Memorandum from the Inspector General, ET 4C-K

April 19, 2017

TVA Board of Directors
William D. Johnson, WT 7B-K

REQUEST FOR FINAL ACTION – FINAL SPECIAL REPORT 2016-16702 – NTD CONSULTING GROUP, LLC'S ASSESSMENT OF TENNESSEE VALLEY AUTHORITY'S EVALUATION OF THE CHILLED WORK ENVIRONMENT AT WATTS BAR NUCLEAR PLANT

The Office of the Inspector General (OIG) received an EmPowerline complaint on January 4, 2016, alleging a chilled/hostile working environment in Operations at Watts Bar Nuclear (WBN) plant. The OIG investigated the allegation and timely communicated information related to the chilled work environment to the Nuclear Regulatory Commission (NRC). On March 23, 2016, the NRC issued Tennessee Valley Authority (TVA) a chilled work environment letter (CWEL) and required TVA to conduct a root cause analysis and take other actions.

Due to the technical nature of the issues, the OIG engaged a consulting firm with expertise in the nuclear power industry, NTD Consulting Group, LLC (NTD), to (1) assess whether TVA's analyses of its April 22, 2016, response to the NRC CWEL were thorough and adequate; and (2) review the history of nuclear safety culture issues at TVA for the past several years. To conduct their assessment, NTD reviewed numerous TVA and NRC documents as well as interviews conducted by the OIG since January 2016.

NTD is responsible for the attached report (Attachment 1) dated April 19, 2017, and the conclusions expressed in the report. TVA management was briefed on the information from the NTD report in July 2016. Subsequently, the OIG solicited and received TVA management's comments on two drafts dated August 17, 2016, and December 15, 2016, of NTD's report and, where appropriate, NTD incorporated changes in their final report. In response to NTD's report, TVA management generally agreed with the recommendations and noted that a number of corrective actions were taken or are underway since the first draft of the report was issued. Additionally, TVA management reiterated that they "previously stated to the OIG and, more importantly, to the NRC, its belief that there is a chilled work environment at WBN 1. Moreover, TVA has expressly acknowledged management's role in creating the condition and its responsibility for correcting it."

The OIG addresses three areas in this letter—(1) TVA management's request to withhold certain information from public disclosure, (2) the OIG's continuing concerns regarding whether TVA's corrective actions will bring about sustainable change to the safety culture, and (3) OIG authority to review the events at WBN.

TVA MANAGEMENT'S REQUEST TO WITHHOLD CERTAIN INFORMATION FROM PUBLIC DISCLOSURE

In the response to the NTD report, TVA requested information in the report be withheld from public disclosure that was related to: (1) attorney-client privilege, (2) proprietary information, and (3) comments provided by employees in interviews and on surveys.

Attorney-Client Privilege Information – TVA management claims some information in the NTD report should not be released due to attorney-client privilege. Despite our request that TVA identify specific language in the report which they believed was subject to the privilege and to explain why that information constituted legal advice, they declined to do so. Consequently, we were left to determine what language in the report involved TVA attorneys without the benefit of knowing whether or not those communications were actually legal advice.

We are not convinced the attorney-client privilege is properly asserted in the context of an OIG report. Attorney-client privilege is more appropriate in a court proceeding or Freedom of Information Act (FOIA) request. Nevertheless, the OIG does not wish to waive any right TVA may have to assert that privilege in one of those forums in the future, nor do we wish to release any privileged information which OGC attorneys would be obliged to hold in confidence under the rules of legal ethics. Consequently, in the NTD report posted on the OIG's Web page and the copy provided to Congressional committees of jurisdiction as required by the Inspector General Empowerment Act of 2016 will contain redactions of any language which we believe could be subject to the attorney-client privilege while we explore this matter further. At this time, we believe this information could be obtained through a FOIA request. While TVA management has stated it does not waive attorney-client privilege, we have sent a separate letter requesting the TVA Board of Directors (Board) review this information and waive the privilege so that Congress and the public are able to review this information without the necessity of a FOIA request. In response to the letter, the TVA Board has retained independent counsel to provide guidance related to the attorney-client privilege issue. The TVA Board is the agency head for TVA and has the authority to override the decision of TVA lawyers to shield from public view statements made by TVA lawyers.

Proprietary Information – TVA's request to redact proprietary information appears reasonable, and the NTD report posted on the OIG's Web page will have this information redacted. However, because Congress recognizes the requirement to protect propriety information and because Congress does not consider the transmission of this information to

constitute a public release of the information, the Congressional committees to which we are required to provide copies of this report will receive copies of the report without redactions of proprietary information.

Employee Comments in Interviews and Surveys – We did not redact comments provided by employees in interviews and on surveys relating to nuclear safety culture. The OIG maintains the anonymity of employees not only because of our statutory duty to do so under the Inspector General Act, but also as a means to prevent retaliation against employees and to promote continued reliance upon our IG EmPowerline and cooperation with IG investigations. However, maintaining anonymity does not preclude using the information without attribution. In this case, we carefully reviewed NTD's report to remove not only any names of cooperating employees but all information which might reasonably identify those employees.

CONCERNS REGARDING SUSTAINABILITY OF CORRECTIVE ACTIONS

The OIG remains concerned about whether TVA corrective actions will bring about sustainable change to the culture at WBN. TVA management asserts that the information contained in the NTD report is dated and many program improvements were made over the last year. In addition, TVA management questioned the validity of the methodology used in the OIG/NTD review. However, additional external assessments and primarily those done by the NRC made public and given to TVA management as recently as March 2017 indicate that although TVA has made some positive changes, challenges still exist in WBN's nuclear safety culture and call into question the sustainability of the positive changes. Even though differing methodologies were used, the assessments made by the NRC and others identified many of the same issues that were reported in the NTD report. Some examples of these findings reported to TVA are as follows:

- A NRC Problem Identification and Resolution (PI&R) report in September 2016[1] indicated an improvement in the primary work environment conditions that prompted the issuance of the Chilled Work Environment letter, but also indicated broader, previously unrecognized challenges to the maintenance of a positive safety culture including substantial weaknesses in various attributes of a safety conscious work environment which were present in various work units across WBN. The NRC stated "given the current state of the site's safety culture, you are not meeting the Commission's expectation that licensees establish and maintain a positive safety culture and safety conscious work environment."

[1] The Nuclear Regulatory Commission report dated October 26, 2016, titled *Watts Bar Nuclear Plant - NRC Problem Identification and Resolution Inspection (Part 1); and Safety Conscious Work Environment Issue of Concern Follow-Up; NRC Inspection Report 05000390/2016007 and 05000391/2016007* can be found at https://www.nrc.gov/docs/ML16300A409.

- A September 2016 external consultant's assessment indicated organizational culture elements driving issues at WBN included the erosion of trust, ineffective communications, and a lack of mutual respect across staff at WBN.
- A March 2017 NRC PI&R report[2] noted:
    - The failure by TVA to implement requirements of a NRC order that was designed to avoid harassment and retaliation against TVA employees and contractors who raise safety concerns. The NRC report stated "…failure to implement the requirements of the Confirmatory Order had the potential to impede or impact the regulatory process."
    - TVA provided inaccurate information in a letter to the NRC regarding the chilled work environment at WBN. The NRC relied on information TVA provided to conclude TVA was in compliance with the confirmatory order requirements. The report stated "… failure to provide accurate information was a violation of 10 CFR 50.9[3] which had the potential to impede or impact the regulatory process."
    - The failure of TVA to consistently implement the program requirements of their Corrective Action Program (CAP) which could result in issues remaining unanalyzed and represent a more significant safety concern, if left uncorrected. Specifically, NRC indicated issues with (1) TVA's ability to identify problems and enter them in the CAP; (2) performance of formal root cause analysis, including independence of personnel performing the root cause analyses; (3) entering of issues into the CAP of items identified in external assessments; and (4) closure of corrective actions. Several of the cited examples parallel issues also identified in NTD's report.
    - Weaknesses exist in the assessment and monitoring of safety culture. NRC "noted a lack of clear, objective or independent criteria for evaluating when nuclear safety culture standards were met." NRC provided several examples that highlight the concern that site leadership's tendency was to not be appropriately self-critical when evaluating the culture at WBN. The NRC report stated "The lack of clear criteria for

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[2] Nuclear Regulatory Commission report dated March 10, 2017, titled *Watts Bar Nuclear Plant – NRC Problem Identification and Resolution Inspection (PART 2); and Safety Conscious Work Environment Issue of Concern Follow-Up; NRC Inspection Report 05000390/2016013, 05000391/2016013* can be found at https://www.nrc.gov/docs/ML17069A133.

[3] **10 CFR 50.9 -- Completeness and accuracy of information**. (a) Information provided to the Commission by an applicant for a license or by a licensee or information required by statute or by the Commission's regulations, orders, or license conditions to be maintained by the applicant or the licensee shall be complete and accurate in all material respects. (b) Each applicant or licensee shall notify the Commission of information identified by the applicant or licensee as having for the regulated activity a significant implication for public health and safety or common defense and security. An applicant or licensee violates this paragraph only if the applicant or licensee fails to notify the Commission of information that the applicant or licensee has identified as having a significant implication for public health and safety or common defense and security. Notification shall be provided to the Administrator of the appropriate Regional Office within two working days of identifying the information. This requirement is not applicable to information which is already required to be provided to the Commission by other reporting or updating requirements.

> evaluating nuclear safety culture standards likely contributed to the missed opportunities to identify and address safety culture weaknesses prior to the development of the chilled work environment." NRC also indicated TVA had made some positive changes; however, "the sustainability of positive changes to the site's safety culture may continue to be challenged without independent checks to ensure that self-assessments are appropriately self-critical."

In addition to the findings in recent assessments by TVA's own external consultants and the NRC, a look at the number of allegations reported to the NRC causes additional concerns. A leading indicator of a healthy safety culture is the number of allegations reported to the NRC. In 2016, WBN led the Nation with 34 allegations[4] filed with the NRC followed by Sequoyah with 18 allegations and a non-TVA site with 12 allegations. Notably, there was an uptick in the number of allegations filed for WBN during the last 4 months of 2016. For the first eight months of 2016, there were 18 allegations filed with the NRC and 16 allegations filed during the final four months of 2016. This upward trend in allegations came after TVA had implemented numerous corrective actions for the CWEL. While the first 2 months of 2017 show a decrease in allegations to the NRC, WBN continues to lead the Nation in the number of allegations made to the NRC. In March 2017, WBN began an outage on Unit 1 and Unit 2 experienced unplanned outages. The number of allegations to the NRC during this higher stress period could be a good indicator of whether employees are feeling more comfortable raising concerns internally instead of with the NRC. The OIG will continue to observe and report on whether TVA management makes progress in this area in 2017.

OIG AUTHORITY TO REVIEW EVENTS AT WBN

In the response to the NTD report, TVA management has questioned the OIG's involvement in reviewing the events at WBN and questioned our authority to perform reviews of their work. They have also implied that the OIG is attempting to usurp the NRC's regulatory authority and management's operating responsibilities. Our intent is not to usurp NRC or to assume operating responsibilities of TVA. OIGs, however, are charged by law with not only investigating or auditing fraud, waste, and abuse after they have occurred, but also identifying vulnerabilities and recommending changes to processes or programs that would, when enacted or implemented, strengthen controls or mitigate risk. The intent of this work in fulfilling our oversight responsibilities is to provide TVA with information and recommendations to help TVA management improve its nuclear program. Ultimately, the safety culture of nuclear plants is the issue, given TVA's now documented schedule over safety practice at WBN 1 in November of 2015 which is discussed in the NTD report. Therefore, rather than the OIG asking TVA to choose between the OIG and NRC as the regulator, as TVA management seems to contend in their response to the NTD report, we believe our work has aided the NRC in determining the true extent of conditions at Watts Bar 1.

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[4] NRC allegations statistical information can be found on the NRC Web site at https://www.nrc.gov/about-nrc/regulatory/allegations/statistics.html.

TVA management has been the beneficiary of OIG findings and recommendations for years and in most cases have acknowledged how our work has benefited TVA. For example, in 2012, it was the OIG that reported certain TVA management had misrepresented data presented to the TVA Board which continued to claim that the construction of WBN 2 was on schedule and on budget. Both the TVA Board and TVA management initially resisted the evidence that the OIG presented and that was ultimately shown to be correct. Management's resistance to the work of the OIG as well as the NTD report (much of which is supported by similar findings by the NRC) could reflect a defensive mindset that will impede positive progress.

The NRC and the TVA OIG have both worked since January 2016 to address the risks created at WBN by TVA management putting schedule ahead of safety. The continued oversight by the NRC, the TVA Board, and the TVA OIG will be critical to ensuring that residents in the Tennessee Valley and other TVA stakeholders have confidence in the ability of TVA management to comply with NRC orders and regulations.

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In conclusion, it is the responsibility of the TVA Board and TVA management to ensure the safe operations of its nuclear plants. NRC policy states that "…the working environment provided for the conduct of operations at nuclear power facilities has a direct relationship to safety." In addition, "Management must provide the leadership that nurtures and perpetuates the safety culture." Embracing independent assessments, being self-critical and seeking to learn and correct issues as quickly as possible is essential to that enhanced level of leadership.

We recently asked the Board to independently examine some of the issues that are raised by the NTD report, the NRC findings, and the OIG work on WBN 1. Specifically, we asked the Board to:

1. Engage a team of nuclear experts independent of TVA management to examine why (a) TVA management failed to comply with the 2009 Confirmatory Order at WBN 1; (b) TVA management submitted inaccurate information to the NRC in its April 22, 2016, response which indicated that TVA had completed an evaluation of the effectiveness of the implementation of the Confirmatory Order requirements relative to the conditions at WBN when in fact the evaluation was not complete; (c) TVA management wrongly reported that the chilled work environment was limited to Operations; (d) TVA management has not made sufficient progress to satisfy the NRC that the chilled work environment situation has improved; (e) WBN 1 still leads the Nation in allegations according to the NRC; and (f) why TVA management used the term "degraded work environment."

2. As the client, consider waiving TVA's attorney-client privilege for this report as a matter of public policy and transparency, regarding information that very well may be revealed by either Congressional intervention or a FOIA request. If need be, seek independent counsel on your authority to do so and the appropriateness of waving the privilege in this instance.

On April 18, 2017, TVA Board Chair Lynn Evans advised the OIG that the Board (1) was in the process of hiring a nuclear expert to examine the issues identified under item 1 above and (2) has retained independent counsel to provide guidance related to the attorney-client privilege issue. We are confident that the TVA Board and its experts will carefully consider the issues before them and work toward an understanding that will ultimately benefit all of the TVA stakeholders. We particularly appreciate the professionalism and care with which Chair Lynn Evans and the TVA Board members have approached this matter, and we look forward to a constructive resolution of the issues before us.

TVA management's written comments, which addressed the management decision and actions planned or taken for the recommendations in NTD's report, are included as Attachment 2. Please notify us when final actions are complete for the recommendations. If you have any questions, please feel free to contact me at (865) 633-7301.

Richard W. Moore

Attachments
cc (Attachments):
Sherry A. Quirk, WT 6A-K
OIG File No. 2016-16702

NTD CONSULTING GROUP, LLC

REVIEW OF CHILLED WORK ENVIRONMENT AT TVA WATTS BAR NUCLEAR PLANT PREPARED FOR TVA OFFICE OF THE INSPECTOR GENERAL

April 19, 2017

Dave Taggart
Senior Principal & Partner

Robert McWey
Senior Principal & Partner

Bruce Norton
Senior Principal & Managing Partner

Chris Younie, Consultant

Rosa Carrillo, MSOD Consultant

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ACRONYMS

BFN	Browns Ferry Nuclear Plant
CAP	Corrective Action Program
CAPRs	Corrective Actions to Prevent Recurrence
CAs	Corrective Actions
CR	Condition Report
CWEL	Chilled Work Environment Letter
CY	Calendar Year
ECP	Employee Concerns Program
FPP	Fire Protection Program
FSSD	Fire Safe Shutdown Design
GCWE	General Culture and Work Environment
HIRD	Harassment, Intimidation, Retaliation, or Discrimination
INPO	Institute of Nuclear Power Operations
NIEP	Nuclear Industry Evaluation Program
NPG	Nuclear Power Group
NQML	Nuclear Quality Management Leadership
NRC	Nuclear Regulatory Commission
NSC	Nuclear Safety Culture
NSCMP	Nuclear Safety Culture Monitoring Panel
NSRB	Nuclear Safety Review Board
NS VB&P	Nuclear Safety Values Behaviors and Practices
NTD	NTD Consulting Group, LLC
NUREG	U.S. Nuclear Regulatory Commission Regulation
OGC	Office of the General Counsel
OIG	Office of the Inspector General

ACRONYMS

PERs	Problem Evaluation Report
PI&R	Problem Identification and Resolution
PSS	Plant Support Subcommittees
QA	Quality Assurance
RCA	Root Cause Analysis
SCWE	Safety Conscious Work Environment
SLT	Site Leadership Team
SQN	Sequoyah Nuclear Plant
SRO	Senior Reactor Operator
SRTR	Special Review Team Report
TVA	Tennessee Valley Authority
USDOE	U.S. Department of Energy
VP	Vice President
WANO	World Association of Nuclear Operators
WBN	Watts Bar Nuclear Plant

EXECUTIVE SUMMARY

SCOPE

The NTD Consulting Group, LLC (NTD) was tasked by the Tennessee Valley Authority (TVA) Office of the Inspector General (OIG) to review and evaluate documents, interviews, reports, analyses, and other relevant materials related to the Nuclear Regulatory Commission's (NRC) March 23, 2016, Chilled Work Environment Letter (NRC CWEL or CWEL). Specifically, OIG asked NTD to review the history of Nuclear Safety Culture (NSC) issues at TVA for the past several years and to evaluate whether TVA's analyses of, and response to, the NRC CWEL were thorough and adequate.

METHODOLOGY

The NTD team reviewed over four-hundred interviews conducted by TVA OIG of individuals from WBN and other TVA organizations as well as numerous documents related to NSC and a Safety Conscious Work Environment (SCWE) at TVA.[1] (*See* Appendices D and E attached to this report.) This review was not a Nuclear Safety Culture Assessment that is typically performed on a biennial frequency at nuclear power plants, and as such, the OIG interviews were specific to the individual or the topic of the interview. NTD also relied upon NRC Regulatory and Guidance documents related to NSC and SCWE as well as nuclear industry publications on those subjects. (*See* Appendix E attached to this report.) Meetings were held between TVA OIG staff and the NTD team in Knoxville, Tennessee, and ongoing video conferencing between NTD team members and OIG personnel took place during the review. As the review progressed, OIG gathered additional documents and conducted further interviews, many as requested by NTD. The data gathered, reviewed, and evaluated, combined with the extensive nuclear power generation and organizational effectiveness experience of the NTD team, form the basis of the conclusions and recommendations of this report.

SUMMARY CONCLUSIONS

1. An examination of data and surveys from 2009-2016, and current interviews performed by OIG, reveals that there are NSC issues that remain unaddressed by TVA and that there is risk in continuing to misdiagnose the organizational state of Watts Bar Nuclear Plant (WBN). An examination of the data presents the picture of an environment that inhibits full expression of safety concerns as the result of management behaviors that include harassment, intimidation, retaliation, and discrimination (HIRD). The NTD team did not look for evidence of existing unsafe conditions, but TVA management's ongoing reluctance or refusal to accept and come to terms with the chilled work environment issues, coupled with continuing misperceptions regarding NSC, keep them from addressing the cultural dynamics that increase the risk of inhibiting individuals from reporting safety concerns that could well avoid safety events. (*See* section entitled TVA Nuclear Safety Culture Issues History and Precursors.)

[1] See Appendix A for NRC definitions of NSC and SCWE.

2. The identification of NSC issues and behaviors that are not aligned with the *Traits of a Strong Nuclear Safety Culture*[2] has been an ongoing trend for several years at WBN and TVA. It is the collective opinion of the NTD team that the current corrective actions (CAs) to address individual events and behaviors associated with chilled work environments from the CWEL Root Cause Analysis (CWEL RCA) will not have long-term effectiveness or sustainability until TVA conducts a root cause at the fleet level. The root cause should be performed to determine the underlying drivers in the current culture that hinder individuals in the organization from recognizing the indications of SCWE issues, the identification of true underlying causes, and the CAs required to bring about effective and sustainable change. Until an independent and critical evaluation is conducted, and the associated changes are embraced throughout the organization, the probability of success will remain low. The keys are effectiveness and sustainability. (*See* section entitled TVA Nuclear Safety Culture Issues History and Precursors.)

3. Despite the CWEL RCA admission of a limited chilled work environment at WBN, several members of the Site Leadership Team (SLT) were in denial that WBN had chilled work environment issues. This underlying denial is a continuing obstacle to ridding the site of the existing chilled work environment and precluding its recurrence at WBN and elsewhere in the TVA nuclear fleet. (*See* section entitled TVA Self-Assessment Process.)

4. TVA's two analyses, the Special Review Team Report (SRTR) and the CWEL RCA are both incomplete and inadequate, as is the TVA response to the NRC CWEL dated April 22, 2016. (*See* sections entitled Watts Bar's Response to the CWEL and SRTR – CWEL RCA and "Degraded Work Environment.")

5. TVA's analyses and response to the NRC demonstrate that TVA did not identify the key challenges of recovery from these NSC issues — the lack of trust of management by the rank and file, the chilling HIRD behaviors of members of the SLT, and the ineffective and damaged barrier programs and processes at WBN. Mistrust permeates the WBN organization. As set forth in its analyses and reports, TVA's mindset is that the chilled work environment was limited to a small group within the Operations Department and was a problem caused, in large part, by a lack of middle management communication skills in rolling out improvement programs beginning in June of 2015, coupled with employees' perceptions of retaliation without a valid basis. In TVA's CWEL RCA, there is no discussion of a need for the SLT to recover trust and regain credibility with WBN personnel or to cease HIRD behaviors. (*See* sections entitled TVA Self-Assessment Process and Response and Change Management Program.)

6. The lack of trust by TVA personnel extends to a lack of trust in chilled work barriers, including the Corrective Action and Employee Concerns Programs (CAP and ECP). Those programs are intended, *inter alia,* to act as barriers to negative behaviors that create chilled work environments and to offer avenues of solution for NSC and SCWE issues for everyone at the site. Execution of the programs appears to have been flawed for the past few years. Supporting this conclusion, the NRC states in the CWEL that these programs "have provided opportunities for management to identify changes in certain aspects of the safety culture and SCWE, but the information has not

[2] See Appendix B of this report.

been fully acknowledged and acted upon." (*See* section entitled Key Barrier Program and Process Weaknesses.)

7. As a direct result of management's misidentification of the chilled work environment root causes as set forth in the SRTR and the CWEL RCA, NTD does not believe the fifty-one (51) CAs in the response to the CWEL filed by TVA will be a panacea for bringing about effective and sustainable change in the WBN chilled work environment issues. While the CAs put in place because of those analyses may bring about short-term, temporary improvements at the site, they do not go to the heart of the chilled work environment causes and will neither permanently resolve the existing chilled work environment in Operations and other departments (where there is evidence like that found in Operations) nor prevent recurrence of a chilled work environment at WBN or at other TVA nuclear facilities. The CAs are not directly related to root causes of the chilled work environment at WBN as the CWEL RCA could not have identified the root cause as it did not adequately consider the traits associated with a chilled work environment in deriving root causes. In addition, the RCA did not address why past TVA Corrective Actions to Prevent Recurrence (CAPRs) for similar TVA SCWE issues failed to prevent the current issues. (*See* sections entitled Watts Bar's Response to the CWEL and SRTR – CWEL RCA and "Degraded Work Environment.")

8. Some positive steps have been taken to improve the SCWE in the Operations Department. There has been positive feedback concerning the new Site Vice President (VP) as stated by several individuals interviewed by TVA OIG investigators. A site-wide e-mail from the new Site VP was issued on April 11, 2016, accepting personal ownership for the chilled work environment issue and committing to resolve the issue. The e-mail sent a strong message to the site that the individual recognizes there is, in fact, a problem, he owns it and is going to get it resolved. During the OIG interviews, comments were made such as "he is much more approachable and open," and "he is seen out in the plant communicating with workers, not just performing observations to find fault." These types of actions should assist in re-establishing trust between personnel and management. Subsequent feedback, however, indicates that the undercurrent of mistrust is so strong that many do not believe management to be sincere in its current efforts at re-establishing trust. (*See* NRC Inspection Report 050000390/2016007, Appendix G.)

9. The SRTR and CWEL RCA analyses both deflect the chilled work environment and the HIRD behaviors of management giving rise to a chilled work environment by repeatedly using the inappropriate term "degraded work environment." The analyses focus on the fact that the environment was caused by "poor communication skills" and invalid perceptions rather than the chilling HIRD behaviors of several individuals (from different departments) in the WBN SLT. (*See* sections entitled Watts Bar's Response to the CWEL and SRTR – CWEL RCA and "Degraded Work Environment" as well as Appendix G.)

10. The precursors for the chilled work environment at WBN could and should have been recognized and acted upon before March of 2016. Those precursors were not, as stated in the TVA CWEL RCA "subtle." They were clear, covering a period of years. It appears there were attempts to downplay the precursors and failures to implement appropriate CAPRs and CAs resulting from prior analyses done throughout the TVA nuclear fleet that found NSC issues. In reviewing the precursors, NTD notes that the extent of the conditions found were not properly considered nor

were the causes of those conditions sufficiently identified and pursued as to extent at WBN or elsewhere in the TVA nuclear fleet. (*See* section entitled TVA Nuclear Safety Culture Issues History and Precursors.)

11. The precursors of the chilled work environment went unrecognized by management, internal and external oversight groups, and TVA barrier programs and processes such as the CAP, the ECP, Quality Assurance (QA), Nuclear Safety Culture Monitoring Panel (NSCMP), and the Nuclear Safety Review Board (NSRB). Those programmatic barriers are put in place to, *inter alia*, detect such precursors. (*See* sections entitled TVA Nuclear Safety Culture Issues History and Precursors, and Key Barrier Program and Process Weaknesses.)

12. The 2013 Synergy Safety Culture Assessment of the TVA fleet brought to management's attention, with clarity, NSC issues. The survey results led to the preparation of the "TVA NPG Synergy Assessment Remediation Plan." That plan, while comprehensive, did not result in changes necessary to prevent a chilled work environment within the TVA fleet. (*See* section entitled TVA Self-Assessment Process and Response.)

13. The CWEL response, SRTR, and CWEL RCA failed to identify or discuss why the previous TVA CAs taken to address the 2009 NRC Confirmatory Order regarding NSC at TVA did not preclude the current WBN chilled work environment. Such an analysis should have been done to, at the least, gain knowledge as to "what did or did not work and why" for application to the current situation. In addition, there have been several root cause analyses done throughout the TVA nuclear fleet in the past decade that have identified numerous NSC and SCWE issues. None of those analyses have resulted in CAPRs that have proven effective and sustainable over time. (*See* sections entitled Watts Bar's Response to the CWEL and SRTR – CWEL RCA and "Degraded Work Environment.")

14. Documentation data and interview results indicate TVA management has inappropriately influenced the outcome of causal analyses and independent investigations pertaining to NSC/SCWE issues at WBN. These actions, coupled with TVA's repeated inappropriate use of the non-regulatory term "degraded work environment," led directly to the NRC and others receiving an inaccurate picture of the existing NSC/SCWE issues at WBN.[3] (*See* sections entitled Supplementary Confirmatory Data; Completeness, Accuracy, and Independence; Recognition of a Chilled Work Environment; Watts Bar's Response to the CWEL; and SRTR – CWEL RCA and "Degraded Work Environment.")

[3] Subsequent to the NTD team reaching its conclusions regarding TVA's use of the term "degraded work environment," an independent consultant retained by TVA in August of 2016 to review the adequacy of TVA's April 22, 2016, Response to the NRC CWEL, also found that the use of the term "degraded work environment" was inappropriate and should be discontinued by TVA.

