apparent and any discussion of potential mitigating actions did not occur. The Change Control Board and the SSRC are the two committees primarily involved in the approval process for change, LOAs, WRs, procedural changes, projects etc. The goal is to manage and execute change for safe and compliant operation. The approvals are normally based upon individual reviews before calling a meeting to approve the particular change. It is recommended the approval processes for change are amended to include a collegial challenging discussion and defense of the safety basis and the mediating actions for any change by subject matter experts. A probing of the safety basis is more likely to address all potential hazards and the required considerations. This recommendation provides an enhancement to the current NFS initiative to strengthen the documentation and review of the technical basis for change.

AFI-CS/PSL-05: The root cause methodology is event focused, and does not systematically evaluate: [This is also identified as an AFI in the Fire Damper Inspection Case Study.]

- Management Ineffectiveness/Management Errors that led to/enabled the event as demonstrated with the SCUBA Team root cause evaluation.
  - Accountability
  - Management Expectations
  - Oversight and Control
  - People Cultivation (Training and Development)
- Extent of Condition Issues related to Management Ineffectiveness/Management Errors

AFI-CS/PSL-06: Field testing and demonstrated proficiency should be a basic part of any drill prior to declaring operational readiness. The decision to not defer implementation of PSL Phase 4 pending improved training and equipment response was non-conservative. Although process flow did not occur, the act of accepting a substance for which adequate emergency response measures had not been demonstrated did not reflect conservative decision making.

AFI-CS/PSL-07: A number of SCC weaknesses/failures were observed as this case study was completed. The SCUBA Team believes each of the following SCCs was a significant factor in this event; but each of them also is an extent of condition issue that could lead to and/or enable future loss events if effective corrective action is not taken:

- Decision Making:
  - Production pressures negatively influenced priorities.
    - Schedule priorities influenced the decision to proceed with training with poor quality procedures.
    - Production pressures influenced development of an LOA not recognizing potential hazards.
    - Allowing an area to be exempted from participation in a drill specifically pertinent to that area due to production interferences.
  - Non-conservative decisions.
    - Test pressures at 110% of design pressure as proof of system integrity.
    - Delivery of hazardous material prior to completion of all actions identified as the result of drill critiques.

- Work Practices: The work practices associated with the human performance across the Engineering organizations (Project and Process) are lacking. The SCUBA Team root cause evaluation identified inadequate work practices are the most frequent root cause in the Human error/ Inappropriate Action Chart. This is apparent in the failure to recognize potential issues (discussed in the findings).
- Work Control: Persistence absence of maintenance supervision in field has been observed. Currently, the majority of the supervisory oversight falls to the Plant Superintendent with most of the significant work performed during back shifts and weekends. The presence of maintenance supervisors in the field would minimize the tendency to vary from work instructions in the face of uncertainty and emphasize the station's commitment to safety over production provided the supervisors were adequately indoctrinated.
- Corrective Action Program: The program was effectively utilized to capture issues and initiate corrective actions relative to the hazardous gas drills. However, no verification process is in place and effectiveness reviews were not conducted. The response to the procedural difficulties was not effective and reinforcing. The expectation to enter significant process excursions into the PIRCS system to notify management was lacking.
- Operating Experience: Previous operating experience could have potentially reduced the issues associated with this case study had an effective program been in place. Learnings from this case study could be beneficial in assisting management with reinforcement of the desired expectations and behaviors within the workforce.
- Accountability: The SCUBA Team's root cause evaluation provides insight to a number of attributes relating to management oversight and control (e.g., Executive Management Failure Mode Chart and the Organizational and Programmatic Diagnostic Chart). The following provides examples of areas lacking in management oversight and control:

  - Implementing changes relating to development and execution of the LOA and WR.
  - Diligence by all those involved in the procedural approval process.
  - Effective response and follow-up of CAP responsibilities and commitments
  - Formality and discipline in verifying and documenting decisions and their basis.
  - PIRCS issue identification.
  - A first line supervisor was not held accountable to conduct and participate in a critical drill which was specifically applicable to an area under their control.
  - Management oversight and control of contractor work is grossly lacking. Standard requirements for quality control and documentation do not exist. One example is the lack of documentation and procedural control of the welding procedures in the field.

