Safety Culture Evaluation

of the

Davis-Besse Nuclear Power Station

Conducted by

Performance, Safety, and Health Associates, Inc.

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EXECUTIVE SUMMARY

In March of 2002, the FirstEnergy Nuclear Operating Company (FENOC) discovered a significant degradation of the Davis-Besse Nuclear Power Station (the Station) reactor pressure vessel head and entered an extended shutdown. The Station was placed under the U.S. Nuclear Regulatory Commission's Inspection Manual Chapter 0350 process for restart. As part of the FENOC Restart Plan, the Station committed to perform an independent evaluation of the safety culture at Davis-Besse.

This report describes the results of an evaluation of the safety culture at the Davis-Besse Station conducted during February 2003. The primary objective of the evaluation was to provide information regarding the presence or absence of safety culture characteristics at Davis-Besse. Observations regarding the Station's safety culture characteristics and areas in need of improvement with respect to those characteristics are presented.

Safety culture characteristics that are important for the existence of a positive safety culture within a nuclear facility have been identified to include:

- **Safety is a clearly recognized value in the organization.**
- **Accountability for safety in the organization is clear.**
- **Safety is integrated into all activities in the organization.**
- **A safety leadership process exists in the organization.**
- **Safety culture is learning driven in the organization.**

Performance objectives are associated with each of the safety culture characteristics and particular behaviors and attitudes have been identified that can be measured to evaluate these objectives.

Using a methodology originally developed with the support of the U.S. Nuclear Regulatory Commission, an assessment of selected organizational behaviors and attitudes was conducted to evaluate the Station in terms of these safety culture characteristics and their associated performance objectives. The methodology involves obtaining a variety of quantitative and qualitative information, using multiple data-gathering methods. The information collected is largely based upon the perceptions of the individuals in the organization. The evaluation is a 'point in time' snapshot of the Davis-Besse Station, but cultural beliefs and assumptions do not change quickly.

Several initiatives that are designed to facilitate the safe restart and operation of the Davis-Besse reactor were observed in the course of the evaluation. These include:

- FirstEnergy and FENOC have allocated needed funding for restart of the Station;
- FENOC management has developed safety culture and safety conscious work environment (SCWE) models and policies intended to address Station issues;
- Multiple mechanisms have been put into place at the Station to communicate the value of safety; and

- Significant efforts through the SCWE program are being made to maintain an open reporting culture.

The results of the evaluation also indicated that the five safety culture characteristics are not yet clearly evident at the Station. In order to ensure the long-term promotion of a safety culture at Davis-Besse, increased attention to these areas for improvement and further corrective measures will be required. In particular:

- Although safety is a recognized value in the organization, it is inconsistently accepted and understood across all levels of personnel. Problems still exist in the transmission, comprehension and implementation of the safety message.
- Accountability and ownership for safety are not yet universally accepted in the organization. Although some individuals readily accept responsibility and take ownership of problems, others are still reluctant to do so.
- Safety is not yet consistently integrated into all activities in the organization. Processes and programs are in various stages of transition, which often reduces their effectiveness.
- An integrated and cohesive organizational safety leadership process does not yet exist. The values and attitudes of the workforce are generally positive, but the many differences found between work groups, and between management and staff, indicate that personnel are not yet aligned with a common set of values. Management's safety goals have not been consistently communicated to nor understood by Station personnel.
- Safety is not learning driven in the organization. Efforts to improve future performance by learning from the Station's past performance, from others' performance, and from the day-to-day implementation of the organization's programs and processes, are not systematic or recognized to be of high value for the organization.

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1 INTRODUCTION

In March of 2002, the FirstEnergy Nuclear Operating Company (FENOC) discovered a significant degradation of the Davis-Besse Nuclear Power Station (the Station) reactor pressure vessel head and entered an extended shutdown. The Station was placed under the U.S. Nuclear Regulatory Commission's Inspection Manual Chapter 0350 process for restart. As part of the FENOC Restart Plan, the Station committed to perform an independent evaluation of the safety culture at Davis-Besse.

The concept of safety culture was originally defined within the nuclear industry in the International Atomic Energy Agency's INSAG-4 document, published in 1991. The INSAG-4 definition of safety culture has been the standard upon which all other efforts are based and refers to "that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance." Many of the attitudes and behaviors necessary to achieve reliable performance in nuclear safety are so general that successful application of these principles typically results in improvements in all aspects of safety performance.