DISCUSSION OF SUPPORTING DATA

TVA NUCLEAR SAFETY CULTURE ISSUES HISTORY AND PRECURSORS

The evaluation of a nuclear site's actions or behaviors, in this case TVA's WBN, is an ongoing process by the corporation, site, and external organizations such as the NRC and Institute of Nuclear Power Operations (INPO). For WBN, some of the recent analyses have resulted in findings or weaknesses in traits as defined in U.S. Nuclear Regulatory Commission Regulation (NUREG) 2165, *Safety Culture Common Language*. The WBN SLT, the NSCMP, the SRTR, and the CWEL RCA did not evaluate this ongoing trend to at least as far back as the 2009 NRC Confirmatory Order. Each time the Watts Bar NSC was reviewed, deficiencies in the NSC have been found. The root causes of that trend, and the CAs that should be derived therefrom to prevent recurrence, are essential to arrive at a sustainable fleet-wide positive NSC and a SCWE.

The NTD team evaluated information from the NRC, TVA, independent assessments, investigations and surveys, pulse data, and the TVA CAP database to develop a timeline of key events or actions concerning NSC and SCWE as respects the chilled work environment at WBN. The search focused on NSC or SCWE issues that acted directly or indirectly as a precursor to serious issues, or as initiators for actions to evaluate and correct behaviors in these areas.

The following chronology does not capture all the historical data for the TVA fleet; however, there is a relatively large representative sample that indicates an ongoing trend of issues related to deficiencies in the NSC within TVA for several years.

There have been multiple issues identified, many driven by the NRC, that have initiated CAs to address behaviors concerning NSC. The NTD team reviewed CAs that have been implemented in the past, and are being implemented now, related to NSC and SCWE issues. NTD has not been able to determine which actions that have been taken were effective in changing or improving the TVA NSC. However, what is apparent to the team is that whatever CAs have been taken, including CAPRs, that may have had a positive effect on NSC, have not been sustainable, and SCWE issues continue to be identified. Several root cause analyses concerning NSC and SCWE have been conducted by TVA over the years; however, the resultant CAPRs that were implemented failed to obtain the required objective of preventing recurrence.

The following examples support this analysis:

- The 2009 Confirmatory Order was issued to TVA concerning the results of two investigations conducted by the NRC Office of Investigation at the Browns Ferry Nuclear Plant (BFN). One of the events, initiated in October 2008, determined that a maintenance mechanic was demoted for raising a safety concern regarding TVA's compliance with its Fitness for Duty program.
- In 2009 and 2011, the Synergy survey reports regarding WBN indicate that mistrust existed in this time frame. Evidence of intimidation was also identified.
- On May 9, 2011, the NRC assessed BFN Station's performance for Unit 1 to be in the Multiple/Repetitive Degraded Cornerstone Column of the NRC's Action Matrix. This was an

indication that station performance, in one or more of the seven cornerstones of safety as defined in the NRC Reactor Oversight Process, had placed the public health and safety at risk. This initiated the NRC 95003 Inspection Procedure to review TVA's response to a Red inspection finding[4] associated with a valve failure in the Residual Heat Removal system.

- On June 2, 2012 at BFN, a potential trend in SCWE was identified and resulted in a Problem Evaluation Report (PER) being written. The PER evaluated fifty-three (53) PERs that were identified as SCWE issues in the time frame from January 1, 2012, to June 18, 2012. The PER was classified by the CAP as a Level C issue being of low risk or low significance.
- In June 2012 at BFN, findings from the 95003-inspection interviews, coupled with the Synergy TVA nuclear fleet survey results, identified a SCWE issue. The problem was identified as weaknesses in the areas of employee willingness to report or inform supervisors of nuclear safety issues, and management ability to effectively use indicators and precursors of a chilled environment to correct performance. The apparent cause analysis performed identified that BFN management had not effectively established a trusting relationship with employees to strengthen the SCWE. Additionally, ECP staff was not viewed as competent and trustworthy. (Apparent Cause Evaluation [ACE] PER 571348 – Revision 0003.)
- On June 4, 2013, the NRC issued Notices of Violations to Sequoyah Nuclear Plant (SQN) and WBN because of issues with the stations' hydrology analysis. Multiple findings and violations were cited at both WBN and SQN. The stations were placed in a degraded cornerstone in the NRC Reactor Oversight Process and in a 95002-inspection process.
- In July 2013, Nuclear Power Group (NPG) Corporate PER 758026 RCA was conducted to determine why SQN and WBN flood mitigation plans were inadequate to mitigate design basis flood events. As a part of the RCA, the NSC was evaluated. The components found to be less than adequate were decision making, CAP, operating experience, work control, self and independent assessments, work practices, and accountability. The CAPRs focused on the development and implementation of only program changes to improve the overall safety culture of NPG. The program was to include: (1) policy statements at both the TVA and NPG level; (2) programs/procedures to implement the policy; (3) communication to rollout the new policy and program/procedures, including specific reference to the flooding event and how a poor safety culture leads the organization there; and (4) a monitoring program to ensure the organization effectively implements the new policies, programs, and procedures. These CAs are noteworthy as they were credited as addressing later events caused by poor performance in NSC in later RCAs, a practice NTD believes to be a strong indicator of a weak CAP.
- PROPRIETARY [redacted]

[4] Inspection findings are NRC risk-based findings that go from green – white – yellow through red, with red being the highest risk that receives the highest regulatory attention.

- In January 2014, the results of the WBN 2013 Synergy survey were received. The survey identified that WBN was in the bottom decile in the industry for NSC, SCWE, and Nuclear Safety Values Behaviors & Practices (NS VB&P). WBN ranked in the 4th quartile in the industry for ECP, General Culture & Work Environment (GCWE), and Leadership Management & Supervisory skills. The Synergy results showed that at WBN NSC, SCWE, and GCWE metrics declined from 2009-2011-2013. WBN ranked in the bottom decile in the industry for the SCWE sub-dimension "Indicators & Precursors of a Potentially Chilled Work Environment."

  The Synergy survey for SQN ranked them in the 4th quartile of the industry for NSC, SCWE, and ECP. They ranked low 3rd quartile in the industry for NS VB&P. The Synergy results show that SQN NSC, SCWE, and GCWE metrics declined from 2011-2013. SQN ranked 4th quartile in the industry for the SCWE sub-dimension "Indicators & Precursors of a Potentially Chilled Work Environment."

  BFN ranked 2nd quartile in the industry for NSC, NS VB&P, and ECP. They ranked 1st quartile in the industry for GCWE and Leadership, Management, & Supervision.

- The 2013 Synergy survey comments from WBN revealed problems related to SCWE, many instances regarding retaliation, and identified the ECP program as an "area in need of attention." These results again revealed a weakness in NSC; specifically, the trait of an Environment for Raising Concerns. The summary provided a negative picture of the conditions at WBN that were conducive to creating a CWE:

  - Behaviors of specific managers/senior managers negatively impacting the SCWE in specific organizations (within WBN).
  - An unusually high rate of comments entered, 1,203. Eighty-two percent negative in nature.
  - There were a total of 52 comments directly related to SCWE -- Retaliation (14) and fear of retaliation (11). The others were negative reactions, SCWE Impact on Identification, CWE, and SCWE general comments.
  - Overall results were rated as an area for improvement in SCWE and show the lowest GCWE ratings with 90 percent rated as weaknesses.

- Notably lower ratings on climate for environment of trust and mutual respect since 2011.
- Leadership Management Supervisor ratings were the lowest in the fleet with all areas in need of attention.
- PROPRIETARY [redacted]

- On May 5, 2015, WBN initiated a Condition Report (CR 1022308) to evaluate the programmatic breakdown of the WBN Unit 1 fire protection program (FPP) for fire safe shutdown (FSSD). Specifically, the question was what led to the delayed identification of the collective significance to challenges to the WBN Unit 1 FSSD strategy? The RCA team concluded that the behaviors associated with safety culture were less than adequate to protect the integrity of the FSSD instructions. The team's conclusion was based on the nature and significance of weakness identified in the safety culture traits of Leadership Safety Values and Actions, Problem Identification and Resolution, Work Processes, Continuous Learning, and Decision Making.

- PROPRIETARY [redacted]

- On March 23, 2016, the NRC issued WBN a CWEL.

The historical events outlined above were entered in the TVA CAP and responded to in the form of either a root cause, apparent cause, or common cause; appropriate evaluation tools to provide a methodical approach to cause determination. The NTD review of the documents that addressed the identified NSC or SCWE issues and found that the CAs focused on process changes. As an example,

to address one of the root causes in the 2013 event with SQN and WBN Flood Mitigation Plans, the corrective action plan states:

> Since mid-2012, organizational and process changes [emphasis added] have been made to improve and sustain a strong Nuclear Safety Culture across TVA NPG. Policy statements have been developed and signed by the TVA Board of Directors and TVA NPG Chief Nuclear Officer; a senior program manager position for nuclear safety culture, reporting directly to the Senior Vice President of Nuclear Operations, has been added to the organization; governance and oversight has been strengthened to address nuclear safety culture; the NPG Nuclear Operating Model (NOM) has been refined to include clear roles and responsibilities for nuclear safety culture; and a series of procedures have been issued to institutionalize the NSC model. The procedures cover the NSC program, the Employee Concerns Program, the NSC monitoring processes and NSC assessment activities. Site safety culture health is monitored by the Nuclear Safety Culture Monitoring Panel, Senior Leadership Teams at each site, and corporate with overall fleet safety culture health being monitored by the Executive Leadership Team.

These actions were developed in 2012 by TVA NPG Executive Leadership to improve NSC based on management observation and NSRB feedback. The root cause on flood mitigation credited the preceding 2012 action plan, requiring no additional recommendations, as all that would be required.

The NTD review identified that in the few instances when a RCA team had recommended addressing behaviors, e.g., as was recommended by a respected contractor brought in to assist in the root cause analysis of the 2015 Programmatic Breakdown of the WBN Unit 1 FPP for FSSD, the actions to address behaviors were rejected by leadership and did not end up in the root cause analyses. The actions to address the low performing areas in the NSC defaulted to the plan referenced in the root cause for the 2013 SQN and WBN Flood Mitigation that had in turn credited a corrective action plan originally developed in 2012 to address prior NSC issues as discussed above.

A TVA fleet employee engagement survey conducted by the Gelfond Group in 2015 was credited by TVA in documents such as the FSSD root cause and the TVA corporate procedure driven Focus Self-Assessment for showing improved performance. The Gelfond Group is not a recognized provider of NSC assessments. They have no trend data with TVA or the nuclear industry. Direct inquiries to the Gelfond Group by NTD did not provide any references to experience in this area nor to their ability to link survey results to nuclear safety. The data used for the Gelfond survey section Nuclear Safety Culture – Industry Comparison does not reference an industry norm for the ten NSC Traits scored. How the fleet or the individual TVA nuclear sites perform compared to the industry cannot be determined from the information presented. However, the fleet deviation information makes it clear that Watts Bar was a negative outlier from both SQN and BFN in NSC. The TVA conclusion that the Gelfond survey establishes that TVA is performing above industry norms in NSC does not appear to be supported by the facts. TVA had been using Synergy to conduct the assessment of NSC within TVA for some time. The

last Synergy evaluation was conducted in 2013 with the data compared to previous surveys conducted in 2009 and 2011. In addition, Synergy had the necessary experience and historical data to make comparisons of performance to the industry as was depicted in the analysis of the 2013 survey data. NTD was unable to determine why TVA dropped Synergy and went with a survey from a non-nuclear industry experienced company for its 2015 survey.

The CWEL RCA team picked the date of June 1, 2015, forward as the temporal focus for their analysis. The narrowing of the focus of the CWEL RCA to the June 1, 2015, period forward did not acknowledge indications (precursors) that the TVA NSC had been having repeat NSC/SCWE issues as early as 2009, and WBN had been having increasingly obvious precursors since the mid-2014-time frame.

From the data presented above, it is apparent that the identification of behaviors that are not aligned with the *Traits of a Strong Nuclear Safety Culture* has been an ongoing trend for many years at TVA nuclear facilities. It is the collective opinion of the NTD team that the current CAs to address individual events and behaviors associated with a strong NSC will not have long-term effectiveness or sustainability until TVA conducts a root cause, at the fleet level, to resolve these enduring issues. This root cause should be performed to determine the underlying drivers that hinder individuals in the organization from timely recognition of the indications of SCWE issues, the identification of true underlying root causes, and the CAs required to bring about an effective and sustainable change. Until a truly independent, critical evaluation is conducted, and the associated changes are embraced throughout the organization, the probability of effective and sustainable CAPRs will remain low.

RECOGNITION OF A CHILLED WORK ENVIRONMENT

A recognized expert in NSC and SCWE states that the reasons a chilling effect can continue to exist in a nuclear power plant environment is that management has either (1) had a blind eye to the chilled work environment, (2) been aware of it and tolerated it, or (3) wanted it to exist.[5] The theme of weakness in the NSC at WBN has been ongoing for several years. In performance reviews or assessments there have been indicators or precursors that there were significant weaknesses in the NSC. In December of 2015, a concern was submitted to the NRC from an individual at WBN stating that there were issues with the environment for raising and addressing safety issues. Considering this information, the NRC began a review within Operations at WBN through their process associated with a SCWE. The fact the allegation that led to the NRC finding of a chilled work environment in Operations at WBN was made to the NRC can be an indicator of weaknesses in internal programs. (*See* section entitled Key Barrier Program and Process Weaknesses, *infra* at page 30.)

The allegation to the NRC concerned weaknesses in behavior as defined in NUREG 2165, *Safety Culture Common Language*; specifically, the trait for an Environment for Raising Concerns. This trait states that a SCWE is maintained where personnel feel free to raise safety concerns without fear of HIRD. The trait, Environment for Raising Concerns, is further defined by attributes that ensure the licensee establishes a

[5] From *The Significance of the Chilling Effect* by W. R. Corcoran, Ph.D., P.E., December 2014.

SCWE Policy that supports individual rights and responsibilities to raise safety concerns, and does not tolerate HIRD behaviors. An additional attribute defines an alternate process for raising concerns that is independent of line-management influence. This attribute is to ensure safety issues may be raised in confidence and are resolved in a timely and effective manner.

The *U.S. NRC Allegations Manual* defines harassment, intimidation, and discrimination as follows:

> Harassment is any action or behavior toward a person that has the effect or perceived effect [emphasis added] of causing the person to be uncomfortable or afraid of working in the employment environment. Harassment covers a wide range of offensive intentional behaviors intended to be disruptive, and is characteristically repetitive, often contributing to a hostile work environment (see definition of "hostile work environment.")
>
> Harassment that progresses to the point of establishing a hostile work environment is a form of discrimination. Harassment that is threatening in nature is a form of intimidation. Intimidation literally means to "fill with fear" and refers to actions intended to coerce or inhibit by threats, insults or aggressive behavior [emphasis added].
>
> Intimidation involves an action or actions with the objective or perceived objective of preventing or discouraging a person from engaging in protected activities. Additionally, it is possible for a threat of discrimination to be considered an adverse action under Section 211 depending on case specific circumstances.
>
> Intimidation is a form of discrimination [emphasis added].

A Hostile Work Environment is further defined as:

> A discriminatory work environment that is either pervasive and regular, or acute but severe, that detrimentally affects the employee, and that is created because the employee engaged in protected activity. A hostile work environment involves unwelcome conduct and/or comments, often harassing in nature, that unreasonably interferes with an employee's work performance.
>
> The victim can be anyone affected by the conduct, not just the individual at whom the offensive conduct is directed.

OIG interviews of management and non-management TVA personnel reveal numerous adverse issues with the NSC work environment and management behaviors. The issue is more pervasive than was represented in the TVA Response to the NRC CWEL, the CWEL RCA, or the SRTR. The following are some examples of these types of comments:

- During the 2015 fall refueling outage, one manager would come into the shop and not talk to anyone. He would just sit down in a chair and glare at people. He did not talk, he just stared at people. This manager stated "It's my intention to get you to the breaking point because that is where I can get the most out of you."
- A WBN Instrument and Controls employee stated that one of his supervisors wrote up a report about a human performance issue that he reviewed and sent to his manager. That evening his manager called him and said "You are fired – you can come and get your things in the morning." When asked why, the manager stated that "the evaluation was too soft." (The employee was not actually fired.)
- A worker received an e-mail telling him to go see the psychologist for a fitness for duty test. He went to his manager and asked if he sent him to the psychologist. The manager said "yes" and tried to make a joke about it, then said that everybody was going to go. He was the only one sent at that time. Six months later some other employees in his shop were also sent. The employee believes they were sent because he complained that he was the only one sent.
- A manager stated that after the results and comments from a survey came out, they were called to a senior leader's office. The senior leader told the manager to discipline a direct report for not controlling his people and allowing them to answer the way they did on the survey. The senior leader stated "they don't have anything to bitch about safety culture – none of the stuff they are saying is safety culture." "Rate the department [redacted] manager a 2 in leadership because he did not manage the responses to the survey."
- As a recent member of the WBN SLT stated "we heavily managed the results of root causes." Still another individual who was a member of numerous RCAs at WBN stated "the more I became involved with doing RCAs, the more I saw that site management always wanted to blame the worker and never themselves." This same individual stated that the top of the SLT "always had the idea during the causal investigations and root cause investigations that the problem is that management has the solutions and the workers just don't want to hear it." One member of the SLT stated that "the head of the Site Leadership Team believed one individual who was on several root causes was a pain in the a— because he always wants to leave things in the root cause analysis that the head of the Site Leadership Team did not want in them."
- In the random pulsing interview results for the root cause conducted for the WBN chilled work environment, some of the Instrument and Controls workers refused to provide feedback. A worker stated "Don't you get it? We're not going to talk to you. You just need to leave." One worker chose to flip his badge behind his shoulder because they did not want to be identified as someone who did not want to participate.
- An individual who works in the outage control center stated that "the problem at WBN is not perception or communication." He stated "when you are getting your head lopped off it is not perception but a chilled work environment."

- In describing the situation where a reactor operator was questioning why something had been done that he did not feel was the safe thing to do, a manager told him that "the people who fire people with licenses said to do this." The reactor operator stated that the manager did not name anyone, but there are not many people above the shift manager. The reactor operator believes he was talking about site leadership.
- One of the individuals who attended the 2015 refueling outage offsite heard a member of the SLT who opened the meeting say "Is there anybody in this room (of around 100 people) that does not believe we can do a 30-day outage? If there is, they need to leave now." The interviewee stated that it was just one of many outages in his career and he had never heard a statement like that. He and the others took the statement to mean "you will leave the company, rather than just leave the room."
- The same individual from the preceding quote heard an executive manager state at the same meeting that "Operators will no longer be able to use their pocket veto. They will be made to follow the schedule."
- A supervisor in operations who was in the same 2015 offsite meeting heard a member of the leadership team make the "pocket veto" comment in front of everyone in the room. The manager "was basically telling everyone that we won't have anyone (operators) vetoing work on the schedule."
- A maintenance employee stated he has been in constant fear for his job and how he is going to put food on his table because a member of the leadership team routinely threatens the workers' jobs by saying "I'm going to fire all of you and bring in Exelon."
- In regard to a question about the NSC at WBN, a manager stated that "WBN is toxic."
- One member of the SLT who was on the CWEL RCA summed the chilled work environment issue up by stating he was not surprised that Watts Bar received the chill letter from the NRC as "there were too many external influences such as the TVA OIG that made the NRC have to respond."
- A member of the RCA team at WBN in October 2015 regarding the fire protection program stated that three members of the SLT were having a "hard spot" with the RCA team saying the cause was the NSC. "They were worried that Unit 2 would not get licensed if it was identified there was a problem with nuclear safety culture."

The *U.S. NRC Allegation Manual* states that the NRC will occasionally receive a concern that an event, interaction, decision, or policy change at a licensee has resulted in a perception that the raising of safety concerns is being suppressed or is discouraged. If this perception is held by one individual or a small number of individuals, the occurrence can best be described as having a "chilling effect" on this person or these individuals. If the concern is that the occurrence has created a work environment where the willingness of a group of employees or the entire facility is inhibited, it is referred to as an assertion of a "chilled work environment." The latter was the situation at WBN.

WATTS BAR'S RESPONSE TO THE CHILLED WORK ENVIRONMENT LETTER

The NRC issued a CWEL to TVA on March 23, 2016, after it had concluded that a chilled work environment existed in the Operations Department at WBN because of a perception that operators were not free to raise safety concerns using all available avenues without fear of retaliation. The NRC determined there was sufficient evidence to support the existence of an environment within the Operations Department where TVA employees did not feel free to raise safety concerns to management because they fear retaliation and did not feel that their concerns were being addressed. The NRC concern was heightened by information that indicated undue influence and direction of licensed operators from sources external to the control room affected operational performance. The NRC expressed a concern that a fear of retaliation existed to the extent that it was impeding open communication within the Operations Department. Their reviews also found that information from the CAP, the ECP, and other sources had provided opportunities for management to identify changes in certain aspects of the safety culture and SCWE, but the information had not been fully acknowledged and acted upon.

In the CWEL, the NRC directed TVA to take several discrete, required actions. Specifically, the NRC directed that TVA:

1. Assess the climate at WBN;
2. Address the root causes that allowed the chilled work environment to exist; and
3. Take steps to ensure the staff at WBN is willing to openly participate in the process.

The NRC acknowledged that surveys and evaluations recently conducted by TVA, such as the SRTR, might form part of the assessment. The NRC also requested that TVA provide its plan of action for addressing the chilled work environment.

The NRC indicated that in the plan, TVA should:

1. Describe any immediate or short-term actions which provide reassurance of acceptable performance during completion of the in-depth assessment;
2. Describe how the in-depth assessment will be/was conducted by persons independent of the organization affected;
3. Evaluate the effectiveness of the implementation of Confirmatory Order EA-09-009, EA-09-203 requirements relative to the current conditions;
4. Detail how TVA will address the potential extent of condition in organizations outside of Operations;
5. Describe any associated CAs and how TVA will measure the effectiveness of the CAs; and
6. Describe how TVA will address past effectiveness of the CAP and the ECP.

TVA provided its response to the CWEL in a letter dated April 22, 2016. In that response, TVA addresses each of the requirements as set forth in the NRC CWEL. It identified 51 specific actions, including the completion of a RCA. Of the 51 actions, 25 had been completed prior to the submittal of the response. An additional 12 were scheduled to be completed by the end of the second quarter of 2016 (including the

RCA), 8 by the third quarter of 2016, 3 by the end of the fourth quarter of 2016, with the remaining 3 to be completed in the second and third quarters of 2017. The RCA was completed on May 3, 2016, and identified a Corrective Action to Preclude Repetition, plus 18 other CAs.

The NTD team does not believe the 51 actions set forth by TVA in its April 22, 2016, response will be sufficient to resolve the current chilled work environment at WBN or to prevent recurrence of a chilled work environment at WBN or other TVA facilities in the future. While many of the actions outlined by TVA present opportunities for improvements in the NSC, including a SCWE at WBN, there is a relatively high probability that those improvements are not sustainable without additional actions being taken. The additional corrective actions to prevent recurrence should be derived from a thorough and fully sufficient CWEL RCA.

Through personnel interviews conducted by OIG investigators, it was learned that many instances of HIRD have occurred or have been alleged to have occurred in Operations and in other departments at WBN. The OIG interviews identify that there is, and has been, an overriding lack of trust by many at WBN of the Watts Bar SLT and the very programs designed to act as barriers against SCWE issues such as the ECP and CAP.

The OIG interviews also reveal that the meetings with Operations personnel arising out of the plan submitted by TVA on April 22, 2016, have not been well received by many. Some personnel do not believe what was presented was accurate or factual, a direct result of the deep-seated mistrust that exists in the rank and file at WBN. Individuals stated that they did not trust the independence of previous assessments performed by the ECP, CAP, or the analyses teams assembled by management to conduct the reviews referred to in the TVA response.

A site-wide NSC Assessment should be performed by an organization completely independent of TVA, such as the company that performed the survey at WBN in 2009, 2011, and 2013. Currently, actions identified in the TVA response letter to measure the effectiveness of CAs are all activities conducted internally by WBN (Response letter, page E-17.) Independent NSC Assessments should be performed as soon as practical and then again in 12-18 months to assess the effectiveness of the actions identified in the response letter to remove the chilling environment and in sustaining a positive SCWE.

With respect to the evaluation of the effectiveness of the implementation of the 2009 Confirmatory Order (EA-09-009, EA-09-2013) relative to the current conditions, the TVA response identified that some actions from the Confirmatory Order were not completed as specified. The actions that were taken in response to the Confirmatory Order were intended to maintain a SCWE where personnel feel free to raise safety concerns without fear of HIRD. This did not occur. However, TVA does not in the response, the SRTR, or the CWEL RCA determine, or even examine, why the actions that were taken in response to the Confirmatory Order failed to prevent the current chilled work environment within the Operations Department at WBN. A rigorous and thorough analysis of why the actions taken did not prevent the current situation was, and still is, in order.

SRTR - CWEL ROOT CAUSE ANALYSIS AND "DEGRADED WORK ENVIRONMENT"

A member of the TVA upper management team stated in an interview that the TVA Office of the General Counsel (OGC) had asked ECP [redacted] ATTORNEY-CLIENT [redacted] The same individual related the following:

- [redacted] ATTORNEY-CLIENT [redacted]

This same interviewee concluded this subject in the interview with the statement that:

- [redacted] ATTORNEY-CLIENT [redacted]

One of the NTD team members met with OGC in the last week of July 2016 to discuss the issue set forth above. The OGC responded that [redacted] ATTORNEY-CLIENT [redacted]

TVA retained an independent firm to conduct an assessment/review of the TVA Response to the NRC CWEL in August 2016. In addition to NTD's renunciation of the term "degraded work environment," that firm also concluded that the term "degraded work environment" should not be used by TVA *(infra* at pages 43-44.)

NTD understands the position of the NRC on this matter to be that nuclear utilities, such as TVA, have the ability and the right, even the duty, to determine whether a chilled work environment exists in a nuclear facility and should be making these types of decisions in the normal course of business.

The evidence is clear that TVA's actions surrounding the "degraded work environment" tactic and their management of results from causal analyses and independent investigations concerning NSC/SCWE issues during the period from at least mid-2015 through mid-2016, resulted in the NRC and others receiving an inaccurate picture of the NSC/SCWE issues at WBN. In addition, and perhaps even more important in the long term, those management actions have further eroded the trust of TVA employees thus creating a condition conducive to further chilled work environments.

The CWEL RCA states in Section 3.0, Extent of Condition, that: "…there was no evidence of a chilled work environment in any of the WBN departments outside of Operations, nor was there evidence of chilled work environments in either of the SQN or BFN Operations Departments." In the May 24, 2016, meeting with the NRC, TVA informed the NRC in a written slide that the "chilled work environment was confined to the Operations Department." NTD is unable to discern a difference in being able to definitively state that no chilled work environment exists as TVA has done repeatedly, but then, on the other hand, not being able to say that a chilled work environment does exist because "the NRC knows things that we don't."

The TVA NPG Synergy Assessment Remediation Plan was developed in early 2014 as the result of the 2013 Synergy survey results. In the Strategic Actions section of the plan, Milestone 5 was developed to enhance procedures to address management concerns where chilled work environment is raised as an issue. Actions in this milestone include:

- Draft procedure to ensure completion of CA for substantiated chilled work environment cases.
- Develop additional action steps for investigation of chilled work environment cases including chilled work environment surveys for affected organizations.
- Add an investigation step to identify the presence of precursors to a chilled work environment where chilled work environment was not substantiated.
- Schedule refresher training by the OGC to ensure ECP professionals have a clear understanding of chilled work environment.

The direction given to ECP by OGC in early 2016 was in direct conflict with the direction given in the 2014 Remediation Plan, developed as the result of the 2013 Synergy Assessment. The plan instructed OGC to offer training to ECP to establish a "clear understanding of a chilled work environment." In contrast to the material set forth in the Remediation Plan, OGC's instructions regarding a chilled work environment to ECP have resulted in ECP's having the ability and right to determine that there is no chilled work environment, but neither the ability nor the right to determine that there is a chilled work environment.

If one couples the logic set forth by TVA OGC in analyzing the SRTR and CWEL RCA analyses, and the use of the term "degraded work environment" in those documents, it becomes a hopeless task of trying to figure out just what TVA is trying to say. The only thing that is clear is the constant position that any chilled work environment at TVA is confined to a small segment of the WBN Operations Department, a position not supported by the facts gathered by OIG interviews, documentary evidence, or this review.