AFI-CS/PSL-08: The organization did not recognize deficiencies until Case Study talking points were issued to management. This is an oversight in the internal processes and behaviors to identify issues. The organization did initiate a TapRoot investigation covering certain technical aspects of this case study; however, has not recognized the need to investigate the internal processes and behaviors which failed to identify issues. The organization has failed to concentrate these weaknesses/failures into an overarching analysis along the lines of SCUBA Team's Case Study despite regulatory intervention that challenged the station to improve their performance in situations such as these and resulted in the issuance of a second Confirmatory Action Letter. This behavior is an indictment of the corrective action program and should be investigated.

ATTACHMENT H
KEY INSIGHTS DERIVED FROM SCUBA TEAM BEHAVIORAL OBSERVATIONS THROUGH JANUARY 1, 2010

Introduction

The SCUBA Team reviewed the documented results of all behavioral observations that it had conducted through January 1, 2010 for the purpose of identifying recurring themes and key insights. These are documented below.

The SCUBA Team believes that it is important to consider this information in the context of the associated safety culture implications and as a reflection of the safety culture at the NFS-Erwin Site as it existed through January 1, 2010. NFS senior management should review this information thoroughly as it considers its continued agenda for change and improvement in the NFS-Erwin safety culture. At a minimum, the cultural deficiencies identified below represent challenges to overcome in the development of an improved safety culture at the NFS-Erwin Site.

The information presented below is organized in accordance with the three general categories of behavioral observations that the SCUBA Team conducted: (1) Meeting Observations, (2) Field Observations, and (3) Training Observations.

Meeting Observations

1. Senior staff meetings did not exhibit the level of concern appropriate for the risk and consequence of self-revealing events. For example:

    - The failure of a structural member of a wastewater tank and the inadvertent penetration of a fire header were two examples of human errors that were not treated as the site-wide learning opportunities that they represented.
    - The combustion events were publicly interpreted in terms of the avoidance of consequences rather than the attendant risk.
    - During one PIRCS Review Committee, it was revealed that fumes generated in the wastewater area as a result of caustic addition to neutralize a tank affected several employees; this problem was not publicly discussed elsewhere.

    The tendency to downplay the significance of errors typified the Site's approach to problem solving, largely because these behaviors were practiced at the most senior levels of the NFS management team.

2. The Chairperson of meetings closely directed the conduct and progress of every meeting and, while that may be appropriate in cases where significant challenges are presented to the members or if the participants are struggling, at NFS the Chairmanship position is concentrated in the hands of very few individuals. Consequently, there has been a tendency for staff meetings to devolve into one-man shows. The lack of originality and diversity of discussion was stifling and the cost in management time was significant. This tendency was most evident in PIRCS meetings.

3. When major process problems arose, it was apparent that the details of the chemical engineering process were not thoroughly understood at some of the critical decision nodes. For instance, the decision to resume Commercial Development Line (CDL) operations after the first combustion event and the telephonic authorization of process changes to the BLEU Processing Facility (BPF) procedures indicated that decisions were not based on adequate facts. Additionally, the subsequent staff meetings observed were not effective in promptly converging on a solution despite a chain of facts that should have led to prompter resolution or better decision-making. The evident priority was to achieve a resumption of production via the quickest means.

4. There were several occasions when differences of opinion or contradictory information arose during meetings without adequate attention given to resolving the differences. While it was infrequent to observe a clash of opinions, when differences did arise, the failure to acknowledge valid issues had the tendency to suppress discussion and limit the degree of participation needed to reach the optimal solution. For example:

    - An identified design inadequacy on a CDL glove box was acknowledged but tolerated as acceptable.
    - The Root Cause Analysis (RCA) of the erroneous fire damper records revealed a pattern of acceptance of reports without verification or challenge of obviously faulty information over a long period of time.
    - Investigation into the cause of the BPF overheating raised tempers over delays in production caused while pursuing procedure improvements and root causes.
    - In this regard, it should be noted that the SCUBA Team had to actively insist on Safety Culture Implication Reviews for significant RCAs that occurred during the fourth quarter of 2009 when the site management hesitated to employ this good practice.

5. PIRCS Screening Committee meetings occasionally devolve into gripe sessions focused on the additional workload imposed by the Corrective Action Program (CAP) rather than valuing the input from employees. Conversely, it was not uncommon to hear an individual self-report an error or problem without any constructive criticism. It became apparent that the light treatment given to many problems reflected the inappropriate emphasis on production.

