Department of Energy
National Nuclear Security Administration
Washington, DC 20585

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DNF SAFETY BOARD

June 30, 2014

The Honorable Peter S. Winokur
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, SW
Suite # 700
Washington, DC 20004-2901

Dear Mr. Chairman:

This letter is to inform you that the Department of Energy, National Nuclear Security Administration (NNSA) has completed Action 2-11 for NNSA of the Department's Implementation Plan for Defense Nuclear Facilities Safety Board (Board) Recommendation 2011-1, *Safety Culture at the Waste Treatment and Immobilization Plant.*

The deliverable for Action 2-12 is a letter to the Board transmitting Program Secretarial Officer's direction to field office managers to develop processes and control for sustainment of a robust safety culture. The enclosure to this letter is a memorandum from me that provides direction to NNSA field offices.

If you have any questions, please contact me at (202) 586-4379.

Sincerely,

James J. McConnell
Acting Associate Administrator
for Infrastructure and Operations

Enclosure

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Department of Energy
National Nuclear Security Administration
Washington, DC 20585

June 30, 2014

MEMORANDUM FOR DISTRIBUTION

FROM: JAMES J. MCCONNELL
Acting Associate Administrator
for Infrastructure and Operations

SUBJECT: Request for Safety Culture Sustainment Plans

The implementation plan (IP) for Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2011-1 requires sites to develop tools for sustainment of a robust safety culture. This memorandum directs the Field Office Managers (FOM) to prepare plans for sustainment tools and submit them to Headquarters by September 15, 2014.

As you know, the National Nuclear Security Administration (NNSA) completed Safety Culture/Safety Conscious Work Environment (SCWE) self-assessments in 2013. The self-assessments were an unprecedented effort by NNSA to be self-critical of the safety culture of the Federal and contractor work environment. I am confident you are making progress on improvements to address the assessment findings. On May 29, 2014, the Deputy Secretary sent the DNFSB the report on the consolidated results of SCWE self-assessments (Attachment 1).

The next 2011-1 IP action involving NNSA, Action 2-12, requires each site to "submit proposed site specific safety culture sustainment tools to PSO's for approval." In NNSA the proposed tools also require concurrence by the Chief of Defense Nuclear Safety, Don Nichols, after review by his NA-SH staff.

Consistent with direction from the Secretary of Energy in the 2011-1 IP, I request each FOM submit a safety culture sustainment plan that identifies specific sustainment tools to be used, describes the tools, and includes plans and schedules for implementation of the tools. Each plan must include the tools the site contractor(s) will implement and may include additional tools the field office will implement. Examples of sustainment tools include:

- safety culture monitoring panels
- action plans for the self-assessments completed in 2013
- periodic self-assessments
- periodic independent reviews
- continuing training
- performance measures
- contract incentives

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You have flexibility to select sustainment tools suitable for the specific conditions at your site.

The NNSA HQ review of sustainment plans supports organizational learning and continuous improvement. Feedback from the HQ review will help sites improve their plans and identify best practices and lessons learned for NNSA and DOE. In July 2014, NA-00 and NA-SH will sponsor a working meeting for HQ, field office, and lab/plant employees to develop a core set of sustainment tools which sites can tailor to their specific needs. We will send you meeting details in a separate correspondence.

Please send your sustainment plans to me at jim.mcconnell@nnsa.doe.gov and Don Nichols at don.nichols@nnsa.doe.gov, by September 15, 2014. If you have questions please contact Mike Zamorski, at 505-845-4375; or Suzy Mellington, at 702-295-1676.

I appreciate your efforts to improve our safety and performance culture.

Attachment

DISTRIBUTION:

Kimberly Davis Lebak, Manager, Los Alamos Field Office
Nicole Nelson-Jean, Acting Manager, Livermore Field Office
Steven J. Lawrence, Manager, Nevada Field Office
Geoffrey L. Beausoleil, Manager, Sandia Field Office
Douglas Dearolph, Manager, Savannah River Field Office
Steven C. Erhart, Manager, NNSA Production Office

cc: Don Nichols, NA-SH

Enclosure

U. S. Department of Energy

Consolidated Report
for
Defense Nuclear Facilities Safety Board Recommendation 2011-1
Actions 2-8 and 2-9

Safety Culture at the Waste Treatment and Immobilization Plant

May 2014

EXECUTIVE SUMMARY

This report provides an analysis of the Department of Energy's (DOE) safety culture extent of condition review. In accordance with DOE's Implementation Plan (IP) for Defense Nuclear Facilities Safety Board (Board) Recommendation 2011-1, the report was prepared by the Recommendation Response Team and provides recommendations for ongoing safety culture management processes for consideration by the Deputy Secretary.

Internal and external subject matter experts (SMEs) were utilized to analyze data and overall trends from the Office of Health, Safety and Security Independent Safety Culture Assessments and the Safety Conscious Work Environment (SCWE) Self-Assessments conducted by individual organizations. These individuals included expertise from several organizations including DOE, NRC, INPO, NEI, and NASA, among others. In all, approximately 38 people with an average of 29 years of experience in the nuclear industry were brought together to provide their individual input and review the material in a phased manner. The analysis method and results are presented in detail in the report.

The analysis grouped issues identified in the extent of condition review data according to the Safety Culture focus areas and associated attributes described and contained within DOE's Integrated Safety Management System Guide. Overall primary and secondary areas for improvement and positive trends were identified, and are discussed in detail within the report. Based on these reviews, four primary attributes for continuous improvement of Safety Culture at DOE were identified:

- Leadership Focus Area
  Demonstrated safety leadership attribute
  Open communication and fostering an environment free from retribution attribute
- Employee Engagement Focus Area
  Teamwork and mutual respect attribute
- Organizational Learning Focus Area
  Credibility, trust and reporting errors and problems attribute

In addition, a primary strength within the leadership focus area was identified in the management engagement and time in the field attribute.

To address these primary issues for continuous improvement as well as the additional issues identified, this report recommends a three-pronged approach to ongoing safety culture management processes within DOE. The three recommended actions are listed briefly here and discussed in more detail in the report, along with recommendations for implementation:

- Formation of a DOE Safety Culture Improvement Panel consisting of line management, to ensure leadership and focus on DOE's safety culture initiatives.

- Incorporation of Safety Culture and SCWE concepts and practices into DOE training, building on the leader and manager training already developed and implemented.
- Evaluation of contract language to incorporate clear reference to Safety Culture to sustain focus on Safety Culture among DOE's contractors.

This report completes Actions 2-8 and 2-9 in DOE's IP in response to Board Recommendation 2011-1.

1.0 PURPOSE & BACKGROUND

This purpose of this report is to provide the deliverable for DOE's Implementation Plan (IP) for Board Recommendation 2011-1, specifically Action 2-8, *Complete a consolidated report from the results in Part 2 and 3;* and Action 2-9, *Based on the results in the consolidated report recommend ongoing safety culture management processes for use at DOE defense nuclear facilities."*

A cross-cutting team was assigned to assess the overall results of the Office of Health, Safety and Security (HSS) Safety Culture Independent Assessments and the SCWE Self-Assessments. This cross-cutting team had the benefit of individual input and assistance from dozens of safety culture SMEs during the course of the review documented by this report. This report provides background information on the methodologies DOE used for performance of the SCWE self-assessments and HSS Safety Culture Independent Assessments, consolidated results of the overall SCWE self-assessments and HSS Safety Culture Independent Assessments, identifies common areas for improvement and common positive observations, and provides recommendations to assist DOE and its contractors in implementation of SCWE and safety culture principles.

The Department deliberately chose to begin integrating safety culture practices and principles, into its Integrated Safety Management System (ISMS). This provided the Department the opportunity to build on the existing ISMS, by defining a refined set of expectations for behavioral excellence. Safety culture and SCWE concepts are not considered "new programs". The concepts have been previously incorporated into DOE Orders and Guides to assist Departmental leaders in promoting a shift from an attitude focused on compliance in safety matters toward a commitment to excellence, reinforcing Integrated Safety Management's (ISM) focus on long-term, continuous improvement of safety at DOE facilities.

DOE Guide (G) 450.4-1C, Attachment 10, *Safety Culture Focus Areas and Associated Attributes*, was issued in September 2011. The Guide was developed based on a DOE and Energy Facilities Contractor Operating Group (EFCOG) program that was initiated in 2007; that program produced a set of safety culture focus areas in the DOE nuclear facility environment, based on commercial nuclear industry experience and research over several decades. The Guide delineates three Safety Culture Focus Areas of Leadership, Employee Engagement and

Organizational Learning and their Associated Attributes that describe what the Focus Areas are meant to encompass. Each Associated Attribute includes behavioral elements, which provide specific behaviors and describe what a positive safety culture (and SCWE) looks like and feels like. These behavioral elements provide a useful tool for leaders to assist them in focusing attention and action in the right areas to create the desired ISM work environment. The behavioral elements emphasize continuous improvement and long-term performance, and are entirely consistent with the original intent of DOE's ISM and best commercial nuclear industry practices.

The extent of condition review was primarily focused on SCWE, which is a work environment where workers feel free to raise safety concerns to management or a regulator without fear of retaliation. The safety culture issues identified at Hanford Waste Treatment and Immobilization Plant (WTP) were primarily SCWE issues and were associated with technical groups and project management for a large nuclear project; therefore the extent of condition review is aimed at determining if similar conditions exist for other sites with defense nuclear facilities or construction projects.

2.0 EVALUATION TEAM

Internal and external SMEs were utilized to analyze data and overall trends from the HSS Independent Assessments and the SCWE Self-Assessments conducted by individual organizations. These individuals included expertise from several organizations including DOE, Nuclear Regulatory Commission (NRC), Institute of Nuclear Power Operations (INPO), Nuclear Energy Institute (NEI), and National Aeronautics and Space Administration (NASA), among others. In addition, members of the EFCOG organization were used to assist with evaluating the SCWE self-assessment reports, analyzing information in regards to both process and report content. In all, approximately 38 people with an average of 29 years of experience in the nuclear industry were brought together to provide their individual input and review the material in a phased manner. A brief biography of participants is provided in appendices 1 and 2.

3.0 ASSESSMENTS

3.1 HSS Safety Culture Independent Assessments

The HSS safety culture independent assessments were performed in accordance with a Secretarial commitment in the Department's Implementation Plan in response to Board Recommendation 2011-1, *Safety Culture at the Waste Treatment and Immobilization Plant.* Specifically, the Secretary directed HSS to perform safety culture assessments of major ongoing large nuclear design/construction projects to determine the extent of condition of safety culture concerns identified at the WTP.

The DOE's Office of Enforcement and Oversight (Independent Oversight), within HSS, conducted independent assessments of nuclear safety culture at the following facilities: WTP (October 2010, January 2012 and Supplemental Volume, January 2012); Los Alamos National Laboratory Chemistry and Metallurgy Research Replacement Project (April 2012); Pantex Plant (contractor only November 2012); Idaho Cleanup Project, Sodium Bearing Waste Treatment Project (November 2012); Salt Waste Processing Facility at Savannah River (January 2013), and the Uranium Processing Facility at Y-12 at Oak Ridge (June 2012).

Independent assessments of the Office of Environmental Management (EM) at DOE Headquarters (HQ)(November 2012), HSS (March 2013) and a semi-independent assessment of National Nuclear Security Administration (NNSA) (i.e., team was composed of NNSA employees and external experts and led by an external independent safety culture expert) were conducted using basically the same methodology as those assessments listed above. These three assessments were not specific 2011-1 commitments, but have helped DOE better understand the status of its safety culture.

In every case, to ensure a valid and effective assessment of the existing safety culture, DOE used external independent safety culture experts to analyze various sources of data and perform an independent evaluation. These independent safety culture experts have extensive experience in the development and application of safety culture assessment methodologies used by commercial nuclear and other industries.

With the guidance of the external independent safety culture experts, a methodology was selected for these assessments that provided an objective and systematic measurement of the organizational behaviors that impact safety performance, using multiple data collection tools to assess organizational behaviors. The methodology included functional analysis, on-line survey, semi-structured focus groups and individual interviews, observations, and behavioral anchored rating scales (BARS). Details of the methodology used by the assessment teams can be found in the individual reports.

All evaluations were conducted using the same methodology that aligns with the current NRC procedures for independent safety culture assessment, which references safety culture traits found in the NRC's Safety Culture Policy Statement, that are viewed to be necessary in the promotion of a positive safety culture. These NRC traits can be found in appendix 3.

While this list of attributes is somewhat different than that described in attachment 10 of the ISMS Guide, they were easily aligned with the "Associated Attributes" in the Guide in subsequent analysis performed by the cross-cutting team.

In all eleven independent assessments, identified above, the independent external safety culture experts analyzed the data collected during the assessment in accordance with their established methodology. The analysis of this data formed the basis of the results

(positive observations and areas in need of attention), conclusions and recommendations that were developed.

3.2 SCWE Self-Assessments

In furtherance of ISMS, with line management maintaining fundamental responsibility for safety, DOE determined that it would perform self-assessments to evaluate the status of SCWE at its facilities. The initiation of the SCWE Self-Assessments (SCWE SAs) was a significant undertaking for the Department. SCWE SA's were led by members of the assessed organizations, supplemented with Subject Matter Expert (SME) support and, in several instances, the assistance of a Behavioral Scientist. Training was made available by the Recommendation 2011-1 Response Team, as was detailed SCWE SA guidance. As the SCWE SAs were performed over a broad spectrum of time, some commencing prior to finalization of SCWE SA Training and final guidance, the format and content of the SCWE SA varies.

3.2.1 SCWE Self-Assessment Guidance

Implementation Plan Action 2-4 committed to *preparing guidance, based on safety culture attributes in the ISM Guide and key lessons learned from the ongoing HSS independent assessments that address SCWE for use in the self-assessments.* A team of headquarters and field representatives from both DOE and NNSA were brought together to develop a framework to guide the performance of the SCWE self-assessments for each organization.

The self-assessment guidance used the attributes associated with an excellent safety culture described within DOE G 450.4-1C, *Integrated Safety Management System Guide* and key lessons learned from independent assessments of safety culture performed by the DOE HSS. The self-assessment guidance identified the ISMS safety culture attributes that are most directly applicable to achieving SCWE excellence.

In developing SCWE Assessment guidance, the guidance development team also performed a review of industry self-assessment practices documented by the U.S. Nuclear Regulatory Commission (NRC)[1], the International Atomic Energy Agency (IAEA)[2], the Nuclear Energy Institute (NEI)[3], the Energy Facility Contractor Operating Group (EFCOG)[4], and the Institute of Nuclear Power Operations (INPO)[5]. The guidance development team also reviewed material presented by

[1] *U. S. Nuclear Regulatory Commission, Regulatory Issue Summary 2005-18, August 2005 and U. S. Nuclear Regulatory Commission, Inspection Manual Chapter 031, February 2010*
[2] International Atomic Energy Commission, IAEA-TECDOC-1329, *Safety Culture in Nuclear Institutions, December 2002*
[3] Nuclear Energy Institute, 09-07, *Fostering a Healthy Nuclear Safety Culture*, June 2009
[4] Energy Facilities Contractor Operating Group (EFCOG), *Assessing Safety Culture in DOE Facilities*, January 2009
[5] Institute of Nuclear Power Operations (INPO), *Principles for a Strong Nuclear Safety Culture*, November 2004 and INPO, *Traits of a Healthy Nuclear Safety Culture*, December 2012

Board Chairman, Dr. Winokur to various organizations[6], concerning topics related to measuring a safety culture and performance metric insights into SCWE.

DOE G 450.4-1C, attachment 10, identifies three Focus Areas and fifteen Associated Attributes, which describe standards of excellence with respect to safety culture and SCWE characteristics. The guidance development team reviewed the safety culture Attributes and determined the nine Attributes that have a strong relationship to a SCWE. The expectations of excellence for each of these Attributes were then adopted as lines of inquiry for assessing an organization's SCWE. The guidance development team also developed and documented lines of inquiry for performance measures and contract incentives that would be evaluated under a supplemental information topic contained in the self-assessment guidance and incorporated input from the industry standards discussed above.