In early 2016, a confidential informant reported the existence of a chilled work environment to ECP. An in-depth Employee Concerns investigation was performed in February 2016. ECP retained two individuals from outside TVA to conduct a "truly independent" investigation. The two individuals asked to conduct the investigation were independent (one being a former TVA Manager) and conducted the investigation in an independent and forthright manner. But the writing of the report is a very different story. In February of 2016, the term "degraded work environment" was introduced into the WBN nuclear lexicon, not by the independent investigators, but by TVA's ECP personnel.

Reviews of e-mails and interviews with the two independent consultants reveal several disturbing facts. The term "chilled work environment" was edited out of the text of the report by ECP personnel. The independent consultants insisted on using the words "chill" or "chilled," but were permitted to do so only when the consultants were quoting the confidential informant. Their report was repeatedly edited by ECP, and ECP insisted upon, and did in fact, write the six-page Executive Summary of the report where they introduced the term "degraded work environment" at page six of the Executive Summary, the first use of that term NTD could find in any TVA documentation at WBN or elsewhere.

After the Executive Summary was written by the ECP Manager and the report finally edited by ECP, it was sent to the Special Review Team at the end of February or the first of March for their use in preparing their report. The adoption of the term "degraded work environment" was soon to be in full swing, finding its way into the SRTR 11 times. When that report, and four of its authors, found their way to the CWEL RCA, "degraded work environment" gained even greater use, appearing 28 times in the RCA. When asked in an interview what the term "degraded work environment" meant to them, one member of the RCA team stated: "It's just a standard term that I have heard over and over in all organizations," a definition not shared by other members of the CWEL RCA team.

The independent consultants' investigation consisted of two phases: Phase I focused on the Operations shift employees (Shift Manager and below) to determine if the five Operations' crews were reluctant to raise safety concerns due to fear of retaliation; and Phase II focused on the remainder of the Operations Department and several members of the Outage Control Center to determine if they felt the same way. Additionally, the overall investigation was to determine the source/cause of any environment where there was a reluctance to raise concerns for fear of retaliation. During Phase I, 45 Operations' shift employees were randomly selected for interviews. A summary of the interview results from Phase I follows:

- One hundred percent knew they were personally responsible for identifying safety and quality concerns and indicated they would raise those concerns to their immediate supervisor and/or chain of command.
- Twenty-four percent indicated they did not believe their management team wanted them to report concerns.
- Forty-five percent indicated that a culture for raising concerns did not exist at WBN.
- Seventy percent indicated they were not supported by plant management. This is further indicated by their lack of trust in senior management.
- They further indicated that an average rating of the morale was 1.76, with a choice of 1 to 5, with 5 being the best.
- Thirty-three percent indicated they were not confident they could raise a safety or quality concern without fear of retaliation and 49 percent indicated they were not confident they could raise any concern without fear of retaliation.
- Thirty-eight percent indicated they personally had experienced a negative reaction for having raised an issue or concern.
- Sixty-six percent indicated they knew someone who had experienced a negative reaction for having raised an issue or concern.

- Seventy-nine percent indicated they felt comfortable questioning a decision made by the Outage Control Center or site management. Their comments indicated that they would question the decision, but if they received any "push back" from the OCC, they would do as told. Several stated that Operations previously pushed back at a level 10, but would now only push back at a level 1.
- On a scale of 1 to 5, with 1 being low, how would you rate your trust in the following various management? Average scores were as follows:

    - Unit Supervisor – 4.9
    - Shift Manager – 4.47
    - Operations Senior Management Team – 3.22
    - Plant Manager – 2.6
    - Site VP – 1.91

Phase I results confirmed the existence of a chilled work environment in Operations at WBN. However, when the investigative team presented the Phase I findings related to employee perception of a poor SCWE, the Site VP, Plant Manager, Operations Director, and Operations Superintendent did not embrace, and in fact rejected, the concept that there was an environment where some employees were reluctant to raise issues due to a fear of retaliation. During a subsequent OIG interview with an individual consultant involved in the investigation, the individual stated that senior management was in "disbelief" and did not like the fact that he had stated TVA management contributed to the poor SCWE. He was not invited back to be part of the Phase II debrief which, in his interview with OIG, he attributed to management's reaction to his report-out to them of the results from Phase I. It should be noted that in the body of the CWEL RCA, the analysis simply ignores the results from Phase I and only discusses Phase II, which was a survey of management that provided a far less damaging picture than Phase I. None of the results from Phase I, or the reaction of the SLT to the independent investigators findings, found their way into any part of the discussion in the SRTR or the CWEL RCA.

In an OIG interview with the other consultant involved in the investigation, the subject of the individual Senior Reactor Operator (SRO) who was relieved from watch on January 11, 2016, shortly after raising a safety concern to management was discussed in some detail. The individual stated that he believed that it was indeed a clear case of a HIRD behavior (retaliation) by management, a conclusion shared by NTD after its review of the facts as set forth in numerous interviews and reports, but not shared by either the internal TVA investigation, the SRTR, or the CWEL RCA.

A detailed review of reports, interviews, and survey comments revealed many examples of the chilling HIRD behaviors of TVA management in several departments, including the WBN SLT over a meaningful period. The SRTR and the CWEL RCA make a point of repeatedly stating that "no retaliation claims were found to be substantiated or valid" ergo, the unspoken, but implied, conclusion is that the perceptions were not valid, ergo the chilled work environment was a "degraded work environment," a position steadfastly maintained until the issuance of the NRC CWEL. Of the four legs of HIRD (harassment, intimidation, retaliation, and discrimination), any one or combination thereof can give rise to a chilled work environment. The SRTR and the CWEL RCA essentially ignored the HIRD behavioral effects of WBN SLT in their analyses.

The only behavior discussed in the TVA reports and response to the CWEL deals with the invalid perceptions of retaliation. There are numerous examples of HIRD behaviors in the TVA OIG interview summaries from TVA line and management employees, present and past. These are clear-cut indicators of a chilled work environment that were apparently not found, and certainly not discussed in the TVA reports, causal analyses, or response to the CWEL.

TVA's insistence on the extensive use of the term "degraded work environment" in the SRTR and the CWEL RCA speaks to a denial of the serious situation facing TVA and the SLT at WBN in recovering the trust of personnel at WBN. Likewise, the continued focus on "poor communication skills" and denying the factual basis of the perceptions of their employees ("no claims of retaliation were substantiated," a theme found repeatedly in the TVA analyses of the situation giving rise to the CWEL) illuminates the strong likelihood that the CAs to prevent recurrence will miss the mark. In addition to minimizing the valid CWEL conclusion that a chilled work environment existed at WBN in Operations, TVA investigations and analyses ignore the HIRD behaviors of management that created a chilled work environment at WBN in more than just the Operations Department. Instead, TVA labels everything outside of the invalid perception framework a "degraded work environment" and devises CAs limited to the "invalid perception" of a chilled work environment.

Instead of looking at the facts of the workplace in the light of the traits of a positive NSC and SCWE found in NRC Regulations, Regulatory Guidelines, and industry treatises on the subject, TVA used the undefined term "degraded work environment" as the guide post of their investigations and reports. The attachments to the CWEL RCA contain many factual incidents that, when held up to comparison with the traits found in NRC guidance documents regarding a chilled work environment, would lead to different conclusions. For example, the following quote can be found in the ECP Extent of Condition Report, Attachment E, of the RCA, at page 85:

> Overall field notes/observations should annotate that Maintenance Instrument and Control (I&C) refused to provide feedback. After repeated attempts to collect data (third), an I&C employee replied with "Don't you get it? We're not going to talk to you. You just need to leave!" There were three occasions where the interviewer was asked to meet in a secretive manner so the employee would not be implicated or identify themselves (or even that someone might overhear the conversation). One employee chose to flip their badge behind their shoulder because they did not want to be identified as they did not want to participate.

The pulse results that were done for the extent of condition review by ECP at WBN (Attachment E of the RCA, at pages 86-88) found the following:

> In response to the question "Do you feel free to approach any level of management regarding any problem or concern?" the following percent of positive answers were given:
>
> Maintenance – 36%
> Chemistry – 50%

In response to the question "Do you believe you can raise any problem or concern without fear of harassment, intimidation, discrimination or retaliation?" the following percent of positive answers were given:

Maintenance – 55%
Chemistry – 50%
Security – 34%
Engineering – 67%

In response to the question "Have you ever witnessed an example of behavior that does not support a healthy nuclear safety culture?" the following percentages of affirmative answers were given:

Maintenance – 91%
Engineering – 66%
Radiation Protection – 78%
Security – 67%
Chemistry – 50%

Concerning a willingness to raise concerns, the ECP WBN Extent of Condition (Attachment E of the CWEL RCA, page 89) the following statement is found:

> There was a consensus among the FLSs [first line supervisors] that they and their direct reports would raise a nuclear safety concern. Concerns were raised as to what avenue that they would raise their concerns to. Most felt comfortable raising only to the level of their Superintendent, and several stated that they would go directly to the Operation's Shift Manager.

Regarding the use of internal programs, the ECP WBN Extent of Condition (Attachment E of the CWEL RCA, page 89) the following statement is found:

> 12 of the 15 FLSs' stated that they do not see Employee Concerns as an avenue to raise concerns. Of those 12, 11 stated they would prefer using the OIG since they know the OIG is separate from NPG management chain and that they trusted that their concerns would remain anonymous.

Based on ECP's own report, NTD does not reach ECP's conclusion that the chilled work environment at WBN was limited to the Operations Department. At a minimum, the pulse data and interview comments collected by ECP, coupled with the fact ECP could not even get information from some personnel, would indicate a contrary conclusion.

Based on a "…comprehensive review of a wide spectrum of source documents over a two-year time …" the Special Review Team concluded that WBN employees, with one exception, are not reluctant to raise safety concerns for fear of retaliation. The single exception was associated with the Operations Department where it was determined that there was a chilling effect on some members of the Operations Department due to a perception [based on a false premise] of retaliation for raising concerns. Despite the

perception of retaliation by some Operations personnel, the Special Review Team determined there had been no verified instances of retaliation by management for raising a nuclear safety concern. For example, an SRO raised an issue while conducting an evolution in the plant. Following a discussion his supervisor had with the plant manager, the SRO was relieved from shift duties. Management stated that the action to relieve the SRO was the result of a previous performance issue [that occurred 3 plus weeks prior] and was simply coincident with the individuals raising a safety concern. The perception of the workers in the control room and others in Operations was that the action was taken in retaliation for pushing back on the conduct of an operational evolution, a view fully shared by the independent investigators of the incident brought in by TVA ECP. The SRTR stated that the "degraded work environment" in the Operations Department was not a long-standing concern; rather the "degradation" was near term and was underpinned by a narrow set of contributing factors.

The key contributors to the "degraded work environment" in the WBN Operations Department were determined in the CWEL RCA to be three-fold and included: (1) fear of retaliation and/or discrimination, and general unwillingness to raise concerns; (2) perception of production over safety emphasis; and (3) management and leadership behavior weaknesses (no actual or "for example" behaviors of the SLT were discussed in the SRTR or the CWEL RCA). NTD's position is that these attributes did not reflect a "degraded work environment," but rather were clear-cut examples of a chilled work environment.

The NRC March 23, 2016, letter stating that a chilled work environment did exist in Operations forced TVA to move from the position taken by the SRTR and conduct a RCA on the NRC's finding of a chilled work environment. Unfortunately, in deviation from normal protocol, four SRTR team members, including the Management Sponsor, rolled over to the CWEL RCA. The Management Sponsor for the CWEL RCA was the same individual that headed up the Level 2 Analysis of the November 11, 2015, Operations incident that was the event that led to the December 2015 complaint to the NRC. That individual was also the Management Sponsor of the RCA on the November 11, 2015, incident before becoming the Management Sponsor of the allegedly "completely independent" CWEL RCA and was the chair of the NSCMP, a group that did not recognize or act on precursors of the chilled work environment.

The CWEL RCA continued with the "degraded work environment" theme they inherited from the SRTR that had in turn been inherited from the ECP Program Manager's Executive Summary of an Employee Concerns investigation of a confidential informant's claims of a chilled work environment in the Operations Department (NEC-16-00127). The SRTR and the CWEL RCA analyses failed to give any serious consideration to either NSC or SCWE traits with respect to the relevant facts, including the HIRD behaviors of the WBN SLT and the effect on personnel exposed to those behaviors.

TVA's repeated use of the term "degraded work environment" to describe the situation at WBN is an unfortunate choice. The term is used 11 times in the March 2016 SRTR and then 28 times in the "completely independent" CWEL RCA of May 3, 2016. By way of contrast, a word search of the term "degraded work environment" does not turn up even a single use of that term in the NRC Regulations, NRC Regulatory Guides, NRC Policy Statements regarding NSC or SCWE, or industry publications about NSC or SCWE (INPO, WANO, NEI, *etc*.). Not surprisingly, it is never defined by TVA in any of the reports or analyses that it submits despite its excessive use in downplaying the existence of a chilled work environment at TVA. In addition, and perhaps the primary reason that it is of no value in analyses of this type, there are no common traits or history of use in the nuclear industry or at TVA with which its use

in this situation can be compared. It is, in other words, a stalking horse. Its sole value to TVA is that there are no regulatory consequences from having a "degraded work environment."

One of the first RCA team members interviewed by OIG stated during his interview regarding the CWEL RCA effort that the term "degraded work environment" was "used only to distinguish issues in the Maintenance Department from the chilled work environment in the Operations Department so people wouldn't think they were the same." When looking at the 28 times the phrase "degraded work environment" is used in the main body of the RCA, including the first sentence of the Executive Summary, that position is unsupportable. Interestingly, there were eight different definitions given by the individual members of the CWEL RCA, as indicated in the following answers to direct questions about the term "degraded work environment" from OIG interviews of the CWEL RCA team members:

- "When standards and expectations are no longer being met…don't know where they got the term from." "It's just a standard term that I have heard over and over in all organizations."
- "It is really anything that is not your normal-work schedule or work activity- and has to do with interaction with co-workers and supervisors; if you have a challenge in any of those areas." "It's not a term that is used a lot." "I would not relate degraded work environment and chilled work environment."
- "ECP does a lot of pulsing every year and they get comments back on those. When they start to see a number of comments stating that people don't feel safe to raise concerns that is an indication of a degrading work environment." "An increase in anonymous comments is also indicative of a degrading work environment." "Don't know where the term came from, just a common term the RCA team used to explain what they were seeing. Don't recall specifically getting that term from anywhere."
- "A degraded work environment is a catch-all phrase that something needs to be done."
- "Degraded is lesser consequence/impactful as opposed to chilled. Less consequential – but certainly not insignificant."

The following response was given by a TVA upper management RCA team member:

- "It means a work environment that is not healthy. Nuclear relies on leadership and processes to be healthy, and if these are not healthy, it will only compound any situation and make it worse." "The team used degraded rather than chilled because they only had three weeks and were caught up on the fear of retaliation inclusion in 'chilled.' Some comments in the interviews were not relevant to a fear of retaliation or chill, but going forward they had more data and proof so they felt more confident using the word 'chilled.' Fear of retaliation may not be from the individual in a situation, but rather could be from someone that witnessed the situation and didn't understand what was going on or didn't know the whole story." The person also stated "…didn't know if degraded work environment is a term in the industry or not or if there is a documented definition." and "… had discussions with the NRC and degraded work environment was a term the NRC used." Finally, the person stated **"… neither [the RCA] team nor the NRC would use that term for WBN now that they have been able to classify it as chilled."** (emphasis added)
- "Not involved with that, but it probably had to do with super crews being in an outage alignment for months that was wearing people down. Everyone knew, or should have known, that it was

going to be challenging to bring a unit online." "I assume degraded work environment came out of Operations."

The TVA Management Sponsor of the CWEL RCA offered the following:

- "We discussed the definition as a team. I'm not sure what the definition is right now. From the Davis-Besse incident, Nuclear Safety was created…anything that doesn't rise to the level of nuclear safety would be a degraded work environment. Some things we found we wanted to go fix. I believe there is a definition, but I'm not sure. I have seen the term used. **I retract my previous statement about the definition; I don't know where you could find this definition."** (emphasis added)

So, other than the fact that a "degraded work environment" is not defined anyplace in the nuclear lexicon and is therefore impossible to measure in an exercise such as a RCA, how else did the analyses suffer because of its use? The answer to that question lies in what the SRTR and CWEL RCA teams did not do. The concept of a SCWE is a subset of NSC. The concepts of a NSC and SCWE are articulated in great depth in the NRC Regulations, Regulatory Guides, Policy Statements, and industry publications. There are specific traits that must be examined when analyzing issues involving NSC and SCWE. There are no guidelines whatsoever to be followed for a "degraded work environment." When looking at chilling effect/chilled work environment concerns, an analyst should be looking at guidance provided by the NRC. Neither the TVA Special Review Team nor the CWEL RCA team conducted a comprehensive examination of the relevant facts against the applicable NSC and SCWE traits. It should also be noted that those teams either did not look for, or found and did not discuss, the many facts concerning chilled work environment HIRD behaviors of the SLT that the OIG found through interviews of TVA working level and management personnel.

The *U.S. NRC Allegation Manual*, Revision 1, April 23, 2015, provides the following chilled work definition:

> A chilling effect is defined as a condition that occurs when an event, interaction, decision, or policy change results in a perception that the raising of safety concerns to the employer or to the NRC is being suppressed or is discouraged. A chilled work environment is a condition where the chilling effect is not isolated (e.g., multiple individuals, functional groups, shift crews, or levels of workers within the organization are affected). A chilled work environment is often referred to as a condition that is the opposite of a safety conscious work environment.

At page 138 of the manual, the chilled work environment related to discrimination and management behaviors is set forth as follows:

Chilling Effect/Chilled Work Environment Concerns Related to Discrimination Issues

- Discrimination against the alleger has caused the alleger and/or others to be chilled

- Discriminatory action against another individual has caused the alleger and/or others to be chilled
- Non-NRC-related discrimination has "chilled" workers, causing the alleger and/or others to be unwilling or hesitant to raise nuclear/radiological safety issues

Chilling Effect/Chilled Work Environment Concerns Related to Management Behaviors (Other than Discrimination)

- Concerns are addressed improperly, slowly, or not at all
- Positive feedback is given for limiting concerns raised
- Management requires that corrective action program items be screened prior to submittal
- No access to supervisor, avoidance
- Management over-emphasizes schedules
- Management requires workers to perform activities they communicate are improper or unsafe
- Workers who raise concerns are sent for psychological counseling
- Workers who raise concerns are treated negatively/chastised by management (troublemaker, not a team player) or differently (singled out)

Neither the SRTR nor the CWEL RCA conducted any direct analysis of these traits or attributes at WBN as was required by the NRC CWEL of March 23, 2016. While they do indirectly include allusions to the traits of Leadership Action and Accountability, they fail to do a full analysis of all the traits, thus missing important elements of any investigation of SCWE issues. A review of OIG interview notes reveals many examples of these chilling HIRD behaviors existent at WBN. Perhaps the reason neither the SRTR nor the CWEL RCA teams found these examples is because there are no such traits for a "degraded work environment," the thematic centerpiece of the two TVA analyses and response to the NRC CWEL.

There are instances in the CWEL RCA where the term "degraded work environment" is used interchangeably with chilled work environment. For example, Attachment E of the CWEL RCA "ECP – WBN Extent of Condition Review" is the TVA Employee Concerns extent of condition review for the CWEL RCA for the SQN and BFN. As set forth *supra*, at page 17, the ECP does not use the term chilled work environment as requested by OGC, so at page 77 of the ECP Appendix E, Extent of Condition Review for the CWEL RCA, it states:

> An extent of condition analysis was conducted to determine if findings of a **degraded work environment** in WBN Operations exist throughout the WBN site and among Operations at Sequoyah and Browns Ferry Nuclear Plants [emphasis added].

There was an extent of condition analysis done by ECP at the other TVA nuclear facilities to see if a "degraded work environment" existed in the Operations Departments at those facilities. However, contrary to the NRC instructions in the CWEL, it was not to see if a chilled work environment existed, unless TVA is using the term "degraded work environment" as a substitute for a chilled work environment.

In other places in the RCA, the phrases are used in the same sentences as probably different things. An example can be seen in the "Extent of Condition" section at page 12 where it states:

> The purpose of this evaluation was to determine, based on interviews and surveys, if there was a chilled work environment or other degraded work environment in (1) in [*sic*] any of the following WBN departments: Maintenance, Work Control…, or (2) in either the SQN or BFN Operations Departments.

In this situation, the extent of condition was different than at the other facilities – at WBN the extent of condition was to see if there was a "degraded work condition" in any department, which they found in Maintenance, and if there was a chilled work environment in any department other than Operations, which they did not find.

An instance where there can be no question that the RCA intended the two terms to have different meanings is found at page 16 in the "Conclusions in Prior Station Events and Significant Changes" where it states:

> This portion of the analysis was characterized by multiple station initiatives to drive performance improvements (accountability model, discipline policy, zero-tolerance initiative, rule deviation tracking) that were ineffectively communicated in the Operations Department. These initiatives coupled with operational errors, events, and discipline set the stage for a degraded work environment. Subsequent gaps in communications resulted in a chilled work environment.

While the "subsequent communications gaps" are never discussed in the SRTR, the CWEL RCA, or TVA's response to the CWEL, the "degraded work environment" was, if not equal to a chilled work environment, something less than a chilled work environment for which there is no regulatory consequence for TVA.

Both the CWEL RCA and SRTR attempt to make the case that a "degraded work environment" arose in Operations due to some middle management miscommunications regarding performance improvement policies put in effect at WBN in June of 2015, and that the management communications about, and implementation of, those policies "could have been handled better." This theme was cited as one of two root causes in the CWEL RCA. This incorrect root cause serves as the basis for many of the corrective actions set forth not only in the RCA, but also in the TVA April 22, 2016, Response to the NRC CWEL.

Given the infirmities of trying to perform a root cause on something that does not exist in the nuclear lexicon, one must ask why did TVA make such use of this term? The answer to that question may well be found in reviewing information regarding warnings or prohibitions against using "chilled work environment" nomenclature in written documents, *supra* at page 17. The CAs arising from the SRTR, the TVA response to the CWEL, and the CWEL RCA fail to meet the legally required objective of developing actions that will preclude recurrence because they do not address the actual root cause(s) of the chilled work environment. The root causes for the "degraded work environment" as found by the

RCA team are no more than underlying contributory causes to the whole of the chilled work environment that was not properly investigated, but the CAPRs for those causes are unlikely to be successful in precluding recurrence of a chilled work environment because they are neither directed at the chilled work environment resulting from the HIRD behaviors of management nor their root causes.

COMPLETENESS, ACCURACY, AND INDEPENDENCE

The NRC "Safety Culture Policy Statement" and INPO 120012, *Traits of a Healthy Nuclear Safety Culture*, define one of the NSC traits to be a Respectful Work Environment where trust and respect permeate the organization. As one of the cornerstones in a SCWE culture, the lack of trust is a serious impediment to a healthy SCWE. Past and current assessments of the WBN work forces show significant issues regarding a lack of trust by WBN personnel of management. The words in the title of this section are inextricably tied to the trust issue.

The NRC policy statement that applies to TVA defines NSC as "the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment." The culture at WBN is based on the beliefs and values established by the leaders within the organization. How leaders respond to issues is observed by workers thus reinforcing the behaviors and beliefs within the organization. A healthy safety culture is founded upon open and honest behaviors of management at all levels.

Trust at WBN has been impacted as TVA has responded in a consistent pattern to the events/allegations regarding NSC and SCWE that arose in late 2015 and early 2016 in the Operations Department. First, there was a denial by TVA that a chilled work environment existed, a position established with the SRTR filed with the NRC. As shown *supra*, at pages 18-19, both the independent investigation commissioned by TVA and the SRTR were inappropriately influenced by TVA management. For example, the independent investigators were told by TVA ECP what they could and could not put in their report and the Executive Summary of that report was written by ECP, not the independent investigators. It was in that Executive Summary that the term "degraded work environment" was first used in lieu of the NRC regulatory term "chilled work environment." ATTORNEY-CLIENT [redacted]

For whatever reason, the TVA SRTR chose not to identify the chilled work environment for what it was; denying that there even was one. In the SRTR, TVA maintained that there was simply a "degraded work environment" in Operations as some individuals had a perception of the existence of retaliation in Operations for raising concerns, but then stated that the Special Review Team did not identify any adverse actions taken by management for raising concerns, implying those perceptions were unfounded. A chilled work environment exists when individuals perceive they may be retaliated against for raising concerns, not just because retaliation has occurred in the past.

It was not until TVA received the CWEL from the NRC on March 23, 2016, stating that a chilled work environment existed in the Operations Department did TVA admit that they did have a chilled work environment in Operations at WBN. Even then, in the *Watts Bar Keeping Current* publication issued to site personnel on March 24, 2016, by the Senior VP, Site VP, and Plant Manager, it stated "As part of the

NRC's ongoing process, it has issued a Chilling Effects Letter (CWEL) to TVA Nuclear reflecting that the NRC inspection process identified indications of a chilled work environment within portions of our site." This is not in line with the NRC CWEL where it stated "The Nuclear Regulatory Commission has concluded that a Chilled Work Environment exists in the Operations Department because of a perception that operators are not free to raise safety concerns using all available avenues without fear of retaliation." The CWEL did not say there were indications of a CWE, it stated that one existed. However, the continuing response of TVA to the NRC CWEL has been to minimize the magnitude and extent of the issue and to continue to deny the existence of any chilled work environment elsewhere at WBN. TVA's continuing denials have been found to be incorrect by the NRC and independent assessors: a chilled work environment exists in at least several departments at WBN and within the ECP program itself.

TVA has also been incomplete in its search for chilled work environment behaviors at WBN, failing to address obvious indications of HIRD behaviors from the WBN SLT. In performing its RCA on the CWEL, TVA failed to look for, and in turn deal with, HIRD behaviors of the SLT that were common knowledge among the personnel in Operations and other departments. The OIG interviews have revealed numerous examples of HIRD behaviors by the SLT and TVA management. These management behaviors have without doubt had significant influence on the lack of trust of management by WBN personnel.

TVA continues to minimize the SCWE issues in its CWEL RCA, repeatedly talking of "degraded work environments" and essentially ignoring chilled work environment regulatory requirements for SCWE traits as a basis of comparison with the situation at WBN. Likewise, in its response to the CWEL, TVA downplays the significance and extent of the SCWE issues. Rather, it appears that TVA is relying on the "correct by volume" approach, identifying some 51 actions that will be a panacea for a healthy SCWE. Unfortunately, none of those actions deals directly with the HIRD behaviors of the SLT or TVA management. Without dealing directly with the management behavior issues, trust cannot, and will not, be restored in the work force. Without that trust, corrective actions will probably not be successful and will not be sustainable.

There has been a history of inappropriate influence by TVA management in independent investigations and causal analyses involving NSC and SCWE issues. Independent investigators and RCA team members were directed to leave negative findings out of their written reports and analyses because of management involvement and direction. When presented with findings in these areas, management has instructed that the findings not be put in the reports or analyses for such reasons as:

- ATTORNEY-CLIENT
- "Saying that there was a safety culture problem would reflect badly on senior management and make them vulnerable to bigger problems."
- "They [the SLT] were worried that Unit 2 would not get licensed if it was identified there was a problem with nuclear safety culture."

As noted *supra*, at page 13, even members of the WBN SLT voiced concern in interviews about the role of the SLT in root causes, noting, *inter alia*, that "we heavily managed the results of root causes" and "the head of the Site Leadership Team believed one individual who was on several root causes was a pain in the a— because he always wants to leave things in the root cause analysis that the head of the Site Leadership Team did not want in them."

The issue concerning a two-phase independent assessment discussed in some detail *supra*, at page 20, is an excellent example of both retaliatory behavior of management toward an independent assessor and omission of data (from the RCA) that gives an incomplete and misleading picture of the extent of the CWE at WBN.

The net result of these behaviors is: (1) the readers/users of the reports and analyses are not getting a complete and accurate portrayal of the facts; (2) there is a chilling effect on the personnel, managers, and root cause teams; and (3) trust is not fostered within the organization, therefore impeding the establishment of a healthy NSC that is essential for safety and for ensuring an unrestricted environment for raising concerns.