6. NFS policies indicating safety as the overriding priority were not practiced or reinforced.

    - Individuals and managers were not held accountable to this standard and, in practice, were reinforced for completing tasks that supported production.
    - The SCUBA Team's observations confirmed that the theme of area staff meetings and the metrics employed to describe progress often emphasized a bias for production. The decision to resume CDL operations after the first combustion episode highlighted that tendency and the daily operations focus meeting on the following Monday similarly demonstrated less immediate concern than was appropriate, given the recurring failure.

7. The Safety and Safeguards Review Council (SSRC) performed many of their reviews independently, basing their conclusions on individually routed documents. When formal meetings were observed, there was a noted lack of probing discussion, evidently because members arrived with a pre-conceived notion that eliminated the benefit of a collegial discussion of questions, challenges, and potential problems. This behavior contributed to the lack of a questioning attitude that allowed operation of the PSL Phase IV system without identification of all potential hazards, resulting in an over-pressurization event.

8. There was little bias for action noted during PIRCS meetings when prompt remedial action was needed, despite the existence of an adequate knowledge base among those in attendance, along with a sufficient level of seniority. Few direct assignments were made, and when assigned, due dates and individual responsibility were either not assigned or not entered in PIRCS. Direct intervention at the vice-president level appeared to be the only remedy to generate activity.

9. Shift turnover meetings were uncoordinated and informal. Even when returning from a weekend shutdown, there was not a formal review of plant status nor was there a discussion of material conditions arising since the last shift – much less the inclusion of a safety topic for discussion. Call-outs and their effect on production were evidently considered to be the responsibility of the area supervisor as there were no evident compensatory measures put in place to ensure safe, reliable operation in the face of personnel shortages.

10. Maintenance turnover meetings were uncoordinated and informal. There were occasions when Operations was expecting a job to be performed and Maintenance was staffed for the work, but the task was not completed as scheduled because the individual interface between department supervisors was ineffective. The lack of a tracking process or formal status turnover contributed to this problem but the result was an inability to work jobs, regardless of priority. Management did not demand an explanation for these inefficiencies and the CAP was not used to document them. Consequently, there had been little progress pending the promise of salvation from Maximo.

11. Operating experience was rarely used at any meetings except in a very general way, despite a widely held belief that the informal use of lessons learned is effective on an ad-hoc basis. When used, the discussions were usually focused on significant events associated with operating experience published by the Nuclear Regulatory Commission. The use of operating experience was more prevalent as the seniority of the participants increased.

12. Safety messages were neither effective nor routinely delivered. When presented, they frequently referred to medical events, traffic safety, home and car safety or some other safety issue not relating to either NFS or the nuclear industry.

13. The CAP did not effectively incorporate the results of independent or self-assessments. Scheduled assessments were not routinely entered into the PIRCS database for tracking purposes or corrective action entries made thereafter.

14. Unless of a significant nature, off-normal events that were entered into PIRCS were not subject to any in-depth discussion for consideration as a topic for self-assessment.

15. Observations of PIRCS meetings did not identify any activities to identify common causes for events, and corrective actions appeared to be narrowly focused. The development of common cause codes remains under development. Although this schedule for completion comported with the station's long-term schedule, it does not support the initiative for following a path to excellence by 2011 and continues to allow learning opportunities to pass without review. The persistent unwillingness to fill the vacant Department Performance Improvement Coordinator slots was a significant example of this clash of priorities.

16. Observation of the PIRCS Screening Committee confirmed increased use of the CAP but not enough to attain a level of performance consistent with industry norms.

    - The quality and timeliness of responses continued to disillusion employees.
    - PIRCS was not consistently used to report equipment problems or difficulties encountered during routine maintenance.
    - Some managers believed that it was a departmental (or senior management) decision whether to report.
    - There were reports that supervisory preference played a significant role in PIRCS generation in some groups.
    - Some meetings were moderated in a manner that stifled debate about differing issues or opinions. These attitudes and actions are threats to the open and thorough resolution of problems.

17. Work execution was not crisp and weekly work management meetings were not designed to improve the process. Weekend work (the primary maintenance window) was often assigned on the preceding Wednesday without assurance that parts were available, plans completed, personnel assigned, or that an integrated safety review had been completed. When the meeting adjourned, specific responsibility for closing these gaps was routinely not assigned and observations of work in-progress revealed that they had not been remedied by the time of execution.