Industry standards were used to identify assessment techniques commonly used to gather data related to safety culture. To adapt to the differences in missions for the various Program Site Offices, and to provide flexibility in approach, a variety of techniques were offered and described; they included: surveys, interviews, field observations, document reviews, performance indicators, and review of SCWE-related processes. The guidance development team also included guidance on additional points to consider when performing self-assessments; these included: self-assessment goals, planning considerations, data gathering and analysis, and interpretation of results.

Department expectations pertaining to self-assessment team membership were based upon information in NEI 09-07, the NEI guideline on Fostering a Strong Nuclear Safety Culture, which describes the industry approach to assessing and addressing nuclear safety culture issues placing primary responsibility on line management, and in particular, on the site leadership team with the goal of providing an ongoing holistic, objective, transparent and safety-focused process. NEI 09-07 was specifically referenced during the creation of the SCWE SA guidance. Finally, the guidance defined format and content expectations for documenting SCWE SA results in order to foster consistency among the SCWE SA reports and facilitate the reviews supporting the development of a DOE/NNSA consolidated report on SCWE (discussed below).

3.2.2 SCWE Self-Assessment Process

Between May 2013 and January 2014, 17 sites across several DOE organizations including EM, NNSA, and Science performed SCWE SAs. These assessments represented 31 organizations including Federal employees and contractors. The

[6] Defense Nuclear Facility Safety Board (DNFSB), Peter S. Winokur, presentations to the American Nuclear Society (2009), EFCOG (2010), and Chemical safety and Lifecycle Management Workshop (2010)

SCWE self-assessments focused primarily on the Safety Culture Focus Areas identified in DOE G 450.4-1C, attachment 10 (although some sites used INPO Safety Culture attributes). The most common assessment techniques used during the SCWE SAs included surveys, interviews with individuals and focus groups, document reviews, workplace observations, or some combination of these methods. Guidance was provided to the sites regarding team composition and methodology (discussed in Section 3.2.1). The SCWE SAs across the complex produced an increased awareness, knowledge, and understanding of safety culture concepts, particularly SCWE. The self-assessments provided an opportunity for organizations to learn about safety culture and how to improve it. The self-assessments provided valuable insights about the current state of SCWE within the assessed organizations. SCWE and safety culture data analysis involving behavior observations is a relatively new concept within the DOE community, and the reports provide evidence at most sites that much has been learned through this process.

4.0 Methodology Used to Evaluate Assessment Results for Consolidated Report

Figure 1 below provides an overall summary of the process for evaluating the Independent Assessments and Self Assessments. Descriptions of the individual steps described in Figure 1 are described in Section 4.1 that follows below. The steps in the process are also annotated on Figure 1.

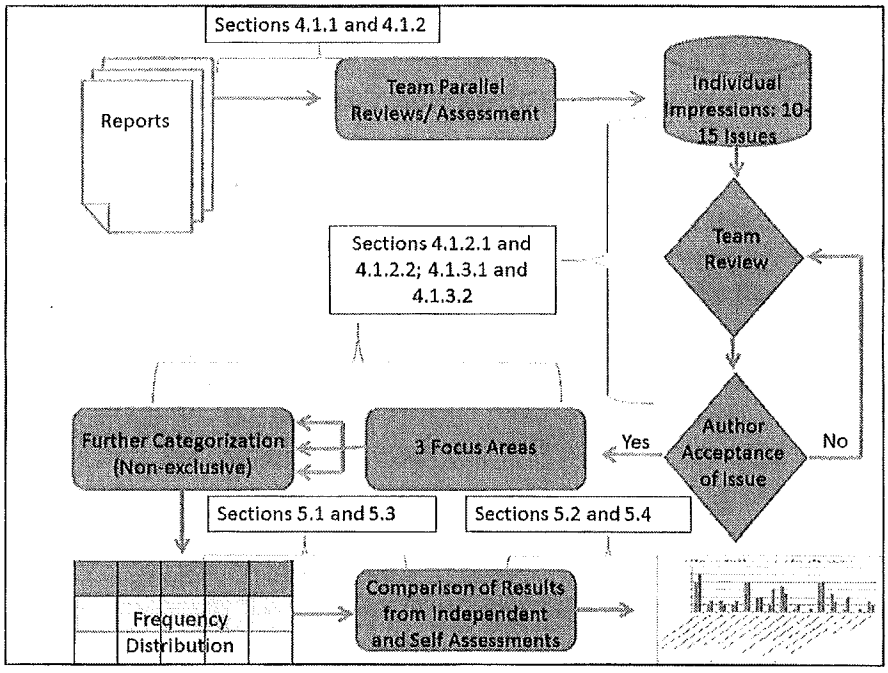

Figure 1: Overall Process to Evaluate Assessment Results for Consolidated Report

4.1 Methodology Used to Evaluate Safety Conscious Work Environment (SCWE) Self Assessments Results

Due to the large amount of information made available by the 31 reports, the SCWE SA data was evaluated in a multi-step process. The first step utilized members of the EFCOG to review the 31 SCWE self-assessments, then a team of internal and external SMEs to evaluate the data to determine trends.

4.1.1 EFCOG SCWE Self-Assessment Review

Members of the EFCOG Safety Culture working group convened December 3-5, 2013, in Las Vegas, NV. The team was tasked with performing a preliminary screening of all 31 SCWE SA reports for both content and consistency in applying the guidance (e.g., process), in accordance with guidance provided by the cross-cutting team. The EFCOG members were broken into four separate teams. Each team was assigned approximately six to eight SCWE self-assessments (SAs) to evaluate the process used in each self-assessment for conformance with the guidance as well as results of the SCWE SAs using a specific set of criteria. To ensure there was no conflict of interest or bias, team members were assigned to review only SCWE self-assessments that they did not participate in and with whom they did not have a business relationship.

The four teams extracted and organized data from each SCWE self-assessment, focusing on identified strengths and opportunities for improvements identified in the SCWE self-assessment report. Each team assessed the strengths and opportunities for improvement in their assigned SCWE SA reports; identifying opportunities for improvement associated with the 3 Safety Focus Areas of Leadership, Employee Engagement, and Organizational Learning, as well as recommendations for which organizations may warrant additional SCWE reviews (if any).

During this review, the EFCOG reviewers also identified ways in which the guidance that had been provided to perform the SCWE SAs could be improved.

4.1.2 Methodology Used to Evaluate HSS Independent Assessment Results

The evaluation of trends and results from Safety Culture Independent Assessments and semi-independent assessments took place in Washington,

DC at DOE HQ January 14-16, 2014. This process involved a small group of internal and external SMEs from across the industry in order to get both an internal and external look at the current extent of condition in the DOE. The internal SMEs provided operational experience that is unique to the DOE workforce and background on Recommendation 2011-1 implementation activities, while the external SMEs provided individual insight from their own work in the safety culture realm and pinpointed areas in which they had particular experience. The SMEs and team members participating in this analysis included individuals from across DOE, including Federal employees from different program secretarial offices and DOE Contractors and Laboratories, as well as the NRC, and CRESP[7]. Summary bios for team members who participated in this review can be found in appendix 2.

4.1.2.1 Process for Identifying Areas for Improvement

The first step in the analysis process was familiarizing the team with the Independent Assessment (IA) reports. As a precursor to the meetings, each team member was tasked to review all of the IA reports, so they were familiar with the content and general trends upon arrival. While reading the reports, each team member was asked to identify 10-15 most significant issues for improvement collected from reviewing the IAs. Each team member brought these issues to the meeting and this information was used to identify overall trends in the analysis.

The methodology applied to evaluate the IAs was consistent with standard qualitative data assessment procedures.[8] Each team member wrote down their identified 10-15 issues with citations indicating the IA reports in which they were noted and placed them on a board, categorizing them by general topic areas. These areas were revised once all issues had been placed to ensure that each issue had been properly captured and categorized. The group then conducted a line-by-line review of the individual issues, allowing the larger group the opportunity to discuss the meaning behind each issue with the author of that issue.

[7]Consortium for Risk Evaluation with Stakeholder Participation (CRESP), a consortium of universities, led by Vanderbilt University, which advances cost-effective, risk-based cleanup of the nation's nuclear weapons production facility sites and cost-effective, risk-based management of potential future nuclear sites and wastes.

[8] Patton, Michael Quinn. *How to Use Qualitative Methods in Evaluation*. Newbury Park, CA: SAGE Publications, 1987. Print.

A nominal grouping technique[9] was used to prioritize importance or significance of issues identified by those team members that were present, with those issues appearing the most frequently placed at the top of the list. From this prioritization, the group was able to further evaluate and discuss those issues with only a single appearance to more easily be captured by the process, frequently absorbing them into other theme groups. After prioritizing and finishing the sorting process, the group discussed the identified issues and binned the issues into the three safety culture focus areas and more specifically, the relevant Associated Attributes identified in attachment 10 of the ISMS Guide. Some of the issues were sorted into more than one bin, depending on how many attributes in attachment 10 the group found were appropriate.

The final steps in the analysis process of areas for improvement in the IAs resulted in the prioritization and determination of significance of trends using the attachment 10 attributes, determining which attributes were identified most frequently by team members and might be the best starting point for potential improvement actions. This also provided the opportunity to categorize either by attribute or significance of theme, both of which were used in collecting trends from the data.

4.1.2.2 Process of Identifying Positive Trends Identification

The process for identifying positive trends in the IAs was conducted in a comparable way to the areas for improvement exercise defined in the previous section. Several members of the team assigned to this task reviewed the IA reports to identify positive themes. In a modified individual issue assessment exercise, each team member self-assigned his or her positive themes into the Safety Culture Focus Areas and Associated Attribute bins from attachment 10 used in the Areas for Improvement analysis.

These positive themes were then shared with the larger group who binned the positive observations under the Associated Attributes. From this exercise, the team was able to identify Areas for Improvement in which the positive observations were prioritized and the significance of trends was captured, both in terms of attribute of significance and number of occurrences of each positive observation in the IAs. The positive observation data was also compared to the previously identified issues to determine trends. The analysis of the positive trends was performed in the same

[9] Patton (above), Page 153.

manner as the areas for improvement analysis, described above in Section 4.1.2.1.

4.1.3 Internal/External SME Evaluation of Overall SCWE Self-Assessment Data

A detailed review of the SCWE Self Assessments (SAs) was conducted in Washington, DC at DOE HQ February 5-6, 2014. This group consisted of Safety Culture SMEs, both internal and external to the Department. Once again, internal SMEs provided operational experience that is unique to the DOE workforce and background on Recommendation 2011-1 implementation activities, while the external SMEs provided individual insight from their own work in the safety culture realm and pinpoint areas in which they had particular experience. The SMEs and team members participating in this analysis included individuals from across DOE, including Federal employees from different program secretarial offices and DOE Contractors/Laboratories, as well as the NRC, and CRESP. Summary bios for team members who participated in this review can be found in appendix 2.

Before arriving in Washington, each team member was provided the SCWE SA information prepared by the EFCOG groups and was tasked to identify 10-15 issues for improvement and also, any positive observations.

4.1.3.1 Process for Identifying Areas for Improvement

The first step in the analysis process was familiarizing the team with the SCWE SAs. As a precursor to the meetings, each team member was asked to review all of the SCWE SA reports, so they were familiar with the content and general trends upon arrival. While reading the reports, each team member was asked to identify 10-15 most significant issues collected from all SCWE SA Reports. Each team member brought these issues to the meeting and this information was used to identify overall trends in the analysis.

The methodology applied to evaluate the SCWE SAs was consistent with that applied to the IAs (and discussed above in Section 4.1.2).

4.1.3.2 Process of Identifying Positive Trends

The process for identifying positive trends in the SCWE Self-Assessment reports was conducted in a comparable way to the areas for improvement exercise defined in Section 4.1.2, above for IAs.

5.0 RESULTS OF EVALUATION & ANALYSIS

5.0.1 Discussion of Focus Areas and Associated Attributes

As discussed above, the ISMS guide discusses three Focus Areas for safety culture. These Focus Areas are further divided into "attributes", as follows:

FOCUS AREA	ASSOCIATED ATTRIBUTES
Leadership	• Demonstrated safety leadership • Risk-informed, conservative decision-making • Management engagement and time in the field • Staff recruitment, selection, retention, and development • Open communication and fostering an environment free from retribution • Clear expectations and accountability
Employee Engagement	• Personal commitment to everyone's safety • Teamwork and mutual respect • Participation in work planning and improvement • Mindful of hazards and controls
Organizational Learning	• Credibility, trust and reporting errors and problems • Effective resolution of reported problems • Performance monitoring through multiple means • Use of operational experience • Questioning attitude

5.0.2 Example of an Associated Attribute with Sorted Issues

As discussed in Sections 4.1.2.1 and 4.1.3.1, above, individual issues were evaluated and sorted into one or more associated attribute(s). For instance, in the HSS IA review there

were eight associated issues identified within the attribute of "Demonstrated Safety Leadership", which is under the Leadership Focus Area. These issues were summarized by the review team as follows:

- Production over safety mentality;
- Narrow definition of safety;
- Management commitment to safety;
- Lack of leadership engagement with staff;
- Lack of change management process;
- Lack of ownership of safety;
- Low survey participation/more important things to do;
- Management acceptance of lower standards;
- SCWE behaviors not internalized/modeled; and
- Lack of importance placed on Human Performance Improvement tools.

In some cases there were multiple instances of these issues being identified, in other cases, the review team concluded that an issue could validly be placed under more than one associated attribute. Therefore, the review team kept track of the number of issues that were categorized as fitting under a particular Attribute, to gauge the relative importance of an associated attribute for continuous improvement.

5.1 Combined Assessment Results

The chart in Figure 2 below tabulates the combined number of issues, sorted from the IAs and SAs, that the SMEs ascribed to each of the associated safety culture Attributes under the three Focus Areas.

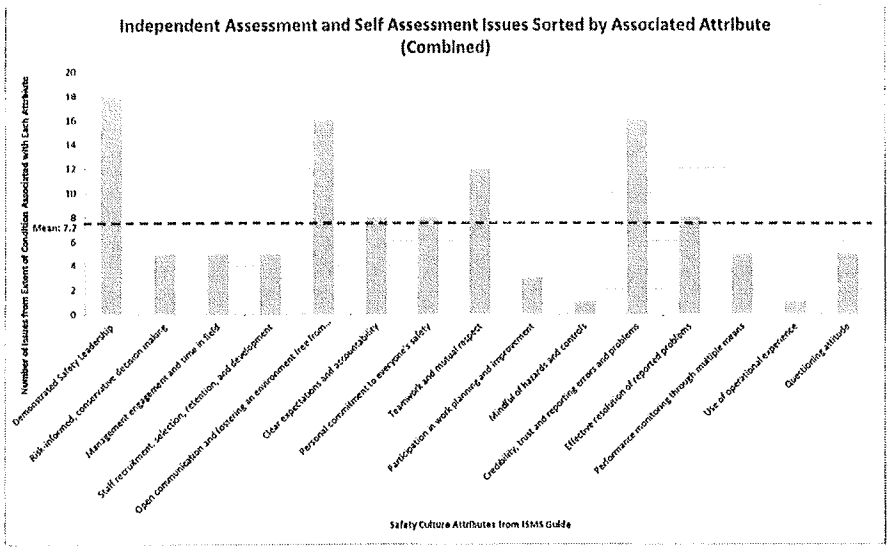

Figure 2: Areas for Improvement Combined Independent and Self Assessment Results

When combining the results from both assessments, the four Attributes that clearly stood out from the rest are:

- Demonstrated Safety Leadership (18 issues), under the Focus Area of Leadership;
- Open Communication and fostering an environment free from retribution (16 issues), also under the Focus Area of Leadership;
- Teamwork and mutual respect (12 issues), under the Focus Area of Employee Engagement; and
- Credibility, trust and reporting errors and problems (16 issues), under the Focus Area of Organizational Learning.

A second tier of issues also present themselves; these are those Attributes that had more than the mean number of issues, and are:

- Clear expectations and accountability (8 issues), under the Focus Area of Leadership;
- Personal commitment to everyone's safety (8 issues), under the Focus Area of Employee Engagement; and
- Effective resolution of reported problems (8 issues), under the Focus Area of Organizational Learning.

These two sets of associated Attributes provide a starting point for prioritizing actions that can assist DOE in its continuous improvement efforts regarding safety culture.