KEY BARRIER PROGRAM AND PROCESS WEAKNESSES

CHANGE MANAGEMENT PROGRAM

The NRC considers Change Management a critical process in maintaining a strong safety culture. They emphasize the importance of being thoughtful and intentional about change management to help overcome cultural resistance and expedite change adoption (Reference: INSAG-18). Weak management of the change process can contribute to eroding trust and a chilled work environment. Change management is an industry proven management technique for systematically evaluating the impact of planned changes, taking actions to mitigate the adverse impacts of change, and proactively communicating with employees to alleviate concerns and encourage understanding and acceptance of changes and management decisions.

Effective change management practices are especially critical to ensure safety programs are not diminished by changes in processes, staffing, or priorities. Safety can be adversely challenged during periods of significant change as has occurred at WBN, such as transitioning Unit 2 to the operational phase, refueling outages, reorganization, workforce downsizing, and management turnover. Part of managing change is communicating the “why behind the changes" and addressing the needs and concerns of the workforce to proactively reduce anxiety and uncertainty. When this is not done well, it quickly erodes trust. Furthermore, when downsizing is not managed properly, it can create an exhausted or distracted workforce that is unable or unwilling to identify the early warning signs of danger. This potential was not discussed in the CWEL RCA. Though the change regarding the implementation of the new “Adverse Employee Action” procedure was identified in the RCA, the broader issue of change management did not appear to be evaluated as part of the “extent of cause.”

There is no evidence in the RCA analysis that it went beyond examining how programs were communicated although the Synergy 2013 survey had 120 comments (98 percent of them negative), regarding workload, equipment condition, and lack of sufficient resources. The RCA further did not remark on the concerns that management was unresponsive to concerns found in the surveys. Per the NRC, “chilled” refers to a perception that raising of safety concerns is being suppressed or discouraged, which includes “by a slow or no response.”

Another aspect of change management that the RCA team did not examine is whether management’s response to missed goals by their increasing discipline and instituting a zero-tolerance policy was

appropriate given the high-stress environment WBN was experiencing. This concern is perhaps best illustrated by a quote from [redacted] PROPRIETARY [redacted]

QUALITY ASSURANCE PROGRAM

One of the potential missed oversight barriers for the WBN CWEL pertained to the QA organization. The question is, why didn't QA internally identify the concerns prior to receipt of the NRC CWEL?

When the CWEL RCA was performed, the RCA stated QA did not identify the issue of the CWEL prior to its receipt from the NRC. However, the RCA did not include an analysis of missed opportunity corrective actions by QA. The RCA allowed a deviation to the normal corrective action process where QA could perform a Missed Opportunity Review separately from the process. The RCA CAs only state that a Missed Opportunity Review will be performed by QA and the CAs resulting from the review will be incorporated into the condition report CAs. When the CWEL RCA was completed and signed, the QA Missed Opportunity Review was not yet completed and approved. This temporal process deviates from established corrective action and causal analysis practices.

An NTD review of the Missed Opportunity Review found that QA internally did identify a potential precursor to the chilled work environment; however, they did not thoroughly perform an effective follow-through and, subsequently, discounted the issue as being an isolated case.

There had been no independent Nuclear Industry Evaluation Program[6] (NIEP) audits of QA at WBN for 4 years. A NIEP was performed at WBN in 2012. The 2012 WBN NIEP did identify weaknesses with TVA independent oversight. The next NIEP at TVA was performed at BFN in 2014. Based on a review of the 2012 and 2014 NIEPs, it appears that TVA had implemented a practice that in lieu of having an independent audit performed at each station every 2 years, they rotate the assessment between the stations. Therefore, any given station would have only been audited every 6 years. TVA had credited the fact it is the same QA Program for all three sites. However, each station site has a unique organization (e.g., site QA, on-site independent review functions, unique culture, and differences in implementation). This practice did not meet the requirement for an independent audit every 2 years for a station unless activities of all their facilities are included within the audit sample (Reference: USNRC Regulatory Guide 1.33 and ANSI 18.7). It is TVA management that establishes the timing and specific scope for any given NIEP, not the other NIEP utilities. This approach would only be acceptable if an appropriate sample of implementation is taken from each of the sites. The NIEP assessments scoped at TVA should be conducted from a "nuclear fleet perspective" every two years to ensure compliance with current regulatory requirements for a biennial audit. Review of the 2016 NIEP performed in August was found to have been appropriately performed on a "fleet level" for TVA. This practice should continue for future NIEPs of TVA.

[6] See Appendix C for description of NIEP audits and requirements.

The 2012 and 2014 NIEP did evaluate NIEP Objective "E" at WBN and BFN, respectively. Objective "E" pertains to organizational effectiveness and assesses QA oversight of NSC at the nuclear station. Evaluation of this objective was appropriately based on earlier NRC issues pertaining to safety culture at BFN. In the BFN NIEP, one recommendation was identified by the NIEP team that QA enter the CAP trend analysis results for NSC attributes. It also noted that QA included NSC traits in their tri-semester reports. It further noted that procedural adherence and work processes safety culture traits were included. However, there is no mention of the other safety culture traits, such as SCWE, being audited.

The 2016 NIEP did not include Objective "E" which is unfortunate considering the March NRC CWEL for Watts Bar. Considering previous safety culture regulatory issues and the CWEL, Objective "E" should be included within the scope of future NIEPs.

The lack of an independent audit of WBN QA was not identified during the CWEL RCA and was not identified in the Missed Opportunity Review performed by QA in June 2016. This would have been one of the missed barriers for ensuring QA is effectively assessing NSC health at WBN as part of their oversight function.

QUALITY ASSURANCE OVERSIGHT OF THE TVA EMPLOYEE CONCERNS PROGRAM

Review of the recent audits of the ECP indicates that the last QA audit was performed in 2013. ECP was included along with Licensing in a series of 3 audits in 2012 and in 2013. However, there have not been any audits of ECP at WBN for 3 years. In addition, QA provides no independent QA oversight for investigations performed outside of ECP, such as when performed by the OGC. This is a telling missed opportunity and flaw in the internal oversight program. All activities affecting quality should be audited on a biennial basis. This lack of auditing was also not identified in the CWEL RCA or in the QA Missed Opportunity Review for the CWEL. It was also not identified in the SRTR or the response to the CWEL. The nuclear industry, through the NQML committee, has established specific guidance for the evaluation of utility nuclear employee concern programs in NECE-GUID-001 "Nuclear Employee Concerns Evaluation Program Performance Objectives and Attributes" and in NECE-GUID-002 "Nuclear Employee Concerns Evaluation Program Evaluation Guidelines" that could be used as input for future independent audits of ECP.

In addition, the NSRB is chartered to ensure an effective internal audit program is conducted at the nuclear stations. The NSRB neither identified this issue, nor did they identify the issue in their review of the RCA.

QA has not been effective in providing independent oversight through the audit process of the ECP at TVA. Furthermore, the issues identified by a lack of oversight of the ECP were not identified by the RCA, the QA Missed Opportunity Review, or by the NSRB in their own chartered oversight of QA. The Missed Opportunity Review does not have the rigor of an analysis such as that provided in a RCA. QA should perform a RCA to identify the cause and establish appropriate CAs to strengthen the effectiveness of independent oversight. The analyses should consider the effectiveness of previous CAs taken to improve independent oversight effectiveness as documented in RCA BFN PER 655461 (RCA dated February 15, 2013). That RCA analyzed why independent oversight missed signals of declining

performance at BFN. The RCA also noted that the August 2012 NIEP at WBN (SSA 1206 WBN NIEP Evaluation) had identified similar issues.

EMPLOYEE CONCERNS PROGRAM

The ECP is the organization responsible for evaluating employee concerns when they are received and has a responsibility to identify whether a chilled work environment exists or if there are trends or other indications that a chilled work environment potentially exists. In addition, ECP is aware of the allegations submitted to the NRC, both the subject of the concern when they are referred to WBN for investigation and the actual number of allegations submitted.

There were ample numbers of indicators available to the ECP, such as survey data from the 2015 Gelfond survey plus an additional independent survey where the data indicated SCWE issues within the Operations Department, and the 2013 Synergy survey comments which revealed problems related to SCWE, many instances of retaliation, and identified the ECP program as an "area in need of attention." ECP Pulsing Questionnaire results for NPG from the third and fourth quarter of 2014 indicated that only 66 percent of the WBN employees felt that concerns could be raised without fear of HIRD. In addition, the allegation data from 2011-2015 shows that Watts Bar Unit 1 had more than three times above the industry median for 2015 (56 allegations from 2012 through June 2016).

TVA OIG interviews and prior survey comments revealed that there is a lack of trust in ECP at WBN, and individuals stated they would go to the TVA OIG rather than the ECP if they had a concern because of the lack of trust and their belief that ECP is not an independent organization from WBN senior/executive management.

A lack of confidence in the internal TVA ECP appears to be further supported by reviewing the number of NRC received allegations for WBN, SQN, and BFN when compared to the number of allegations received by the NRC for the rest of the U.S. nuclear industry. Additionally, it is further supported by reviewing the number of received allegations by the NRC from on-site sources compared to the number of formal concerns (concerns resulting in a formal investigation report) received by WBN ECP.

A review of the number of NRC received reactor allegations for the 60 operating reactor sites for calendar year (CY) 2016 (thru August) indicates that WBN, SQN, and BFN have a significantly higher number of allegations as compared to their industry peers and already far exceed the total CY 2015 rate for the three facilities, 44 through August 2016 to 27 for all of 2015. WBN (excluding WBN Unit 2 construction) has the highest number of industry received NRC allegations with 18, with SQN having the second most in the country with 14, and BFN the third highest with 12. In addition, through June 2016, WBN Unit 1 had the highest rate of substantiated allegations to the NRC, having tripled the number of the next highest unit in the United States. During this period, WBN Unit 1 had 3 substantiated allegations, compared with 3 sites (of the 60 total industry nuclear sites) having 1, and 56 sites having none.

WBN accounted for 9.6 percent of all industry operating site allegations received in CY 2016 thru June. The three TVA sites (excluding WBN Unit 2) account for nearly a quarter (23.4 percent) of all industry operating site allegations received in CY 2016 thru August.

In reviewing the number of WBN Unit 1 concerns from CY 2013 to June 2016, the number of TVA ECP formal investigations (excluding NRC referrals) was less than allegations received by the NRC from on-site sources. (*Refer to the table below*)

NRC Received Allegations (From On-Site Sources) CY 2013 thru May 2016	ECP Received Concerns Resulting in Formal Investigations CY 2013 thru June 2016
34	30

WBN Unit 1 On-Site Allegations to NRC compared to Formal ECP Investigations

In August 2016, OIG completed an evaluation of the work environment in the oversight organizations to determine whether the work environment in those organizations is conducive to raising concerns without fear of retaliation (Reference: OIG 2016-15398). OIG identified that 50 percent of the ECP personnel did not feel safe to raise nuclear safety, technical, or quality concerns, or problems without fear of retaliation.

Recent interviews conducted by OIG with TVA ECP personnel revealed that 75 percent (3 of 4) of the ECP personnel felt they did not feel safe to raise concerns or problems without fear of retaliation in their work environment. The instructions by OGC to management regarding the non-use of the term chilled work environment, coupled with the fact the giver of those instructions and the recipients of those instructions are doing the investigations of the allegations, raises a question about the "no allegations of retaliation have been substantiated" statements that are found throughout the SRTR and the CWEL RCA in making the case that the perceptions of retaliation by individuals in Operations was invalid. Additionally, when 75 percent of a work group at a nuclear utility perceives that they are working in a chilled environment as is the case with ECP at TVA, it would seem reasonable to conclude that there is a chilled work environment in that group and unreasonable to pass it off as a "degraded work environment."

CORRECTIVE ACTION PROGRAM

Feedback from interviews and previously conducted culture surveys indicate a striking lack of confidence in parts of the nuclear organization, including the CAP. Additionally, internal TVA QA audits performed since 2013 have identified numerous ongoing ineffective CAs that indicate an even larger issue with the effectiveness of the CAP.

Corrective actions resulting from the RCA for the CWEL:

- Lacked the depth of extent of condition and cause;
- Failed to fully address the holistic nuclear safety culture environment;
- Were based on surveys that were not independent nor comprehensive;
- Were not based on interviews of individuals in key organizations to ascertain cultural issues; and
- Identified corrective actions that addressed symptoms in limited areas.

The NTD team reviewed information gathered from TVA OIG interviews and a prior, but relatively recent, WBN Root Cause (CR 1022308) from October of 2015 entitled "Programmatic Breakdown of the WBN Unit 1 Fire Protection Program (FPP) for Fire Safe Shutdown (FSSD)." That RCA team did compare the factual findings of the team to NSC traits and concluded there were weaknesses in behaviors, demonstrated by weaknesses identified within the areas of leadership safety values and action, problem identification and resolution, work processes, continuous learning, and decision making. While these are traits of a healthy NSC, they were not referenced in the RCA as such. It was learned from several sources that senior management had a hard time with the RCA team saying the cause was NSC, and senior management was worried that Unit 2 would not get licensed if it was identified that there was a problem with safety culture. It was also learned that the management sponsor for the RCA had initially supported the evaluation and was on board with the conclusions until meeting with senior management. After the meeting, he met with the RCA team and discussed why they should remove the words NSC. Another member of the team opined that when the results were presented to senior management that there was a safety culture problem, senior management disagreed and preferred to place fault with a single individual.

An external expert in RCA and safety culture was brought in to assess the RCA team's work and conclusions. He supported the team's conclusion, but he faced insurmountable hurdles when presenting his conclusions to senior management, which included the former Site VP, the current Site VP, and the Plant Manager. He received feedback from senior management that "saying that there was a safety culture problem would reflect badly on senior management and make them vulnerable to bigger problems."

The FSSD Root Cause in Revision 0 did not include the term "safety culture" as being less than adequate as the initial draft stated; rather it uses the term "organizational behaviors." From Revision 0 (June 26, 2015) of the RCA to Revision 3 (October 29, 2015), several changes were made in the report, specifically in the Executive Summary where reference to the actions to improve the safety culture are identified based upon input from the independent expert. The final root cause states: "Watts Bar Nuclear did not demonstrate the organizational behaviors [emphasis added] necessary to assure the technical accuracy of the station's fire safe shutdown design output and implementing procedures in a manner consistent with their risk significance." It further states following the cause statements that "While the root cause statement identifies weaknesses in nuclear safety culture (NSC) related to FSSD…." This statement is in error as the RCA statement does not mention "nuclear safety culture"; instead, the term "organizational behaviors" is used in its place. The RCA team did assess the NSC monitoring process, as codified in RCA 758026 for fleet hydrology issues, and determined that the established process was adequate to monitor and affect changes in the organizational behaviors and awareness associated with NSC principles and that no further actions were determined to be necessary to address the high-level organizational aspect of the identified cause. The corrective action to prevent recurrence was also completely different from Revision 0 to Revision 3. The corrective action to prevent recurrence in Revision 0 was to implement a behavioral modification plan with WBN Leadership Team as constructed in Attachment J of the root cause report. This action was removed from the final revision at the request of the Site VP.

The RCA was not taken advantage of to change behaviors at the station. The industry consultant for the root cause made a recommendation in the root cause to "…leverage the behaviors of the new management team in such a way that it demonstrates new behaviors in a positive way that can be modeled by all others in the organization." This recommendation was taken out by management and did not remain in the root

cause as a corrective action. NTD would conclude that management's response to findings in a root cause by changing the outcome and softening the wording may well create a chilled work environment of the CAP and the CAP process, including members of the Root Cause Team.

The WBN CWEL RCA conducted an extent of condition analysis to determine if findings of a chilled work environment in WBN Operations existed throughout the WBN site and among Operations at SQN and BFN. The extent of condition review included:

- ECP data;
- Independent interviews with first line supervisors; and
- Independent interviews with bargaining unit leaders.

The conclusion as written in Section 3.0 of the RCA at page 12 was that "…there was no evidence of a chilled work environment in any of the WBN departments outside of Operations, nor was there evidence of chilled work environments in either of the SQN or BFN Operations Departments." However, it should be noted that per Attachment E to the RCA, ECP – WBN Extent of Condition Review, "An extent of condition analysis was conducted to determine if findings of a degraded work environment in WBN Operations exists throughout the WBN site and among Operations at Sequoyah and Browns Ferry Nuclear Plants."

In reading the attachments to the CWEL RCA, it is most difficult to understand how the RCA team arrived at their conclusions regarding chilled work environments. There are many instances of chilled work environment behaviors and anecdotes quoted and cited in the attachments that are never discussed in the body of the RCA. The focus on a "degraded work environment" as opposed to a chilled work environment could explain this omission.

OIG interviews found indications contrary to the conclusion for extent of condition. There are indications of a chilled work environment at WBN. Interviews documented signs of retaliation, harassment, and intimidation in departments outside of Operations. As set forth *supra*, at page 14, the *U.S. NRC Allegation Manual* provides examples of behaviors, other than retaliation, that create a chilled work environment. These include the examples of workers who raise concerns are sent for psychological counseling and workers who raise concerns are treated negatively/chastised by management (troublemaker, not a team player) or differently (singled out) all as behaviors that create a chilled work environment.

TVA SELF-ASSESSMENT AND RESPONSE PROCESS

In examining TVA's self-assessment process, the NTD team discerned several reasons why the chilled work environment was not recognized and addressed in a timelier manner.

In interviews done by OIG, it appears that as recently as April of 2016 the SLT believed the problem was limited to two rogue operators. TVA hired a specialist who made it a top priority for the WBN SLT to own the situation and accept that some of members of the SLT had created an environment that suppressed open communications. He stated the SLT has made some progress, but "it has been the hardest spot." When the people in charge do not accept feedback from the workforce, they cut themselves off from valuable information that could help them avert a tragedy. In fact, by not accepting the feedback as valid, management creates barriers that cut off communication—the very essence of a chilled work environment.

United States Navy Admiral Hyman G. Rickover, who directed the original development of the naval nuclear propulsion program and controlled its operations for three decades as director of Naval Reactors, instilled two important management objectives for success; specifically, the ability to "face facts" and to "develop the capacity to learn from experience."[7] It would serve TVA well to embody these objectives in addressing its NSC/SCWE issues.

TVA's response to the NRC CWEL demonstrated that leadership did not recognize or accept the two key challenges they face in their recovery: (1) the pervasive lack of trust in management, and (2) recognition and addressing of the chilling HIRD behaviors of the SLT at WBN.

Mistrust permeates the organization, yet in leadership's mind the challenge is contained to Operations and represents a miscommunication problem rather than a need for management to regain trust and credibility. In addition, many of the survey comments point to management's failure to manage change in a way that manages the stress and anxiety of restructuring and downsizing. High levels of stress are a recognized safety hazard in the nuclear industry and the Synergy 2013 survey had 120 comments, 98 percent of which were negative, regarding workload, equipment condition, and lack of sufficient resources.

Management's assertion that the threat of retaliation was a misperception caused by miscommunication is an element of the continuing, and perhaps increasing, lack of trust in management. However, this lack of trust has been present for several years. The survey data over the past several years indicates there is a distrust of management and that there is a perception of retaliation. In contrast to management's assertions, the survey data indicates that the threat of retaliation in Operations was real, not invalid, and that other departments are also impacted by fear of reprisal. Failure to acknowledge this damages management's credibility and trust with WBN personnel and its ability to conduct a reliable self-assessment. One WBN operator expressed his frustration at management's refusal to admit that they have been using retaliation states "… people have been intentionally retaliated against. Not by firing, but by other methods such as poor performance reviews, lower raises or none, and limiting career progression."

An example that belies the belief that the chilled work environment was not a "long-standing concern" is a 2013 [redacted]

[redacted]

[7] Quotations of Rickover from *The Rickover Effect* (1992) by Theodore Rockwell.

An examination of surveys conducted during the 2013-2015 period, backed by current interviews performed by OIG, reveals that there are deep and pervasive issues that remain unrecognized and unaddressed by TVA. There is increased risk in continuing to misdiagnose the organizational state of the WBN that could lead to serious failures, endangering the facility and the public safety. There is an alternative to TVA leadership's interpretation of the survey data. The data indicates an environment where a fear of retaliation inhibits full expression of safety concerns and, more importantly, that management misinterpretations and continued ignoring of the safety culture issues at WBN will keep them from addressing the cultural dynamics that could stop people from preventing a safety incident.

In September 2016, an independent assessment at WBN found that a chilled work environment still existed and that there was a considerable lack of trust in management. The assessors found that "most interviewees identified that the first email that came out [from management] after the CWEL talked about 'there is a perception of a problem here' indicating a lack of understanding and belief in the issues that had been identified"; again, a clear showing of the pervasive lack of trust of management by WBN personnel. Until that fabric of trust is repaired, through a valid analysis of the actual underlying causes and implementation of the necessary CAs, the work environment at WBN will not be a safety conscious one.

NUCLEAR SAFETY REVIEW BOARD

The NTD team evaluated the effectiveness of the NSRB process for identifying nuclear safety culture issues including SCWE issues. Two NSRB meeting reports were reviewed during the period from June 1, 2015, to the present date, one dated August 11, 2015 (for meetings conducted on July 13 and 14, 2015), and another dated December 18, 2015 (for meetings conducted on November 30 and December 1, 2015). Additionally, an older July 2012 NSRB set of meeting minutes was reviewed by the team to compare the current depth of the scope of documented review by the NSRB to earlier reviews.

Neither of the August 11, 2015, or December 18, 2015, NSRB reports identified a concern with Nuclear Safety Culture or SCWE in the Operations Department.

The focus areas of the August 11, 2015, NSRB report of the Plant Support Subcommittee did not include ECP within the stated agenda, and as such, there were no comments or insights related to potential SCWE issues or concerns documented from the program. The NSRB Plant Support Subcommittee (PSS) did conclude that "The Performance Improvement (PI) and Corrective Action Programs (CAP) continue to be performed at a level above average in the industry, except for trending of low level issues and quality of some CAP products." The NSRB PSS further concluded that "the Quality Assurance (QA) program continues to perform at the excellence level, both for Unit 2 construction and Unit 1 operations." In operations, the NSRB concluded that WBN "Operations performance continues to be good with an improving trend."

However, the December 18, 2015, NSRB Operation Subcommittee report did document declining performance in the Operations Department due to operational events that resulted from diminished operator standards and fundamentals, as well as weaknesses in oversight of monitoring of plant conditions. This NSRB performance review had been in consult with the Operations Corporate Functional Area Manager in the TVA Nuclear Corporate oversight role, requesting NSRB support to conduct

observations based on recognized declining trends. The December 18, 2015, NSRB report also documented that they believed there were much deeper performance drivers and behaviors that needed to be understood, but the PSS review of both CAP and ECP did not reveal indications of a chilled work environment in Operations, documenting that there were no trends indicating a NSC problem.

In summary, the NSRB process was not, in this instance, effective in reviewing available CAP and ECP data, and identifying signs or conditions that would lead one to believe that there was at least a potential chilling work environment in the Operations Department. Declining performance in Operations was noted by the NSRB "…due to several recent operational events caused by inconsistent application of operator fundamentals, and poor oversight of monitoring plant indications and controlling plant evolutions." The information in the CAP and ECP programs did not provide the NSRB with clear evidence that would suggest any type of chilling environment was occurring. There were no independent observations or interviews noted in the NSRB minutes that this was evaluated. In fact, the NSRB Subcommittee concluded that "The Employee Concerns Program (ECP) continues to be proactive in obtaining insights into employee concerns and providing [insights] to Station leaders." It further concluded "The number of employee concerns for 2015 remain high, most likely due to the construction of Unit 2; however, there are no trends indicating a nuclear safety culture problem." It then concluded that "The organization is effective in maintain (sic) a positive work environment." Regarding QA oversight, the NSRB concluded "QA organization continues to perform at a level in keeping with excellence in the industry."

Recommendations were subsequently made because of the CWEL RCA to improve the ability of the NSRB process to identify "subtle" signs and indications of degraded work environments including revising NPG-SPP-03.2 (Nuclear Safety Oversight). The procedure is to be revised to require the Plant Support Subcommittee "to include within the scope of the PSS standard agenda a requirement to interview NSCMP departmental representatives, to gain insights and concerns associated with the health of a safety conscious work environment (SCWE) at the station."

This team's review of the 2012 NSRB Report (July 12-13, 2012) indicates that the content discussed was substantially more probing and challenging of NSC and QA than the more recent NSRB reports. It included documentation of independent NSRB member interviews with plant personnel on the topic of safety culture and SCWE. It also went into good depth in reviewing the ECP and results of pulsing surveys. Similarly, the NSRB independent review of QA was more in depth in that time frame.

Overall, based on the NTD review and comparison, earlier NSRB activities (2012-2013) were much more intrusive in independently assessing safety culture and QA. The 2015/2016 NSRB oversight of WBN NSC did not proactively identify the SCWE concerns identified by the NRC for this basic period. Consideration should be given to requiring each NSRB Subcommittee to conduct periodic independent observations and selective personnel interviews to specifically ascertain the safety culture of the organizational areas they overview.

NUCLEAR SAFETY CULTURE MONITORING PANEL

TVA procedure NPG-SPP-01.7.2 Nuclear Safety Monitoring establishes the purpose, scope, and process for monitoring NSC on a continuous real-time basis. The goal of nuclear safety monitoring is to provide an objective and safety-focused process to identify early indication of potential problems linked to culture. The process establishes confidentiality for ECP issues as well as NRC allegation-related request for information.

The process is designed to review key inputs from processes, such as those previously mentioned in this report, such as QA, CAs, Self-Assessments, Survey Data, ECP, and NRC issues. This process is the last line of analyses or defense in assessing and reporting the health of the sites NSC. Two NSCMP meeting reports, one dated August 13, 2015, and the other dated November 5, 2015, were reviewed by NTD. The focus of this review was for the team to evaluate the effectiveness of the NSCMP process for identifying chilled work environment issues within the context of the CAP and ECP. The minutes did not reveal any awareness on the part of the NSCMP of any existing indications of NSC or SCWE issues. The fact that the NSCMP was unaware of the ongoing NSC issues during this time frame leads to the conclusion that this overview process was deficient.

RECOMMENDATIONS

1. Recommend TVA conduct an independent fleet level RCA sponsored by executive management to be performed by independent individuals with the skill sets necessary to determine the underlying drivers in the current culture that hinder individuals from recognizing and accepting early indications of NSC issues, identification of the true underlying root cause(s), and implementation of CAPRs that would be effective in changing behaviors. This RCA should address why the CAPRs in prior RCAs involving NSC/SCWE issues (dating back to the Confirmatory Order of 2009) did not prove to be effective or sustainable. The RCA should also include an analysis of why the 2014 TVA NPG Synergy Assessment Remediation Plan failed to prevent the instant CWE.
2. Recommend an independent NSC assessment be performed as soon as practicable to determine the overall safety culture at the WBN site. An additional survey should be performed in 18-24 months to assess the effectiveness of the actions taken to address the chilled work environment.
3. Recommend re-performing the CWEL RCA with an independent team to include an evaluation of the NSC Traits, an evaluation of possible extent of condition of a chilled work environment in, at a minimum, Maintenance, ECP, Chemistry, and Training at WBN, and to establish CAPRs that will remove the chilled work environment, prevent its recurrence, and will be sustainable. The Extents of Condition(s) and Cause(s) from the re-performed CWEL RCA should be evaluated throughout the TVA nuclear fleet.
4. Recommend that TVA QA perform a formal root cause analysis (in lieu of Missed Opportunity Review) to identify the cause of their failure to proactively identify the CWE issues prior to the NRC and to establish appropriate CAs to strengthen the effectiveness of its independent internal oversight. The analyses should consider the effectiveness of previous CAs taken to improve independent oversight effectiveness as documented in RCA BFN PER 655461. It is further recommended the

current TVA QA auditing methodology include a periodic independent audit of ECP utilizing NQML industry guidance contained in NECE-GUID-001 and 002.

5. Recommend updating the methodology of scheduling NIEP Assessments to ensure that future NIEPs are performed at the "fleet level." Review of the 2016 NIEP performed at TVA in August was found to have been appropriately performed at the fleet level. This practice should continue for future NIEPs of TVA.
6. Recommend a RCA of the WBN ECP, the CAP, QA, the Change Management process, the NSCMP, and the NSRB as to why those barrier programs/processes did not serve one of their primary purposes as barriers for early identification and prevention of the NSC and SCWE issues dating back to at least 2009 at TVA.
7. Recommend revising NPG-SPP-03.2 (Nuclear Safety Oversight) to include within the scope of each NSRB Subcommittee, standard agenda requirements to include periodic independent observations and selective interviews with departmental representatives to specifically gain insights associated with NSC including the health of the SCWE in the organizational areas they overview.