18. Several meetings and review boards had begun to overlap in terms of perceived scope of responsibility, thereby costing management time and threatening consistency. For example:

    - The PIRCS Oversight Committee had begun to function in name only and had been supplanted by the Corrective Action Review Board.
    - The Executive Oversight Board has been recently instituted but appeared to fulfill some of the responsibilities of the Safety and Safeguards Review Council (SSRC).
    - The Change Control Board reviewed any and all modifications presented for consideration, regardless of the quality of the product. While the intent was to ensure configuration control rather than design accuracy, their review could be interpreted as tacit approval of a substandard design. The absence of an engineering sponsor or a SSRC member for continuity added to the confusion.

- The Communications Steering Committee dissolved through disuse.

19. As the level of NRC involvement increased, the amount of defensiveness increased. Management accepted responsibility for communicating with the regulators but at the expense of openness at the individual level. The more effort that was invested in damage control, the more it appeared to be information control. This behavior tended to stifle improvement initiatives and had a negative impact on the management team. Additionally, some status reports from executive management were phrased in terms that were reportedly viewed as threats to employment by some employees.

20. Operational Readiness Reviews (ORR) were ineffective. The SCUBA Team drew this conclusion based upon results as much as upon observation. In particular, the PSL Phase IV process was instituted after a series of failed walk-through evolutions (these evolutions were not categorized as drills because supervisors did not believe that the station was far enough along to benefit from the strictures of a drill), the operating procedure (SOP 401-8D) was full of pen-and-ink changes that had not been firmly reviewed and incorporated, and a safety related equipment (SRE) test conducted prior to startup failed to detect several significant leaks in the system. When the system was put into operation, it failed. It is worth noting that the next project due for implementation after an ORR is the Building 234 decontamination effort, and there are no signs of improvement in the ORR process to protect against such latent organizational weaknesses causing problems with handling radioactive material. It would seem appropriate to conduct some form of ORR prior to commencing fuel processing activities whenever the source material changes.

Field Observations

1. The program of management by walking around (MBWA) did not deliver the desired results. The absence of supervisory presence was obvious to craft personnel and the failure to improve performance based on either NFS management or SCUBA Team observations reinforced the need for improvement. The lack of executive or management presence on backshifts and weekends was not lost on employees or the SCUBA Team.

2. Work request packages varied substantially in quality. Many lacked sufficient detail – job planning required better project coordination, and there needed to be less reliance on the skill of the craft.

3. Although the Maintenance Coordinator was attentive to talking and walking down work with supervisors and craftsmen, there was no assurance that the lessons learned or issues discussed would be formally included in the written procedure. When jobs were uncomplicated, the work proceeded well. When there were emergent problems or unanticipated decision points, there was no roadmap for desired action. The SCUBA Team attributed this trait to the consistent tension between respect for the supposed skill of the craft and providing useful, but detailed, procedural guidance.

4. Continued absence of Maintenance Supervisors during weekend (principal) work windows limited the opportunity for coaching in the field (except by the Plant Superintendent) and the deferral of Maximo implementation slowed the improvement process.

5. The CAP practices continued to allow paperwork to close paperwork when physical action was required. Specifically, PIRCS reports citing equipment faults were closed to work requests. The SCUBA Team noted many instances where the work had not been completed during the six months of field observations.

6. Hold points were not used effectively in work procedures and quality control (QC) personnel were not evident at the job site. It was uncommon to find a QC hold point outside of laboratory procedures. For instance, when replacing contaminated piping in the wastewater treatment area, the maintenance crew skipped the step for determining the radiological cleanliness of the scrap material before discarding it for free release. Either quality control or supervisory control could have prevented this error; the SCUBA Team stepped in and corrected the situation. The scope of this particular issue was not adequately realized and documented in PIRCS until the SCUBA Team made an issue of the event.

7. Expectations for work performance varied considerably among groups and between procedures. For example, SOPs were hampered by the excessive use of Letters of Authorization (LOA) to provide temporary instructions, job hazard analyses were not routinely incorporated into procedures, the Process Development Laboratory lacked the discipline offered by a quality assurance program, and the complexity of station limit cards was confusing. In this regard, the development of a Conduct of Operations Manual had been under development for over a year.

8. Operating Experience was not often observed in use on the job. When used during pre-job briefs, the lessons were generally informally delivered and direct application of that operating experience was lacking. Maintenance involving cranes and forklifts, contaminated material control, and hand tool safety were all areas that would have benefited from hearing about good practices among peers.