5.2 Comparison of Assessment Results

The chart in Figure 3 below tabulates the number of issues, sorted from the IAs and SAs, that the SMEs ascribed to each associated safety culture Attribute under the three Focus Areas.

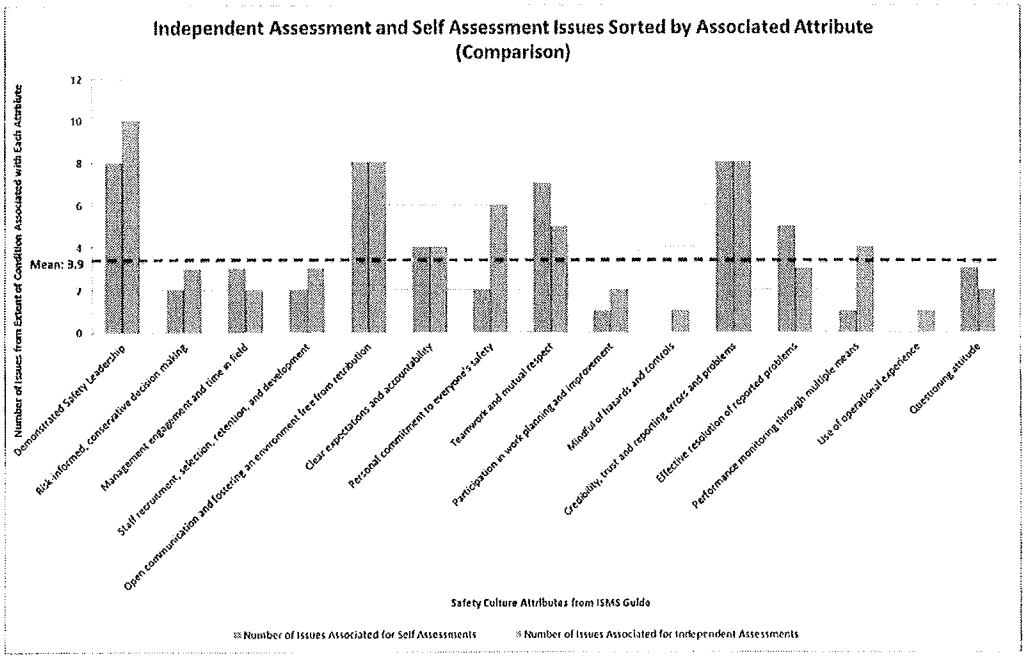

Figure 3: Areas for Improvement Comparison of Independent and Self Assessment Results

The four attributes that clearly stood out in the combined results show close agreement between the SCWE SAs and the IA results:

- Demonstrated Safety Leadership (8 and 10 issues);
- Open Communication and fostering an environment free from retribution (8 and 8);
- Teamwork and mutual respect (7 and 5); and
- Credibility, trust and reporting errors and problems (8 and 8).

By and large, the results for all other attributes are similar--with the possible exception of Personal Commitment to Everyone's Safety, which was identified by both sets of assessments, but more frequently by the IA reports (2 and 6). This lack of consistency could argue for this attribute also being placed among those considered for priority action.

5.3 Combined Assessment Results for Positive Trends

Looking at opportunities for improvement, or "issues", however, is only part of the picture. It is important to also look at what areas were assessed as strengths; these can also assist in focusing actions to continuously improve safety culture within DOE. Figure 4 below tabulates the combined number of strengths sorted from the IAs and SAs that the SMEs ascribed to each associated safety culture attribute under the three Safety Culture Focus Areas.

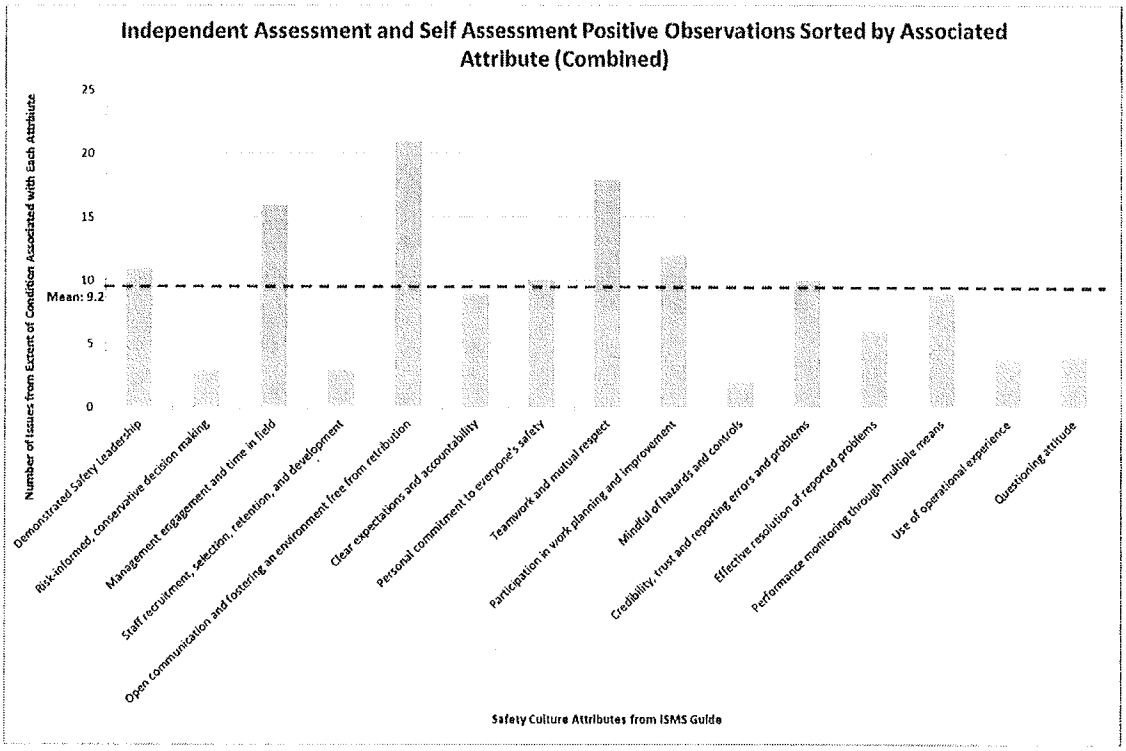

Figure 4: Positive Observation Combined Independent and Self Assessment Results

In the combined positive attribute assessment results, three attributes that clearly stand out from the rest are:

- Open Communication and fostering an environment free from retribution (21 strengths)*, under the Focus Area of Leadership;
- Teamwork and mutual respect (18 strengths)*, under the Focus Area of Employee Engagement; and
- Management engagement and time in field (16 strengths), also under the Focus Area of Leadership.

It is interesting to note that two of the attributes that were frequently mentioned as issues have also been frequently identified as strengths at individual sites (indicated by an "*" above). This too can be important information for the development of recommended continuous improvement actions (see section 5.5).

A second tier of strengths also present themselves (similar to issues, above); these are those attributes that had more than the mean number of strengths sorted into them, and are:

- Participation in work planning and improvement (12 strengths), under the Focus Area of Employee Engagement;
- Demonstrated safety leadership (11 strengths), under the Focus Area of Leadership;
- Personal commitment to everyone's safety (10 strengths), also under the Focus Area of Employee Engagement;
- Credibility, trust and reporting errors and problems (10 strengths), under the Focus Area of Organizational Learning.

5.4 Comparison of Assessment Results for Positive Trends

The chart in Figure 5 below tabulates the number of strengths sorted from the IAs and SAs that the SMEs ascribed to each associated safety culture attribute under the three attachment 10 focus areas.

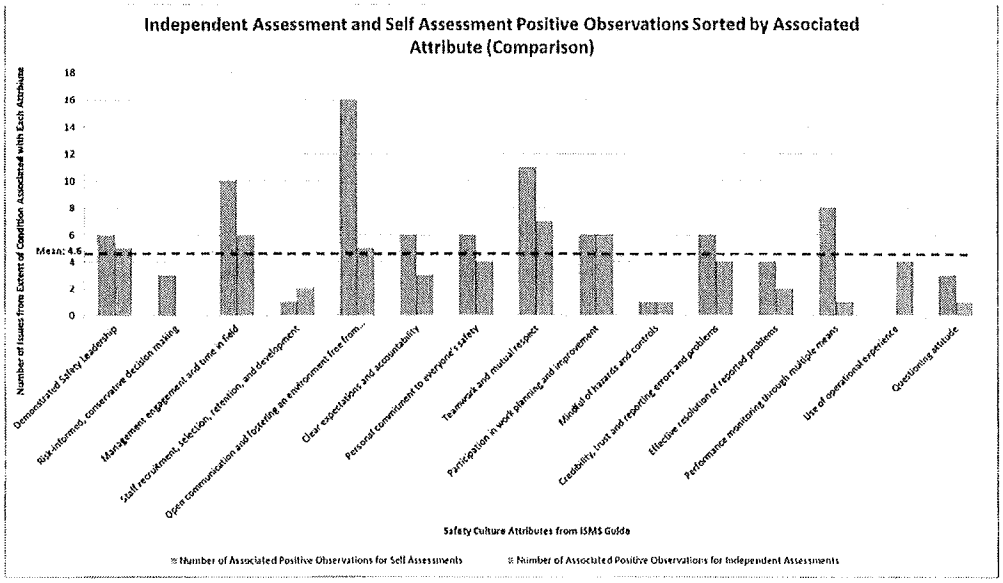

Figure 5: Positive Observations Comparison of Independent and Self Assessment Results

Similar to the analysis in Section 5.2 above, four of the five attributes that clearly stood out in the combined assessment of positive attributes show close agreement between the SCWE SA and the IA results:

- Teamwork and mutual respect (11 and 7);
- Management engagement and time in field (10 and 6);
- Participation in work planning and improvement (6 and 6); and
- Demonstrated safety leadership (6 and 5).

One attribute that does not illustrate close agreement between the IA and SCWE SA results is the most frequently occurring attribute of open communication and fostering an environment free from retribution. The number of hits in the SA positive observations was much higher than that of the IA observations (16 versus 5)[10]. However, looking separately at the general trends of both of the IAs and SAs, the most frequently occurring positive attributes in the SAs are the same as those in the IAs.

5.5 Discussion of summary observations

In the following discussion, the attributes occurring most frequently in the results of the SCWE SAs and IAs are discussed. The use of this data is not to suggest that all of the attributes are not important, rather it is to identify the areas where the assessment results indicate that we can initially make the most improvement. These attributes are those that had the most issues identified, and are likely the areas that people would most like to see improvement in.

In evaluating the data, the cross-cutting team identified both "issues" and "strengths"; the summary below ascribes importance/value to both frequently identified issues and frequently indentified strengths; further, it differentiates between primary strengths and issues and those that were secondary. Consistent with DOE's commitment to continuous improvement, a primary identified strength in an area did not cancel out a primary issue; therefore, primary issues that had corresponding strengths were still carried forward for recommended action. Issues to emphasize in continuous improvement actions are described in section 5.1.1, and summarized in the table below. The four primary attributes with an indication for needed action are shown in **bold red** and **bold orange** in the table.

FOCUS AREA	ISSUES FOR CONTINUOUS IMPROVEMENT	IDENTIFIED STRENGTHS
Leadership	Demonstrated safety	**Open Communication and**

[10] Another is performance monitoring through multiple means, which was also more frequent in the SCWE SAs than the IAs (8 versus 1); however, this occurred less than the mean number of times.

	leadership Open Communication and fostering an environment free from retribution	**fostering an environment free from retribution** Management engagement and time in field
	Clear expectations and accountability	Demonstrated safety leadership
Employee Engagement	Teamwork and mutual respect	**Teamwork and mutual respect**
	Personal commitment to everyone's safety	Participation in work planning and improvement Personal commitment to everyone's safety
Organizational Learning	Credibility, trust and reporting errors and problems	**None**
	Effective problem resolution	Credibility, trust and reporting errors and problems

5.5.1 **Issues to Emphasize in Continuous Improvement Action**

5.5.1.1 **Demonstrated Safety Leadership –** this was a primary issue for continuous improvement and only off-set by a secondary identified strength – thus this was a stronger indication of needed action, indicated by **bold red**, above.

5.5.1.2 **Credibility, Trust and Reporting Errors and Problems –** this was a primary issue for continuous improvement and only off-set by a secondary identified strength - thus this was a stronger indication of needed action, indicated by **bold red**, above.

5.5.1.3 **Teamwork and Mutual Respect-** this was a primary issue for continuous improvement and although off-set by a primary identified strength, a bias for action on the part of DOE should place this as a priority – overall indicating a higher priority for needed actions, indicated in **bold orange**, above.

5.5.1.4 **Open Communication and Fostering an Environment Free from Retribution -** this was a primary issue for continuous improvement and although off-set by a primary identified strength, a bias for action on the part of DOE should place this as a priority – overall indicating a higher priority for needed actions, indicated in **bold orange**, above.

5.5.1.5 **Clear Expectations and Accountability -** this was a secondary identified issue for continuous improvement and not off-set by an

above average incidence of strengths identified – overall indicating a lower priority for needed actions, indicated in , above.

5.5.1.6 Effective Resolution of Reported Problems - this was a secondary identified issue for continuous improvement and not off-set by an above average incidence of strengths identified – overall indicating a lower priority for needed actions, indicated in , above.

5.5.2 Strengths to Build on in DOE's Safety Culture Journey

5.5.2.1 Management Engagement in the Field - this was a primary identified strength and not off-set by an above average incidence of issues identified – showing a demonstrated safety culture strength that DOE can build upon, indicated in bold green above.

5.5.2.2 Participation in Work Planning and Improvement - this was a secondary identified strength and not off-set by an above average incidence of issues identified– showing another safety culture strength, possibly to a lesser degree, that DOE can build upon, indicated in green above.

5.5.3 Focus Area Summary

DOE's ISM groups the attributes associated with safety culture under three focus areas. Thus, these focus areas provide a logical way to group the safety culture lessons learned from the SCWE SAs and IAs that have been completed.

5.5.3.1 Leadership: this focus area had the largest number of issues identified for continuous improvement and the greatest number of identified strengths. It will, then, provide a focal point for DOE's continuous improvement actions. Those actions will take full advantage of the clearly identified strength associated with manager's engagement with the workforce in the field; building on this strength, managers can emphasize the DOE's commitment to improve in the areas outlined in Section 5.5.1. However, management training and performance measurement need a clear focus on management shortcomings in: demonstrating safety leadership and also setting clear expectations and accountability. Although identified as both an issue and strength, establishing and maintaining a work environment that is characterized by open communications and non-retribution is an area in which management can learn lessons from those sites where it was deemed a strength so that best practices can become commonplace.

5.5.3.2 Employee Engagement: the SCWE SA and IAs indicated that there were equivocal results with respect to teamwork, mutual respect, and demonstrating a personal commitment to co-worker safety. Continued strong participation in work planning and

improvement can help to set these perceptions in the right direction, but challenges noted below in problem resolution processes will need to be a focus of Department actions before substantial movement in these perceptions is likely. Also, the identified strength in management field engagement can be used as a tool to address issues with teamwork, mutual respect, and demonstration of a personal commitment to safety. Results of planned benchmarking activities (discussed below) can provide a natural opportunity for communications that build confidence in these areas as well.

5.5.3.3 **Organizational Learning:** the existence of issues with a lack of trust and error/problem reporting are exacerbated by a perceived lack of effectiveness in the Department's issues management processes. One of the processes frequently mentioned was the Employee Concern Program, which this report recommends be a focus of early recommended action in the Department's sustainment program, outlined in Section 6, below.

6.0 IMPROVEMENT ACTIONS & NEXT STEPS

Responding to the summary observations from Section 5.5, this report recommends DOE take a three-pronged approach for the development of improvement actions. First, the formation of a DOE Safety Culture Improvement Panel (SCIP) to ensure leadership and focus on DOE's safety culture initiatives. Second, the incorporation of safety culture and SCWE concepts and practices into training, building on the leader and manager training already developed and implemented, and development of qualified safety culture and SCWE self-assessment assessors. Third, evaluation of contract language to incorporate clear reference to Safety Culture to sustain focus on Safety Culture among DOE's contractors. These recommended actions were developed from the attributes identified during the extent of condition review. A summary of each recommended action and what it would accomplish is provided below, tying it to the identified attributes and the organizations or persons responsible for fulfilling the action. More detailed descriptions are provided in Sections 6.1-6.3.