SUPPLEMENTAL CONFIRMTORY DATA – NRC AND INDEPENDENT ASSESSMENT FINDINGS

The findings of this report were first presented to TVA on July 28, 2016, at a joint meeting of TVA executive management, TVA OIG, and NTD.

TVA commissioned an independent assessment for the NRC's scheduled inspection to assess the current climate of the work environment at WBN. That assessment report was submitted by the independent assessor to TVA on September 9, 2016. TVA also commissioned two additional independent assessments: (1) the Assessment of Root Cause Analysis "Watts Bar Nuclear Plant Chilled Work Environment" CR 1155393, and (2) a Problem Identification and Resolution Inspection Readiness Assessment and CWEL Response Assessment. Those assessment reports were submitted to TVA on September 27 and 28, 2016, respectively.

The NRC conducted its Problem Identification and Resolution (PI&R) biennial inspection, which included a Safety Conscious Work Environment Issue of Concern Follow-Up at WBN from September 12-15, 2016, and discussed those findings with TVA on September 15, 2016. The NRC issued its written report for that PI&R inspection on October 26, 2016.

The NRC stated that "as follow-up to the issuance of the CEL, this inspection included a focused assessment of the safety conscious work environment. The staff evaluated the attributes of a SCWE as described in inspection procedure (IP) 93100, 'Safety Conscious Work Environment Issue of Concern Follow-up.'" The NRC inspection team "conducted 17 focus groups and 22 interviews with members of the Watts Bar staff and key management. A total of 136 employees participated in the focus groups and interviews. The information from the focus groups, interviews, and document reviews were organized into the themes" is discussed in the NRC report.

The following are a sample of determinations made by the NRC in their September PI&R inspection of WBN:

- "The NRC has determined that, given the current state of the site's safety culture, you are not meeting the Commission's expectation that licensees establish and maintain a positive safety culture and safety conscious work environment as described in the Safety Culture and SCWE Policy Statements (76 FR 34773, June 14, 2011; 61 FR 24336, May 14, 1996)."
- "The team made the following key observations associated with the current work environment, which are explained in more detail in the report. Interviews and focus groups with Operations department staff indicated an improvement in the primary work environment conditions that prompted the issuance of the CEL, but focus groups within and outside of the Operations department indicated the existence of broader, previously unrecognized challenges to the maintenance of a positive safety culture, which continued to challenge the SCWE. The team identified substantial weaknesses in various attributes of a SCWE, which were found to be pervasive across various work units. Most prominent was that although most employees in the assessment indicated that they were personally willing to raise nuclear safety concerns, nearly half believed retaliation was a potential outcome for raising concerns. In addition, most employees did not believe that concerns were promptly reviewed or appropriately resolved, either by their management or via the Corrective Action Program."
- "The inspection team observed that, in some work units, employees expressed a clear distinction between their willingness to raise nuclear safety concerns versus non-nuclear safety concerns. While nearly all employees stated that they were willing to raise nuclear safety concerns, many indicated that they would be unwilling to raise concerns that they believed to be unrelated to nuclear safety. Further, most employees did not believe that management would respond to or act to resolve non-nuclear safety concerns. When questioned about what a non-nuclear safety concern was, employees gave examples of concerns that had potential ties to nuclear safety, such as deficient procedures, work orders that were inappropriately closed before all work was completed, personal safety concerns about working on live systems (e.g., safety systems that remain electrified or pressurized), and long-standing equipment issues. Thus, the inspection team determined that employees used a very narrow definition of "nuclear safety" when identifying the types of concerns that they were encouraged to raise. The potential negative consequences of making a distinction between nuclear and non-nuclear safety concerns is that employees may self-censor and decide not to raise a concern because they fear retaliation and do not believe it is tied to nuclear safety. The inspection team observed that employees' perceptions about how management would respond to a concern, and whether the concern would be resolved in a timely manner, strongly influenced their overall willingness to raise any concerns."
- "Employees noted that the incomplete communications gave the impression that management was controlling the story, which contributed to a lack of trust in management. Some groups felt they had no basis to judge whether positive changes would last, and noted that the next planned outage in Spring 2017 would be an effective indicator of whether there have been true changes in the work environment. Multiple groups observed that the safety conscious work environment is particularly challenged during outages because of the added schedule pressure."
- "The inspection team observed a lack of trust between employees and management regarding their environment for raising concerns, particularly beyond the level of first line supervision. While most employees felt free to raise issues to their first line supervisor, they would be hesitant to raise

concerns to middle or upper management. In addition, employees did not feel that first line supervision was supported by upper management. For example, some employees believed that first line supervisors who regularly raised concerns up their management chain were subject to ridicule from higher levels of management and received more negative performance appraisals."

- "At the time of the inspection, most employees noted slight improvements in the work environment since the issuance of the CEL, and licensed operators reported that they felt free to execute their duties. However, the interviews and focus groups indicated deficiencies in the SCWE, specifically ensuring management behaviors encouraged the raising of concerns, the effectiveness of the CAP and ECP for resolving concerns, and the effectiveness of management actions to detect and prevent retaliation and chilling effects."
- After noting some employee improvements in the current make-up and operation of the Nuclear Safety Culture Monitoring Panel at WBN, the NRC noted that: "However, from the inspection team's review of the NSCMP procedures and meeting minutes from 2014 through August 2016, the NSCMP did not appear to be self-critical of key safety culture traits that were precursors for the issues that led to the chilled work environment in Operations. Specifically, the team noted that the safety culture trait, "leadership safety values and actions," was only identified as an improvement opportunity on two occasions since 2014. On both occasions, the trait was rated as an improvement opportunity due to issues identified by external organizations (e.g., Quality Assurance and Institute of Nuclear Power Operations). Further, the "leadership safety values and actions" trait has remained acceptable since fourth quarter of 2015, yet leadership deficiencies were identified as a root cause of the chilled work environment in Operations in early 2016. This suggested that the NSCMP may have difficulty self-identifying safety culture issues, particularly when the source relates to leadership behaviors.

The findings and recommendations from the three independent assessments of the NSC and SCWE issues at WBN were also consistent with, and confirmatory of, the conclusions and recommendations contained in this report. The following is a summary of conclusions and recommendations found in one or more of those assessments:

- WBN has significant issues in the work environment contributing to an unhealthy SCWE. Information indicates that SCWE issues exist in at least four plant departments. Contributing are larger organizational issues related to respect, trust, loyalty, and communications.
- The TVA response to the NRC CWEL was incomplete in addressing concerns expressed by the NRC. Deficiencies included the assessment of the climate at WBN, lack of independence in performing the assessment of the CWE, and the assessments performed of the action taken in response to the 2009 Confirmatory Order. It was also identified that the CWEL RCA does not clearly establish a basis for concluding the CWE is limited to WBN and not a fleet-wide issue and that there were no corporate drivers or causes.
- TVA should eliminate the use of the term "degraded work environment" in future correspondence and to "accept and state clearly that a CWE exists to the extent identified."
- TVA should not use the term "degraded work environment."
- The true root cause may not have been identified in the Root Cause Analysis "Watts Bar Nuclear Plant Chilled Work Environment." The methods used did not look at all plausible causes such as those at the fleet or TVA level and a Safety Culture Analysis process was not used effectively. Had these methods been used, different causes may have been identified.

- There is a lack of confidence in the CAP at WBN.
- In assessing these issues, TVA leadership should acknowledge the extent of the condition on-site, communicate the areas where progress has been made, and acknowledge the areas not progressing or meeting desired expectations.
- In addressing these deficiencies, TVA should conduct an Independent Safety Culture Assessment in early 2017 to understand safety culture on-site. A corrective action plan based on current findings from assessments should be developed and a follow on Independent Safety Culture Assessment approximately 12-18 months later to very effectiveness should be conducted.
- TVA should meet the requirements of the NRC's CWEL by determining why the actions taken from the 2009 Confirmatory Order were not effective and did not prevent the CWE at WBN.
- TVA should assemble a team of experts, independent of the current organization, to perform an assessment of the history and cultural drivers that currently promote NSC behaviors at WBN. These findings should be used to ensure sustainability in corrective actions.
- In the interim, recommended actions include the celebration of successes, leaders demonstrate change through behaviors that are visible to the staff, not just communicate the change. Make visible changes to oversight programs such as the Safety Culture Monitoring Panel and the ECP and address the effectiveness of the CAP.
- TVA should re-open the CWEL RCA and supplement the current analysis by assessing the issues outlined above to include actions for ensuring sustainability.

CONCLUSION

The amount of stress and fear noted in the survey comments over the past several years, as well as current interviews undertaken by OIG, and the recent NRC P&IR inspection and TVA commissioned independent assessment results, are atypical of an organization on its way to improved performance, but rather, one that could well reach negative outcomes. It would be a mistake to assume that continuing the same path of CAs that produced the current environment at WBN will somehow erase that threat of failure. The findings in this report lead to the conclusion that the dilemma at WBN is not confined to a few people within Operations, and that the focus of TVA on discipline, nuclear safety procedures, and performance of the past year or more will not adequately address the chilled work environment issues or intrusive lack of trust. The continued lack of trust between employees and management may well result in critical information being withheld that could lead to a significant safety incident. It is imperative that the trust issues be addressed and remedied to permit other CAs to be successful. Unless and until TVA addresses the HIRD behaviors of management (WBN SLT and others), TVA will not be able to overcome the trust issues.

As noted *supra*, at page 18, the 2014 TVA NPG Synergy Assessment Remediation Plan was prepared by TVA corporate in response to the NSC/SCWE issues identified in the 2013 Synergy survey that had covered all three TVA nuclear sites. That remediation plan was comprehensive and well done, with one exception. It was aimed at TVA personnel at the first supervisory level and below, not at upper management. NTD's review of the CAPRs emanating from RCAs that touched on NSC/SCWE issues dating back to 2008 reveals the same flaw. It does not appear that any CAPRs have been developed that pertain to TVA upper management (for this purpose upper management is defined as anyone at the Director level and above) that would address behaviors of management which could be considered as

HIRD in nature, including such behaviors as “pushing back” on recommendations from RCA teams and outside expertise on correcting NSC issues. It is certainly worth considering whether this might be at least a contributor, if not a root cause, of the failure of any of the CAPRs, remediation plans, and the like to correct the continuing recurrence of chilled work environments at TVA over the past decade. It could well be the missing item that would lead to effective and sustainable CAPRs.

The 51 plus CAs that TVA presented in its response to the NRC CWEL are focused on process and procedures and “better communications” from management to workers. TVA is focused on “better explaining programs and processes,” but not coming to grips with the very deep seated mistrust of management, and the SCWE and HIRD issues that have been found to exist in the current TVA management environment. All the “explanations” from management’s viewpoint will not repair the lost trust, no matter how nicely put or cleverly delivered the message. Until the trust issue is resolved (i.e., trust is restored), the CAs, CAPRs, etc., even if on point, will not be sustainable. The trust issue cannot be resolved until management admits that there are significant SCWE issues caused, at least in part, by the HIRD behaviors of management. Admission alone will not restore trust – effective CAs aimed at reducing/removing HIRD behaviors accompanied by timely actions when they are observed, along with pervasive effectiveness reviews will also be necessary.

The values and standards that people within TVA apply in the management and implementation of a program or process will make the outcome of that process either effective or ineffective. In correcting performance issues, another change to a procedure or process alone will generally not alter the outcome. Managers and the individuals responsible for the safe operation of the nuclear power plant through the implementation of these procedures or processes will be far more successful in altering the outcome if they can recognize the need for changes to incorporate the values, standards, beliefs, and behaviors that support a strong NSC, including a healthy and robust SCWE that avoids HIRD behaviors.

APPENDIX A

GLOSSARY AND DEFINITIONS

Adverse Action

An action that may adversely impact the compensation, terms, conditions, or privileges of employment including, but not limited to, a failure to receive a routine annual pay increase or bonus, demotion or arbitrary downgrade of a position, transfer to a position that is recognized to have a lesser status or be less desirable (e.g., from a supervisory to a non-supervisory position), failure to promote, overall performance appraisal downgrade, verbal or written counseling, or other forms of constructive discipline, or termination.

Change Management

Leaders use a systematic process for evaluating and implementing change so that safety remains the overriding priority. Leaders use a systematic process for planning, coordinating, and evaluating the safety impacts and potential negative effects on the willingness of individuals to raise safety concerns, when making major changes. This includes decisions concerning changes to organizational structure and functions, leadership, policies, programs, procedures, and resources. Leaders ensure safety is maintained when planning, communicating, and implementing change and ensure that significant unintended consequences are avoided. Leaders ensure that individuals understand the importance of, and their role in, the change management process.

Chilled Work Environment

A condition where the chilling effect is not isolated (e.g., multiple individuals, functional groups, shift crews, or levels of workers within the organization are affected). A chilled work environment is often referred to as a condition that is the opposite of a safety conscious work environment.

Chilling Effect

A condition that occurs when an event, interaction, decision, or policy change results in a perception that the raising of safety concerns to the employer or to the Nuclear Regulatory Commission is being suppressed or is discouraged.

Discrimination

Adverse action taken by an employer against an employee, at least in part, for engaging in NRC protected activity.

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Disparate Treatment

Disparate treatment, in the context of a matter of alleged discrimination, occurs when a person is treated differently or less favorably than others in a similar situation. At issue in a case of disparate treatment is whether the employer's actions were motivated by discriminatory intent.

Executives

Corporate decision makers who are responsible for setting the long-term strategic goals for the organization; executives develop and implement corporate policies. This includes Chief Nuclear Officer, Senior Vice Presidents, Corporate Vice Presidents, and Site Vice Presidents

Harassment and Intimidation

Harassment is any action or behavior toward a person that has the effect or perceived effect of causing the person to be uncomfortable or afraid of working in the employment environment. Harassment covers a wide range of offensive intentional behaviors intended to be disruptive, and is characteristically repetitive, often contributing to a hostile work environment (see definition of “hostile work environment”).

Harassment that progresses to the point of establishing a hostile work environment is a form of discrimination. Harassment that is threatening in nature is a form of intimidation. Intimidation literally means to “fill with fear” and refers to actions intended to coerce or inhibit by threats, insults, or aggressive behavior.

Intimidation involves an action or actions with the objective or perceived objective of preventing or discouraging a person from engaging in protected activities. Additionally, it is possible for a threat of discrimination to be considered an adverse action under Section 211 depending on case specific circumstances. Intimidation is a form of discrimination.

Hostile Work Environment

A hostile work environment is a discriminatory work environment that is either pervasive and regular, or acute but severe, that detrimentally affects the employee, and that is created because the employee engaged in protected activity. A hostile work environment involves unwelcome conduct and/or comments, often harassing in nature, that unreasonably interferes with an employee’s work performance.

Anyone in the workplace can be involved in the creation of a hostile work environment (manager, co-worker, contractor, vendor). The victim can be anyone affected by the conduct, not just the individual at whom the offensive conduct is directed.

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For action to be taken against the employer, the employee must establish some prima facie showing of potential discrimination in relation to an asserted hostile work environment. The employee must show that the harassment affected a term, condition, or privilege of employment. This means that the harassment was severe enough to interfere with the individual's ability to work effectively and that the employee encountered an atmosphere in which the harassing conduct was so severe or pervasive that a reasonable co-worker would conclude that it impacted his/her freedom to raise safety concerns. Also, it must be demonstrated that the employer was aware of the hostile work environment and either failed to take prompt and effective action to remedy the situation or took no action at all. For reference, a DOL ARB decision from a Clean Air Act discrimination case (ARB 99-094) provided a list of factors to be weighed in evaluating a hostile work environment claim, as noted below:

- The complainant suffered intentional discrimination because of his/her membership in a protected class;
- The discrimination was pervasive and regular;
- The discrimination detrimentally affected the complainant;
- The discrimination would have detrimentally affected a reasonable person of the same protected class; and
- The existence of *respondeat superior* liability (This a legal term referring to the fact that an employer is responsible for employee actions performed within the course of their employment).

Leaders

Individuals who influence, coach, or lead others within the organization and determine the vision, goals, or objectives of their teams; leaders include executives, senior managers, managers, supervisors, and others who influence individuals in the organization.

Management

This group includes all individuals who supervise or give direction to others.

Nuclear Safety Culture

Nuclear safety culture is defined as the set of core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment. Nuclear safety is a collective responsibility. The concept of nuclear safety culture applies to every employee in the nuclear organization, from the board of directors to the individual contributor. No one in the organization is exempt from the obligation to ensure safety first.

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Nuclear safety culture is a leadership responsibility. Experience has shown that leaders in organizations with a healthy safety culture foster safety culture through activities such as the following:

- Leaders reinforce safety culture at every opportunity. The health of safety culture is not taken for granted.
- Leaders frequently measure the health of safety culture with a focus on trends rather than absolute values.
- Leaders communicate what constitutes a healthy safety culture and ensure everyone understands his or her role in its promotion.
- Leaders recognize that safety culture is not all or nothing but is, rather, constantly moving along a continuum. As a result, there is a comfort in discussing safety culture within the organization as well as with outside groups, such as regulatory agencies.

Prima facie Showing of Discrimination

Facts provided by an alleger that create a reasonable inference that an employer took an adverse action against the alleger for having engaged in protected activity. Specifically, the alleger must provide facts indicating that (1) the alleger engaged in protected activity, (2) an adverse action was taken against the alleger, (3) persons responsible for the adverse action had knowledge of the alleger's protected activity, and (4) the protected activity was, at least in part, a reason for the adverse action. In such circumstances, further investigation and/or development of evidence is needed in order to establish whether discrimination actually occurred.

Protected Activity

Activity related to the administration or enforcement of a requirement imposed under the Atomic Energy Act of 1954, as amended, or the Energy Reorganization Act of 1974, as amended, which includes, but is not limited to, providing NRC or the employer with information about alleged violations of either statute or any requirements imposed under either statute; refusing to engage in any practice made unlawful under either statute if the employee identifies the alleged illegality to the employer; requesting NRC to institute action against the employer for administration or enforcement of these requirements; testifying before NRC, Congress, or in any Federal or State proceeding regarding any provision of the statutes; and assisting or participating in, or preparing to assist or participate in these activities.

Retaliation

The act of taking an adverse action against an individual, at least in part, for engaging in protected activities (See *U.S. NRC Allegations Manual*, Section 5.2.c.2(a)(2), for examples of adverse action). Retaliation is a form of discrimination.

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5.2.c2(a)(2) Adverse Action Examples:

- Employment termination or layoff
- Blacklisting
- Performance appraisal downgrade
- Demotion or arbitrary downgrade of a position
- Transfer to a position that is recognized to have a lesser status or be less desirable (e.g., from a supervisory to a non-supervisory position, less desirable work schedule, less desirable work location (isolated))
- Denial of overtime or promotion, or reassignment affecting the prospects for promotion
- Constructive discipline, including verbal or written counseling
- Denial of training
- Failure to hire or rehire
- Intimidation/harassment; hostile work environment
- Failure to receive routine annual pay increase or bonus, other reduction in pay, hours, or benefits
- Exclusion from activities to which co-workers are invited
- Disparate treatment

Safety Conscious Work Environment

A work environment in which employees are encouraged to raise safety concerns, are free to raise concerns to both their management and the NRC without fear of retaliation, where concerns are promptly reviewed, given the appropriate priority, and appropriately resolved, and where timely feedback is provided to those raising concerns.

Site Leadership Team

The term Site Leadership Team or acronym “SLT” refers to the most senior leaders at the site, typically those who report directly to the Site Vice President or Plant Manager. Other common names for this group include senior leadership or senior management. The SLT is typically comprised of the Site Vice President, Plant Manager, Directors, and senior managers from the primary line organizations at the site. Typically, these would include the heads of Operations, Quality Assurance, Maintenance, Engineering, Radiation Protection, Chemistry, Oversight, Security, and Regulatory Assurance. These managers are responsible for the execution of business activities, including setting priorities for and monitoring the performance of the organization.

APPENDIX B

NUCLEAR SAFETY CULTURE AND CULTURE TRAITS

The importance of a healthy nuclear safety culture has been clearly demonstrated by a number of significant adverse events in the United States and throughout the world.

In the Schein model of culture (1992), culture is assumed to be a pattern of shared basic assumptions of an organization. According to Schein's three-level model, an organization's safety culture can be assessed by evaluating the organization's "artifacts, claimed values, and basic assumptions." "Artifacts" are the visible signs and behaviors of the organization. Examples may be organizational mission statements, vision, values, and policy statements. "Claimed or espoused values" might include slogans such as, "safety first." However, "basic assumptions" are the actual "beliefs and attitudes" of the individuals within the organization. These are developed based on experience, interactions, observations, and what is reinforced by the leadership. Artifacts, claimed values, and basic assumptions may identify the presence or absence of the safety culture traits essential for a healthy nuclear safety culture. The basic assumptions can provide significant insight on the actual nuclear safety culture of an organization.

In 1996, the U.S. Nuclear Regulatory Commission (NRC) published "Freedom of Employees in the Nuclear Industry to Raise Safety Concerns without Fear of Retaliation." This policy statement applied to the regulated activities of all NRC licensees and their contractors. It provided the expectation that licensees and employers subject to NRC authority establish and maintain work environments where employees feel free to raise safety concerns without fear of retaliation (referred to as a safety conscious work environment, or SCWE).

The NRC Safety Culture Policy Statement (SCPS), published on June 14, 2011, delineates the NRC's expectation that individuals and organizations performing regulated activities establish and maintain a healthy safety culture that recognizes the safety and security significance of their activities and the nature and complexity of their organizations and functions. The SCPS notes that these traits describe patterns of thinking, feeling, and behaving that emphasize safety, particularly in goal conflict situations (e.g., safety considerations given precedence over concerns about production, schedule, and the cost of the effort). The SCPS notes that these traits are not all-inclusive. Some organizations may find that one or more of the traits are particularly relevant to their activities. There may also be traits not included in the SCPS that are important in a healthy safety culture.

As stated in Institute of Nuclear Power Operations (INPO) 12-012, "Traits of a Healthy Nuclear Safety Culture" and in the SCPS, nuclear safety culture is defined as the "core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment."

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The "Traits of a Strong Nuclear Safety Culture" describes the essential attributes of a healthy nuclear safety culture, with the goal of creating a framework for open discussion and continuing evolution of nuclear safety culture throughout the commercial nuclear industry. These are to be taken holistically and individually as to their impact on the nuclear safety culture at a nuclear facility and at a nuclear utility. The safety conscious work environment is just one trait of a collection of traits essential for maintaining an appropriate nuclear safety culture.

The traits and associated attributes described have a strong historic basis in previous industry plant events. These traits and attributes, when embraced, influence values, assumptions, experiences, behaviors, beliefs, and norms that describe basic behaviors (culture) that are expected in the design, maintenance, and operation of a nuclear power plant.

Several concerns associated with some of the individual nuclear safety culture traits exhibited at Tennessee Valley Authority's (TVA) Watts Bar Nuclear Plant (WBN) have been identified based on a review of the following:

- TVA internal investigation & Special Review Team Report
- Chilled Work Environment Letter (CWEL) Root Cause Analysis
- CWEL Response of April 22, 2016
- TVA Office of the Inspector General (OIG) Interviews of current and former TVA personnel
- TVA WBN Documentation
- Internal TVA pulsing surveys by Employee Concerns Program
- Previous WBN safety culture surveys
- Summary of internal concerns received by the NRC and OIG

For a nuclear facility to have a strong nuclear safety culture, the culture must have a healthy respect for nuclear safety, and not be compromised by production or cost priorities. Additionally, it must have a healthy safety conscious work environment in which "employees feel free to raise safety concerns, both to their management and to the NRC, without fear of retaliation." The NRC recognizes that an employee's willingness to identify safety concerns can be affected by factors such as the effectiveness of the processes for resolving concerns or management's ability to detect and prevent retaliatory actions (Reference: RIS 2005-18, "NRC Regulatory Issue Summary 2005-18, Guidance for Establishing and Maintaining a Safety Conscious Work Environment"). A "chilled work environment" is often referred to as a condition that is the opposite of a safety conscious work environment. A chilling effect is defined as "a condition that occurs when an event, interaction, decision, or policy change results in a perception that the raising of safety concerns to the employer or to the NRC is being suppressed or is discouraged" (Reference: *U.S. NRC Allegations Manual*).

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It is indisputable that every nuclear operating facility must have a quality assurance program as a basis for its license from the NRC. However, for a nuclear facility quality assurance program to be effective, it must rely on a sound nuclear safety culture including a nuclear safety work environment where personnel throughout the organization are free to identify problems and feel uninhibited to exhibit a questioning attitude and to "push-back" when appropriate. If this is not in place, it could adversely affect the reliability, the economics of the facility, and its investment due to lengthy regulatory shutdown or forced outages. Additionally, over time, safe operations could ultimately be challenged and that in turn could adversely affect the safety and health of the public and plant employees.

Safety-culture weaknesses were identified as one of the causes of major accidents and incidents such as the Fukushima nuclear accident in Japan in 2011, the Davis-Besse reactor vessel head degradation near-miss incident discovered in 2002, the Chernobyl accident in the former Soviet Union in 1986, and the Three Mile Island Unit 2 accident in 1979. Other facilities, such as Peach Bottom and Millstone, had major regulatory shutdowns due to major weaknesses in safety culture.

In cases such as Davis-Besse, the root cause was a shift in focus at all levels of the organization from pursuing high standards to justifying minimum standards. This shift was driven by "a focus on production goals and caused behaviors that undermined the plant's safety culture." Reference: INPO SOER 02, Reactor Pressure Vessel Head Degradation at Davis–Besse Nuclear Power Station. The Davis-Besse event involved many of the warning flags described in a 1998 INPO study of long-term regulatory shutdowns, such as the effects of organization and staff changes were not fully considered, independent and self-assessment processes did not find or address problems, employees were not involved or listened to by management, and the raising of problems was not valued by the organization. Organizational and safety-culture weaknesses related to Davis-Besse prevented the station from finding, evaluating, and correcting the problem before the head was seriously damaged. Other contributors were ineffective management, ineffective oversight, and inadequate use of the corrective action program.

APPENDIX C

NUCLEAR INDUSTRY EVALUATION PROGRAM (NIEP) AUDIT PROCESS

Commercial nuclear power plants in the United States of America (U.S.) have always had the requirement within 10 CFR 50, Appendix B, to "shall regularly review the status and adequacy of the quality assurance program" and to "regularly review the status and adequacy of that part of the quality assurance program which they are executing." Additionally, Criteria 18 of 10 CFR 50, Appendix B, requires "a comprehensive system of planned and periodic audits shall be carried out to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program." For the operational phase, the audit frequency is defined by regulation (i.e., U.S. Nuclear Regulatory Commission (USNRC) Regulatory Guide 1.33) to be on a biennial basis. For the construction phase, it is on an annual basis (i.e., USNRC Regulatory Guide 1.28).

Historically in the period of the early 1970s to 2004, this process consisted of utilities joining regional Joint Utility Management Audit Groups that would provide an independent audit and evaluation of the respective nuclear utility's quality organizations and activities. There were multiple such Joint Utility Management Audit Groups across the U.S. fulfilling this function. Some utilities also elected to have independent consultants provide this assessment. However, the process was not consistent, there were no pre-established evaluation criteria, and independent utility personnel supplied to perform the assessment were not of sufficient management depth. Over time, the process was deemed to be ineffective. This was further manifested with other industry events (e.g., Davis-Besse Reactor Head Vessel Event) where quality oversight functions (e.g., Quality Assurance (QA), Nuclear Safety Review Board (NSRB)) were not being effectively deployed and independent processes failed to identify such weakness.

The Nuclear Quality Management Leadership (NQML) forum was created in 2005 and consists of utility QA management decision makers that sponsor and promote activities to support effective quality management within the commercial nuclear industry. The NQML optimized the interface with other industry organizations to provide a consistent focus to current issues and challenges in the nuclear oversight processes within the industry.