9. Maintenance supervisors were not evident in the field unless major work (e.g., involving a special work permit) was in progress. However, in neither situation did the assignment of a supervisor routinely improve the quality of the product. Pre-job briefs were cursory (when used), post-job briefs were not used, supervisors did not serve as subject matter experts, nor did they supplement the industrial safety organization to improve the work environment. It was the SCUBA Team's observation that Maintenance Supervisors were most helpful as parts expediters and agents for procedure revisions. Neither of these tasks contributed to a more effective product in such instances as roof work, crane supervision, post-maintenance testing and component restoration.

10. Preventive maintenance practices did not require the use of formal equipment guide lists to ensure complete performance of work within an expected timeframe. Components such as fire extinguishers, smoke detectors, and fire dampers were checked by using lists

that were not computerized or verified for accuracy. In one case, a new building was put in commission and the new fire extinguishers were added to the list by hand. In every case, an annual check was required to be performed on a calendar year basis without regard for the spacing between events and no means of checking. Hypothetically, December and January would be satisfactory months for completing the same task in succeeding years. There were no specific instances observed of such extremes but there was no way to check and work schedules were not controlled tightly enough to include any consideration for adequate spacing in time. Craftsmen and supervisors did not view this practice as problematic and the Industrial Safety group did not treat this matter as a potential fire code violation.

11. Maintenance Supervisors were not assigned to weekend (when most maintenance work is scheduled) work teams unless special work permits were in force – and then, Plant Superintendents normally performed the pre-job briefings and the work site walkdowns. This standard practice was invoked because of the lack of supervisors available to assign to weekend work combined with a lack of resolve by the management team to assign individuals to a rotating backshift assignment. Additionally, union rules result in assigning the more junior (i.e., inexperienced) craftsmen to the same backshift and weekend work assignments.

12. The organization continued to emphasize production over safety. It was not uncommon to find workers/supervisors implementing one-off solutions as opposed to formally changing procedures and/or addressing these behaviors to improve safety culture. For example:

    - When acid of an incorrect molarity was delivered, Operators wanted to halt production but management decided to use the material. The result was degradation in product quality.
    - A Fuels Operator suggested the use of a checklist to improve performance and this suggestion was summarily rejected due to the additional time required.
    - A process to address problems is almost never a final consideration; instead, individual or direct action is usually the first and only alternative considered. For example, when a problem arose with an Operations lock, the resolution addressed the individual problem instead of implementing a process to inventory and mange all Operations locks. This more generic solution was not given serious consideration in the specific area much less across the entire organization.

13. The organization did not foster the wholehearted use of the corrective action system. In some cases, individual supervisors discouraged entering problems for unspecified reasons. During subsequent conversations, the SCUBA Team learned of concern for showing too many faults to the regulators. In some cases, individuals were urged to group issues into one PIRCS entry, thereby diluting the effect of trend analysis and perhaps allowing premature conclusions. Finally, those organizations deemed to be problem solvers were not expected to enter PIRCS issues because their actions were deemed to be corrective in nature already (e.g. Maintenance). The SCUBA Team's conclusion was that these diluting factors insulated work in the field from organizational learning.

14. Safety requirements, policies, and processes were not rigorously followed. Attention to detail while implementing Work Requests and LOAs was variable among teams and supervisors.

    - One particular LOA required 40 individual data entries per hour (per process line) in order to produce uranium. Procedure revision and simplification would have improved both safety and efficiency.
    - The SCUBA Team observed instances where personal protection equipment (PPE) requirements were not followed, cordoned-off area signs were not obeyed, special work permit requirements were not followed, and lock-out/tag-out guidance procedures were violated. Supervisors, when present, did not aggressively coach compliance.
    - One glaring example is the apparent option to use rubber gloves upon entering the Material Access Area; some individuals (i.e. supervisors) simply choose not to wear them because they believed that their job would not result in contamination.
    - Safe work standards, practices, and behaviors are not routinely emphasized and/or reinforced; consequently individual behaviors vary and become the accepted standard.
    - The organization's acceptance of the status quo for injuries sustained by the fact that the workforce demonstrates an insular frame of reference and an apparent lack of commitment and priority for improvement in performance. The conclusion is that the NFS Industrial Safety Program was struggling although the competence of the organization was generally recognized across the organization.