RECOMMENDED ACTION	HOW RECOMMENDED ACTIONS RELATE TO REPORTED ISSUES & STRENGTHS	RECOMMENDED RESPONSIBLE ORGANIZATIONS
Formation of DOE Safety Culture Improvement Panel (SCIP) &	• *Demonstrated Safety Leadership*- line management will be assigned to head this effort, consistent with ISM principles. The SCIP will report to the Deputy Secretary to ensure continued visibility of safety culture improvement efforts within DOE.	DOE-AU, with SCIP members (appointed by PSOs)

Assigned Initial Improvement Actions	• *Credibility, Trust and Reporting Errors and Problems*- the SCIP will provide a focal point for evaluating issues and strengths regarding DOE's safety culture. It will provide a platform to evaluate major Departmental changes for their potential to impact DOE's safety culture. • *Effective Resolution of Reported Problems* – the SCIP will provide high-level, line management attention to the evaluation of issues and strengths regarding DOE's safety culture. Assigned actions will address issues raised concerning the ECP and other issues management systems. • *Open Communication and Fostering an Environment Free from Retribution*- the SCIP will provide a forum for evaluating DOE safety culture status, progress and challenges, meeting minutes will be widely distributed. • *Teamwork and Mutual Respect*- the SCIP will have representatives from all involved DOE groups, working together to continuously improved safety culture in DOE. • *Management Engagement and Time in Field*- line managers assigned to the SCIP illustrate management's engagement with the task of continuously improving safety culture. SCIP oversight of training improvements will reinforce this area that was deemed to be an area of particular DOE strength.	
Incorporation of Safety Culture and SCWE Concepts and Practices Into Training, and Development of Qualified Safety Culture and SCWE Self-Assessment Assessors	*Clear Expectations and Accountability*- safety culture training for all personnel, up and down the management chain, will be updated and/or developed to ensure that roles and responsibilities are understood and personnel have the capabilities needed to play their part in continuously improving DOE's safety culture; training incorporate insights on issues and strengths identified in Section 5.5.1. Regular revisions of the program will incorporate lessons learned from SCIP monitoring of performance measures and issues	National Training Center (NTC) in coordination with the SCIP and Federal Technical Capability Panel (FTCP)

	management.	
Evaluation of Contractual Language for Consistent Approach in Implementing Safety Culture and SCWE	• *Clear Expectations and Accountability*- the DEAR clause for ISM institutionalized the requirement for incorporating ISM into DOE work management; it will be revised to incorporate clear reference to safety culture to ensure continues focus on safety culture among DOE's contractors. • *Participation in Work Planning and Improvement*- building on an indentified strength, incorporation of safety culture into the ISM DEAR clause shows DOE's commitment to safety culture as a part of its day-to-day operations.	DOE-AU

6.1 Form DOE Safety Culture Improvement Panel (SCIP)

DOE recognizes that to be successful in fostering continuous improvement in our organizations and safety culture requires a high level of commitment and engagement by DOE's senior leaders. As such, this report recommends DOE establish a SCIP, which will report to the Deputy Secretary of Energy and be made up of Program Secretarial Officer (PSO) assigned career line managers from Headquarters and the Field, along with career safety professionals (also from Headquarters and the Field), to provide enduring leadership and focus for DOE's safety culture initiatives. The cross-functional team was informed by the individual input from the external SMEs in developing this action. The SCIP will seek input from external SMEs. SCIP members will receive comprehensive safety culture training.

The charter for this team will be developed, building on the foundation of the ISMS concepts and practices, and organized around the three Safety Culture Focus Areas outlined in the ISMS guide. The charter will establish the SCIP's role, along with other matters (as assigned by the Deputy Secretary and PSOs) to continuously improve the safety culture in DOE. The organization of this panel is patterned on successful, long-term improvement programs such as the improvements in DOE technical training and qualification programs that have been championed by the Federal Technical Capability Program (FTCP) Panel. The SCIP will develop a plan to rollout and communicate the charter. The SCIP will brief the Deputy Secretary on recommended sustainment actions that align with the improvement actions listed below (6.1.1-6.1.6). This report recommends that the SCIP manage and oversee the following initial recommended improvement actions:

6.1.1 Continue to Anchor Safety Culture and SCWE Into DOE's ISMS

Starting with the insights received in the IAs and SAs, and also based on feedback from stakeholders, leaders, and employees, DOE will improve DOE G 450.4-1C to incorporate best industry Safety Culture and SCWE concepts into the full text of the guide (safety culture concepts are now covered primarily in Attachment 10).

6.1.2 Development of Safety Culture Performance Measures

Development of some means to monitor safety culture is a high priority action. This is consistent with actions taken recommended by the NEI 09-07 safety culture monitoring panels. As a part of this action, the SCIP will develop criteria to screen events and incidents for potential safety culture or safety conscious work environment issues. Also performance measures will be developed to provide one of the means for the SCIP to monitor safety culture.

6.1.3 Revise/improve the SCWE Self-Assessment Guidance

The SCWE Self-Assessment Guidance will be revised and improved to provide rigor and consistency in our Departmental approach/methodology, incorporating feedback and lessons learned during performance of the IAs and SAs, In addition, DOE's continually developing understanding of best industry Safety Culture evaluation practices (e.g., INPO, Utilities Services Alliance) will be incorporated. The Guide will identify consistent criteria by which to measure effectiveness across the Department (e.g.., DOE G 450.4-1C, attachment 10, Safety Focus Areas and Associated Attributes).

The implementation of a best industry practice SCWE and Safety Culture Self-Assessment approach/methodology will provide a cost-effective approach, while promoting shared resources and continued learning within and amongst the DOE/DOE contractor & laboratory community. Self-Assessment tools will be validated using a behavioral scientist and/or other SME input to ensure reliability of the instruments.

6.1.4 Benchmarking

To verify the Department's improvement actions are consistent with best industry practices, and to reinforce organizational learning, continued benchmarking will occur with organizations with similar challenges (e.g., NRC, NASA, FAA) as well as nuclear industry leaders (e.g., INPO, IAEA, WANO, commercial nuclear organizations). Tools and resources will be shared to promote continuous learning.

6.1.5 Evaluation of other DOE Orders, Guides and Standards to Incorporate ISM, as well as Safety Culture & SCWE Concepts

As revisions are being developed to the ISMS Guide, as discussed in Section 6.1.1, above, the directives and technical standards in the DOE system will be reviewed to determine if revisions to incorporate the understanding developed of safety culture in the DOE environment should be incorporated.

6.1.6 DOE Employee Concerns Program (ECP)

ECP is an important program, providing employees an outlet for feedback on safety-related (and other) issues, especially when they deem other avenues to be inadequate to their needs. Feedback from the SCWE SAs and IAs will be evaluated and reviewed with the Department's ECP community to develop responsive revisions of the ECP.

6.2 Incorporation of Safety Culture and SCWE Concepts/Practices Into Training, and Development of Qualified Safety Culture and SCWE Self-Assessment Assessors

DOE's SAF-200, SCWE Training for DOE & DOE Contractor Senior Leaders provided a basis for understanding the foundation of Safety Culture and SCWE practices and principles. The Department is also developing a first line supervisor course to align with the Senior Leadership training. To be successful in implementing the SCWE and Safety Culture concepts and practices, this report recommends that additional training in the concepts is necessary and warranted, and that Safety Culture and SCWE should be incorporated within existing training modules. Senior Technical Safety Manager and Nuclear Executive Leadership Training (STSM and NELT) will be updated to include the Department's understanding of these concepts after completing the IAs and SAs. An employee computer-based training module will be developed to reinforce the Department's expectations and desired behaviors, thus driving accountability for these behaviors at all levels within the organization. Through this new and revised set of training, appropriate training will be available for all individuals in the chain of safety management, from the worker up through senior management.

Department-wide standards/criteria will be established for individuals who participate in Safety Culture and SCWE Self-Assessments. Consistent with best industry practices, an Assessment Guide will be developed (as discussed above) and individuals who are designated to participate in the assessments will receive specific training, to provide consistency in approach, methodology and analysis of data. Assessment team participants will be provided training on how to conduct the assessment. Specialized focus will be on developing skills to analyze organizational behaviors.

The development of this interlocking set of training will be coordinated by the SCIP and FTCP and executed by the National Training Center.

6.3 Evaluation of Contractual Language for Consistent Approach in Implementing Safety Culture and SCWE

Safety culture concepts presently exist in the DOE Nuclear Safety Policy (DOE P 420.1) and the ISMS Guide; however neither of these directives are self-invoking. This report recommends an evaluation of contract language to incorporate clear reference to Safety Culture expectations to sustain focus on Safety Culture among DOE's contractors. In coordination with the SCIP, DOE-AU will develop a recommendation to specifically revise the ISMS portion of the DEAR clause to incorporate clear reference to Safety Culture expectations as part of ISM.

7.0 LESSONS LEARNED

The analysis review team unanimously agreed that there was value in both performing HSS IAs and SCWE SAs.

There was considerable variability in report content and format for the self-assessments. The independent assessments reports were very consistent in format, level of detail, and content. The variability in the SCWE SA methodologies and reports was exacerbated by performing a large number of self-assessments in a relatively short time frame, and some organizations had completed their assessment prior to DOE issuing the self assessment guidance. Given these differences, there are similar benefits using each approach, and they were complimentary in several cases. Benefits derived from both types of assessments included:

- The act of self-assessing allowed organizations to learn and grow by going through the process and interacting with other organizations. The team felt that although the quality of assessments varied, a step change in awareness and knowledge of the SCWE concept was achieved across the complex. Performing self-assessments increased awareness, knowledge, and understanding of safety culture concepts by each organization. Attachment 10 was issued in 2011 and many organizations were not familiar with or trained on the attributes. The act of preparing for, performing, and responding to a self-assessment provided an opportunity for each organization to become much more familiar with attachment 10, how to assess safety culture, and how to improve safety culture.

- Independent assessments allowed for greater confidence in comparing results from one facility to the next because of the consistent approach used. They also allowed for a truly independent look at the organization that was not affected by familiarization with the organization, management bias, or inexperience in performing the self-assessment.

- Review of assessment results from both IAs and SAs indicated there is a SCWE extent of condition that requires additional and ongoing actions to improve performance. There was high correlation between qualitative results between the assessment approaches across the

complex which provides additional confidence in the results. Separate qualitative review of the SCWE self-assessment reports identified similar attributes in need of improvement.

8.0 SUMMARY

DOE has used internal and external subject matter experts to evaluate the information gained in performance of both Safety Culture IAs and SCWE SAs. The IAs and SAs provided immediate feedback to the applicable facilities, organizations and sites on areas for focus in continuously improving their SCWE and safety culture. The information available in the IA and SA reports has also yielded information on the status of SCWE and safety culture in DOE in general. This information has been used to develop a series of recommended actions to institutionalize safety culture within DOE and sustain a path of continuous improvement within the Department. The recommended Safety Culture Improvement Panel (SCIP) would form a principal commitment by DOE to a continued effort to understand safety culture, as it is implemented in the Department, sustain a common understanding of the importance of safety culture in the executing the missions assigned to the Department, and consistently find ways in which to improve DOE's safety culture.

9.0 APPENDIX LIST

Appendix 1: Brief Biography for SME's – Evaluation of SCWE Self-Assessments

Appendix 2: Brief Biography for SME's – Evaluation of HSS Independent Assessments

Appendix 3: NRC Traits of a Healthy Nuclear Safety Culture

Appendix 4: Summary Charts from Evaluation of SCWE Self-Assessments and Departmental Independent Assessments (developed by the review teams)

REFERENCES

The Secretary of Energy's letter to the Board, dated December 27, 2011, transmitting the Department of Energy's (DOE's) Implementation Plan for Recommendation 2011-1

Board letter to the Secretary of Energy, dated March 2, 2012, acknowledging receipt of DOE's December 27, 2011 letter enclosing DOE's Implementation Plan for Recommendation 2011-1

The Board's public hearing and meeting of March 22, 2012 and May 22, 2012

DOE's Office of Health Safety and Security (HSS) *Independent Oversight Assessment of Nuclear Safety Culture and Management of Nuclear Safety Concerns at the Hanford Site Waste Treatment and Immobilization Plant,* January 2012

NEI 09-07, *Fostering a Strong Nuclear Safety Culture*

Patton, Michael Quinn. *How to Use Qualitative Methods in Evaluation.* Newbury Park, CA: SAGE Publications, 1987. Print.

U. S. Nuclear Regulatory Commission, *Safety Culture Policy Statement*

U. S. Nuclear Regulatory Commission, *Safety Culture Common Language*

APPENDIX 1

Brief Biography for Participants: EFCOG Safety Culture Work Group Analysis of SCWE Assessment Reports

Lanette Adams, Deputy Vice President, Environment Safety Health Quality & Training, Mission Support Alliance, Richland, WA

Lanette Adams has over 30 years' experience working at DOE and commercial nuclear sites. As the Deputy VP of MSA Safety, Health, Quality & Training (SHQ&T) Organization, she serves as MSA's Safety Culture point of contact and VPP Advisor. She has performed several VPP self-assessments for both MSA and other Hanford contractors.

Ms. Adams managed MSA's Integrated Safety Management System (ISMS) Phase I and II implementation and verification efforts following the Mission Support Contract award and continues to orchestrate safety awareness and communication programs, employing tools that share common ISM principles that affect organizational and individual performance, such as VPP and Human Performance Improvement. She was the MSA organizational liaison on the both the DOE-HQ 2012 Hanford Site Organizational Climate & Safety Conscious Work Environment Survey and DOE-RL's Safety Culture Good Practices Evaluation Teams and has provided support to the DOE-HQ SCWE Supervisor Training Development Team.

Ms. Adams has a B.S. in Psychology from Washington State University.

William (Bill) Brocker, ESH/QA Representative, EESA Associate Laboratory Directorate, Argonne National Laboratory, Argonne, IL

Mr. Brocker is a Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP) and Health and safety professional with over thirty-five years of private industry and Department of Energy (DOE) contractor experience in the research & development, engineering & construction, chemical, pesticide, and hazardous waste industries. Specific program development and management experience includes: industrial hygiene, medical monitoring, drug testing, health and safety training, environmental protection, safety and epidemiology. Significant improvements in worker and environmental protection have been achieved by partnering with business, operations and marketing management to integrate environment, health and safety considerations into corporate, facility and project operations.

His experience includes: industrial hygiene monitoring or work exposures, worker complaint and accident investigations, authoring Argonne's first Differing Professional Opinion procedure, and health and safety program management. Active member of Energy Facilities Contractors Group's ISM/QA Working Group and served as Vice-Chair of the ISM Program Managers Sub-group for five years. The ISM Program Managers Sub-group activities included Human Performance Improvement and Safety Culture. In 2011 he completed the Senior Nuclear Power Plant Manager five-week course at INPO and the DOE Safety Conscious Work Environment training in 2013.

Mr. Brocker holds a B.S. in Environmental and Public Health granted by the University of

Wisconsin – Eau Claire and a M.S. in Environmental Health, with concentration in Industrial Hygiene and a minor in Biometry, granted by the University of Minnesota.

Cynthia (Cindy) Caldwell, Senior Technical Advisor, Pacific Northwest National Laboratory, Richland, WA

Cindy Caldwell is currently a senior technical advisor in the Environment, Health, Safety and Security directorate at Pacific Northwest National Laboratory. Her work includes understanding and evaluating operational culture, organizational reliability, and risk management. She has over 30 years of technical and managerial experience in the field of Safety and Health including reactor operations, training, and technical support within production and laboratory environments as a DOE contractor. She currently chairs the Safety Culture Task Team for the Energy Facilities Contractor Operating Group (EFCOG).

Ms. Caldwell is certified by the American Board of Health Physics, has a B.S. in Bacteriology, and an M.S. in Radiological Science and is currently studying for a Ph.D. in Organizational Development.