As part of the efforts, the NQML established an industry NIEP Subcommittee to provide for the development of an independent peer assessment process of oversight practices associated with nuclear utilities. In 2006, industry evaluation efforts were integrated and came under the purview of the newly created NQML and NIEP Committee.

The subcommittee developed an evaluation process including performance objectives and attributes by which to measure the health and effectiveness of nuclear oversight and quality assurance organizations. The performance objectives were broad in scope and each objective lists several criteria to provide the breadth and depth of the objective. The objectives and

attributes were specifically tied to USNRC regulatory commitments and Institute for Nuclear Power Operations (INPO) Performance Objectives and Attributes.

The NQML partnered with the Nuclear Energy Institute to further promote the advancement of effective oversight of nuclear power operations. The first national consistent and combined process was defined within the “Nuclear Industry Evaluation Program Performance Objectives and Attributes” and “Nuclear Industry Evaluation Program Guidelines.” The “Nuclear Industry Evaluation Program Performance Objectives and Attributes” describe specific criteria to assist nuclear utilities and facilities in developing programs and improving their quality assurance management and nuclear oversight functions. It established a uniform industry process by which to assess each member using common criteria.

APPENDIX D

LIST OF INTERVIEWEES

JOB TITLE	INTERVIEW DATE
Program Manager, Nuclear	5/17/2016
Program Manager, Nuclear (1)	5/17/2016
Program Manager, Nuclear (2)	5/17/2016
Program Manager, Nuclear	5/17/2016
WBN Senior Manager	5/18/2016
WBN Training Employee	5/18/2016
Program Manager, Nuclear	5/19/2016
Senior Manager, Nuclear	5/19/2016
Program Manager, Nuclear	5/19/2016
WBN Senior Manager	5/19/2016
Supervisor, Nuclear	5/19/2016
Program Manager, Nuclear	5/19/2016
Program Manager, Nuclear	5/19/2016
Program Manager, Nuclear	5/19/2016
WBN Senior Manager	5/19/2016
Program Manager, Nuclear	5/19/2016
WBN Manager	5/19/2016
Program Manager, Nuclear	5/24/2016
WBN Supervisor	5/24/2016
Program Manager, Nuclear	5/24/2016
Program Manager, Nuclear	5/24/2016
WBN Vendor	5/24/2016
WBN Manager	5/24/2016
Program Manager, Nuclear	5/24/2016
WBN Senior Manager	5/24/2016
Program Manager, Nuclear	5/25/2016
Program Manager, Nuclear	5/25/2016
Program Manager, Nuclear	5/25/2016

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JOB TITLE	INTERVIEW DATE
Program Manager, Nuclear	5/25/2016
Senior Manager, Nuclear	5/25/2016
Program Manager, Nuclear	5/25/2016
Program Manager, Nuclear	5/25/2016
Program Manager, Nuclear	5/25/2016
Program Manager, Nuclear	5/25/2016
Program Manager, Nuclear	5/26/2016
WBN Manager	5/26/2016
CAP Employee	6/2016
Program Manager, Nuclear	5/26/2016
Program Manager, Nuclear	5/26/2016
Senior Manager, Nuclear	5/31/2016
Program Manager, Nuclear	5/31/2016
Gen Manager, Nuclear	6/1/2016
TVA Senior Manager	6/1/2016
Program Manager, Nuclear	6/2/2016
Program Manager, Nuclear	6/8/2016
Program Manager, Nuclear	6/9/2016
WBN Supervisor	6/13/2016
WBN Employee	1/6/2016
NRC	1/11/2016
WBN Control Room Personnel	1/19/2016
WBN Supervisor	1/19/2016
WBN Control Room Personnel	1/19/2016
WBN Control Room Personnel	1/19/2016
WBN Control Room Personnel	1/19/2016
WBN Control Room Personnel	1/20/2016
WBN Employee	1/20/2016
WBN Control Room Personnel	1/26/2016
WBN Control Room Personnel	1/27/2016

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JOB TITLE	INTERVIEW DATE
WBN Senior Manager	1/27/2016
WBN Control Room Personnel	1/27/2016
Former WBN Director	1/27/2016
WBN Manager	1/28/2016
WBN Control Room Personnel	1/28/2016
Former WBN Employee	1/29/2016
TVA Legal	2/1/2016
WBN Superintendent	2/1/2016
WBN Senior Manager	2/2/2016
WBN Control Room Personnel	2/2/2016
WBN Control Room Personnel	2/2/2016
WBN Control Room Personnel	2/3/2016
WBN Control Room Personnel	2/3/2016
WBN Manager	2/4/2016
WBN Manager	2/4/2016
WBN Control Room Personnel	2/4/2016
WBN Employee	2/4/2016
Former WBN Manager	2/7/2016
WBN Control Room Personnel	2/8/2016
WBN Manager	2/8/2016
WBN Manager	2/8/2016
WBN Senior Manager	2/9/2016
WBN Control Room Personnel	2/9/2016
WBN Control Room Personnel	2/10/2016
Former WBN Manager	2/10/2016
WBN Control Room Personnel	2/10/2016
WNB Control Room Personnel	2/10/2016
WBN CAP Employee	2/10/2016
WBN Senior Manager	2/10/2016
WBN Senior Manager	2/11/2016

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JOB TITLE	INTERVIEW DATE
Former WBN Manager	2/14/2016
WBN Employee	2/16/2016
WBN Manager	2/17/2016
WBN CAP Employee	2/17/2016
WBN Control Room Personnel	2/17/2016
WBN Control Room Personnel	2/17/2016
WBN Control Room Personnel	2/18/2016
WBN Employee	2/19/2016
WBN Control Room Personnel	2/22/2016
WBN Manager	2/22/2016
TVA Senior Manager	2/23/2016
Former WBN Manager	2/23/2016
TVA Senior Manager	2/24/2016
WBN Control Room Personnel	2/24/2016
Former WBN Manager	2/25/2016
WBN Manager	2/29/2016
WBN Vendor	3/1/2016
Former WBN employee	3/2/2016
WBN CAP Employee	3/3/2016
WBN Control Room Personnel	3/3/2016
WBN Control Room Personnel	3/7/2016
WBN Control Room Personnel	3/7/2016
WBN Control Room Personnel	3/14/2016
WBN Vendor	3/14/2016
WBN Manager	3/15/2016
WBN Vendor	3/15/2016
TVA Senior Manager Chattanooga	3/17/2016
WBN Control Room Personnel	3/21/2016
WBN Control Room Personnel	3/21/2016
TVA Senior Manager Knoxville	3/23/2016
Former Manager WBN	3/23/2016

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JOB TITLE	INTERVIEW DATE
WBN Manager	3/24/2016
Former TVA Senior Manager	3/31/2016
WBN Manager	3/31/2016
Former WBN Manager	3/31/2016
WBN Senior Manager	4/6/2016
WBN Control Room Personnel	4/11/2016
TVA Manager Chattanooga	4/11/2016
WBN Manager	4/15/2016
WBN Manager	4/21/2016
WBN Senior Manager	4/26/2016
TVA Manager Chattanooga	5/11/2016
WBN Manager	5/12/2016
WBN Senior Manager	5/17/2016
WBN Senior Manager	5/18/2016
WBN Manager	5/18/2016
WBN Vendor	5/19/2016
WBN Vendor	5/20/2016
TVA Manager	5/25/2016
WBN Senior Manager	5/26/2016
Former WBN Manager	6/2/2016
WBN Manager	6/6/2016
WBN Senior Manager	6/6/2016
WBN Senior Manager	6/6/2016
Former WBN Senior Manager	6/8/2016
WBN Senior Manager	6/14/2016
NRC	6/14/2016
WBN Vendor	6/15/2016
WBN Control Room Personnel	6/15/2016
WBN Control Room Personnel	6/20/2016
WBN Vendor	7/19/2016

APPENDIX E

LIST OF DOCUMENTS REVIEWED

The NTD Consulting Group, LLC, team reviewed the following documents (not inclusive):

TITLE	DATE	NUMBER
2013 Institute of Nuclear Power Operations Survey		
2013 Assessment of Watts Bar Nuclear Plant Unit 2 Nuclear Safety Culture and Safety Conscious Work Environment	2013	
2013 World Association of Nuclear Operators Peer Review		
2015 Engagement Index Gelfond		
2015-2016 Institute of Nuclear Power Operations Survey		
ANSI 18.7 / ANS 3.2		
Audit Report QA-BF-12-009; Browns Ferry Nuclear Plant Fleet Assessment Report of Licensing and Employee Concerns Program	7/18/2012	
Audit Report QA-SQ-12-002 Licensing and Employee Concerns Program	5/3/2012	
Audit Report QA-WB-12-003 Revision 1 Watts Bar Nuclear Plant Licensing and Employee Concerns Program Assessment	5/3/2012	
Audit Report SSA-1303 Fleet Wide Licensing Employee Concerns Report	5/13/2013	
Audit Report SSA-1304 Document Control and Quality Assurance Records (Fleet Comparative Report)	4/24/2013	
Audit Report SSA-1305 Emergency Preparedness (Fleet Comparative Report)	6/20/2013	
Audit Report SSA-1308 Operations (Fleet Comparative Report)	8/9/2013	
Audit Report SSA-1502 Corrective Action Program (Fleet Comparative Report)		
Audit Report SSA-1506 Radiation Protection (Fleet Comparative Report)	9/8/2015	
Audit Report SSA-1507 Chemistry, Radwaste, Effluent and Environmental Monitoring (Fleet Comparative Report)	8/27/2015	
Audit Report SSA-1509 FFD (Fleet Comparative Report)	10/15/2015	

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TITLE	DATE	NUMBER
Audit Report SSA-1601 Nuclear Training (Fleet Comparative Report)	3/15/2016	
Audit Report SSA-1602 Materials and Procurement (Fleet Comparative Report)	3/23/2016	
Audit Report SSA-1603 Maintenance (Fleet Comparative Report)	5/18/2016	
Audit Report SSA-1606 Engineering Design (Fleet Comparative Report)	5/25/2016	
Browns Ferry Nuclear Plant Problem Evaluation Report 655461 Root Cause Analysis Report on Independent Oversight Effectiveness	2/15/2013	
Browns Ferry Nuclear Plant Potential Trend Problem Evaluation Report	6/2/2012	
Browns Ferry Nuclear Plant & Corporate Nuclear Industry Evaluation Program Evaluation Audit Report	9/8/2014	SSA-1411
Concern Files Opened as a Result of Exit Interview with TVA Employee Concerns Program Watts Bar Nuclear Plant (1/1/13 to 3/5/15), Sequoyah Nuclear Plant 1/1/13 to present	1/1/13 to 3/5/15	
Condition Report Word search for degraded	5/16/2016	
Conger-Elsea WBN Units 1 and 2 Safety Conscious Work Environment Inspection Readiness Assessment Report	09/09/2016	
Conger-Elsea WBN Units 1 and 2 Assessment of Root Cause Analysis: “Watts Bar Nuclear Plant Chilled Work Environment” CR 1155393	09/27/2016	
Conger-Elsea WBN Units 1 and 2 Problem and Resolution Inspection Readiness Assessment and CWEL Response Assessment Report	09/28/2016	
Employee Concerns Program Pulsing Questionnaire for Nuclear Power Group Results from 3rd and 4th Quarter 2014		
Effectiveness Review Confirmatory Order EA-09-009; EA-09-203	Undated unauthored	
Employee Concerns Program Investigation Report – Safety Conscious Work Environment, 19 pp. and 14 pp. of Appendices	3/1/2016	NEC-16-00047

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TITLE	DATE	NUMBER
Employee Concerns Program Investigation Report – Safety Conscious Work Environment, 8 pp. of Appendices	3/20/2016	NEC-16-00127
Employee Concerns Program Specific File Reports	2/13 thru 3/14	
Gelfond 2015 Watts Bar Nuclear Plant		
Institute of Nuclear Power Operations 12-012, *Traits of a Healthy Nuclear Safety Culture*		INPO 12-012
Institute of Nuclear Power Operations 2016 WBN Report		
INSAG-18		
Inspection Report – Review of the Kingston Fossil Plant Ash Spill Root Cause Study and Observations about Ash Management	7/23/2009	
Interview Notes with TVA Employee Concerns Program Senior Managers/Managers		
Interview Questions and Answers – Program Manager, Employee Concerns Program	5/19/2016 & 5/26/2016	OIG File 2016-15398
"Keeping Current" Communication e-mail to Site	3/24/2016	
"Keeping Current" Communication e-mail to Site	5/12/2016	
"Keeping Current" Communication e-mail to Site	6/21/2016	
Letter from Nuclear Regulatory Commission Region II to TVA Re Attached Report Covering Three Month Nuclear Regulatory Commission Inspection at Browns Ferry 10/14 thru 12/14	2/11/2015	N/A
Level 2 Analysis of November 15, 2015 Operations Incident (RHR)		
Level 1 Evaluation (Root Cause Process Procedure) Revision 006	3/12016	NPG-SPP-22.306
Meeting Minutes Nuclear Safety Review Board Plant Support/Programs Subcommittee	5/29/2016	
Missed Opportunity Review CEL by Quality Assurance	3/30/3016	
NECE-GUID-001 “Nuclear Employee Concerns Evaluation Program Performance Objectives and Attributes” (Developed by the Nuclear Quality Management Leadership Committee)		

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TITLE	DATE	NUMBER
NECE-GUID-002 “Nuclear Employee Concerns Evaluation Program Evaluation Guidelines” (Developed by the Nuclear Quality Management Leadership Committee)		
NIEP GUID-001 Revision 8 “NIEP Performance Objectives and Attributes”		
Nuclear Industry Evaluation Program Evaluation Plan for Tennessee Valley Authority for August 2016		
Nuclear Power Group SPP-01.7.2 Nuclear Safety Monitoring		
Nuclear Power Group SPP-03.2 Nuclear Safety Oversight		
Nuclear Power Group SPP-22.300 Revision 6 Corrective Action Program		
Nuclear Regulatory Commission Confirmatory Order Modifying License for Browns Ferry, Sequoyah, and Watts Bar	12/22/2009	N/A
Nuclear Regulatory Commission Letter to Tennessee Valley Authority Chief Nuclear Officer - "Chilled Work Environment Letter" (CWEL)	3/23/2016	N/A
Nuclear Regulatory Commission Regulatory Issue Summary 2005-18 Guidance for Establishing and Maintaining a Safety Conscious Work Environment	8/25/2005	2005-18
Nuclear Regulatory Commission – Watts Bar Nuclear Plant – NRC Problem Identification and Resolution Inspection (Part 1), and Safety Conscious Work Environment Issue of Concern Follow-Up, NRC Inspection Report 05000390/2016007/ and 05000391/2016007	10/26/2016	
U.S. Nuclear Regulatory Commission Allegation Manual, pp. 138-143, regarding Chilling Effect/Chilled Work Environment Allegations	4/23/2015	
Nuclear Regulatory Commission Assessment of Browns Ferry Nuclear Plant Performance to be in Multiple/Repetitive Degraded Cornerstone Column of the Nuclear Regulatory Commission’s Action	5/9/2011	

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TITLE	DATE	NUMBER
Nuclear Regulatory Commission Problem and Resolution Inspection (part 1); and Safety Conscious Work Environment Issue of Concern Follow-Up for Watts Bar Nuclear Plant	10/26/2016	05000390/2016007 and 05000391/2016007
Nuclear Regulatory Commission Allegation Statistics on Allegations (NRC.gov)	6/2016	
Nuclear Regulatory Commission Final Safety Culture Policy Statement	6/14/2011	NRC 2010-0282
Nuclear Regulatory Commission Inspection Procedure 95002	2/9/2011	
Nuclear Regulatory Commission Inspection Procedure 95003	12/18/2015	
Nuclear Regulatory Commission Inspection Manual Chapter 0310	12/19/2013	
Nuclear Regulatory Commission Notices of Violations to SQN and WBN	6/4/2013	
Nuclear Regulatory Commission Letter to the U.S. Department of Energy Office of Civilian Radioactive Waste Management (Accession Number ML031770292)	2/21/1996	
Nuclear Regulatory Commission Regulatory Guide 1.33		
Nuclear Safety Culture Monitoring Panel meeting minutes/reports		

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TITLE	DATE	NUMBER
Nuclear Safety Review Board Meeting Minutes	4/29/13, 8/8/13, 1/8/14, 7/15/14, 12/2/14, 4/16/15, 5/8/15, 8/11/15, 12/18/15, 3/29/16	
Nuclear Safety Review Board Letter to Tennessee Valley Authority Chief Nuclear Officer dated 8/6/2013 with attached Operations Subcommittee Report	7/13/2012	
NUREG 2165, *Safety Culture Common Language*		
Operations Shift Order	1/18/2016	15-50
Problem Evaluation Report 571348 Apparent Cause Evaluation		
Problem Evaluation Report Vault Summary Report for Problem Evaluation Report 212256 Nuclear Regulatory Commission Confirmatory Order Modifying License-Alternate Dispute Resolution Agreement	10/09/2014	
Problem Evaluation Report 849288 Corrective Actions (from Synergy Survey)		
Problem Evaluation Report 938135 (Problem Evaluation Report 849288 was closed to this Problem Evaluation Report)		
Personnel Performance Awards Listing		
Quality Assurance Assessment Plan-Assessment Number QA-SQ-16-016 (Sequoyah (SQN) 95009 Inspection Readiness (Draft)		
Quality Assurance Missed Opportunity Review for Condition Report 1155393	3/30/2016-5/5/2016	
Quality Assurance Oversight Report	9/25/2015	QA-WB-15-015
WBN Management Review Committee Meeting Agenda	07/28/2016	

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TITLE	DATE	NUMBER
Root Cause Analysis 655461 “BFN Independent Oversight”	02/15/2013	PER 655461
Root Cause Analysis 758026		
Root Cause Analysis on Flood Mitigation Plans at SQN and WBN were Inadequate to Mitigate Design Basis Flood Events	7/13/2013	Corporate PER 758025
RCA on Programmatic Breakdown of the Watts Bar Nuclear Plant Unit 1 Fire Protection (FPP) from Fire Safe Shutdown (FSSD), Revision 0	6/26/2015	CR 1022308
RCA on Programmatic Breakdown of the Watts Bar Nuclear Plant Unit 1 Fire Protection (FPP) from Fire Safe Shutdown (FSSD), Revision 1	7/24/2015	CR 1022308
RCA on Programmatic Breakdown of the Watts Bar Nuclear Plant Unit 1 Fire Protection (FPP) from Fire Safe Shutdown (FSSD), Revision 3	10/30/2015	CR 1022308
RCA on Inadequate Management of an Outage Emergent Issue Results in Challenge to Plant Operation WBN Nuclear CR 1127691	3/1/2016	
Request For Final Action - Audit 2015-15312 - TVA's Ethics Program	2/29/2016	N/A
Request for Final Action - Audit 2015-15312 - TVA's Ethics Program	2/29/2016	2015-15312
Request for Management Decision - Evaluation 2015-15270 - Nuclear Employee Concerns	2/24/2016	2015-15270
Response of the Vice President, Nuclear Oversight, TVA, to Draft Report Evaluation 2015-15270	2/16/2016	N/A
U.S. Nuclear Regulatory Commission Safety Culture Common Language	3/2014	NUREG-2165
Site Wide e-mail from new Site Vice President issued on April 11, 2016	4/11/2016	
Synergy 2013-2014		
Synergy Survey White Paper	2/26/2014	
The Safety Culture of an Effective Nuclear Regulatory Body	2016	
The Significance of the Chilling Effect by W.R. Corcoran, Ph.D., P. E.	12/2014	

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TITLE	DATE	NUMBER
TVA 2015 Gelfond Executive Briefing		
TVA 2015 Gelfond Survey Watts Bar Nuclear Plant Breakdown		
TVA 2015 Gelfond Watts Bar Nuclear Plant Comments		
TVA Condition Report Vault Summary Report – Effectiveness Review of 2009 Confirmatory Order	4/20/2016	
TVA Discipline Report by Nuclear Facility	1/2014-1/2016	
TVA Letter - Watts Bar Nuclear Plant Unit 2 - Safety Culture Assessment	10/14/2014	CNL-14-182
TVA Nuclear Power Group Synergy Assessment Remediation Plan, Revision 4	Spring 2014	
TVA Procedure Corrective Action Program, Revision 0006	4/14/2016	NPG-SPP-22.300
TVA Procedure Employee Concerns Program	10/26/2015	NPG-SPP-01.7.1
TVA Response to Nuclear Regulatory Commission Chilled Work Environment Letter	4/22/2016	N/A
Watts Bar 2nd Trimester 2014 Excellence Plant		
Watts Bar Nuclear Plant Nuclear Safety Review Board Letter	12/2015	
Watts Bar Nuclear Plant Nuclear Safety Review Board Letter	8/2015	
Watts Bar Nuclear Plant Chilled Work Environment Letter Root Cause Analysis	5/3/2016	CR1155393
Watts Bar Management Review Committee Meeting Agenda of 10/27/2016 and pages 1-124 of attachments	10/27/2016	
Watts Bar Management Review Committee Meeting Agenda for 10/25/2016 and pages 1-51 of attachments	10/25/2016	
Watts Bar Special Review Team Report, Revision 1	3/2016	N/A
Watts Bar Nuclear Plant Employee Concerns Program Intakes vs. On-Site Nuclear Regulatory Commission Allegations		
Watts Bar Nuclear Plant Nuclear Industry Evaluation Program Evaluating Audit Report	11/27/2015	SSA-1206
Watts Bar Work Environment Performance Improvement Excellence Plan, Revision 1		

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TITLE	DATE	NUMBER
Watts Bar Nuclear Plant Integrated Analysis of Site Performance Trend Report	5/21/2013	2QFY13
Watts Bar Nuclear Plant Nuclear Safety Culture Monitoring Minutes Panel Minutes – Covers Last Two Quarters of 2015	3/3/2016	
Watts Bar Nuclear Plant Safety Conscious Work Environment Pulsing Operations 21 employees	5/2016	
Watts Bar Nuclear Plant Safety Conscious Work Environment Pulsing (Excluding Operations) 28 employees	5/2016	
Watts Bar Nuclear Plant Safety Conscious Work Environment Pulsing (Excluding Operations) 26 employees	6/2016	
Watts Bar Nuclear Plant Site Audit Report	6/2/2015	SSA 1505
Watts Bar Nuclear Plant Site Performance Review Meeting Minutes	2/19/2015	
Watts Bar Nuclear Plant Site Trimester Performance Assessment May 23-September 30, 2015	10/21/2015	N/A
Watts Bar Nuclear Plant Station Nuclear Safety Review Board Plant Support Subcommittee Meeting Minutes	12/1/2015	N/A
Watts Bar Nuclear Plant Unit 2 Concerns from Exits (2013-2016)	2013-2016	

APPENDIX F

QUALIFICATIONS SUMMARY OF NTD CONSULTING GROUP, LLC

The NTD Consulting Group, LLC (NTD), provides comprehensive facility, organizational, and workforce consulting in support of excellence, regulatory compliance, and continuous improvement.

The NTD team has nationally recognized expertise in the quality and nuclear safety culture areas. NTD provides comprehensive services in the fields of quality assurance; nuclear safety evaluation and program development; quality programs procedure and process development; audit assistance; auditor training; supplier quality oversight; independent investigations; and pre-Nuclear Industry Evaluation Program (NIEP) Assessments; nuclear security; and regulatory assistance.

NTD Principals and consultants include former senior leaders in these disciplines as well as topical experts with many years of relevant and in-depth experience. NTD assists clients in complying with existing regulations and in developing plans, programs, and processes to address new and changing regulatory requirements. NTD supports clients in the areas of New Nuclear, Operations, Decommissioning, and Dry Cask Storage.

NTD consultants supporting the TVA Office of the Inspector General collectively have over *175 years of nuclear and safety experience*. The experience includes legal, licensing, quality assurance, employee concerns, nuclear safety culture, environment, safety and health, corrective action, projects, engineering, organizational development, and plant operations with extensive experience related to commercial nuclear utilities.

A summary of the pertinent experience of each team member is provided below:

Bruce Norton; Principal & Managing Partner, NTD Consulting Group, LLC

Mr. Norton has *43 years* of experience in developing and implementing management strategies for resolving complex and sensitive management and technical issues in the nuclear industry.

His areas of expertise are in dealing with complex “political/technical” issues, NRC regulatory matters, nuclear safety culture, corrective action programs and processes, causal analysis, quality assurance, project management strategies, and nuclear security.

He has assisted several nuclear utilities in diverse areas including organizational reviews, design bases, quality assurance programs, causal analyses, maintenance and design change processes, corrective action programs and strategies for “get well” programs.

Mr. Norton was the Project Manager for independent management assessments of the Nuclear Quality Assurance Program at Westinghouse and the *Nuclear Safety Culture at V. C. Summer Units 2 & 3*, and supported an Independent Management Quality Assessment

of *South Carolina Electric & Gas V. C. Summer Unit 1 ISFSI Project*. He consulted with *Shaw Modular Solutions* with respect to their Corrective Action Program including performance of root cause analyses and training of individuals to participate in causal analyses. Mr. Norton was also a member on a special independent assessment team of Commercial Grade Dedication Programs at the *U.S. Department of Energy's Waste Treatment Project* in Hanford, Washington.

Prior to that he provided causal analysis services and project management for security projects at the *National Enrichment Facility* in New Mexico (2007-2011). He was the project manager for the *Humboldt Bay Power Plant* project to recover lost fuel rods (2004-2006). From 1998-2003 he managed the development of the process for procurement, evaluation, and selection of bids and services for construction of nuclear fuel dry-cask storage facilities at three different nuclear facilities. In 1998-99, Mr. Norton was part of a three-member senior review panel retained by two west coast utilities to determine the feasibility of decommissioning a jointly owned nuclear facility. From mid-1994 through 1995, Mr. Norton was retained by the *California Seismic Safety Commission* to oversee and manage a multi-discipline investigation of the Northridge Earthquake for the State of California to determine adequacy of current building codes, zoning laws, and related infrastructure.

From 1991 to 1994, Mr. Norton was *President of ATI Consulting* where his primary emphasis was in consulting to utility management, organizational reviews, and streamlining of quality, engineering, and maintenance programs and work planning activities for nuclear utilities.

From 1986 to 1991, he was the *Senior Vice President of the TENERA, LP Senior Management Division*. During 1990, he was a member of the Senior Resumption Team for EG&G, Rocky Flats. During 1989, he was responsible for developing and implementing strategies to demonstrate to NRC regulators that an east-coast plant that had been ordered shutdown was ready for restart.

During 1987 and 1988, he was the principal consultant responsible for a major organizational review of one the largest nuclear organizations in the United States.

From 1976 to 1986, Mr. Norton was the managing partner of the law firm of *Norton, Burke, Berry, and French* in Phoenix, Arizona. During this period, he was the outside *Lead Counsel for litigation and licensing of Diablo Canyon, Units 1 and 2* (1976-1984) and various other utility matters. He was a *member of the senior management team during the Diablo Canyon Independent Design Verification Program* (1981-1984). Mr. Norton also served as outside *Lead Counsel for the Diablo Canyon Prudency Case pending before the California Public Utilities Commission* (1984-1986).

Mr. Norton has a J.D. from State University of New York at Buffalo and a B.A. from Southern Illinois University.

David Taggart; Senior Principal & Partner, NTD Consulting Group, LLC

Mr. Taggart has *42 years* of experience in the nuclear industry with over *40 years* in the quality assurance, performance improvement, corrective action, employee concerns, and nuclear safety disciplines. His experience is associated with the commercial nuclear industry and Department of Energy nuclear programs, including 33 years working for utilities.

Mr. Taggart is currently an industry executive management consultant in the quality assurance and nuclear safety culture evaluation field. As an executive consultant, he has consulted directly for the *U.S. Department of Justice* and supported the *U.S. Department of Energy's Office of Inspector General - Office of Investigations* at the Mixed Oxide Fuel Fabrication Facility Project at the Savannah River Site as a nuclear Quality Assurance/Quality Management and Commercial Grade Dedication (CGD) Expert. He has consulted with *Blue Castle Holdings, Inc.* in the area of quality assurance/quality management and currently consults with the *Japan Nuclear Safety Institute (JANSI)* with regard to efforts to improve Japanese commercial nuclear power plant quality assurance, nuclear safety and performance improvement programs. "JANSI" is Japan's equivalent to "INPO" in the United States. Mr. Taggart also consulted with and supported the *U.S. Department of Energy* and *Bechtel National Inc*. as an expert member on a five-member executive independent assessment review team (led by retired NRC Chairman Nils Diaz) evaluating the Managed Improvement Plan at the *U.S. Department of Energy's Waste Treatment Project* in Hanford, Washington.