Since its inception, the concept of safety culture has been a key topic in discussions of safety across many industries. There is "a general recognition that while the importance of engineered safeguards and formal management systems to control risks is essential, it is equally important to win the commitment of the workforce to treat safety as a priority through a genuine corporate commitment to achieve high levels of safety" (INSAG-15, 2002).

2 PURPOSE

This report describes the results of an evaluation of the safety culture at the Davis-Besse Nuclear Power Station. The primary objective of the report is to provide information regarding the presence or absence of safety culture characteristics. Observations regarding the characteristics of the Station's safety culture that should be sustained are presented. Areas in need of management focus to improve the Station's safety culture are also presented.

3 BACKGROUND

Evaluating the safety culture of a particular organization poses some challenges. Cultural assumptions, which influence behavior and, therefore, safety performance, are not always clearly observable. Schein (1992) presents a model of culture that helps in understanding how the concept can be assessed. In Schein's model, culture is assumed to be a pattern of shared basic assumptions, which are invented, discovered or developed by an organization as it learns to cope with problems of survival and cohesiveness.

According to Schein's three-level model, an organization's safety culture can be assessed by evaluating the organization's artifacts, claimed values, and basic assumptions. On the first level of the model are the organization's artifacts. Artifacts are the visible signs and behaviors of the organization, such as its written mission, vision, and policy statements. The second level consists of the organization's claimed or espoused values. Examples of claimed values might

include mottos such as, "safety first" or "maintaining a blame-free work environment." The third level is comprised of the basic assumptions of the individuals within the organization. Basic assumptions are the beliefs and attitudes that individuals bring into the organization or that are developed as a result of experience within the organization. Examples of basic assumptions may include, "safety can always be improved" or "everyone can contribute to safety." The organization's basic assumptions regarding safety culture are less tangible than the artifacts and claimed values. They are often taken for granted within the organization that shares the culture.

Artifacts, claimed values, and basic assumptions are evaluated to identify the presence or absence of the characteristics that have been found to be important for the existence of a positive safety culture within a nuclear facility (INSAG-15, 2002). These characteristics include:

- **Safety is a clearly recognized value in the organization.**
- **Accountability for safety in the organization is clear.**
- **Safety is integrated into all activities in the organization.**
- **A safety leadership process exists in the organization.**
- **Safety culture is learning driven in the organization.**

Performance objectives are associated with each of the safety culture characteristics. Particular behaviors and attitudes have been identified to evaluate the extent to which the organization has attained these objectives. The relationship between the five characteristics identified as important for promoting a positive safety culture, the performance objectives associated with each characteristic, and the organizational behaviors that can be measured to assess the safety culture characteristics is depicted in Figure 1. This framework provides the basis for the evaluation of safety culture that was conducted.

This methodology was originally developed with the support of the U.S. Nuclear Regulatory Commission (1991) to assess the influence of organization and management on safety performance. The Canadian Nuclear Safety Commission used a modification of the methodology in the assessment of its licensees (Haber and Barriere, 1998). The methodology has also been implemented at two nuclear power plants in Spain in collaboration with the Spanish Research Center for Energy, Environment and Technology.

The methodology entails collecting a variety of information that is largely based upon the perceptions of the individuals in an organization, as well as conducting structured observations of individuals performing work activities. Perceptions are often reality when it comes to influencing behavior and understanding basic assumptions. Therefore, the data collected regarding individuals' perceptions are critical to this type of evaluation.