Kevin Daniels

Mr. Daniels has over 39 years of nuclear experience. During his 22 years of Naval Nuclear experience he qualified on three different reactor designs and qualified as a Joint Test Group and Joint Refueling Group member representing the Naval Reactor Program. He also served as a radiological controls expert for Naval Reactors. Mr. Daniels has over 15 years nuclear experience in operational, environmental, safety, health, and quality senior leadership positions, primarily within the DOE complex. He has worked at the DOE's Rocky Flats Environmental Technology Site, Idaho Cleanup Project, and Hanford Tank Farms Projects. In addition, he was the Project Manager for completion of a research reactor decommissioning at the University of Michigan and was the Manager responsible for the initial Health, Safety, Security, and Environmental program development for the nuclear energy program in the United Arab Emirates.

Mr. Daniels has been a qualified cause analyst and a qualified lead auditor. He has been assigned as conduct of operations mentor and has participated on numerous DOE Project readiness reviews (MSAs, CRAs, & ORRs), and ISMS reviews. Mr. Daniels has received formal training in Safety Culture attributes, including a DOE National Training Center course on Safety Conscious Work Environment. He is currently the Vice President for Environmental, Safety, Health, and Quality at the Idaho Cleanup Project.

Michael (Mike) Gaden, Deputy Director, Performance Assurance, Transuranic Waste Processing Center (TRU Project), Oak Ridge, TN

As the Deputy Director, Performance Assurance, at the Transuranic Waste Processing Center in Oak Ridge, Mr. Gaden is responsible for improving project performance by changing organizational culture and promoting continuous improvement and a Safety Conscious Work Environment (SCWE). He has 42 years of experience in the nuclear industry.

Mr. Gaden has 15 years of experience in commercial nuclear power, having performed technical and human performance tasks for the James A. Fitzpatrick, Dresden, LaSalle, South Texas Project, Comanche Peak, River Bend, and Rancho Seco nuclear power plants. He was the manager for the out-of-core nuclear fuel procurement and planning group for CAPCO, a group of nuclear utilities consisting of Ohio Edison, Toledo Edison, Duquesne Light, the Cleveland Electric Illuminating Company, and Ohio Power.

Mr. Gaden has 20+ years of experience in the DOE weapons complex at Rocky Flats, Hanford, and Oak Ridge, assessing and improving organizational performance, using ISMS, HPI, SCWE, and VPP processes to improve performance. This experience includes working-level to management-level Operations, Engineering, Maintenance, Nuclear Safety, and Health and Safety. To accomplish the task of improvement, Mr. Gaden has successfully coached and mentored workers, supervisors, managers, and senior managers of organizations ranging in size from ten to fifteen people to several thousand people. He developed the first ISMS program for the Rocky Flats facility, in 1996-1997, and conducted required ISMS training for all levels in the organization. He was part of a team that instituted a SCWE at Tank Farms in Hanford (2004-2005), including mentoring and coaching Tank Farms staff.

He started his career in nuclear power as an Electronics Technician in the US Naval Nuclear Power Program. He attended the University of Oklahoma while in the Navy and was commissioned as an officer, accepted into the nuclear program. He spent ten years in the Navy, serving as Watch Officer, qualifying as Engineer (USS Long Beach, CGN-9), and serving as Radiological Controls Officer (USS Puget Sound, AD-38). Mr. Gaden has a B.S. in Nuclear Engineering from the University of Oklahoma and an M.B.A. from the University of Houston, with a concentration in organizational behavior.

Richard (Rick) S. Hartley, Ph.D., P.E., Principle Engineer, B&W Pantex, Amarillo, TX

Rick Hartley is a principal engineer in the Environment, Safety, Health and Quality Division for B&W Pantex in Amarillo, Texas. Dr. Hartley is the primary lead for developing and implementing High Reliability Organization (HRO) practices at Pantex, the country's principal nuclear weapon assembly and disassembly plant. Because of the importance of a healthy safety culture to high reliability operations, Dr. Hartley has invested a large effort understanding the meaning, the practical ways to assess, and the practical implications of, safety culture on reliable operations. Dr. Hartley complements these efforts with an organizationally focused Causal Factors Analysis (CFA) investigation process for information-rich, yet non-consequential events to learn when HRO practices fall short. Dr. Hartley has written two texts on the HRO and CFA as practical guides for organizations wanting to pursue high reliability and learn as organizations.

Dr. Hartley has developed a practical methodology to proactively improve the work environment to aid in the journey to become an HRO. This methodology has been taught to more than 500 senior managers and over 3100 employees at Department of Energy (DOE) production sites, the Defense Nuclear Facility Safety Board, world-wide petroleum companies, and at National Laboratories. Dr. Hartley has presented numerous HRO case studies at the American Public Transportation Association, the American Nuclear Society, local and regional hospitals, universities,

at international HRO conferences, and with the Atomic Weapon Establishment in England. Dr. Hartley provided expert testimony at the NTSB hearing on the Washington Metro Area Transit Authority collision of June 2009 and for the Metro North collisions in September 2013.

Dr. Hartley is well versed in the safety culture approaches of the Institute of Nuclear Power Operations (INPO), the Nuclear Regulatory Commission (NRC), the International Atomic Energy Agency (IAEA), the International Nuclear Safety Advisory Group (INSAG), the DOE, and the Nuclear Energy Institute (NEI). Dr. Hartley has taught numerous seminars on safety culture and seminars comparing DOE with NRC safety assessment approaches to senior management and employees. Dr. Hartley is a contributor to 2009 DOE Energy Facilities Contractor Operating Group (EFCOG) Safety Culture Task Team which supported the publication of DOE safety culture policy, the DOE safety culture attributes, and safety culture assessments and improvement techniques. Dr. Hartley is currently the chairman of the EFCOG Safety Culture/High Reliability Working Group. Dr. Hartley led a pilot safety culture assessment of 3200 employee Pantex site and contributed to research, design, implementation, interpretation of the Pantex safety culture assessment led by Texas Tech University. Dr. Hartley has presented safety culture assessment methodologies at numerous professional meetings and at DOE Integrated Safety Management (ISM) Conferences.

Dr. Hartley received his Ph.D. in Nuclear Engineering from the University of Texas at Austin, his M.S. in Nuclear Engineering from the Air Force Institute of Technology, and his B.S. in Physics from Texas A&M University. He holds Professional Engineering Licenses in Environmental Engineering in Ohio and Texas. Dr. Hartley is a certified Six Sigma Blackbelt. Dr. Hartley comes to DOE after 20 years' experience in the United States Air Force.

Sandra Hyman, Senior Technical Advisor, Savannah River Remediation, Aiken, SC

Ms. Hyman is currently assigned as the Safety Culture and Issues Management Lead in the Savannah River Remediation Contractor Assurance organization in Aiken, SC. In this role, she has led the Safety Culture initiative at SRR including authoring and publishing over 40 Safety Culture articles for company level communications, development of the CERTAIN worksheet (HPI tool for decision makers) and a formalized Operational Decision Making program in support of risk based, conservative decision making, a formal Change Management program to minimize impact of change on Front Line Workers, and a Safety Culture booklet for use in promoting dialogue and discussion on Safety Culture topics with the SRR work force. Ms. Hyman is currently a working member of the Department of Energy SAF-199, Safety Conscious Work Environment (SCWE) for First Line Supervisors/Managers Development Team.

Ms. Hyman has 27 years of experience at three major Department of Energy Sites (Hanford, Idaho, and Savannah River) in support of diverse facilities such as High Level waste (Tank Farms) and Defense Waste Processing facilities, plutonium production and chemical separations facilities, Research and Development activities at the Savannah River Technology Center, Tritium Operations, Decontamination and Decommissioning (D&D) activities as well as External and Internal Dosimetry operations. Work at these sites has exposed Ms. Hyman to different organizational cultures including union and non-union, contractor and non-contractor. Ms. Hyman's assignments

have included leadership positions in both centralized and decentralized organizations, providing both programmatic and project support.

Ms. Hyman is a Certified Health Physicist and a Certified Six Sigma Black Belt. Ms. Hyman received a M.S. from the University of Florida (Health Physics) and a B.S. from Francis Marion College (Health Physics).

David (Dave) Kaveshan, Deputy Facility Manager, Transuranic Waste Processing Center (TRU Project), Oak Ridge, TN

Mr. Kaveshan has over 23 years nuclear experience, including 6 years of Navy Nuclear Power Operations, 5 years of commercial nuclear waste processing, and 12 years of operations experience at a DOE radioactive and hazardous waste processing facility. He has related experience and skills in Conduct of Operations, operations procedure writing, training, causal analysis, and personnel management.

Mr. Kaveshan started at the Transuranic Waste Processing Center in Oak Ridge as a Waste Operations Lead, writing Operations procedures for the plant and processes, training and supervising operations personnel, and overseeing daily operations activities of the multi-phased radioactive waste processing facility during construction, start-up, and operation of the facility. As Deputy Facility Manager, he ensures daily operations and work activities are authorized by Facility Management personnel and performed in compliance with the site Technical Safety Requirements and other regulatory requirements. He is assigned as an Incident Investigation Lead performing Critiques and Investigations of incidents at the site, and performs Root Cause Analysis of issues and incidents at the site. He is a founding member of the site's Continuous Improvement Team, championing the concept of High Reliability Organizations, and identifying opportunities for improvement in organizational and Operations processes, and in the site's safety culture. He is actively involved with coaching and mentoring personnel in the principles and practices of a Safety Conscious Work Environment, and Human Performance Improvement. He also performs oversight of operations activities as a Senior Supervisory Watch, monitoring, coaching and mentoring personnel in performance of work using sound Work Control and Conduct of Operations principles and ensuring compliance with procedure use requirements.

Mr. Kaveshan has 5 years of experience at a one-of-its-kind commercial radioactive waste thermal processing facility where he served as a Shift Supervisor. He was responsible for writing and revising operations procedures, training operations personnel, and supervising a crew of personnel in daily plant operations. He received training in supervisory management, and maintained Conduct of Operations and Human Performance Improvement as key topics in his coaching and mentoring of operations personnel.

Mr. Kaveshan began his career as a Machinists Mate in the Navy Nuclear Power Program, serving aboard two nuclear powered submarines (USS Guardfish, SSN-612 and USS Guitarro, SSN-665). He was qualified as an Engine Room Supervisor, and also served as Leading First (Supervisor) for the Mechanical Division aboard his second boat.

Ron Knief, Nuclear Criticality Safety Engineer, Nuclear Facility Training Coordinator, Sandia National Laboratories, Albuquerque, NM

Ronald Allen Knief, Ph.D. is a Nuclear Criticality Safety Engineer and Principal Member of the Technical Staff at Sandia National Laboratories (SNL) in Albuquerque, NM. Since 1998 he has served as Nuclear Facility Training Coordinator focusing on certification of operations personnel for the "Technical Area V" (TA-V) research reactor, hot cell, and irradiation facilities. In late 2012, he and a recently retired INPO executive facilitated a nuclear safety culture "immersion" week which involved most TA-V personnel, as well as others with allied research and corporate-safety perspectives.

As a nuclear-engineering professor at the University of New Mexico, Dr. Knief developed and initiated the Nuclear Criticality Safety Short Course programs which from 1974 to date have achieved an international reputation. In this subject that he defines colloquially as the "art and science of not building a nuclear reactor where you don't want one," the "art" is substantially aligned with what we now call nuclear safety culture.

Dr. Knief the decade of the 1980s at Three Mile Island (TMI), serving as Training Manager in the aftermath of the TMI-2 accident, and subsequently in corporate risk management. In the latter role, he was an organizer of a symposium which included a session on "organization culture." In four follow-on meetings, nuclear safety culture became a significant topic. He has edited four proceedings books (the most recent currently in preparation). He also is author of *Nuclear Criticality Safety and Nuclear Engineering* textbooks and a contributor to encyclopedias and handbooks.

For most of the 1990's, Dr. Knief was as a "road-warrior" consultant with specializations including nuclear-criticality safety, training, and risk management. Clients included DOE HQ and AL & OR field offices, all major DOE nuclear-contractor sites, NRC HQ, and many NRC-licensee nuclear-fuel-facility sites, as well as organizations in Canada, the United Kingdom, France, Sweden, Japan, Russia, and the Ukraine.

Dr. Knief is an ANS Fellow. He is past chair of their Education & Training, and current chair-elect for Nuclear Installation Safety, Divisions and is actively involved in developing ANS standards for criticality safety, critical experiments, and fast-burst reactor operation – all subject areas in which nuclear safety culture is essential. He was honored with the 2012 ANS award for excellence in education and training for *"his pioneering contributions as professor, manager, author, consultant, and ardent accident-lesson advocate in blending performance-based training and education for the benefit of the nuclear enterprise."*

Dr. Knief holds a B.A. in physics, mathematics, and economics from Albion (MI) College and Ph.D. in nuclear engineering from the University of Illinois at Urbana-Champaign. He completed a program in Management Development at the University of Pennsylvania's Wharton School. He has served as an NRC Licensed Senior Reactor Operator.

Ann Koplow, Senior Quality Assurance Specialist, Navarro-Intera, Las Vegas, NV

Ann Koplow has more than 24 years of experience supporting Department of Energy contractors at the Nevada National Security Site, Yucca Mountain Project, Idaho National

Laboratory, and Hanford Site. She is a subject matter expert in Integrated Safety Management and Safety Conscience Work Environment.

Ms. Koplow is a certified NQA-1 Lead Auditor. She led the contractor annual Integrated Safety Management Effectiveness Assessments since 2007. Ann is a trained Facilitator. She has provided systems engineering support to the Nuclear Regulatory Commission on projects such as the Fort St. Vrain Independent Spent Fuel Storage Installation and the Three Mile Island Core-2 Independent Spent Fuel Storage Installation Projects. Ms. Koplow has participated in Facility Excellence Program walk-down of facilities. She verified implementation of safety management programs for the Plutonium Finishing Plant in Hanford. She has requirements management expertise and has working knowledge of DOE O 414.1, DOE 226.1, 10 CFR 830, 10 CFR 835, 10 CFR 851, NQA-1. She is familiar with nuclear safety/authorization basis documents and nuclear safety requirements.

Ann holds a BS in Architecture from the University of New South Wales in Australia. She is a Certified Six Sigma Yellow Belt.

Mark Krauss, Project Manager & Technical Consultant, S.M. Stoller/Navarro-Intera, LLC, Las Vegas, NV

Mr. Krauss is currently employed with the S. M. Stoller Corporation as a Project Manager supporting the Nevada Site Office in Environmental Restoration activities at the Nevada National Security Site (NNSS). This includes planning investigation, remediation, and closure of dozens of contaminated sites on the NNSS. He also provides support to the Nevada Enterprise culture improvement effort underway within the Nevada Enterprise.

He has more than 26 years of experience in radioactive waste management, nuclear facility operations, and quality assurance. This includes assignments at the DOE Fernald site, NNSS, Yucca Mountain Project, and Lawrence Livermore National Laboratory (LLNL). He has participated in numerous audits, culture assessments, and corrective action program assessments and served as the Yucca Mountain Corrective Action Program manager. He participated in the nuclear power industry Corrective Action Program Owners Group (CAPOG) including semi-annual conferences and benchmarking efforts. He served as the contractor Quality Assurance Manager at the NNSS and at LLNL.

In line organizations he was the Facility Manager of an NNSS Category 2 Nuclear Facility where he was responsible for Documented Safety Analysis compliance, daily operations, and supervision of more than 100 personnel. This includes successfully achieving operational status through the completion of Contractor Operational Readiness Review and DOE Operational Readiness Reviews. He has extensive experience in the characterization, packaging, transport, and disposal of waste under the requirements of DOE Order 435 for both Low Level Radioactive and Transuranic Waste. Mr. Krauss has a B.S. in Petroleum Engineering from The Pennsylvania State University.

John A. McDonald, Organizational Performance Improvement Manager, WRPS, LLC, Richland, WA

Mr. McDonald has more than 35 years of nuclear related experience with DOE contractors at the Hanford site and commercial nuclear power industry at multiple facilities, and he served as an officer in the US Navy submarine program. He is a recognized expert in Safety Culture activities, experienced in organizational development of safety culture, mediation of safety culture-related issues, and management of organizations in need of rapid culture improvement. Mr. McDonald has successfully resolved complex workplace disputes, and has managed a number of culture-related processes such as Employee Concerns Programs (ECPs), issues management, differing professional opinions, and assessment programs under the purview of DOE and NRC regulation.