15. Procedure use in the field was not commonplace throughout – maintenance teams, production crews and chemistry laboratory. Since there was no indication as to the expectations for procedure use (e.g., step-by-step, reference use, or general information), the choice was left up to the judgment of the operator. When the failure to stay within process was discovered, it was unlikely that procedure use in the field was cited as a cause. Instead, the tendency was to treat this poor practice as isolated instances without an analysis of the generic effect of this laxity.

    - During one observation, the weekly startup needed to be suspended because the Process Engineer's guidance was incomplete and the Operator had not pre-reviewed the procedure.
    - Valve line-ups were noted to be an ongoing problem without an emphasis on crosscutting actions to prevent recurrence across the organization. One such event resulted in contaminated effluent being discharged (above normal but within approved limits).
    - Laboratory analysis procedures were frequently performed from memory.
    - Transportation procedures allowed the shipment of uranium products although one of the formulas for calculation of U-232 was non-conservative (and had been for several months beyond the biennial review requirement).
    - Fall protection was not used when working at height per OSHA standards.

16. The Human Performance (HuP) Program had not advanced much beyond the awareness stage, and had been slow to develop and initiate effective improvement. Observation data indicated the training program had been well received; however, some disillusionment was apparent as a portion of the workforce believed that supervision and management did not embrace and utilize the tools. For example, pre-job briefs (when conducted) varied in content, shift turnover meetings were not standardized, and there was no standard expectation for implementing HuP tools in the field. It was the SCUBA Team's impression that senior management support was superficial and their lack of active use (e.g., MBWA) slowed the implementation plan to eliminate flawed defenses or follow through on HuP incidents.

17. Housekeeping had improved in certain areas; however, opportunities for improvement were available, particularly in the wastewater treatment, tank farms, and warehouse overflow areas (pipe racks). The cafeterias were significantly below standards acceptable for a fast-food restaurant. Surprisingly, the areas assigned to the contractor work force were significantly cleaner and better stowed.

18. The list of major components in need of replacement or repair that was identified in 2007-2008 had largely been addressed, but there was another growing list of major equipment in need of long-term asset management – specifically, scrubbers, calciners, welding system components, basic building services, and furnaces.

19. The Analytical Service Laboratory had occasionally adopted the practice of suspending operations during tours or visits. While it might be reasonable to take this action when visitors are present (in the name of safety and contamination control), it seemed that this behavior was simply invoked to minimize the opportunity for SCUBA Team members to observe and comment on performance. This practice was not consistent, but even one occasion gives the impression of furtiveness. In light of the outlying survey results of site chemists, this behavior was disturbing.

20. The SCUBA Team observed repeated instances of inadequate use of personnel protective equipment. An operator in one area indicated the timing of certain events precluded the ability to obtain PPE, and the individual is comfortable with the associated risk of injury. The presence of supervisors did not seem to have a salutary effect and the equipment worn by various members of the same work team varied. The expectations for personnel protective equipment were not covered during pre-job briefs. The conclusion was that personnel safety was not a focus of the individual worker, the industrial safety organization, or management.

21. The sublimation process was flawed. The population of the available cylinders subjected to receipt inspection was significantly lower than would be statistically significant. Procedures were not developed to deal with variations in assay quality. Department of Transportation rules preclude the shipment of rejected cylinders, which has prompted the station to accept all cylinders, indicating that the tendency to experiment with the production process is high. This attitude was observed during the recent BPF and CDL exothermic events.

Training Observations

1. Operating Experience was lacking in most training sessions. Neither the syllabus nor the class content of those sessions observed contained Operating Experience.

2. Toolbox training is conducted; however it is poorly executed for issues that cross over organizational lines. Different supervisors teaching different audiences deliver differing results. This has been detrimental to uniformly raising the level of awareness of issues and setting out courses of corrective action.

3. NFS processes to execute work and set expectations for performance are set through the individual NFS supervisor but a formal program was not used for consistency. The expectation for safety and work quality were minimal and varied by job and coordinator. A formal program was being developed and appeared to have a good foundation but it was too soon to declare success.

4. The PIRCS system and the Training organization did not seem to be aligned to learn lessons from recurring issues. Each PIRCS report cites the number of times that a similar issue had occurred during the preceding 12 months. It was typical to find over 50 such events noted, but there was not a corresponding effort to either refine the cause codes for better analysis or take active steps to improve the level of knowledge of the employee body to reduce events. A draft version of improved cause codes remained under development at the conclusion of the Independent Safety Culture Assessment.