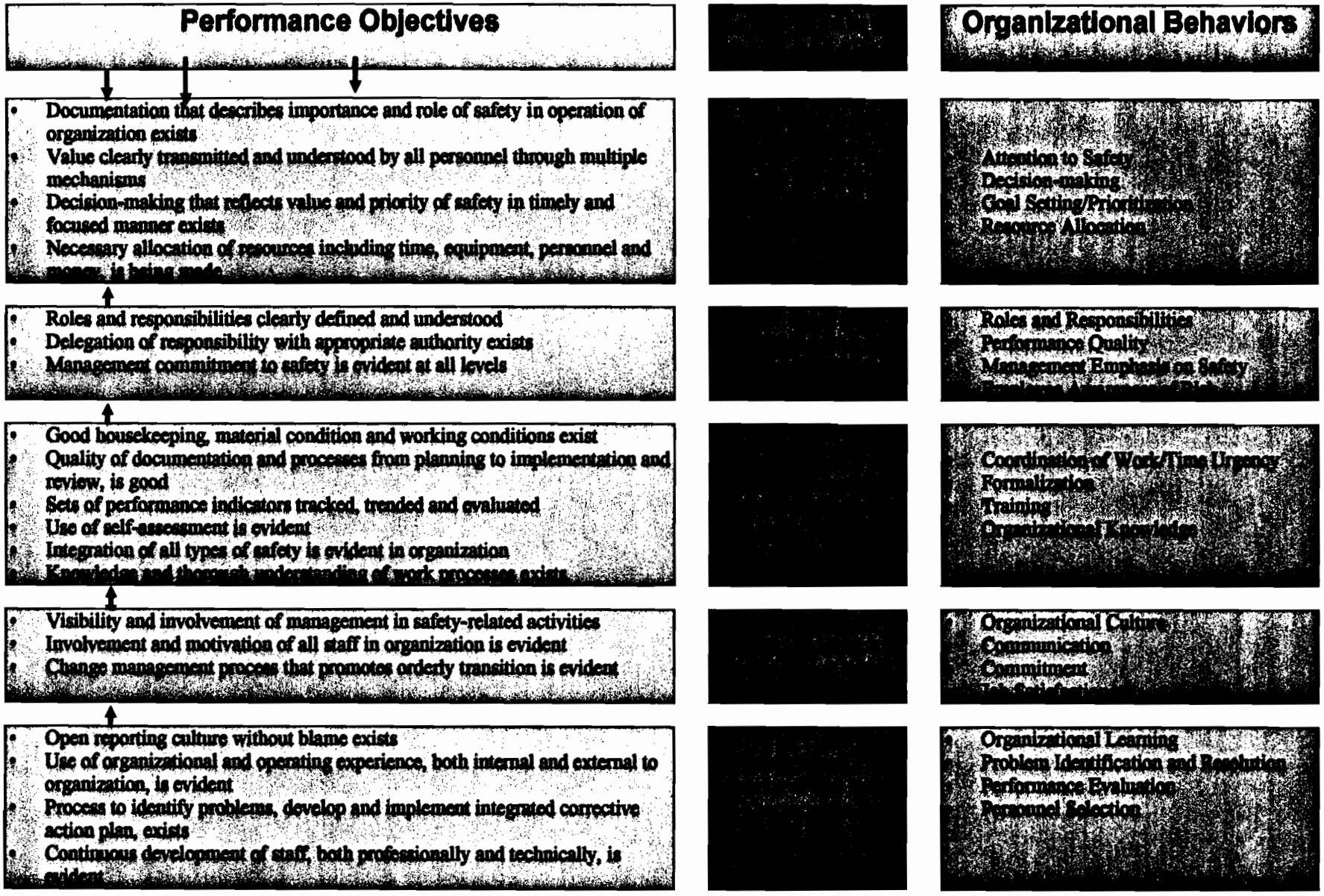

Figure 1. Relationship between safety culture objectives, characteristics and organizational behaviors

4 SCOPE OF SAFETY CULTURE EVALUATION

The scope of this safety culture evaluation was defined to include all of the functional areas at the Davis-Besse Nuclear Power Station, the FirstEnergy Nuclear Operating Company (FENOC) and some corporate functions of FirstEnergy Corporation (FE). The evaluation team was on site at the Davis-Besse Nuclear Power Station from February 4 – 6, 2003 to administer an Organizational and Safety Culture Survey and then from February 10 – 20, 2003 to conduct the interviews and observations. On February 17, 2003, interviews were conducted at the FE and FENOC corporate offices in Akron, Ohio.

The on-site team was comprised of four consultants from Performance, Safety and Health Associates, Inc. (PSHA). Two additional consultants from PSHA provided oversight and an independent review of this report. Abbreviated biographies of the team members are presented in Section 10.

This Safety Culture Evaluation is a 'point in time' snapshot of the Davis-Besse Nuclear Power Station. Although the team recognizes that FE, FENOC and Davis-Besse have made organizational and process changes to continue improving the Station's safety culture since the point in time at which the evaluation was conducted, the team has not assessed the impact of these actions. Therefore, changes that have occurred subsequent to the time of the evaluation are not discussed in this report.