His experience includes: nuclear power plant manager and senior management positions in Operations, Environment, Safety, Health and Quality Assurance and organizational effectiveness. He was the senior manager over the Hanford Tank Farms operations organization, which achieved a VPP Star in 2006, and ESHQ Manager in 2014 when the Hanford Tank Operations Contractor received APP Star status for the entire company, and was senior manager over initial culture improvement activities at Hanford Tank Farms from 2005 to 2008. He is currently the first Chair of the Energy Facilities Contractors Group (EFCOG) ISMS/QA Working Group. He co-chaired with DOE an initiative to develop an ISMS safety culture model for the DOE complex which was the foundation for the safety culture attributes described in the DOE ISMS Guide 450.4-1, and was chairman of the EFCOG safety culture subgroup for 3 years. He was involved in the development of, and is a qualified trainer for, the DOE SAF-200 SCWE course.

Mr. McDonald holds a B.S. in Chemical Engineering from the University of Minnesota and a M.S. in Management from Cardinal Stritch College. He is a former member of the Hanford Concerns Council and has completed Senior Nuclear Plant Manager and Executive Nuclear Plant Management courses at INPO. He was previously licensed as a Senior Reactor Operator by the NRC in the commercial nuclear power industry.

Suzanne (Suzy) Mellington, Senior Technical Advisor, USDOE/NNSA

Ms. Mellington, a Senior Leader in the Department and NNSA, has managed a diverse variety of engineering, scientific, and business and administrative organizations over her 28-year career with the Federal government. As a Senior Executive with the Office of Civilian and Radioactive Waste Management (OCRWM,) she had the opportunity to lead the Organizational Development Initiative and programmatic strategy to design, staff, and train the organization, developing and demonstrating to the NRC that the organization had the skills, organizational culture, safety culture, and safety conscious work environment (SCWE) expected of an NRC Licensee.

In collaboration with Program leaders, she worked with the organization's leadership to change and improve the organizational culture to achieve strategic and business objectives and was a change agent for continuous improvement of the systems, structures, and processes. By utilizing organizational development expertise, learning tools, and a formal change management process she ensured that the organizational development activities were successfully integrated and achieved the

following outcomes: 1) Actions taken were value added and demonstrated measureable organizational learning and continuous improvement; 2) Leadership and organizational culture shifts were realized; and 3) the organization's behavioral attributes were practiced and ingrained into the work environment (Federal and contractor).

Her additional experience includes engineering and design, environmental management, ISMS, VPP, ES&H, personnel security, safeguards and security, FOCI, classification and control, project management, project controls, EVMS, training development, acquisition planning and execution, and contract negotiations.

Ms. Mellington holds a B.S. in Civil Engineering from Tennessee Technological University.

James (Jim) Merrigan

Brief Biography not available.

Michael Mikolanis, Chief Engineer, Savannah River Operations Office, USDOE

Michael Mikolanis has more than 19 years of technical and leadership experience with the Department of Energy supporting design and safety activities at the Savannah River Site, Office of River Protection, and the Hanford Nuclear Reservation. He also has 10 years of technical and leadership experience working nuclear safety and engineering in the United States Navy and the commercial nuclear industry.

Mr. Mikolanis is a recognized expert in the fields of nuclear safety and engineering design, with extensive experience developing safety analyses for nuclear facilities. Through this experience, he developed practical experience analyzing and managing a healthy safety culture as he successfully resolved numerous technical issues within these facilities. He was a contributing author to the Secretarial Implementation Plan addressing concerns related to the safety culture at Department of Energy defense nuclear facilities and was selected as a field representative to the core team implementing that plan.

Mr. Mikolanis has additional experience in the fields of nuclear, environmental and mechanical engineering. He has extensive experience with safety and health topics associated with quality assurance; nuclear safety; facility and system design; facility operations; and organizational safety culture. As the Team Leader for the first ever self-assessments of safety culture of two organizations at the Savannah River Site, Mr. Mikolanis developed and delivered safety culture assessor training to the teams performing those assessments.

Mr. Mikolanis holds a B.S. in Nuclear Engineering from Purdue University and a M.S. in Environmental Engineering from the Georgia Institute of Technology (Georgia Tech). He is a licensed professional engineer in the state of Maryland and was certified as a Naval Nuclear Engineer Officer by Naval Reactors.

Carol Sohn, Senior Nuclear Safety Advisor, Office of Chief Nuclear Safety, Office of Science (SC), USDOE/HQ, Richland, WA

Ms. Sohn is currently serving as the Office of Science Chief of Nuclear Safety and the Senior Nuclear Safety Advisor for the Department of Energy. She has more than 34 years experience in

nuclear facilities operations and nuclear safety, both as a contractor and Federal employee. She has worked at two National Laboratories and for three different DOE program offices.

Carol received her BS in Chemical Engineering from Purdue University and her MS in Management from the Purdue Krannert School with an emphasis on organizational behavior in R&D organizations.

She worked at Los Alamos National Laboratory (LANL) for >14 years at the Plutonium Facility (TA-55) and led an investigation of culture issues early in her career. She authored more than 20 technical papers in plutonium processing and disposition and served as the group leader for waste management operations, blending, shipping receiving and nuclear materials management. She has extensive experience in glove box operations and nuclear materials processing. Her organization received LANL's outstanding performance improvement team. She received two DOE Awards of Excellence while at LANL.

Ms. Sohn has taken several details including a two year assignment DOE-EM on the Tank Waste Remediation System project. She became a Federal employee in 1995 and worked on the initiative to privatize processing of the Hanford tank waste before becoming a Division Director for Technical Services. In 1999, she became the Senior Nuclear Safety Advisor for the Livermore Site Office which included oversight of the LLNL nuclear facilities and leading a small team of safety analysts. She was a member of the NNSA Columbia Accident Investigation team Lessons Learned group. In 2006, she worked for the Pacific Northwest National Laboratory (PNNL) on the Physical Sciences Facility project for the evaluation of a new nuclear facility.

Her latest position has involved nuclear safety oversight of >20 nuclear facilities across the Office of Science. In addition to her nuclear safety oversight responsibilities, she led a team to develop the SC-3 leadership development program. Recently she served as the Deputy Team Leader of the SC security review of B-3019 that evaluated lessons learned from the Y-12 security event including organizational behavior and leadership issues. In 2013 she completed an 8 month detail to NNSA as the Acting Deputy Manager for the Nevada Field Office (NFO) that oversees activities at the Nevada National Security Site. In conjunction with the new NFO Manager, she worked to instill new organizational behavior concepts with senior contractor and Federal leadership. She received a Secretarial Award of Excellence for her contribution to the ANL Nuclear Footprint reduction.

Dan Way, Chief of Nuclear Safety Operations, B&W Y-12 Technical Services, LLC, Oak Ridge, TN

Daniel Way has more than 20 years of leadership and executive experience operating high consequence nuclear power plants and nuclear weapons systems. As a career U.S. Navy submarine nuclear power trained officer, he served in increasing positions of responsibility including tours as a Naval Reactors prototype Shift Engineer, submarine Chief Engineer, submarine squadron Chief Engineer, Executive Officer of a strategic missile submarine, Deputy Squadron Commander of the largest squadron in the U.S. Navy, and Commanding Officer of a waterfront submarine support center. Prior to receiving his commission, Mr. Way served 10 years as a submarine electrician. In addition to his Naval Reactors' nuclear engineer certification, Mr. Way was also a qualified Quality Assurance officer.

After retiring in 2011, Mr. Way served as the Director of Nuclear Safety Operations at B&W Y-12 and most recently as the Chief of Nuclear Safety Operations at Y-12. In these positions, he is recognized as the Conduct of Operations expert and site champion for use of a systems approach to reduce performance variations. His organization has been a major contributor in driving continuous improvement across the Y-12 site and has been closely involved in Y-12 efforts in sustaining a healthy nuclear safety culture.

Mr. Way holds a B.S. in Computer Science from The Citadel and a M.B.A. Mr. Way also has extensive experience in causal analysis, high reliability organizing, leadership training, and major accident investigations - both from his naval and Y-12 careers.

Pete Wells, Program Manager, HAMMER Federal Training Center, Mission Support Alliance, Richland, WA

Mr. Wells is currently a Program Manager for HAMMER Federal Training Center in Richland, Washington, with concentration in Asbestos and Electrical Safety Programs, Safety Trained Supervisor, Conduct of Operations, Global Harmonization (GHS) Upgrade of HAZCOM, and others. He is currently part of the team that is developing Safety Conscious Work Environment Supervisor and Worker training as follow-on to the successful SAF-200 SCWE course for senior leadership. Mr. Wells is also developing course material for the Department of Energy National Training Center including Worker Safety and Health Program, 10 CFR 851. He has been at HAMMER for three and a half years and has over forty years of experience in the nuclear community.

Prior to coming to HAMMER in 2010, Mr. Wells was the Work Control Manager and D4 (decommissioning, deactivating, decontaminating, and demolishing) Area Engineer for Washington Closure Hanford, LLC (WCH). He came to WCH when the contract changed hands from the Bechtel Environmental Restoration Contract where he was the Field Engineering Manager.

Mr. Wells came to Hanford in 1996 to support the Lockheed Martin Advanced Environmental Systems (LMAES) Vitrification Team as the Program Manager for Low Activity Waste Product Packaging and Rad/Non-Rad Waste Stream Interfaces. The LMAES Team successfully developed a preliminary design and cost model for their version of the Waste Treatment Plant.

Prior to moving to Washington State, Mr. Wells managed projects for ChemNuclear and a variety of Waste Management based subsidiaries (as we were frequently reorganized within the company structure) conducting small scale nuclear decontamination and remediation projects for the government and industry.

Mr. Wells started his career in the U.S. Naval Nuclear Power Program serving on four nuclear powered submarines, two staff tours at the S-1-W Prototype at INL (Idaho Falls) at which he qualified Engineering Officer of the Watch and Engineering Watch Supervisor, and a tour on the staff of Commander Submarine Group 6 in Charleston, SC where he was the Assistant Training Officer. Mr. Wells retired from the U.S. Navy as a Master Chief Machinist Mate.

Caren Wenner, Manager, Human Factors Department, Sandia National Laboratories, Albuquerque, NM

Dr. Caren Wenner currently manages the Human Factors Department at Sandia National Laboratories. She has 15 years of experience in providing human factors support within the DOE complex, and previously conducted human factors research in the aviation maintenance industry. Her department includes cognitive psychologists and industrial engineers performing diverse human factors work across Sandia, including support for the nuclear weapons complex, the Nuclear Regulatory Commission, safety and security organizations, and other work-for-other projects.

She previously supported Sandia's Safety Basis Department as the Readiness Review Project Lead, and in that capacity supported and led numerous contractor operational readiness reviews and readiness assessments of both nuclear and non-nuclear Sandia facilities. Dr. Wenner participated on the safety culture self-assessment performed at Sandia in 2013, and her department has supported numerous efforts on safety culture across Sandia. She also has extensive experience in conducting training on human factors, and is a trained causal analyst.

Dr. Wenner has a Ph.D. and M.S. in Industrial Engineering (Human Factors) and a M.S. in Mechanical Engineering from the University at Buffalo.

Naomi Wheeler, Associate Safety Engineer, Human Performance SME, CH2M-WG Idaho, LLC (CWI), Idaho Falls, ID

Naomi Wheeler has over 12 years of experience with the Department of Energy, supporting the Idaho National Laboratory under the Idaho Clean-Up Project. She started as a Union worker with the Decommission, Decontamination and Demolition (D&D) efforts to improve the INL's footprint. She was very active with the Safety programs offered through her company and participated in several committees across the Lab to ensure and improve the overall safety culture. In October of 2012, she started her professional career with the ESH&Q department for CH2M-WG, Idaho LLC as a direct result of her education efforts and performance in the safety arena.

She is recognized by CWI and her peers as an expert in Human Performance as the Subject Matter Expert and Associate Safety Engineer. She has completed several Human Factor Assessments, resolved numerous employee concerns regarding safety in the workplace, and has completed numerous workplace inspections. She has experience with developing and maintaining adult curriculum related to Human Performance and is a qualified associate instructor for CWI.

Mrs. Wheeler attained her B.S. in Industrial Technology, Health and Safety and an Academic Certificate in Human Performance from the University of Idaho. She has been a presenter at several national conferences, including DOE Safety Summits, for topics on Safety Culture, Human Performance and Behavior Based Safety Programs.

Cynthia Williams, Performance Assurance & Compliance Manager, Savannah River Nuclear Solutions, Aiken, GA

Ms. Williams has over 24 years of experience in the nuclear industry in leadership and technical roles at various DOE Sites in ESH&Q and Program Management areas. Currently, she is

responsible for oversight of ESH&Q, Contractor Assurance, and other compliance related programmatic activities for NNSA Nuclear Nonproliferation missions at the Savannah River Site. Ms. Williams has performed audits, inspections, and operational readiness reviews at DOE, commercial nuclear, and private sector facilities throughout her career. She is experienced in implementing and integrating ISM, HPI, and Safety Culture into systems and processes to improve the work environment.

Ms. Williams holds a B.S. in Chemistry and Biology from Troy University.

Michael Zamorski, Senior Technical Advisor, USDOE/NNSA, Albuquerque, NM

Mike Zamorski is a Senior Advisor in the NNSA Office of Nuclear Safety, Nuclear Operations, and Governance Reform. He has 40+ years of experience in nuclear operations and programs. His current assignments include development of governance metrics, streamlining requirements, and implementation of Federal line oversight and contractor assurance systems (LOCAS). In 2011 and 2012 Mr. Zamorski participated in NNSA LOCAS affirmation reviews at Y-12, Sandia National Laboratories (SNL), and the Nevada National Security Site. He has significant experience leading and participating in teams, including readiness reviews, accident investigations, ES&H assessments, and management assist visits. Most recently he has supported DOE's response for DNFSB Recommendation 2011-1.

In December 2002, Mr. Zamorski was one of seven senior managers assigned to stand up the new NNSA Service Center, select the mid-level managers, close the Oakland and Nevada Operations Offices, transition federal employees to Albuquerque, and become fully operational by September 2004. He worked in the Office of Technical Services until 2011 when NNSA disestablished the Service Center and reassigned its functions to Headquarters. From December 2004 to July 2005, he served on a detail as Assistant Manager for Nuclear Facilities and Safety Basis at the Sandia Site Office. He was responsible for review of safety basis documents and for oversight of nuclear facilities at Sandia National Laboratories. From April 1995 to December 2002, Mr. Zamorski was Manager of the Office of Kirtland Site Operations (now the Sandia Site Office). He was Deputy Manager at Kirtland from 1993 to April 1995. The Office provided day-to-day Federal direction and oversight of SNL. He managed a staff of +/-60 employees whose responsibilities included contract administration; oversight of nuclear and hazardous non-nuclear operations; construction project management; safeguards and security; and environment, safety, and health.

From 1989 to 1993, Mr. Zamorski was Program Manager for the Albuquerque Operations Office, Operational Surety Program. He was responsible for implementing new DOE safety initiatives and applying modern quality principles to safety and facility operations at nuclear weapons complex sites. Earlier in his career, he worked at the Richland Operations Office from 1972 to 1989, overseeing staff engineering assignments involving nuclear fuel manufacturing, irradiated fuel storage, nuclear waste management technology development, nuclear fuel reprocessing, and plutonium processing. From 1986 to 1989, he was chief of the Nuclear Processing Branch, with line responsibility for reprocessing, plutonium and uranium product recovery, operation of four major nuclear facilities, and nuclear materials management.

Mr. Zamorski has a B.S. in chemical engineering and an M.B.A. from the University of Washington. He is a qualified DOE/NNSA Senior Technical Safety Manager.

John (Jack) Zimmerman, DUF6 Program Manager, Portsmouth Paducah Project Office, USDOE, Lexington, KY

Mr. Zimmerman has nearly thirty years of experience in nuclear operations, project management, and environment, safety and health management. He has been employed by the Department of Energy for the past eighteen years, and is currently the Program Manager for the PPPO DUF6 Conversion Project. Prior to entering Federal Service, he held positions as a Nuclear Test Engineer with General Dynamics, Electric Boat Division and engineering positions with Parsons Corp (Engineering Science, Inc.) and Pennsylvania Power and Light Co.