He has led independent nuclear safety culture assessments and independent QA management audits of nuclear utilities, EPCs and suppliers. Recently he led an independent QA Management audit & COL Readiness assessment of *Nuclear Innovations North America* (NINA) in support of STP 3 & 4. Mr. Taggart has also performed numerous industry quality management (Nuclear Industry Evaluation Program Audits) and nuclear safety culture evaluations. He has participated on or led independent management nuclear audits of 11 different nuclear utilities.

Previous industry management leadership positions held include the *Quality Manager/Director and Nuclear Safety Engineering Director* for *Pacific Gas & Electric Company* (PG&E) in support of the Diablo Canyon and Humboldt Bay nuclear facilities; *Consortium Project Quality Director* for South Carolina Electric & Gas Company's V. C. Summer 2 & 3 new nuclear facilities; and *Senior Quality Manager* for U.S. Department of Energy's management and operations contractor, Bechtel SAIC Company (BSC) in support of the Nation's High Level Radioactive Waste Repository at Yucca Mountain reporting to the BSC President. Earlier in his career, he held the positions of *Section Head of Audits &*

Management Systems, General Supervisor of Nuclear Quality, and Assistant Superintendent of Plant Assurance Programs at the *Consumers Power Company* - now called Consumers Energy.

While with PG&E, he was the company's senior nuclear quality assurance official and managed all quality assurance/control activities, nuclear safety culture programs and the nuclear safety employee concerns programs. In this capacity he reported directly to the PG&E Chief Nuclear Officer. During his tenure of 23 years with PG&E, Diablo Canyon received 12 INPO "1" top ratings out of 14. At PG&E, he served on the *Nuclear Safety Oversight Committees* for both the Diablo Canyon and Humboldt Bay Nuclear Power Plants, served as a member on the *President's Nuclear Advisory Committee*, served as the *Chair of the Independent Technical Review Function*, and served as the *Company's Chair of the Part 21 Review Group.* At the USDOE High Level Waste Repository at Yucca Mountain, he served on the *Quality Review Board* consisting of USDOE, Sandia National Laboratory and BSC and served on the *Nuclear Safety Council* for BSC. At Consumers Power, he served on the *Nuclear Safety Audit & Review Board* for the Palisades and Big Rock Point Nuclear Plants.

Mr. Taggart is the previous Industry Chair of the Nuclear Quality Management Leadership Forum (NQML), the previous Industry Chair of the Nuclear Industry Evaluation Program (NIEP), and the previous Chair of the Strategic Teaming & Resource Sharing alliance (STARS) Quality Team. The NQML consists of every nuclear utility senior quality official within the United States and Canada and provides senior industry leadership and guidance of NUPIC and NIEP. STARS is a multi-nuclear utility alliance.

He has given numerous presentations on QA, performance-based audits, and nuclear safety at venues including the American Nuclear Society, American Society for Quality, the International Conference on Pressure Vessel Technology, the Nuclear Oversight Conference, EPRI - Operational Reactor Safety Engineering and Review Group Conference and most recently at the Japan Nuclear Safety Institute nuclear utility Conference held in Tokyo, Japan. Mr. Taggart authored the Chapter "Quality Assurance and Audits in the Nuclear Industry in the USA" in the international book Managing Nuclear Projects that was published by Woodhead Publishing Limited. He also co-authored the "Nuclear Industry Evaluation Program Guidelines" (NQML 07-002; 1/2007) and the "Nuclear Industry Evaluation Program Performance Objectives and Criteria" (NQML 07-001; 1/2007) that are used by the industry to assess the effectiveness of nuclear utility quality oversight organizations throughout the United States and Canada.

He is currently a member of the industry Working Group for ANSI/ANS 3.2 "*Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of Nuclear Power Plants.*"

Mr. Taggart received his B.S. with Honors from Michigan State University in the field of Mechanical Engineering. He completed the Nuclear Technology for Utility Executives Program at the Massachusetts Institute of Technology (MIT), a program co-sponsored by the Institute of Nuclear Power Operations (INPO). Mr. Taggart is an industry certified NQA-1 Lead Auditor.

Robert McWey; Senior Principal & Partner, NTD Consulting Group, LLC

Mr. McWey has over *40 years* of experience in the nuclear industry including 30 years with Southern California Edison at the San Onofre Nuclear Generating Station. Prior to working in the commercial nuclear industry, Mr. McWey served as an officer in the U.S. Navy submarine service where he qualified as a Nuclear Propulsion Plant Supervisory Engineer; certification by U.S. Naval Reactors Nuclear Power Board.

As a nuclear executive consultant, he has performed independent audits, assessments, and quality program consulting at nuclear plants/sites and supplier facilities. He performed a comprehensive quality assessment of the SCE&G QA Program and ISFSI project and participated as a team member on a major nuclear independent safety culture assessment of CB&I. He participated as a Commercial Grade Dedication industry expert on an assessment of the Emergency Turbine Generator dedication program and process at the U.S. Department of Energy Hanford Tank Waste Treatment and Immobilization Plant (WTP). Also at Hanford, he participated on major independent assessments of the BNI quality assurance program and of the BNI corrective action program and the Managed Improvement Program. He has performed audits at several supplier facilities including General Electric Hitachi, Invensys, and Power Analytics assessing quality assurance and dedication programs. He consulted with Westinghouse Electric Company in the area of quality assurance and supplier quality assurance. Mr. McWey has also supported the Japan Nuclear Safety Institute in the area of U.S. industry supplier quality oversight practices.

Mr. McWey has held the position of Manager, Oversight and Projects Oversight at the San Onofre Nuclear Generating Station. His responsibilities included overall responsibility for all QA and QC activities associated with the site, Projects and Supplier Quality. He was also responsible for oversight of the SONGS Unit 1 Decommissioning activities, as well as oversight of ASME spent fuel canister fabrication and management of the SCE ASME Quality Assurance Program. Prior to joining the Quality organization, he was the Chemistry Supervisor for San Onofre Units 2 & 3, responsible for directing and supervising chemical and radiochemical sampling and analysis of reactor plant, steam plant, and auxiliary systems.

Mr. McWey has been actively involved in the nuclear industry, has served as the Industry Chairman of the Nuclear Procurement Issues Committee (NUPIC), Chairman of the Private Fuel Storage LLC QA Committee, Regional Representative and Vice-Chairman of the

NUPIC Steering Committee, and a Member of the Nuclear Industry Evaluation Program Committee.

He co-authored the "Nuclear Industry Evaluation Program Guidelines" (NQML 07-002; 1/2007) and the "Nuclear Industry Evaluation Program Performance Objectives and Criteria" (NQML 07-001; 1/2007) that are used by the nuclear industry to assess the effectiveness of nuclear utility quality oversight organizations throughout the United States and Canada. Mr. McWey also participated in the National Nuclear Security Administration's International Nuclear Safety Program workshop in the Ukraine as a presenter and Industry Expert on vendor quality and oversight.

He holds a B.S. Chemistry from the University of Southern California and an MBA from National University. Mr. McWey is an ANSI N45.2.23 and NQA-1 certified nuclear Lead Auditor, obtained ASQC Quality Engineer certification and has completed ISO 9000 Lead Assessor Training.

Rosa Carrillo; President of Carrillo & Associates; (Executive Consultant to NTD)

Ms. Carrillo, President of Carrillo & Associates, is a thought leader in transformational leadership for nuclear safety culture and industrial safety. She brings over *20 years* of industry experience with all levels of the organization. She is fluent in English and Spanish, is at ease working across many cultures, and holds a M.S. in Organization Development.

Her unique understanding of safety culture and complex environments is translated into direct and concrete recommendations and tools to manage environmental protection and safety performance. The issues confronting high hazard operations are unique and require a fresh approach to ongoing challenges.

Carrillo & Associates has been working in the field of environment, safety, and health since 1990. One of the original companies working with safety culture, it was and is employed by U.S. regulatory agencies such as the NRC and BESEE to advise on and develop its safety culture leadership courses.

Creating a climate of open communication and trust is key to maintaining the highest level of safety awareness in nuclear facilities. This is one of Carrillo & Associates' key competencies. C&A has developed and delivered courses in safety culture leadership for nuclear clients. They have also partnered with managers, HR, and Safety professionals to restore collaboration and productivity in situations where employee/management relationships were severely damaged.

In addition, she has extensive experience working with all levels of management at DOE sites such as Lawrence Livermore National Laboratories, Sandia Labs, and Los Alamos. Her clients have included the Nuclear Regulatory Commission, Sandia National Labs,

Pacific Gas & Electric (Diablo Canyon), Southern California Edison (SONGS), GE Nuclear Power Systems—Safety Culture change management, NuStar Energy—Team building and leadership team development, Honeywell—Mexico/US, Biosense Webster—biotechnology, Johnson & Johnson World-Wide—Strategic planning for EHS function, Florida Power and Light (Nuclear), Bureau of Safety and Environment Enforcement, Exxon Mobil Chemical. She has authored numerous publications on the subjects of safety culture, building trust, improving safety performance through cultural interventions, and leadership.

Experienced in: Culture development/change/integration, behavioral assessments, program design, management development, employee accountability, employee engagement, Human Performance (HU), safety culture, performance management, and change management. She is flexible, adaptive and her business management, training and consulting skills are transferable to all industries.

Chris Younie; Owner of Chris Younie Consulting; (Executive Consultant to NTD)

Mr. Younie has over *30 years of diverse nuclear senior management experience* having held management positions at Xcel Energy Prairie Island Units 1&2, the Callaway Nuclear Plant, the Wolf Creek Nuclear Power Plant and at the Institute of Nuclear Power Operations (INPO).

He has held positions as *Plant Evaluation Team Leader* for 7 years with the Institute of Nuclear Power Operations (INPO) where he conducted over 20 plant evaluations in the area of organizational effectiveness, operations, maintenance, engineering and performance improvement; *Plant Manager* for a dual unit nuclear facility where he managed over 630 employees and influenced key cultural changes and improvements seen in all areas of performance with the most impactful being the corrective action and work management programs*;* *leadership consultant* providing coaching and observation for improved management performance and nuclear safety at a major nuclear facility; *plant operations manager* for two major nuclear facilities; and the *senior nuclear quality oversight official* for two major nuclear facilities and *manager for business operation and operations* at a major nuclear facility.

Within nuclear operations, he advanced through positions of *Reactor Operator, Control Room Supervisor, Shift Supervisor,* and *Assistant Operations Manager* prior to attaining the position of *Operations Manager* and ultimately *Plant Manager*. His contributions supported his facility to attain an INPO 1 and sustained high regulatory performance.

He has developed and implemented an Observation Process based on the defined traits for a strong nuclear safety culture. Mr. Younie has held an NRC Senior Reactor License (PWR) and has a B.S. in Engineering Technology.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

October 26, 2016

EA-16-061

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3D-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION (PART 1); AND SAFETY CONSCIOUS WORK ENVIRONMENT ISSUE OF CONCERN FOLLOW-UP; NRC INSPECTION REPORT 05000390/2016007 AND 05000391/2016007

Dear Mr. Shea:

On September 15, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed the first part of a Problem Identification and Resolution biennial inspection, which included a Safety Conscious Work Environment Issue of Concern Follow-Up inspection at your Watts Bar Nuclear Plant, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on September 15, 2016, with Mr. Paul Simmons and other members of your staff.

In a letter dated March 23, 2016, the NRC issued a Chilling Effect Letter (CEL) entitled, "Chilled Work Environment for Raising and Addressing Safety Concerns at the Watts Bar Nuclear Plant," (ML16083A479). The NRC determined there was sufficient evidence to support the existence of an environment within the Operations department where your employees did not feel free to raise safety concerns to management because they feared retaliation and did not feel that their concerns were being addressed. As a follow-up to the issuance of the CEL, this inspection included a focused assessment of the safety conscious work environment (SCWE). The staff evaluated the attributes of a SCWE as described in inspection procedure (IP) 93100, "Safety Conscious Work Environment Issue of Concern Follow-up." IP 93100 identifies a SCWE as an environment in which employees are encouraged to raise safety concerns, are free to raise concerns both to their own management and to the NRC without fear of retaliation, where concerns are promptly reviewed, given the proper priority, appropriately resolved, and timely feedback is provided to those raising concerns.

The inspection team conducted 17 focus groups and 22 interviews with members of the Watts Bar staff and key management. A total of 136 employees participated in the focus groups and interviews. The information from the focus groups, interviews, and document reviews were organized into the themes that are discussed in the attached report. The team made the following key observations associated with the current work environment, which are explained in more detail in the report. Interviews and focus groups with Operations department staff indicated an improvement in the primary work environment conditions that prompted the

issuance of the CEL, but focus groups within and outside of the Operations department indicated the existence of broader, previously unrecognized challenges to the maintenance of a positive safety culture, which continued to challenge the SCWE. The team identified substantial weaknesses in various attributes of a SCWE, which were found to be pervasive across various work units. Most prominent was that although most employees in the assessment indicated that they were personally willing to raise nuclear safety concerns, nearly half believed retaliation was a potential outcome for raising concerns. In addition, most employees did not believe that concerns were promptly reviewed or appropriately resolved, either by their management or via the Corrective Action Program.

The NRC has determined that, given the current state of the site's safety culture, you are not meeting the Commission's expectation that licensees establish and maintain a positive safety culture and safety conscious work environment as described in the Safety Culture and SCWE Policy Statements (76 FR 34773, June 14, 2011; 61 FR 24336, May 14, 1996). The inspectors did not identify any findings or violations of regulatory requirements of more than minor significance. The NRC will continue to inspect and monitor the site's safety culture and the progress of the actions identified in your response to the CEL to address the work environment issues. The observations made during this inspection will be reviewed in conjunction with the results of the second part of the inspection and included in the overall assessment and conclusions regarding the effectiveness of the PI&R program.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Alan Blamey, Branch Chief
Reactor Projects Branch 6
Division of Reactor Projects

Docket Nos.: 50-390, 391
License Nos.: NPF-90, NPF-96

Enclosure: Inspection Report 05000390/2016007 and 05000391/2016007
w/Attachment: Supplemental Information

cc: Distribution via ListServ

issuance of the CEL, but focus groups within and outside of the Operations department indicated the existence of broader, previously unrecognized challenges to the maintenance of a positive safety culture, which continued to challenge the SCWE. The team identified substantial weaknesses in various attributes of a SCWE, which were found to be pervasive across various work units. Most prominent was that although most employees in the assessment indicated that they were personally willing to raise nuclear safety concerns, nearly half believed retaliation was a potential outcome for raising concerns. In addition, most employees did not believe that concerns were promptly reviewed or appropriately resolved, either by their management or via the Corrective Action Program.

The NRC has determined that, given the current state of the site's safety culture, you are not meeting the Commission's expectation that licensees establish and maintain a positive safety culture and safety conscious work environment as described in the Safety Culture and SCWE Policy Statements (76 FR 34773, June 14, 2011; 61 FR 24336, May 14, 1996). The inspectors did not identify any findings or violations of regulatory requirements of more than minor significance. The NRC will continue to inspect and monitor the site's safety culture and the progress of the actions identified in your response to the CEL to address the work environment issues. The observations made during this inspection will be reviewed in conjunction with the results of the second part of the inspection and included in the overall assessment and conclusions regarding the effectiveness of the PI&R program.

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☒ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ☒ NON-SENSITIVE
ADAMS: ☒ Yes ACCESSION NUMBER: ML16300A409 ☒ SUNSI REVIEW COMPLETE ☒ FORM 665 ATTACHED

OFFICE	OE:AT	RII:DCP	RII:DRP	RII:ORA	RES:DRA	HQ:OE	RII:DRP	RII:DRP
SIGNATURE	Via Email	Via Email	Via Email	Via Email	Via Email	/RA via Email/	/RA/	/RA/
NAME	D.Willis	N. Coovert	G.Smith	M.Checkle	SMorrow	LJarriel	CKontz	ABlamey
DATE	10/13/2016	10/12/2016	10/18/2016	10/21/2016	10/13/2016	10/20/2016	10/21/2016	10/26/2016
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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-390, 50-391
License No.:	NPF-90, NPF-96
Report No.:	05000390/2016007, 05000391/2016007
Licensee:	Tennessee Valley Authority (TVA)
Facility:	Watts Bar, Units 1 and 2
Location:	Spring City, TN 37381
Dates:	September 12 - 15
Inspectors:	C. Kontz, Senior Project Engineer (Team Lead) S. Morrow, Human Factors Engineer (Lead Safety Culture Assessor) D. Willis, Allegations Team Leader M. Checkle, Senior Allegation Coordinator N. Coovert, Senior Construction Inspector G. Smith, Senior Resident Inspector Sequoyah
Approved by:	Alan Blamey, Branch Chief, Reactor Projects Branch 6 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000390/2016007; 05000391/2016007; September 12 – 15, 2016; Watts Bar, Units 1 and 2; Biennial Inspection of the Problem Identification and Resolution Program.

This inspection constituted the first part of the biennial inspection of the Problem Identification and Resolution Program and was conducted by a senior project engineer, senior resident inspector, human factors engineer, an allegations team leader, senior allegations coordinator, and a senior construction inspector. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

REPORT DETAILS

4. OTHER ACTIVITIES

4OA2 Problem Identification and Resolution

.1 Safety-Conscious Work Environment

a. Background

In a letter dated March 23, 2016, the NRC issued a Chilling Effect Letter (CEL) to the Watts Bar Nuclear Plant entitled, "Chilled Work Environment for Raising and Addressing Safety Concerns at the Watts Bar Nuclear Plant," (ML16083A479). The NRC concluded that a chilled work environment existed in the Operations department because of a perception that operators were not free to raise safety concerns using all available avenues without fear of retaliation. Additionally, Region II identified and documented a safety conscious work environment (SCWE) cross-cutting theme during the 2016 mid-cycle assessment, due to the issuance of the CEL and a violation with a cross-cutting aspect in the SCWE cross-cutting area (Inspection Report 05000390/2016001; ML 16098A323).

As part of the follow-up to the work environment issues, the NRC elected to include an assessment of the SCWE attribute of a licensee's safety culture using inspection procedure (IP) 93100, "Safety Conscious Work Environment Issue of Concern Follow-up."

As described in IP 93100, "A safety conscious work environment (SCWE) is defined as an environment in which employees are encouraged to raise safety concerns, are free to raise concerns both to their own management and to the NRC without fear of retaliation, where concerns are promptly reviewed, given the proper priority, and appropriately resolved, and timely feedback is provided to those raising concerns. In contrast, a "chilled work environment" is one in which employees perceive that raising safety concerns to their employer or to the NRC is being suppressed or is discouraged and can occur because of an event, interaction, decision, or policy change."

b. Inspection Scope

The inspection was performed in accordance with IP 93100, "Safety Conscious Work Environment Issue of Concern Follow-up," and other IPs as referenced by IP 93100. The objectives of the inspection were to determine whether interim actions have improved the work environment in the Operations department since the CEL; if indications of a chilled work environment exist in other departments; if employees are reluctant to raise nuclear safety or regulatory issues; and if employees are being discouraged from raising nuclear safety or regulatory issues.

Specifically, the inspection team performed semi-structured interviews and focus groups using questions designed to address four primary elements of a SCWE:

1) employees' willingness to raise concerns and whether management's behaviors encourage them to do so;
2) employees' perception of the effectiveness of the corrective action program as the primary avenue to raise concerns;
3) employees' perception of the effectiveness of an alternative program if one exists, such as an employee concerns program (ECP); and
4) employees' perception of the effectiveness of management actions to detect and prevent retaliation and chilling effects.

The inspection team conducted 17 focus groups and 22 interviews with the licensee's staff and key management. For the focus groups, the inspection team randomly selected 10 to 20 percent of employees from the following departments: Operations, Engineering, Maintenance, Work Management, Security, Chemistry, Radiation Protection, and Training. Each focus group consisted of employees at the same organizational level and from the same department. A total of 136 employees participated in the focus groups and interviews. The information from the focus groups, interviews, and document reviews were organized into the themes that are discussed in this report.

c. Observations

1) General

Based on the results of the interviews and focus groups, the inspection team identified deficiencies in the safety conscious work environment across multiple departments. Although nearly all employees indicated that they were personally willing to raise nuclear safety concerns, many stated they did not feel free to raise concerns without fear of retaliation. In addition, most employees did not believe that concerns were promptly reviewed or appropriately resolved, either by their management or via the Corrective Action Program.

The inspection team observed that, in some work units, employees expressed a clear distinction between their willingness to raise nuclear safety concerns versus non-nuclear safety concerns. While nearly all employees stated that they were willing to raise nuclear safety concerns, many indicated that they would be unwilling to raise concerns that they believed to be unrelated to nuclear safety. Further, most employees did not believe that management would respond to or take action to resolve non-nuclear safety concerns. When questioned about what a non-nuclear safety concern was, employees gave examples of concerns that had potential ties to nuclear safety, such as deficient procedures, work orders that were inappropriately closed before all work was completed, personal safety concerns about working on live systems (e.g., safety systems that remain electrified or pressurized), and long-standing equipment issues. As a result, the inspection team determined that employees used a very narrow definition of "nuclear safety" when identifying the types of concerns that they were encouraged to raise. The potential negative consequences of making a distinction between nuclear and non-nuclear safety concerns is that employees may self-censor and decide not to raise a

concern because they fear retaliation and do not believe it is tied to nuclear safety. The inspection team observed that employees' perceptions about how management would respond to a concern, and whether the concern would be resolved in a timely manner, strongly influenced their overall willingness to raise any concerns.

2) Response to Chilling Effect Letter

When asked about the chilling effect letter, all employees indicated that they had received communications from management explaining the letter. Many employees expressed disappointment in the initial communications from management, which seemed to downplay the issue by focusing on the "perception" of a SCWE problem. However, employees noticed a shift in the tone of more recent communications, which suggested management ownership for the chilled work environment in Operations and commitment to address work environment issues across the entire site. Most employees also indicated that they are cautiously optimistic about the recent management changes. However, employees were not generally aware of specific actions to address the root causes of the chilled work environment beyond recent management changes and increased communications.

Multiple focus groups expressed skepticism about the sustainability of positive changes in the work environment, particularly given their experiences with frequent management changes. While staff had noted increased communications, the information provided was not always seen as open and honest. For instance, communications were seen as incomplete, often over-emphasizing positives, and down-playing challenges. Employees noted that the incomplete communications gave the impression that management was controlling the story, which contributed to a lack of trust in management. Some groups felt they had no basis to judge whether positive changes would last, and noted that the next planned outage in Spring 2017 would be an effective indicator of whether there have been true changes in the work environment. Multiple groups observed that the safety conscious work environment is particularly challenged during outages because of the added schedule pressure.

3) Environment for Raising Concerns

Most licensed operators in both interviews and focus groups reported slight improvements in the work environment since the CEL, and expressed that they felt free to execute their duties without undue external pressure. However, many employees, including licensed operators, believed that retaliation for raising safety concerns has occurred in the past, and therefore remained cautious when deciding when and how they would raise concerns. Many based this belief on management actions they considered to be retaliatory in nature. Employees provided examples of dismissive, disrespectful, or blaming behaviors that did not encourage the raising of concerns. In spite of this, most employees stated they would raise nuclear safety concerns.

The inspection team observed a lack of trust between employees and management regarding their environment for raising concerns, particularly beyond the level of first line supervision. While most employees felt free to raise issues to their first line supervisor, they would be hesitant to raise concerns to middle or upper management. In addition,

employees did not feel that first line supervision was supported by upper management. For example, some employees believed that first line supervisors who regularly raised concerns up their management chain were subject to ridicule from higher levels of management and received more negative performance appraisals.

Many employees noted that the continuous turnover and rotation of managers had created instability in their departments. Employees from different departments provided examples of having from six to sixteen different managers in the past six years. Most employees expressed frustration with the frequent management changes because they felt it led to changing priorities and a lack of long-term accountability. For example, employees indicated that because managers would not remain in a position for a long period of time they could make decisions that prioritized short-term gains over long-term improvements. Other examples included beliefs that managers were more concerned with meeting metrics and production goals than fully addressing issues with degraded equipment, ensuring procedures were updated, or improving work processes. The lack of management visibility or development of relationships with employees had also contributed to a lack of trust between management and staff.

4) Other Safety Culture Observations

In addition to questions regarding the environment for raising concerns, the inspection team asked questions related to other traits of a positive safety culture, such as decision making, questioning attitude, problem identification and resolution, and work processes. The team sought to determine the extent to which weaknesses in other safety culture traits may be driving the identified deficiencies in the safety conscious work environment.

Most employees indicated that they have the authority to stop work and expressed a willingness to stop when they believed the work to be unsafe or work instructions were unclear. However, most employees also noted that there was a strong sense of production over safety throughout the organization. Many employees expressed the opinion that if they raised issues that would disrupt "critical path" activities then they would be viewed negatively by management. Focus group participants provided examples of disrespectful behavior, intimidation and shopping around work to other employees or contractors who would be less likely to raise issues.

When asked about the Corrective Action Program (CAP), all focus groups stated that they could enter issues into the CAP; however, most believed the CAP was ineffective at resolving issues. The CAP was characterized as a problem identification, but not a problem resolution tool. Employees expressed frustration with the lack of feedback, and issues that were closed to trend or repeatedly deferred.

5) Employee Concerns Program

Most employees stated that they were aware of the Employee Concerns Program. However, many employees were not aware or did not perceive ECP as independent from management. Some employees did not believe that management would take action to resolve issues identified through ECP.

Most employees stated that they can be open and honest when participating in ECP surveys and other safety culture assessments. However, the inspection team noted that many employees were not able to differentiate between the different safety culture assessments that they take. For example, ECP pulsing surveys were often confused with other surveys that ask similar questions about safety culture and SCWE, but also required employees to report identifying information such as their work unit, tenure, age range, and gender. As a result, the ECP pulsing surveys were not viewed as anonymous, which also affected employees' overall perception of the ECP. In addition, most employees did not recall communications regarding the results of the assessments, or saw changes made to the work environment prior to the next assessment. This created a continuous cycle of employees providing feedback but not seeing any action as a result of that feedback. Such action can discourage continued employee engagement and is interpreted by employees to mean management is not supportive of employees raising any concerns, including nuclear safety concerns.

6) Nuclear Safety Culture Monitoring Panel

The team interviewed multiple members of the Nuclear Safety Culture Monitoring Panel (NSCMP), and all members reported improvements in recent meetings of the NSCMP. For example, after the CEL the panel met monthly rather than quarterly to provide more timely reviews of safety culture trends. Panel members also reported more engagement during meetings, and the addition of craft level employees rather than just management at the meetings to provide additional insights regarding the work environment in different departments.

However, from the inspection team's review of the NSCMP procedures and meeting minutes from 2014 through August 2016, the NSCMP did not appear to be self-critical of key safety culture traits that were precursors for the issues that led to the chilled work environment in Operations. Specifically, the team noted that the safety culture trait, "leadership safety values and actions," was only identified as an improvement opportunity on two occasions since 2014. On both occasions, the trait was rated as an improvement opportunity due to issues identified by external organizations (e.g., Quality Assurance and Institute of Nuclear Power Operations). Further, the "leadership safety values and actions" trait has remained acceptable since fourth quarter of 2015, yet leadership deficiencies were identified as a root cause of the chilled work environment in Operations in early 2016. This suggested that the NSCMP may have difficulty self-identifying safety culture issues, particularly when the source relates to leadership behaviors.

The inspection team also observed considerable fluctuations in the NSCMP ratings of safety culture from meeting to meeting, primarily based on recent examples of positive or negative performance. For example, the NSCMP rated the safety culture trait, "environment for raising concerns" as a strength in November 2015, during the same time period that the chilled work environment developed in the Operations department. Since that time period, the "environment for raising concerns" trait has been rated as acceptable during multiple meetings, including the NSCMP meeting immediately before the chilling effect letter was issued (March 2016) and the meeting two months after the chilling effect letter (May 2016). This gives the impression that the NSCMP believed the

site had resolved the issues associated with the environment for raising concerns in May 2016. The rating of acceptable was based in part on pulsing survey results, which showed that high percentages of employees were willing to raise concerns. However, the data did not indicate whether employees feel encouraged to raise concerns, whether they believe they may be retaliated against for raising concerns, or whether employees believed concerns will be appropriately addressed and resolved.