5 METHODOLOGY

The complete details of the methodology used in this evaluation are presented elsewhere (Haber and Barriere, 1998), but are briefly described in this section. Five methods are used to collect information on the organizational behaviors identified in Figure 1. These methods are:

- Functional Analysis
- Structured Interviews
- Behavioral Anchored Rating Scales (BARS)
- Behavioral Checklists
- Organizational and Safety Culture Survey

The use of multiple methods to assess any organizational behavior assures adequate depth and richness in the results obtained. In addition, confirming the results obtained through the use of one method with results obtained through the use of another method provides convergent validity for the results.

A brief description of each method is provided below.

5.1 Functional Analysis

The purposes of the Functional Analysis were to: (1) clearly identify the organizational units of FE, FENOC, and the Davis-Besse Nuclear Power Station, (2) gain an understanding of each organizational unit's functions and interfaces, (3) examine the way in which information flows

among and within units, and (4) identify the key supervisory and managerial positions of each organizational unit. Information to support this activity was obtained primarily through the review of the documentation identified below, some semi-structured interviews, and some observations of organizational activities. The organizational behaviors to be evaluated were identified from the information collected during this analysis.

Documentation Review

Prior to the team's activities on site, the following documents were reviewed:

AIT Report - May 2002
AIT Report - October 2002
Root Cause Analysis Report on Significant Degradation of the RPV Head – April 2002
DB Reactor Head Case Study – All Hands Delivery
Engineering Improvement Plan – July 2002
Root Cause Analysis Report on Failure to Identify Significant Degradation of RPV Head – 8/13/02
Work Management Development Plan – October 2002
Strategic Communications Plan
Management and Human Performance Improvement Plan – Sept. 2002
FENOC Leadership Issues Action Plan
Evaluation of Corporate Management Issues - 12/18/02
Root Cause Analysis – CR 2002-04884/5 – 11/26/02
Root Cause Analysis - CR 2002-02578 – 9/10/02
Root Cause Analysis – CR 2002-02581 – 11/22/02
Blue Ribbon Panel Report
NQA Review of SCR - 6/13/02
Assessment of FENOC Company Nuclear Review Board
SCWE – Presentation to NRC – 9/18/02
NRC News – Lessons Learned
Return to Service Plans
Building Block Plans
SMT Standards and Values
NOP – Decision Making and Problem Solving
Draft Functional Areas Reviews
Performance Indicators - January 12, 2003
Results of SCWE Survey
Organizational Charts – Sept. 2002
QA Examination of the RPV Nonconformance
FENOC Performance Appraisal Form
Program Compliance Plan Overall Results Assessment 1/8/03

Organizational Behaviors

Based upon the results obtained from the Functional Analysis, the following organizational behaviors were identified for evaluation:

Attention to Safety – Attention to safety refers to the characteristics of the work environment, such as norms, rules, and common understandings, that influence personnel's perceptions of the importance that the organization places on safety. It includes the degree to which a critical, questioning attitude exists that is directed toward organizational improvement.

Communication – Communication refers to the exchange of information, both formally and informally, primarily between different departments or units. It includes both the top-down (management to staff) and bottom-up (staff to management) communication networks.

Coordination of Work – Coordination of work refers to the planning, integration, and implementation of work activities of individuals and groups.

Formalization - Formalization refers to the extent to which there are well-identified rules, procedures, and/or standardized methods for routine activities as well as unusual occurrences.

Goal Setting/Prioritization – Goal setting/prioritization refers to the extent to which facility personnel understand, accept, and agree with the purpose and relevance of goals.

Organizational Learning – Organizational learning refers to the degree to which individual personnel and the organization, as whole, use knowledge gained from past experiences to improve future performance.

Performance Evaluation – Performance evaluation refers to the degree to which facility personnel are provided with fair assessments of their work-related behaviors. It includes regular feedback with an emphasis on improvement of future performance.

Performance Quality – Performance quality refers to the degree to which facility personnel take personal responsibility for their actions and the consequences of the actions. It also includes commitment to and pride in the organization.

Problem Identification and Resolution – Problem identification and resolution refers to the extent to which the organization encourages facility personnel to draw upon knowledge, experience, and current information to identify and resolve problems.

Roles and Responsibilities – Roles and responsibilities refer to the degree to which facility personnel's job positions and departmental work activities are clearly defined and carried out.