Mr. Zimmerman served as the Federal Project Director for the Major Systems Acquisition of the DUF6 Conversion Facilities. He directed the project through the design process, baseline development, construction and startup in accordance with DOE O 413.3X. As the DUF6 Program Manager, he is responsible for providing leadership and day-to-day program direction for the operation of government owned contractor operated nuclear chemical processing facilities at two sites (Portsmouth, Ohio and Paducah, Kentucky) with an annual budget of ~$100M and a workforce of 460 employees. He was responsible for the greenfield startup of these two newly constructed facilities including the successful completion of the Operational Readiness Reviews and transition from hot testing into steady state operations. Entering initial operations, he implemented a performance indicator program within DOE and the contractor organization based on the Institute for Nuclear Power Operations and Nuclear Energy Institute guides and lessons learned.

Previously, he served as the Associate Director of the Miamisburg Closure Project where he provided expert knowledge of environment, safety and health requirements and the technical analysis of how those requirements apply to the operation, maintenance, and decommissioning of nuclear facilities. He was the primary point of contact for programs and projects such as environmental restoration, worker safety, radiological safety, regulatory reform, nuclear safety and quality assurance with a direct staff of 16 subject matter experts of various technical disciplines including four facility representatives. In this position, his organization provided oversight of contractor performance of a contract with a budget over $100 million a year and a workforce of over 700 employees.

Mr. Zimmerman possesses a B.S. in Nuclear Engineering and a M.S. in Radiological Engineering from University of Cincinnati. He is a registered Professional Engineer in the State of Ohio and a registered Project Management Professional by the Project Management Institute. He is a qualified DOE Senior Technical Safety Manager and Project Management Career Development Program certified Level III Federal Project Director.

Rochelle Zimmerman

Rochelle Zimmerman has been the Safety Culture Lead for the Portsmouth/Paducah Project Office (PPPO) since 2012. She also serves as the Lead for Integrated Safety Management System, Continuity of Operations, Worker Health & Safety, Beryllium, Computerized

Accident/Incident Reporting System, Federal Employee Occupational Safety & Health, Energy Employees Occupational Illness Compensation (EEOIC), Freedom of Information Act (FOIA) and Privacy Act Lead for PPPO since 2005.

Mrs. Zimmerman has worked for Department of Energy Environmental Management since 2005. Prior to joining DOE, she worked for General Service Administration as a Contracting Program Analyst and served in the U.S. Air Force in Aerospace Medicine. Mrs. Zimmerman is certified in OSHA, Nursing, and Occupational Health.

APPENDIX 2

Brief Biography for Participants: Overall Analysis of DOE's Safety Culture and SCWE (SCWE Self-Assessments & HSS Independent Assessments)

Cynthia (Cindy) Caldwell, Senior Technical Advisor, Pacific Northwest National Laboratory, Richland, WA

Cindy Caldwell is currently a senior technical advisor in the Environment, Health, Safety and Security directorate at Pacific Northwest National Laboratory. Her work includes understanding and evaluating operational culture, organizational reliability, and risk management. She has over 30 years of technical and managerial experience in the field of Safety and Health including reactor operations, training, and technical support within production and laboratory environments as a DOE contractor.

Ms. Caldwell is certified by the American Board of Health Physics, has a BS in Bacteriology and an MS in Radiological Science and is currently studying for a PhD in Organizational Development.

Lyndsey Fyffe, Graduate Research Assistant, Consortium for Risk Evaluation with Stakeholder Participation (CRESP), Nashville, TN

Lyndsey Fyffe is a graduate research assistant with CRESP, the Consortium for Risk Evaluation with Stakeholder Participation, a multi-university consortium working with the Department of Energy and its stakeholders to advance cost-effective, risk-based cleanup of the nation's nuclear weapons production facility waste sites and cost-effective, risk-based management of potential future nuclear sites and wastes. This is accomplished by seeking to improve the scientific and technical basis for environmental management decisions by the Department of Energy (DOE) and by fostering public participation in that search. Ms. Fyffe is the Vice-President of Vanderbilt University's American Nuclear Society Student Chapter.

Ms. Fyffe has a M.S. in Environmental Engineering from Vanderbilt and a B.S. in Engineering from Duke University. She is a Ph.D. Candidate in Environmental Engineering at Vanderbilt University in Nashville Tennessee. Her research area is nuclear and chemical safety, with a dissertation focused on analyzing trends (qualitative and quantitative) from accidents in both the nuclear industry and the chemical industry to improve safety and efficiency of operations at nuclear chemical facilities.

Julie A. Goeckner, Senior Advisor for Nuclear Safety Culture, EMCBC (permanently assigned to HQ/EM-40, Office of Safety Security and Quality Programs), USDOE, Las Vegas, NV

Julie Goeckner has more than 28 years of experience with the Federal government supporting the Hanford Nuclear Reservation, the Office of Civilian Radioactive Waste Management

(Yucca Mountain), the EM-Consolidated Business Center, and DOE Headquarters. She also has experience with commercial nuclear industry, the gas/oil industry, and private industry.

She is a recognized expert in the fields of Nuclear Safety Culture (NSC), Safety Conscious Work Environment (SCWE), and Employee Concerns Program(s), with extensive experience in investigating allegations of retaliation and employee safety concerns within the government as well as in private industry. Ms. Goeckner has successfully resolved thousands of workplace disputes, and has been recognized for the establishment, management and assessment of Employee Concerns Programs (ECPs) under the purview of DOE and NRC regulation.

Ms. Goeckner has additional experience in: Environment, Safety, Health, and Quality (ISMS and VPP); evaluating and improving stakeholder relations; improving organizational culture through the creation and implementation of innovative systems, structures, and processes; Contractor Human Resource Programs including Labor Relations, Workers Compensation, and the U.S. Department of Labor's Energy Employees Occupational Injury Compensation Program Act (EEOICPA); and Safeguards and Security Program Management/Oversight. She has served as an Equal Employment Opportunity (EEO) Counselor, trained/experienced in conducting inquiries and investigations. Ms. Goeckner has experience with developing adult curriculum courses, and has served as Lead Trainer and keynote speaker at national conferences, for and on topics such as Nuclear Safety Culture, Safety Conscious Work Environment, Employee Concerns Program, Prevention of Sexual Harassment, and Mediation. She served as the DOE Representative to the Board of Directors for the National Association for Employee Concerns Professionals (NAECP) for over 13 years.

Ms. Goeckner holds a B.S. in Applied Management from Grand Canyon University. She is a Certified Mediator, served as a Certified Contracting Officer Representative, is a 2005 graduate of the Federal Executive Institute, and is the Lead Trainer for the DOE's SAF-200, Safety Conscious Work Environment for DOE/DOE Contractor Senior Leaders.

Thomas C. Houghton, Consultant to the Department of Energy (formerly with the Nuclear Energy Institute), Washington, DC

Thomas C. Houghton has over forty-five years' experience in the nuclear power industry, including operation and maintenance of the Navy's largest reactor plants, regulation at the US Nuclear Regulatory Commission, consulting to nuclear utilities and national laboratories in technical, licensing, management and organization issues, and proven leadership in addressing key industry issues while serving at the Nuclear Energy Institute (NEI). Over the past two years, he has provided consulting assistance to utility managers and executives in addressing regulatory, safety and human performance issues.

Mr. Houghton served at NEI for eleven years, initially hired to create the strategic approach to the reactor oversight process, the most significant change in the inspection, assessment and enforcement practices of the Nuclear Regulatory Commission in its history. This work involved fashioning industry positions across multiple disciplines and organizations, forging consensus with the NRC on mutually satisfactory innovative approaches, and project managing the multiyear effort. He then requested to be assigned to the new plant group, where he was responsible for security,

quality assurance, infrastructure and financial issues. His next assignment was Director, Strategic Regulatory Programs and Deputy to the Chief Nuclear Officer. He was responsible for devising strategies for interaction with the NRC and in developing innovative approaches to resolving technical and regulatory issues critical to the nuclear industry. He was heavily involved in the development of the NEI strategic and business plans and was instrumental in achieving company goals. In addition to technical responsibilities, Mr. Houghton has also taken the lead in developing an innovative approach to addressing NRC concerns regarding the safety culture at nuclear power plants, a key industry initiative.

For six years prior to joining NEI, Mr. Houghton was co-owner of H&P, Inc., a management and engineering company which provided services to government laboratories and commercial nuclear power plants, assisting them in technical support and in management consulting in the areas of strategic planning, staffing, recovery from NRC's watchlist, and process improvements. Prior to H&P, he worked for several companies assisting utilities in licensing, rulemaking activities and also in staffing and reorganization. He served as a licensing project manager at the NRC following the TMI event, gaining a foundation in regulatory processes, licensing and inspection.

Mr. Houghton also served eleven years in the nuclear navy, with engineering assignments at sea operating and maintaining nuclear power plants and was qualified as a Nuclear Chief Engineer by Naval Reactors. He retired as a Captain in the U.S. Naval Reserve.

He graduated with distinction in the top two percent of his class from the United States Naval Academy in 1968. He holds a M.S. in Management Science from the Naval Postgraduate School and an M.B.A. in Finance from the George Washington University. He has extensive graduate work in the field of leadership and organizational development.

James A. Hutton, Acting Deputy Assistant Secretary for Safety, Security and Quality Programs, US DOE, Washington, DC

As the Acting Deputy Assistant Secretary for Safety, Security and Quality Programs in DOE-EM, Jim Hutton is responsible for activities including ISMS implementation oversight activities, Defense Nuclear Facilities Safety Board (DNFSB) recommendations, operations safety and awareness, and quality assurance programs.

Mr. Hutton has a combined 30+ years of civilian and military nuclear safety training and experience, and previously served as Chief Nuclear Safety Advisor for DOE EM. DOE-specific experience includes: participating in/leading DOE EM oversight assessments and reviews at various sites/facilities, review of implementation of DSA and TSR nuclear safety requirements/controls, review of hazard categorization reports and DSA updates, and review of Operational Readiness Review (ORR) Plans of Action and Implementation.

He has led and participated in ORRs at various EM sites/facilities and reviewed implementation of DOE nuclear safety requirements prior to nuclear facility startup. He conducted an EM complex review of Startup Notification Reports and represented EM HQ in the directives revision process for DOE O 425.1D, Verification of Readiness to Startup or Restart of Nuclear Facilities.

His commercial nuclear power training and experience includes performing, supervising, and managing commercial nuclear plant operations, as well as engineering, reactor engineering, procedure development, design, construction, startup, testing, maintenance, personnel qualification/training, refueling, emergency preparedness, chemistry, environmental compliance, licensing, safety/accident analysis, criticality safety, radiological protection, corrective action management, and radioactive waste packaging/shipping. He has been a Shift and Operations Manager at a dual reactor power plant; Licensing Director for 8 reactors at 5 sites; and Plant General Manager for 4 reactors at 3 sites with overall responsibility for nuclear, reactor, and personnel safety, protecting public health/safety, environmental/regulatory compliance, and authorizing plant operation/startup. He served as Plant Operations Safety Review Committee Chairman at 4 commercial nuclear power plant sites and Nuclear Safety Review Board Member at 6 sites. Mr. Hutton served as Fleet Operations Steering Committee Member for Utilities Services Alliance plants.

Mr. Hutton's Military training/experience as a Naval Officer includes: Naval Nuclear Power Training, qualifying to operate/supervise 4 different Naval Nuclear Propulsion Plants, and qualifying for assignment as Chief Engineer of a nuclear powered ship. His formal education and certifications include: B.S. in Electrical Engineering from Lafayette College, M.B.A. from Villanova University, MIT Executive Education Certificate in Management and Leadership, Registered Professional Engineer in Pennsylvania, and NRC Licensed Sr. Reactor Operator.

Steven Krahn, Professor of the Practice of Nuclear Environmental Engineering, Department of Civil and Environmental Engineering, Vanderbilt University

Dr. Krahn is Professor of the Practice of Nuclear Environmental Engineering in the Department of Civil and Environmental Engineering at Vanderbilt University. Immediately prior to coming to Vanderbilt, he served in U. S. Department of Energy as the Deputy Assistant Secretary for Safety & Security in the Office of Environmental Management.

Dr. Krahn brings to Vanderbilt more than 30 years of technical and project management experience in positions of increasing responsibility in government, private industry and the military. His technical highlights have included: providing leadership to the nation-wide safety program of the largest nuclear program at DOE; providing technical direction and leadership for a major DOE engineering program; managing a federal agency providing safety oversight to the nuclear weapons complex; directing a $25 million division in an engineering services company; leading the technical review of numerous technical and systems issues at nuclear facilities; and providing senior engineering consulting services to the U. S. nuclear industry.

He has participated in or led external technical reviews on nuclear waste remediation for the Department of Energy including a range of technology approaches to accelerate cleanup of contaminated areas in vicinity of the Columbia River at Hanford, Washington and waste disposal technologies and options at the Savannah River site in South Carolina.

His project management highlights include: management of the $140 million complex overhaul of a nuclear submarine; management of the $30 million nuclear work package for two submarines; producing the first-ever strategic plan for a federal agency; technical direction of the

R&D program for two different DOE program offices; and the direction of the design and construction of two major safety upgrades at DOE nuclear facilities.

Dr. Krahn holds a Ph.D. in Public Administration from University of Southern California, 2001; an M.S. in Materials Science from University of Virginia; a B.S. in Metallurgical Engineering, University of Wisconsin; a Certificate for Management and Leadership from The Sloan School, Massachusetts Institute of Technology; and a Certificate in Nuclear Engineering from Bettis Reactor Engineering School, U.S. Department of Energy.

Andrew (Andy) Lawrence, Director, Office of Environmental Protection, Sustainability Support, and Corporate Safety Analysis, USDOE

Andrew Lawrence is the Director of the Office of Environmental Protection, Sustainability Support, and Corporate Safety Analysis within the Office of Health, Safety, and Security (HSS). He is responsible for establishing environmental protection policy, requirements and expectations for the Department of Energy (DOE) to ensure that the environment is adequately protected from hazards associated with DOE activities; furthering the understanding and implementation of environmental sustainability program goals and requirements within the Department; managing the maintenance and implementation of safety-related mission support programs and processes; and analyzing DOE-wide performance in protecting the public, the workers and the environment.

Mr. Lawrence is also responsible for providing assistance to field elements to support compliance with environmental, sustainability, and corporate safety requirements. He works across the Department to integrate environmental, sustainability, and corporate safety goals and objectives, including safety culture goals, into DOE directives and standards, and to ensure their integration into the agency's processes and programs. Mr. Lawrence also chairs an office-wide Organizational Culture Group (OCG) which is responsible for evaluating and recommending responses to the results of an independent safety culture assessment of HSS. The OCG has been instrumental in developing a set of core values for HSS, establishing a new organizational mission statement, and laying the groundwork for ongoing efforts to develop an HSS Strategic Plan.

Prior to his current assignment, he was Director of the Office of Nuclear Safety, Quality Assurance and Environment within HSS. In this position he established nuclear safety, quality assurance, and environmental protection requirements and expectations for the Department. He represented the Department in coordinating with other Federal agencies on major environmental initiatives including environmental sustainability, green house gas reduction, and application of environmental management systems to Federal activities.

Mr. Lawrence has played a key role in DOE's sustainability efforts since the first "Greening the Government" Executive Orders were issued in the late 1990s. Serving as the Deputy Assistant Secretary for Environment in DOE's Office of Environment Safety and Health (EH) from 2003 to 2006, for example, he led the implementation of environmental management systems throughout the Department to ensure that environmental impacts were considered in all aspects of DOE program and project planning and execution.

Mr. Lawrence has worked at DOE/EH and HS since 1990, serving as the Director, Office of Environmental Policy and Guidance, the Associate Deputy Assistant Secretary for Health Studies,

and the Director of the Compliance Strategies Division. Prior to joining DOE, Mr. Lawrence worked with EH as a support contractor, served as the Director of the Environment Office of the U.S. Synthetic Fuels Corporation, and managed Dames and Moore's Environmental Regulations Service.