The inspection team observed that NSCMP members have not received specialized training regarding how to draw conclusions about safety culture. Given the fluctuations in the safety culture ratings, it was not clear that the NSCMP members shared a common understanding of the nuclear safety culture standards they were trying to achieve when assessing whether a safety culture trait was a strength, acceptable, or an improvement opportunity. As a result, the inspection team did not have confidence that the NSCMP provided an accurate snapshot of the safety culture at the site, or that the NSCMP would be able to detect and correct a gradually declining safety culture prior to the development of a chilled work environment.

7) Summary

Based on the inspection team's limited assessment, the licensee's safety culture and safety conscious work environment were not consistent with the Commission's expectations as described in the Safety Culture and SCWE Policy Statements (76 FR 34773, June 14, 2011; 61 FR 24336, May 14, 1996). There were strong indications that similar stressors and precursors that allowed the chilled work environment to develop in the Operations department also existed in other departments. These underlying issues included perceptions that decision making favored production over safety, lack of effective problem resolution, lack of trust between management and staff, and beliefs that employees who raised concerns, including nuclear safety concerns, were at risk of being retaliated against for doing so. At the time of the inspection, most employees noted slight improvements in the work environment since the issuance of the CEL, and licensed operators reported that they felt free to execute their duties. However, the interviews and focus groups indicated deficiencies in the SCWE, specifically ensuring management behaviors encouraged the raising of concerns, the effectiveness of the CAP and ECP for resolving concerns, and the effectiveness of management actions to detect and prevent retaliation and chilling effects.

4OA6 Meetings, Including Exit

On September 15, 2016, the inspectors presented the inspection results to Mr. Simmons and other members of the site staff.

ATTACHMENT: SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel:
Gordon Arent, Licensing Manager

NRC personnel:
Jared Nadal, Senior Resident Inspector

LIST OF REPORT ITEMS

None

LIST OF DOCUMENTS REVIEWED

Condition Reports Reviewed (CRs)

1125714
1127691
1151960
1155393
1182538
1209515
1210654

Corrective Action Documents (Completed)

1162755-013
1162755-028
1162755-033

Procedures

NPG-SPP-01.7, "Nuclear Safety Culture," Rev. 3
NPG-SPP-01.7.2, "Nuclear Safety Culture Monitoring," Rev. 6
NPG-SPP-01.7.3, "Conduct of Nuclear Safety Culture Assessments and Organizational Effectiveness Surveys," Rev. 2

Attachment

Miscellaneous Documents

CR 1127691, "Inadequate Management of an Outage Emergent Issue Results in Challenge to Plant Operation Root Cause Analysis (RCA) CR Report," Rev. 1
CR 1155393, "Watts Bar Nuclear Plant Chilled Work Environment RCA CR Report," Rev. 0
EA-16-061, Letter from U.S. NRC to Mr. Joseph Grimes, "Chilled Work Environment for Raising and Addressing Safety Concerns at the Watts Bar Nuclear Plant," 03/23/2016
Gelfond Employee Engagement Survey, dated Summer 2015
Gelfond Nuclear Supplement to Employee Engagement Survey, dated Summer 2015
Letter from Watts Bar Nuclear Plants Units 1 and 2 to U.S. NRC, "Response to NRC Letter Concerning a Chilled Work Environment for Raising and Addressing Safety Concerns at the Watts Bar Nuclear Plant," 04/22/2016
Nuclear Safety Culture Monitoring Panel Agenda and Report, 06/05/2014
Nuclear Safety Culture Monitoring Panel Agenda and Report, 008/14/2014
Nuclear Safety Culture Monitoring Panel Minutes, 11/06/2014 and 11/20/2014
Nuclear Safety Culture Monitoring Panel Minutes, 02/05/2015
Nuclear Safety Culture Monitoring Panel Minutes, 05/07/2015
Nuclear Safety Culture Monitoring Panel Minutes, 08/13/2015
Nuclear Safety Culture Monitoring Panel Minutes, 11/05/2015
Nuclear Safety Culture Monitoring Panel Agenda and Report, 01/14/2016
Nuclear Safety Culture Monitoring Panel Minutes, 03/03/2016
Nuclear Safety Culture Monitoring Panel Minutes, 04/14/2016
Nuclear Safety Culture Monitoring Panel Minutes, 05/19/2016
Nuclear Safety Culture Monitoring Panel Minutes, 06/23/2016
Nuclear Safety Culture Monitoring Panel Minutes, 07/14/2016
Nuclear Safety Culture Monitoring Panel Minutes, 08/11/2016
OE.01.WBN.01, "Improve WBN Work Environment," Business Planning Initiatives and Actions," FY17-21 BP Rev 0
Organizational Survey Analysis Report by Midwest Organizational Services, 11/26/2014
Watts Bar Nuclear Plant CWEL Oversight Meeting Minutes, 08/23/2016
Watts Bar Nuclear Plant Nuclear Chilled Work Environment Assessment of Progress, presentation, 09/12/2016

Condition Reports generated as a result of the inspection

CR 1212504, "Consider Revising NSCMP Procedure NPG-SPP-01.7.2 to Add Craft," 09/12/2016
CR 1212515, "Consider Adding the NSCMP Index Developed at Watts Bar to NSCMP Procedure," 09/12/2016

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902

February 14, 2017

Mr. Richard W. Moore
Inspector General
Office of the Inspector General
Tennessee Valley Authority
400 West Summit Hill Drive
4C East Tower
Knoxville, Tennessee 37902

Dear Richard:

This document is in response to your letter of December 16, 2016, which forwarded a revised version of "NTD Consulting Group, LLC's Assessment of the Tennessee Valley Authority's Evaluation of the Chilled Work Environment at Watts Bar Nuclear Plant" (NTD Report). In your letter, you indicated that NTD had "incorporated [TVA's] feedback into the report, as appropriate." You requested that TVA review the NTD Report and "address each recommendation by indicating agreement or disagreement with all facts, conclusions and recommendations." Your statement regarding feedback provided to NTD was in reference to comments TVA provided to you on an earlier draft of this report in a letter dated October 18, 2016.

Our review of the revised NTD Report indicates that NTD did not find many of TVA's prior comments "appropriate for incorporation." TVA provided extensive feedback to the Office of Inspector General (OIG) on the draft NTD Report. See Attachment 1. TVA commented on the nature of the investigation on which the NTD Report is based, and provided important context and additional detail regarding the timeline of events and the various reviews TVA has conducted. Nonetheless, NTD declined to respond to or chose to ignore the vast majority of TVA's comments, and the final NTD Report continues to allege widespread management incompetence and predict failure, without offering much helpful insight or many constructive suggestions.

Despite NTD's apparent lack of reception to TVA's prior comments, TVA's general reaction and response to the NTD Report remains the same. Rather than restating those concerns in detail, TVA will focus its comments on six main points:

1. The NTD Report and the OIG investigation have had the effect of trying to make TVA serve two masters in its nuclear operations. By law and by sound reasoning and practice, TVA can serve only its sole regulator in this space – the Nuclear Regulatory Commission (NRC).

2. The bases for the conclusions in the NTD Report, and the manner in which the bases were constructed, remain of great concern to TVA. The confidential nature of the OIG's

work and corresponding information base prevent TVA from indicating "agreement or disagreement with all the facts, conclusions, and recommendations."

3. NTD's view of the legal analysis and advice of TVA's Office of General Counsel (OGC) is inconsistent with industry practice and the opinion of a leading nuclear regulatory law firm.

4. The NTD Report contains both privileged and confidential information that must be redacted.

5. Despite NTD's prediction of failure, TVA is making progress on improving the safety conscious environment at Watts Bar Nuclear Plant Unit 1 (WBN 1), although more work needs to be done.

6. Responses to the NTD recommendations are attached.

TVA has repeatedly stated to the OIG and, more importantly, to the NRC, its belief that there is a chilled work environment at WBN 1. Moreover, TVA has expressly acknowledged management's role in creating the condition and its responsibility for correcting it. Management must be vigorous in promoting a healthy nuclear safety culture (NSC) and a safety conscious work environment (SCWE), and TVA acknowledges that it has at times fallen short. With that recognition, TVA is eager not only to create an acceptable work environment, but indeed one in which performance is excellent and the workforce is engaged and comfortable expressing differing views and concerns without the fear of retaliation. That has been the process and end state that TVA has been working on for the last year.

Congress has given the NRC primary jurisdiction over matters regarding nuclear safety at its licensees, including TVA. This principle has long been upheld in Federal court; courts have repeatedly stated that regulating and enforcing the safety of nuclear power plants is the sole responsibility of the NRC. *See, e.g.*, *State of Ohio ex rel. Celebrezze v. Nuclear Regulatory Comm'n*, 868 F.2d 810, 813 (6th Cir. 1989) (noting that the NRC is the "authority in regulating the safety of nuclear plants through licensing and other procedures"); *Suffolk County v. Long Island Lighting Co.*, 728 F.2d 52, 60 (2nd Cir. 1984) (stating that the responsibility for regulation and enforcement of nuclear safety is the "sole province" of the NRC). Given the prescribed role of the NRC, it would be problematic for TVA to rely on OIG or NTD to determine a path forward in dealing with the chilled environment at WBN 1. Rather, as it has done from the moment the possibility of an unacceptable environment was first identified by TVA Employee Concerns in January 2016, TVA will continue to look to the NRC as the primary source of guidance regarding correction of this unacceptable work environment.

The NRC is the only entity that has both the statutory authority and the expertise for evaluating the work environment at a nuclear station. *See Suffolk County*, 728 F.2d at 60. As the agency implementing this authority and expertise, the NRC also fully understands the appropriate mechanisms for responding to a chilled work environment. The NRC incorporates NSC assessments into its inspection program, routinely examining NSC and SCWE as part of the biennial problem identification and resolution inspection. *See, e.g.*, NRC Inspection Manual Chapter 0310; NRC Inspection Procedure 95003.02, "Guidance for Conducting an Independent

NRC Safety Culture Assessment." Since identifying the chilled work environment at WBN 1, the NRC has already conducted two separate assessments of the status of the work environment at WBN 1 and provided insights to TVA management on areas where progress has been made as well as areas that continue to be below expectations. TVA welcomes these assessments by the NRC, and is fully engaged with the NRC at every level regarding the issues that have been identified; TVA strives to incorporate meaningful improvements into its nuclear program.

By contrast, OIG's authority and expertise is generally more in the fiscal and audit arena. The Inspector General Act (IGA) Section 6(a)(2) grants OIG discretion "to make such investigations and reports relating to the administration of the programs and operation of the applicable establishment as are, in the judgment of the Inspector General, necessary or desirable," but Congress did not intend for the OIG to undertake investigations that require specialized knowledge such as NSC. 5 U.S.C. App. 3, § 6(a)(2). Federal courts have emphasized the limitations on the role an Inspector General plays in agency operations. *See, e.g.*, *Truckers United for Safety v. Mead*, 251 F.3d 183, 186 (D.C. Cir. 2001) (The IGA "defines the [Inspector General's] core role as preventing fraud and abuse, by conducting audits and investigations relating to agency programs and operations."); *Burlington Northern Railroad Co. v. Office of Inspector General, Railroad Retirement Board*, 983 F.2d 631, 641 (5th Cir. 1993) ("Nor do an Inspector General's investigatory powers generally extend to matters that do not concern fraud, inefficiency, or waste within a federal agency.") Indeed, under IGA Section 8G(b), an agency head is not permitted to transfer "program operating responsibilities" to an Inspector General.

Central to TVA's statutory missions is the production of safe, reliable and efficient energy through the operation of generating facilities. *See* 16 U.SC. § 831d(1). Further, the NRC has a stated preference for relying on a "licensee-based approach," which is rooted in the sound principle that a "licensee has primary responsibility for ensuring the safe operation of the facility." *See* NRC Management Directive Handbook 8.8. Assessing and remediating the NSC issues identified by the NRC are program operating responsibilities that cannot be assigned to, or usurped by, the OIG pursuant to IGA Section 8G(b). 5 U.S.C. App. 3, § 8G(b). As stated by the D.C. Circuit, "[p]rogram operating responsibilities may be defined as those activities which are central to an agency's statutory mission versus those which are purely internal or administrative." *United States v. Hunton & Williams*, 952 F.Supp. 843, 850 (D.C. Cir. 1997). TVA's management of safety programs at Watts Bar Nuclear Plant is not purely internal or administrative, but an essential component of TVA's status as an NRC licensee.

Through the NTD Report and its own investigation, the OIG would have TVA serve two masters: the NRC on the one hand, which possesses the full depth and breadth of nuclear regulatory expertise and the legal authority required to implement it; and the OIG on the other hand, whose expertise and mandate are different. TVA continues to believe that serving the NRC as the sole regulator in this area is the appropriate path. TVA is ultimately responsible to the NRC and the public for maintaining the safety and reliability of its nuclear program, and so TVA must defer to the NRC's expertise in these matters.

In its original comments, TVA provided extensive support for its position that the original investigation conducted by the OIG into the allegations of an unacceptable work environment at WBN 1 was not conducted in a manner that would provide a basis to determine the existence or

cause of a chilled work environment; thus, TVA had no way to assess whether or not the report's conclusions were valid. Specifically, TVA noted that:

- Interviews were conducted by armed and credentialed investigators;
- Some individuals were interviewed multiple times; and
- Investigators reportedly used tactics designed to pressure or intimidate interviewees, such as threats, bullying, profanity and other unprofessional behavior.

As TVA observed in its initial response, this is not within accepted standards for SCWE investigations. If the goal is to understand the extent to which and reasons why employees feel threatened, investigators must not engage in threatening behavior during the interviews. TVA also observed that by failing to use a consistent set of questions, OIG failed to follow the accepted industry protocol for assessing SCWE matters.

NTD did not conduct any interviews of its own, relying instead on the work done by OIG investigators and thus basing all of its conclusions on information gathered by others. Having not participated in the interviews, the authors of the report were not in a position to observe the demeanor or credibility of the individuals, but rather based their conclusions on hearsay. Although the rules of evidence and procedure are based on the concept that the truth is best established when both sides have equal access to the evidence, the OIG has repeatedly declined to share with the TVA any of the interview reports. Without having the information that purports to be the basis for the report, commenting on the particular factual findings is difficult. A good investigative report would include exculpatory, mitigating, or other positive evidence gathered in the course of the investigation. This fact was noted in the attached assessment (Attachment 2), conducted at TVA's request by a well-regarded nuclear industry law firm, which TVA also provided as an attachment to its October 2016 response letter.

In response to these concerns regarding the investigative process and lack of access to alleged factual material raised in TVA's response to the draft report, which continue to apply to this version, NTD now states that neither its review nor the OIG investigation was "a Nuclear Safety Culture Assessment." Despite having made this statement, NTD's report, conclusions and recommendations all relate to NSC and are essentially unchanged from the previous version. NTD has agreed that the investigation and review did not follow the protocols of a NSC assessment, while simultaneously offering its assessment of the health of WBN 1's NSC. TVA finds it difficult to integrate the information in the NTD Report into its regulatory response on NSC given NTD's own admission that the data was not gathered in a way that provides insight into the then-existing NSC.

The NTD Report also contains an extended criticism of advice OGC has provided to TVA Nuclear regarding NSC issues, and claims that the advice has helped TVA to obfuscate facts or otherwise prevent a clear picture from emerging for the NRC's benefit. This is a serious allegation that is not supported by any evidence. As TVA explained in its earlier comments, TVA has previously used descriptive language to characterize work environments for which no standard terminology exists. Claiming that such descriptive language fails to reveal identified issues is unpersuasive on its face, because it necessarily includes the acknowledgement that

the work environment is not a healthy safety-conscious work environment. TVA explained the inherent challenges of accurately describing a less-than-ideal work environment by providing NRC references documenting these challenges, but NTD continues to assert that, because TVA did not use a specific term that did not apply to the condition that was found, it was somehow attempting to mislead. TVA engaged a well-respected nuclear industry law firm to evaluate OGC's legal advice, among other things, and this legal expert concluded that the advice rendered is "consistent with industry practice and our own methodology." It is not clear why TVA should ignore the advice offered by its own legal counsel and supported by a recognized outside legal expert firm in favor of the interpretation advanced by NTD.

You requested that TVA identify any sensitive information that should be withheld from this report. In its October 2016 response, TVA observed that the NTD Report contained several categories of information not suitable for public disclosure, but this information remains in the final version. First, comments provided by employees in interviews and on surveys relating to NSC should be withheld; employees expect that their comments are provided in confidence, and TVA procedure and the Institute of Nuclear Power Operations (INPO) *Traits of a Healthy Nuclear Safety Culture* demand the maintenance of this confidentiality. Ironically, revelation of this information by release of the NTD Report could actually further degrade employee trust in the Employee Concerns Program. Second, any information relating to INPO surveys or reviews is proprietary to INPO and cannot be released without INPO's consent. Disclosure of this information would breach the terms of the INPO membership agreement and could constitute a violation of 18 U.S.C. § 1905. Finally, any discussion of legal advice provided by OGC to TVA management is governed by attorney–client privilege, and TVA has not agreed to waive the privilege. Please note that we have also identified both Attachments 1 and 2 as Attorney-Client Privileged information.

Much has happened since TVA first identified this issue in January 2016; while the NTD Report is focused on events from over one year ago, TVA has been actively addressing the situation since that time and is focused on an environment that continues to evolve. By no means are all of the issues resolved; however, much progress has been made. As we have made clear, we are actively working with the NRC to address the chilled work environment at WBN 1, and have developed a chilled work environment action plan (action plan) to address the issues that have been identified. Originally initiated in April 2016, the action plan has been updated after input from an independent consulting firm and NRC inspections in September and November 2016. Specific elements of the action plan include the following:

1. Changing leadership in key positions and departments to strengthen TVA's resolve in improving NSC and SCWE.

2. Providing forums and communication tools to foster discussions that promote a SCWE.

3. Providing training to all site personnel regarding SCWE and the traits of a strong NSC to reinforce a respectful work environment.

4. Assessing the SCWE at Watts Bar. This assessment evaluated the environment at Watts Bar in the following key areas:

- Willingness to Raise Concerns;
- Production over Safety/External Influences; and
- Effectiveness of both the Corrective Action Program (CAP) and Employee Concerns Program (ECP).

5. Performing a root cause analysis (RCA) on the chilled work environment. The RCA identified the following root causes:

   - Senior leaders failed to recognize the potential impacts on the work environment associated with initiatives to drive improvements in overall station performance.
   - A failure by management to communicate the rationale and bases for some personnel actions taken led to an atmosphere of fear by some workers.

6. Ensuring that Watts Bar staff members are willing to openly participate in the process. Actions in this area included, but are not limited to:

   - Conducting work environment observations using an executive facilitator;
   - Establishing an Adverse Action Executive Review Board; and
   - Providing Operations Shift Manager mentoring.

TVA has established the following focus areas to define Watts Bar's goals in meeting its commitment to ensuring that a healthy NSC and SCWE exists, where employees feel free to raise concerns without fear of retaliation:

- Safety has priority over production;
- CAP is effective;
- Management and employees have mutual respect; and
- NSC is understood and reinforced.

Given the previous response and this one, TVA has reservations about the conclusions contained in the NTD Report. Nonetheless, as described in Attachment 3, TVA has taken or will take actions that comport in substance with many of the recommendations provided by NTD. TVA will continue to work with the NRC to ensure that a healthy SCWE is restored at WBN 1.

Sincerely,

William D. Johnson
President and Chief Executive Officer

Attachments

Attachment 1

TVA's October 18, 2016
Response to NTD's Draft Report

[12 PAGES WITHHELD UNDER CLAIM OF ATTORNEY-CLIENT PRIVILEGE]

Attachment 2

Pillsbury Report

[102 PAGES WITHHELD UNDER CLAIM OF ATTORNEY-CLIENT PRIVILEGE]

Attachment 3

RESPONSE TO RECOMMENDATIONS
DRAFT SPECIAL REPORT 2016-16702

1. **Recommend TVA conduct an independent fleet level RCA sponsored by executive management. This root cause should be performed by independent individuals with the skill sets necessary to determine the underlying drivers in the current culture that hinder individuals from recognizing and accepting early indications of NSC issues, identification of the true underlying root cause(s), and implementation of CAPRs that would be effective in changing behaviors. This RCA should address why the CAPRs in prior RCAs involving NSC/SCWE issues (dating back to the Confirmatory Order of 2009) did not prove to be effective or sustainable. The RCA should also include an analysis of why the 2014 TVA NPG Synergy Assessment Remediation Plan failed to prevent this instant CWE.**

   TVA management had previously determined to obtain the services of a senior consultant with significant nuclear industry experience in organizational dynamics and organizational cultural change. The consultancy will be designed to examine the current nuclear organization, including cultural performance and behavior patterns. The consultancy will also be designed to be knowledgeable of known nuclear cultural historical trends as well as historical events (such as the 2009 Confirmatory Order and the 2013 Synergy Survey and TVA response) to advise the Nuclear Executive Leadership Team on trends and patterns that existing processes and existing leaders may not be detecting. The consultant will be established to have ready access to senior executives within TVA including the Chief Nuclear Officer and the Chief Generation Officer. The consultant will provide feedback regarding the approaches implemented by leadership to address safety culture and safety conscious work environment improvement at Watts Bar and across the fleet.

   In addition, TVA management has established a new additional oversight approach specifically focused on fleet wide safety culture performance and safety conscious work environment conditions at all TVA nuclear locations. This approach, which will be designated as the Safety Culture Peer Team, will be led by a nuclear Executive and will report to the Chief Nuclear Officer. The team will review the results and performance of the site Nuclear Safety Culture Monitoring Panels and will integrate the results on a fleet wide basis. The team will provide reports to the Chief Nuclear Officer as necessary.

   TVA leadership's experience with root cause analyses that attempt to diagnose a contemporary organizational problem against a complex backdrop extending back as far as a decade is that they tend to advance causes that are too general to provide meaningful insights and yield corrective actions that rely unrealistically on process changes without allowing for the variability of the people within the organization over time. Consequently, TVA does not currently intend to perform the root cause analysis in the specific manner described in Recommendation 1. Should the findings and feedback of the independent nuclear consultant indicate that a broader root cause analysis is warranted, TVA will perform such a review.

2. **Recommend an independent NSC assessment be performed as soon as practicable to determine the overall safety culture at the WBN site. An additional survey should be performed in 18-24 months to assess the effectiveness of the actions taken to address the chilled work environment.**

   TVA had previously planned and will conduct an independent nuclear safety culture assessment for the Watts Bar Nuclear site. TVA's current plan is to develop the detailed assessment plan and administer any associated survey or employee interview activities sometime after the spring 2017 WBN 1 refueling outage. TVA intends to evaluate the results of the survey to determine and document the need for any additional causal analysis. TVA will develop actions tailored to the results of the NSC assessment; such actions will be oriented toward both near-term mitigation of identified improvement areas as well as a sustainable improved NSC.

   Subsequently, TVA will re-administer an independent NSC assessment between 18 and 24 months from the time of the final report of the spring 2017 assessment. TVA will give consideration to performing this follow-up NSC assessment across the fleet.

3. **Recommend re-performing the CWEL RCA with an independent team to include an evaluation of the NSC Traits, an evaluation of possible extent of condition of a chilled work environment in, at a minimum, Maintenance, ECP, Chemistry, and Training at WBN, and to establish CAPRs that will remove the chilled work environment, prevent its recurrence, and will be sustainable. The Extents of Conditions(s) and Cause(s) from the re-performed CWEL RCA should be evaluated throughout the TVA nuclear fleet.**

   TVA commissioned an independent review of the Chilled Work Environment Root Cause Analysis. The independent review identified a number of recommendations, including a recommendation that TVA re-open the original CWEL RCA. TVA took action in consideration of those recommendations and issued Revision 1 of the CWEL RCA on October 14, 2016.

   The revised extent of condition evaluation documented in Revision 1 concluded that the WBN Work Management and Security organizations also exhibited characteristics of a chilled work environment. The revised RCA included additional corrective actions and enhancements to improve the sustainability of a healthy safety conscious work environment at WBN. The additional corrective actions and enhancements also address sustainability across the fleet.

4. **Recommend that TVA QA perform a formal root cause analysis (in lieu of Missed Opportunity Review) to identify the cause of their failure to proactively identify the CWE issue prior to the NRC and to establish appropriate CAs to strengthen the effectiveness of its independent internal oversight. The analyses should consider the effectiveness of previous CAs taken to improve independent oversight effectiveness as documented in RCA BFN PER 655461. It is further recommended the current TVA QA auditing methodology include a periodic independent audit of ECP utilizing NQML industry guidance contained in NECE-GUID-001 and 002**.

   This recommendation has two elements. The first element is a recommendation to perform a root cause analysis to identify the cause of TVA QA's failure to proactively identify the chilled work environment issue prior to the NRC. This recommendation has similarities to Recommendation 6, below. TVA's response to this element of Recommendation 4 is provided as part of the response to Recommendation 6.

   TVA does not agree with the second element of Recommendation 4 associated with inclusion of a periodic independent audit of ECP in the TVA QA methodology. While valuing the importance of outside perspectives on the Employee Concerns Program, TVA does not intend to add an audit of the nuclear Employee Concerns Program to the Quality Assurance audit program. This decision is based on a number of considerations, including concerns previously expressed by employees and Employee Concerns Program staff that QA auditing of Employee Concerns Program records was creating privacy concerns. Additionally, TVA's Employee Concerns Program is subject to biennial assessments performed by industry peers using the guidance developed by the National Association of Employee Concerns Programs in NECEP 08-001, "Nuclear Employee Concerns Evaluation Program Performance Objectives and Attributes."

5. **Recommend updating the methodology of scheduling NIEP Assessments to ensure that future NIEPs are performed at the "fleet level." Review of the 2016 NIEP performed in August was found to have been appropriately performed at the fleet level. This practice should continue for future NIEPS of TVA.**

   TVA agrees with this recommendation. The biennial NIEP audit requirements are specified in NPG-SPP-03.18, Conduct of Quality Assurance Assessments and NPG-SPP-03.19, Conduct of Quality Assurance Internal Audits. These QA procedures implement the Nuclear Quality Assurance Program requirement to conduct a biennial assessment of the TVA Nuclear QA Program by an organization external to the QA organization. QA will revise NPG-SPP-03.18 and NPG-SPP-03.19 to specifically state that a "fleet level" audit will be conducted in accordance with NIEP guidelines to ensure this practice continues for future NIEPs of TVA. This revision will be completed by March 31, 2017.

6. **Recommend a RCA of the WBN ECP, the CAP, QA, the Change Management process, the NSCMP, and the NSRB as to why those barrier programs/processes did not serve one of their primary purposes as barriers for early identification and prevention of the NSC and SCWE issues dating back to at least 2009 at TVA.**

   TVA will perform an analysis to assess the role that each of these individual barriers should have played in serving as a conduit for early identification and prevention of the NSC and SCWE issues. After identifying which barriers should have reasonably provided such early identification and prevention, TVA will perform appropriate causal analyses to determine why the affected barrier did not adequately serve that role and identify necessary corrective actions.

   TVA currently plans to complete these reviews before May 31, 2017.

7. **Recommend revising NPG-SPP-03.2 (Nuclear Safety Oversight) to include within the scope of each NSRB Subcommittee, standard agenda requirements to include periodic independent observations and selective interviews with departmental representatives to specifically gain insights associated with NSC including the health of the SCWE in the organizational areas they overview.**

   TVA agrees with this recommendation. TVA revised NPG-SPP-03.2 in July 2016 to include a requirement to the NSRB Plant Support/ Programs Subcommittee (PSS) to include within the scope of the PSS standard agenda a requirement to interview NSCMP departmental representatives to gain insights and concerns associated with the health of the SCWE at the station. By March 31, 2017, TVA will further revise NPG-SPP-03.2 to require each of the NSRB subcommittees to conduct periodic independent observations and selective interviews with departmental representatives to specifically gain insights associated with NSC, including the health of the SCWE in the organizational areas they overview.