Training – Training refers to the degree to which personnel are provided with the knowledge and skills required to perform tasks safely and effectively. It includes personnel's perceptions regarding the general usefulness of the training program.

5.2 Structured Interview Protocol and Behavioral Anchored Rating Scales (BARS)

The Structured Interview Protocol was derived from a database of interview questions. A particular subset of questions can be selected to provide a predefined focus to an interview session. The evaluation team members selected a set of questions to gather information related to the safety culture characteristics and to assess the organizational behaviors identified from the Functional Analysis.

A total of 96 interviews were requested as part of the evaluation. Eighty-eight interviews were conducted. Interviews with job incumbents in six positions from Operations, one from Maintenance and one from Radiation Protection could not be scheduled for various reasons. Each interview lasted approximately one hour and a few less formal follow-up interviews were conducted to provide further clarification when necessary.

The Behavioral Anchored Rating Scales (BARS) were administered to those individuals who participated in the structured interviews. Each interviewee was administered the BARS belonging to four organizational behaviors. The BARS provided the opportunity to quantitatively summarize qualitative data associated with the interviewee's perceptions of the organization. Approximately 330 BARS were collected representing 11 organizational behaviors

Job positions were placed in categories labeled as Directorates, based upon the Director to whom the functional group reports. The Strategic Level was defined as the FE Chairman and CEO, the Corporate Officers of FENOC, and the Directors of the Davis-Besse Station. Senior Management was defined as the subset of the Strategic Level group comprised of the Acting Site Vice President and the Station Directors.

5.3 Behavioral Checklists

The use of behavioral checklists provides an unobtrusive assessment of particular organizational behaviors and structures observations of critical processes including shift turnovers, work planning, management meetings, work unit meetings, and responses to planned or unplanned events. The appropriate behavioral checklists to be implemented were selected based upon the type of meeting or activity being observed.

During the course of the evaluation, over 50 observations were made. All of the observations were made at the Station. The data represent observations of Control Room Turnovers, Operations Turnovers, Management and Communication Team Meetings (MCTM), Outage Management Meetings, Managers' Meetings, Restart Review Board Meetings, a Pre-job Briefing on the CSA Lift, a Refueling Planning Meeting, a NRC Teleconference Call, the CSA Lift, a 4Cs Meeting, a Corrective Action Review Board, and a reverse de-brief on Fuel Reload.

5.4 Organizational and Safety Cultural Assessment

The primary purpose of administering a paper-and-pencil survey is to measure, in a quantitative and objective way, topics related to organizational culture, safety culture, coordination of work,

job satisfaction, communications, work group cohesion, organizational commitment, perceived hazardous nature of work, environment, safety and health issues, and attention to safety. By conducting a survey, a broad sample of the individuals in the organization can be obtained and it is possible to gather information from a larger number of personnel than can be reached through the interview process alone.

The total population of 830 full-time, permanent Station personnel was invited to participate in the survey. A total of 661 individuals actually completed the survey, which represents a 79.6% response rate. This response rate is acceptable for the purpose of drawing accurate conclusions regarding the perceptions of Davis-Besse personnel.

6 CONCLUSIONS

The conclusions presented below summarize the insights gained from the evaluation team's analyses of the structured interviews, BARS, checklists and survey data. The conclusions are presented in terms of the five Safety Culture Characteristics and their associated Performance Objectives. Observations and Areas for Improvement related to each Performance Objective are presented.

1. Safety is a clearly recognized value in the organization.

1.1 *Performance Objective: Documentation that describes the importance and role of safety in the operation of the organization exists.*

Observations

- Documentation exists that demonstrates the clear and high priority the organization places on safety, such as the FENOC Safety, Safety Culture and SCWE Policies.
- Some functional groups have issued new documentation describing expectations and standards with respect to safety, such as the Operations Blue Book.

Areas for Improvement

- Although FENOC has issued a policy defining safety culture, the policy was less than clear.
    - Editorial mistakes in the policy went unnoticed and resulted in statements that were inconsistent with other related documents.
    - Many individuals interviewed, including those at the Strategic Level, and across all groups in the Station, are confused about the differences between the concepts of Safety Culture and Safety Conscious Work Environment (SCWE). The open identification of problems and raising of safety concerns without fear of retaliation (i.e., SCWE) does not in itself assure a positive safety culture.
- On the public FE internet website, safety is not mentioned in any of the statements concerning the vision, mission or strategy of the Corporation. Safety is identified as a core value on the FE and FENOC internal intranet websites.
- Problems were identified by Station personnel with the revision of the Blue Book available at the time of the evaluation. Some of these problems were minor editorial issues, such as a lack of pagination, but were perceived as a lack of attention to detail.