Kelli Markham, Chief of Nuclear Safety, Office of Nuclear Energy, USDOE

Dr. Kelli Markham is the Chief of Nuclear Safety for the Office of Nuclear Energy (NE) where she advises the Assistant Secretary for NE and the Deputy Assistant Secretary for Nuclear Facilities Operations, in NE on nuclear safety. Prior to this, Kelli was a Director for the Environment, Safety and Health (ESH) Division for the Office of Science (SC), where she had headquarter-level ESH responsibilities for ten DOE-SC laboratories. Dr. Markham comes to DOE from the Nuclear Regulatory Commission where she was a Chemical Safety Reviewer and lead areas of the Mixed Oxide Fuel Fabrication Facility license application review. Also, she was the Project Manager and principal author of several white papers to the Commission on the development of regulations to license commercial reprocessing facilities.

Kelli has a Ph.D. in Organic Chemistry from the University of Iowa and prior to her civil service career, she was in academia as an Adjunct Faculty and an Assistant Professor, instructing at the graduate and undergraduate levels.

John A. McDonald,

Mr. McDonald has more than 35 years of nuclear related experience with DOE contractors at the Hanford site and commercial nuclear power industry at multiple facilities, and he served as an officer in the US Navy submarine program. He is a recognized expert in Safety Culture activities, experienced in organizational development of safety culture, mediation of safety culture-related issues, and management of organizations in need of rapid culture improvement. Mr. McDonald has successfully resolved complex workplace disputes, and has managed a number of culture-related processes such as Employee Concerns Programs (ECPs), issues management, differing professional opinions, and assessment programs under the purview of DOE and NRC regulation.

His experience includes: nuclear power plant manager and senior management positions in Environment, Safety, Health and Quality Assurance. He was the senior manager over the Hanford Tank Farms operations organization, which achieved a VPP Star in 2006, and was senior manager over initial culture improvement activities at Hanford Tank Farms. He is currently the first Vice Chair of the Energy Facilities Contractors Group (EFCOG) ISMS/QA Working Group. He co-chaired with DOE an initiative to develop an ISMS safety culture model for the DOE complex which was the foundation for the safety culture attributes described in the DOE ISMS Guide 450.4-1, and was chairman of the EFCOG safety culture subgroup for 3 years.

Mr. McDonald holds a B.S. in Chemical Engineering from the University of Minnesota and a M.S. in Management from Cardinal Stritch College. He is a current member of the Hanford Concerns Council and has completed Senior Nuclear Plant Manager and Executive Nuclear Plant Management courses at INPO. He was previously licensed as a Senior Reactor Operator by the NRC in the commercial nuclear power industry.

Suzanne (Suzy) Mellington, Senior Technical Advisor, USDOE/NNSA

Ms. Mellington, a Senior Leader in the Department and NNSA, has managed a diverse variety of engineering, scientific, and business and administrative organizations over her 28-year career with the Federal government. As a Senior Executive with the Office of Civilian and Radioactive Waste Management (OCRWM,) she had the opportunity to lead the Organizational Development Initiative and programmatic strategy to design, staff, and train the organization, developing and demonstrating to the NRC that the organization had the skills, organizational culture, safety culture, and safety conscious work environment (SCWE) expected of an NRC Licensee.

In collaboration with Program leaders, she worked with the organization's leadership to change and improve the organizational culture to achieve strategic and business objectives and was a change agent for continuous improvement of the systems, structures, and processes. By utilizing organizational development expertise, learning tools, and a formal change management process she ensured that the organizational development activities were successfully integrated and achieved the following outcomes: 1) Actions taken were value added and demonstrated measureable organizational learning and continuous improvement; 2) Leadership and organizational culture shifts were realized; and 3) the organization's behavioral attributes were practiced and ingrained into the work environment (Federal and contractor).

Her additional experience includes engineering and design, environmental management, ISMS, VPP, ES&H, personnel security, safeguards and security, FOCI, classification and control, project management, project controls, EVMS, training development, acquisition planning and execution, and contract negotiations.

Ms. Mellington holds a BS in Civil Engineering from Tennessee Technological University.

Michael Mikolanis, Chief Engineer, Savannah River Operations Office, USDOE

Michael Mikolanis has more than 19 years of technical and leadership experience with the Department of Energy supporting design and safety activities at the Savannah River Site, Office of River Protection, and the Hanford Nuclear Reservation. He also has 10 years of technical and leadership experience working nuclear safety and engineering in the United States Navy and the commercial nuclear industry.

Mr. Mikolanis is a recognized expert in the fields of nuclear safety and engineering design, with extensive experience developing safety analyses for nuclear facilities. Through this experience, he developed practical experience analyzing and managing a healthy safety culture as he successfully resolved numerous technical issues within these facilities. He was a contributing author to the Secretarial Implementation Plan addressing concerns related to the safety culture at Department of Energy defense nuclear facilities and was selected as a field representative to the core team implementing that plan.

Mr. Mikolanis has additional experience in the fields of nuclear, environmental and mechanical engineering. He has extensive experience with safety and health topics associated with quality assurance; nuclear safety; facility and system design; facility operations; and organizational

safety culture. As the Team Leader for the first ever self-assessments of safety culture of two organizations at the Savannah River Site, Mr. Mikolanis developed and delivered safety culture assessor training to the teams performing those assessments.

Mr. Mikolanis holds a B.S. in Nuclear Engineering from Purdue University and a M.S. in Environmental Engineering from the Georgia Institute of Technology (Georgia Tech). He is a licensed professional engineer in the state of Maryland and was certified as a Naval Nuclear Engineer Officer by Naval Reactors.

Diane Sieracki, Senior Safety Culture Program Manager, Office of Enforcement, USNRC

Diane Sieracki is a Senior Safety Culture Program Manager in the Office of Enforcement at the U.S. Nuclear Regulatory Commission (NRC). She functions as the lead for the safety culture efforts related to the external regulated communities in the NRC's Office of Enforcement. Ms. Sieracki led the efforts for the development and publication of a Safety Culture Policy Statement (SCPS) applicable to all licensees, and continues to coordinate the efforts to continue dialogue and education with external stakeholders with respect to the SCPS based on Commission direction.

She is involved in International safety culture efforts with the International Atomic Energy Association (IAEA) and is a co-author of a recently published Technical Document related to Oversight of Safety Culture and is working on several other Technical Documents and Report Series documents related to safety culture. Ms. Sieracki has over 25 years of experience in the nuclear power field and was responsible for all Safety Conscious Work Environment activities as well as Safety Culture activities for a large domestic nuclear power owner for ten years as the Fleet Manager of the Employee Concerns Program.

Ms. Sieracki has a M.S. in Management and Organizational Behavior, a B.A. in Business Administration and Accounting, and an A.A. in Legal. She also completed the Carlson School of Management at the University of Minnesota as well as the Leadership Academy sponsored by Dominion Resources Service, Inc.

Carol Sohn, Chief of Nuclear Safety, Office of Science, USDOE

Ms. Sohn is currently serving as the Office of Science Chief of Nuclear Safety and the Senior Nuclear Safety Advisor for the Department of Energy. She has more than 34 years experience in nuclear facilities operations and nuclear safety, both as a contractor and Federal employee. She has worked at two National Laboratories and for three different DOE program offices.

Carol received her BS in Chemical Engineering from Purdue University and her MS in Management from the Purdue Krannert School with an emphasis on organizational behavior in R&D organizations.

She worked at Los Alamos National Laboratory (LANL) for >14 years at the Plutonium Facility (TA-55) and led an investigation of culture issues early in her career. She authored more than 20 technical papers in plutonium processing and disposition and served as the group leader for waste management operations, blending, shipping receiving and nuclear materials management. She has extensive experience in glove box operations and nuclear materials processing. Her organization

received LANL's outstanding performance improvement team. She received two DOE Awards of Excellence while at LANL.

Ms. Sohn has taken several details including a two year assignment DOE-EM on the Tank Waste Remediation System project. She became a Federal employee in 1995 and worked on the initiative to privatize processing of the Hanford tank waste before becoming a Division Director for Technical Services. In 1999, she became the Senior Nuclear Safety Advisor for the Livermore Site Office which included oversight of the LLNL nuclear facilities and leading a small team of safety analysts. She was a member of the NNSA Columbia Accident Investigation team Lessons Learned group. In 2006, she worked for the Pacific Northwest National Laboratory (PNNL) on the Physical Sciences Facility project for the evaluation of a new nuclear facility.

Her latest position has involved nuclear safety oversight of >20 nuclear facilities across the Office of Science. In addition to her nuclear safety oversight responsibilities, she led a team to develop the SC-3 leadership development program. Recently she served as the Deputy Team Leader of the SC security review of B-3019 that evaluated lessons learned from the Y-12 security event including organizational behavior and leadership issues. In 2013 she completed an 8 month detail to NNSA as the Acting Deputy Manager for the Nevada Field Office (NFO) that oversees activities at the Nevada National Security Site. In conjunction with the new NFO Manager, she worked to instill new organizational behavior concepts with senior contractor and Federal leadership. She received a Secretarial Award of Excellence for her contribution to the ANL Nuclear Footprint reduction.

Caren Wenner, Manager, Human Factors Department, Sandia National Laboratories, Albuquerque, NM

Dr. Caren Wenner currently manages the Human Factors Department at Sandia National Laboratories. She has 15 years of experience in providing human factors support within the DOE complex, and previously conducted human factors research in the aviation maintenance industry. Her department includes cognitive psychologists and industrial engineers performing diverse human factors work across Sandia, including support for the nuclear weapons complex, the Nuclear Regulatory Commission, safety and security organizations, and other work-for-other projects.

She previously supported Sandia's Safety Basis Department as the Readiness Review Project Lead, and in that capacity supported and led numerous contractor operational readiness reviews and readiness assessments of both nuclear and non-nuclear Sandia facilities. Dr. Wenner participated on the safety culture self-assessment performed at Sandia in 2013, and her department has supported numerous efforts on safety culture across Sandia. She also has extensive experience in conducting training on human factors, and is a trained causal analyst.

Dr. Wenner has a Ph.D. and M.S. in Industrial Engineering (Human Factors) and a M.S. in Mechanical Engineering from the University at Buffalo.

APPENDIX 3

NRC Traits of a Healthy Nuclear Safety Culture

- Leadership Safety Values and Actions
- Problem Identification and Resolution
- Personal Accountability
- Work Processes
- Continuous Learning
- Environment for Raising Concerns
- Effective Safety Communication
- Respectful Work Environment
- Questioning Attitude
- Decision Making

Summary Charts from Evaluation of SCWE Self-Assessments and Departmental Independent Assessments (developed by the review teams)

SCWE SELF ASSESSMENT REVIEW & EVALUATION

	Attribute	Associated Issues Identified
LEADERSHIP	Demonstrated Safety Leadership	Over-reaction to issues
		Senior line management lack of demonstrated commitment to safety leadership
		"Production over safety" versus "safe production" mentality
		Intimidating work environment
		Fear of retaliation for raising issues
		Roles and responsibilities are not clearly understood
		Narrow definition of safety (focus on industrial safety)
		No formal change management process for non-technical issues (organizational changes)
	Risk-informed, conservative decision making	Production over safety versus "safe production" mentality
		Lack of defined approach to risk-informed, conservative decision making
	Management engagement and time in field	Senior line management lack of demonstrated commitment to safety leadership
		Lack of line management engagement and visibility in the work place
		Roles and responsibilities are not clearly understood
	Staff recruitment, selection, retention, and development	Favoritism
		Lack of priority for staff development/training
	Open communication and fostering an environment free from retribution	Over-reaction to issues
		Intimidating work environment
		Fear of retaliation for raising issues
		Favoritism
		Ineffective Employee Concerns program (ECP)
		Ineffective issue resolution
		Lack of trust (across organizations, in management, and among individuals)
		A questioning attitude is not encouraged or valued
	Clear expectations and accountability	Line management (from supervisors to senior leaders) is not holding poor performers accountable
		Intimidating work environment
		Favoritism
		Roles and responsibilities are not clearly understood
EMPLOYEE ENGAGEMENT	Personal commitment to everyone's safety	Production over safety versus "safe production" mentality
		Roles and responsibilities are not clearly understood
	Teamwork and mutual respect	Senior line management lack of demonstrated commitment to safety leadership
		Intimidating work environment
		Fear of retaliation for raising issues
		Favoritism
		Lack of teamwork
		Issue management system process problems
		Ineffective communication
	Participation in work planning and improvement	Need to improve worker engagement in work planning and improvement
	Mindful of hazards and controls	
ORGANIZATIONAL LEARNING	Credibility, trust and reporting errors and problems	Lack of rewards and recognition
		Over-reaction to issues
		Intimidating work environment
		Fear of retaliation for raising issues
		Blaming culture
		Lack of trust (across organizations, in management, and among individuals)
		Ineffective communication
		No formal change management process for non-technical issues (organizational changes)
	Effective resolution of reported problems	Ineffective Employee Concerns program (ECP)
		Ineffective Differing of Professional Opinion process (DPO)
		Issue management system process problems
		Ineffective issue resolution
		No formal change management process for non-technical issues (organizational changes)
	Performance monitoring through multiple means	Issue management system process problems
	Use of operational experience	
	Questioning attitude	Ineffective Employee Concerns program (ECP)
		Ineffective Differing of Professional Opinion process (DPO)
		A questioning attitude is not encouraged or valued

HSS INDEPENDENT ASSESSMENT REVIEW & EVALUATION

	Attribute	Associated Issues Identified
LEADERSHIP	Demonstrated Safety Leadership	Production over safety mentality
		Narrow definition of safety (focus on industrial safety)
		Management commitment to safety
		Lack of leadership engagement with staff
		Lack of change management process
		Lack of ownership of safety
		Low survey participation / more important things to do
		Management acceptance of lower standards
		SCWE behaviors not internalized/modeled
		Lack of importance for HPI tools (pre-job briefs and procedure use)
	Risk-informed, conservative decision making	Lack of change management process
		Management acceptance of lower standards
		Decaying facility conditions send a mixed message
	Management engagement and time in field	Lack of leadership engagement with staff
		Significant differences between management and employee perceptions
	Staff recruitment, selection, retention, and development	Lack of respect of employees by management (not valued)
		Low quality and priority of training
		Lack of sufficient resources to perform work (dollars and staffing)
	Open communication and fostering an environment free from retribution	Fear of reprisal/retaliation
		Ineffective ECP / issues not resolved
		Lack of communication (ineffective communication) (vertical and horizontal)
		Environment to challenge decisions (management)
		Lack of trust
		Favoritism (lack of inclusion)
		OPO process not used
		Low survey participation / more important things to do
	Clear expectations and accountability	Lack of defined roles and responsibilities
		Lack of defined values
		Lack of accountability
		Inappropriate focus on individuals rather than issues
EMPLOYEE ENGAGEMENT	Personal commitment to everyone's safety	Production over safety mentality (one example: inconsistencies between initiatives and actions—not walking the talk)
		Narrow definition of safety (focus on industrial safety)
		Lack of accountability
		Lack of ownership of safety
		Low survey participation / more important things to do
		Lack of importance for HPI tools (pre-job briefs and procedure use)
	Teamwork and mutual respect	Lack of communication (ineffective communication) (vertical and horizontal)
		Lack of respect of employees by management (not valued)
		Lack of or transparency of decision-making practices (lack of communication—vertical)
		Lack of teaming (federal and contractor/ contractor and contractor)
		Lack of integration/coordination between orgs
	Participation in work planning and improvement	Weak processes and procedures (procedures not consistently followed)
		Lack of importance for HPI tools (pre-job briefs and procedure use)
	Mindful of hazards and controls	Rad control issues
ORGANIZATIONAL LEARNING	Credibility, trust and reporting errors and problems	Ineffective ECP / issues not resolved
		Lack of defined values
		Lack of communication (ineffective communication) (vertical and horizontal)
		Environment to challenge decisions (management)
		Lack of trust
		Favoritism (lack of inclusion)
		Inappropriate focus on individuals rather than issues
		Lack of or transparency of decision-making practices (lack of communication—vertical)
	Effective resolution of reported problems	Ineffective ECP / issues not resolved
		Ineffective issues management systems
		Decaying facility conditions send a mixed message
	Performance monitoring through multiple means	Ineffective ECP / issues not resolved
		Poor execution of oversight activities in the field
		Reduced authority of HQ oversight activities (direct vs assistance/advising)
		Significant differences between management and employee perceptions
	Use of operational experience	Not using lessons learned
	Questioning attitude	Environment to challenge decisions (management)
		Low quality and priority for training