5. HuP training was conducted in breadth and depth but the presence and obvious sponsorship of senior leadership was absent from classroom sessions. Employees were passive receptors in some cases and the term "latent organizational weakness" was not mentioned despite its importance in the program's fundamentals. The training sessions were growing to becoming rote meetings delivered in volume rather than pointed learning opportunities.

6. Lessons learned from site-wide drills and training evolutions were not fed back to the organization in order to improve performance in a timely manner. The PIRCS system was not used to record drill progress. This resulted in long-standing material deficiencies going uncorrected despite signals to the contrary and the tendency to embark on projects without being fully prepared. The stumbles in the adoption of the PSL Phase IV process were a prime example, particularly when one on those organizations most directly affected by the modification was exempted from drill participation.

ATTACHMENT I – TABLE OF ACRONYMS

ACC	Accountability
ADL	Analytical Development Laboratory
AFI	Area for Improvement
ANA	Area in Need of Attention
AOA	Area of Adequacy
AOS	Area of Strength
BLEU	Blended Low-Enriched Uranium
BOE	Balance of Error
BPF	BLEU Processing Facility
CAL	Confirmatory Action Letter
CAP	Corrective Action Program
CARB	Corrective Action Review Board
CCB	Change Control Board
CCA	Common Cause Analysis
CDL	Commercial Development Line
CLE	Continuous Learning Environment
ClF3	Chlorine Tri-Fluoride
CM	Configuration Management
CSCII	Comprehensive Safety Culture Improvement Initiative
DM	Decision Making
DOE	Department of Energy
DPIC	Department Performance Improvement Coordinator
DPO	Differing Professional Opinion
ECP	Employee Concerns Program
ECR	Enterprise Change Request
EOC	Extent of Condition
ERB	Executive Review Board
ERC	Environment for Raising Concerns
ERO	Emergency Response Organization
FFD	Fitness for Duty
FMF	Fuel Manufacturing Facility
FoF	Force-on-Force
GET	General Employee Training
HEU	Highly Enriched Uranium
HIRD	Harassment, Intimidation, Retaliation, and Discrimination
HR	Human Resources
HuP	Human Performance
HVAC	Heating, Ventilating, Air-Conditioning
IIP	Infrastructure Improvement Plan
INPO	Institute of Nuclear Power Operations
IROFS	Items Relied on for Safety
IS	Industrial Safety
ISA	Integrated Safety Analysis
ISCA	Independent Safety Culture Assessment
LEU	Low Enriched Uranium

LINC®	Configuration Management software system
LOA	Letter of Authorization
MAA	Material Access Area
MBWA	Management by Walking Around
MC&A	Material Control and Accountability
NOx	Nitrous oxide
NCS	Nuclear Criticality Safety
NFS	Nuclear Fuel Services
NRC	Nuclear Regulatory Commission
OCA	Owner Controlled Area
OCM	Organizational Change Management
ODMI	Operational Decision Making Initiative
OE	Operating Experience
OFI	Opportunity for Improvement
ORR	Operational Readiness Review
PA	Protected Area
PDM	Preventing, Detecting, and Mitigating Perceptions of Retaliation
PIRCS	Problem Identification, Resolution, and Correction System
PM	Preventive Maintenance
QA	Quality Assurance
QC	Quality Control
R&D	Process Development
RES	Resources
RFS	Reliable Fuel Supply
RIS	Regulatory Issue Summary
SA/IA	Self- and Independent Assessments
SAP®	Enterprise Resource Program
SCC	Safety Culture Component
SCIR	Safety Culture Implications Review
SCSA	Safety Culture Self-Assessment
SCUBA	Safety Culture Board of Advisors
SCCWE	Safety and Compliance Conscious Work Environment
SCWE	Safety Conscious Work Environment
SEC	Security
SNM	Special Nuclear Material
SOP	Site Operating Procedure
SP	Safety Policies
SRE	Safety Related Equipment
SSC	Structures, Systems, and Components
SSRC	Safety and Safeguards Review Council
T&Q	Training and Qualification
TD&C	Technical Development and Commercialization
UF6	Uranium Hexafluoride
WC	Work Control
WM	Work Management
WOG	Wet Off-Gas
WR	Work Request