The absence of additional review or training on the content of the Blue Book, however, was described as a more significant factor that reduced its effectiveness.

- Some documentation in the Station is outdated and does not reflect recent changes. For example, Employee Concerns Program posters in some areas of the Station still reflect the old Ombudsman approach.

1.2 ***Performance Objective: The value of safety is being clearly transmitted and understood by all personnel through multiple mechanisms.***

Observations

- Multiple mechanisms exist to communicate the value of safety throughout the organization. These mechanisms include shift turnovers, stand-downs, group meetings, town hall meetings, 4Cs meetings, newsletters, and SCWE training.
- The Station's industrial safety performance is recognized as being as among the best in the U.S. nuclear industry.
- Some behaviors are occurring which indicate that the value of safety is understood.
    - Use of the Employee Concerns Program (ECP) has increased.
    - Personnel are writing more Condition Reports (CRs) to raise management issues related to safety.
    - Many individuals indicate that it has not been a problem to raise safety issues in the past, and they do not perceive it to be a problem now.
- Results from the survey data indicate that the groups in the Plant Directorate (i.e., Operations, Radiation Protection/Chemistry, and Training) understand the hazardous nature of their work and the need to pay attention to potential danger more so than other groups. These groups, along with the Engineering Groups, also have a broader understanding of how the whole technological system operates than other functional groups.
- The overall score for the Davis-Besse employee population on the Attention to Safety Scale in the survey was high. This result indicates that the general employee population at the Station believes that the organization highly values attention to safety in its work activities.
- The survey results indicated a very high overall mean score on the Perfectionistic Scale, suggesting that individuals perceive they need to work extremely hard to avoid all mistakes.

Areas for Improvement

- Some behaviors indicate that the value of safety is not consistently demonstrated and understood by all members of the organization.
    - Basic safety issues exist with respect to Foreign Material Exclusion (FME), Personnel Protective Equipment (PPE), and housekeeping, particularly in containment.
    - The absence of pedestrian walkways on some of the roads leading to and within the protected area sends an inconsistent message on the value of safety.
    - The communication of a daily safety message is not highly effective since many individuals cannot recall the message of the day.

- Group safety meetings are not universally conducted and some Safety Committee representatives do not routinely provide information from the meetings to their work groups.

- Significant differences between management and non-management personnel were found on the Attention to Safety Scale of the survey. Specifically, survey responses indicated that managers perceive that Attention to Safety is valued in the organization more than non-management personnel. This difference is not typically observed in other nuclear power plants at which the same survey has been conducted and suggests a lack of alignment between managers and staff in this area.
- A lack of alignment also exists within and between functional groups on several of the behaviors included on the Attention to Safety Scale. This lack of alignment is consistent with data collected in other areas as part of this evaluation.
    - Some of the differences between functional groups were generally consistent with group responsibilities. For example, for the behavior 'not making work for others,' the Quality Assessment Group scored significantly lower than the other groups. That is, the Quality Assessment Group perceives, to a greater extent than other groups, that 'making work for others' is valued within the organization.
    - On other behaviors that should be perceived as valued by each group, such as 'owning a problem until it is resolved,' the Maintenance Group scored significantly lower than other groups.
    - Similarly, some job position categories, most often the Union/Represented Category, scored significantly lower than other job position categories on some important behaviors on the Attention to Safety Scale. These behaviors should be similarly aligned across all position categories. For example, responses from members of the Union/Represented Category indicated that they perceive that 'knowing how important it is to resolve problems' and 'reporting mistakes is rarely punished' are less descriptive of the organization than other groups.
- Senior Management at the Station perceives that the staff believes having a schedule is equivalent to production pressure whereas most of the staff acknowledges that having a meaningful schedule would be very helpful. This difference provides another example of a lack of alignment within the organization.
- Many personnel have the perception that management continues to transmit mixed messages with respect to the value of safety over production.
    - Staff reports still hearing messages about how the work needs to be done quickly or perhaps in a less complete manner than they would prefer, e.g., tightening and testing valves, rather than repacking.
    - The exceptionally high mean score on the Perfectionistic Scale of the survey, in combination with the other data obtained, may reflect some of this perceived production pressure.

1.3 *Performance Objective: Decision making that clearly reflects the value and priority of safety in a timely and focused manner exists.*

Observations

- Examples of conservative decision-making with respect to safety were observed during this evaluation, including:

- The decision to ensure two-train availability on the Decay Heat Removal System;
- Removal of the Core Structure Assembly to ensure vessel cleanliness;
- The operability determination on the Emergency Diesel Generators.

- The development and implementation of the Nuclear Operating Procedure (NOP) on Decision Making and Problem Solving is a positive example of efforts to facilitate the decision making process.

Areas for Improvement

- Decision making in the organization is a very top-down process and is based upon the perception reported to the team by Senior Management that Station managers don't know how to make decisions. Although this decision-making style ensures that some decisions made meet Senior Management's expectations, this style often does not facilitate ownership and commitment to the decisions that are made among individuals at all levels of the organization that are necessary for the decisions to be implemented effectively.
  - Almost all meetings observed in which representatives of multiple organizational levels were present were conducted in a very top-down manner. Most of the communication that occurred in those meetings was initiated by the more senior members present. Less senior personnel typically did not volunteer additional information, raise alternatives, or challenge assumptions underlying the decisions.
  - When senior managers were not present, more information was exchanged and greater interaction was observed among meeting participants.
- The team did not observe, and, in interviews, were not provided with good examples of first-line supervision involvement in the decision-making process during this evaluation. When an opportunity presented itself, e.g., the operability determination of the Emergency Diesel Generators prior to refueling, first-line supervision was hesitant to make a decision without first consulting higher levels of management.
- Few opportunities were identified for first-line supervision to be involved in decision making. The Corrective Action Review Group (CARG) involves first-line supervision in decision making, but it is not perceived to be a permanent process. The CARG was described by many interviewees as a compensatory measure to handle the current backlog of corrective actions. The lack of first-line participation in decision-making appears to be contributing to the question asked by many Station personnel, "Are managers listening to the staff?"

1.4 ***Performance Objective: The necessary allocation of resources, including time, equipment, personnel and money, is being made.***

Observations

- FE has allocated the resources that have been requested by Davis-Besse Senior Management to enable Davis-Besse to restart.
- Some work has been conducted during this outage that exceeds what is required and FE has supported these activities, e.g., sump modifications.

Areas for Improvement

- Station personnel expressed a number of concerns about continuing FE support for restart efforts and on-going support after restart has occurred. Employees are asking, "How

long can this situation continue? Will Corporate decide the effort is no longer cost-effective to continue? What will happen once the plant is back on line? Will the changes that have been made continue and will improvement continue to be a goal, irrespective of budgets?" These concerns need to be addressed by Senior Management.

- Employees perceive that resources for personnel are a low priority. They believe that hardware-oriented priorities, such as replacing and repairing equipment, often take precedence over programmatic or policy needs, and that programmatic or policy needs take precedence over personnel issues. The exception noted was personnel-related SCWE concerns, which are perceived as being a management priority. More effective Senior Management communication to address these perceptions is needed.

2. Accountability for safety in the organization is clear.

2.1 *Performance Objective: Roles and responsibilities are clearly defined and understood.*

Observations

- Personnel in the Plant and Engineering Directorates have the clearest perception of their roles and responsibilities.
    - Within Operations, a work group within the Plant Directorate, jobs are clearly identified and defined.
    - Within the Engineering Directorate, roles and responsibilities of all groups have recently been restructured.
- Personnel in the Quality Assessment Group, which now reports to the Vice President of Oversight in FENOC, more clearly understand their roles and responsibilities than they did before the re-organization.
- There is a push toward common processes across all three FENOC sites to streamline and improve overall performance.

Areas for Improvement

- The organizational structure at the Station needs to be stabilized.
    - Individuals at all levels in the organization are being moved in and out of different job positions to facilitate the outage, making it difficult to clearly establish roles and responsibilities.
    - Almost all of the individuals in the manager-level positions have been recently placed and interviews during this evaluation suggested additional changes would be occurring.
    - Several supervisory positions are filled on an 'acting' basis, some for extended periods.
    - Organizational charts are dated September 2002 and in many cases do not reflect proper position titles nor the correct chains of command.
- Generic job descriptions exist within FE, but job descriptions for specific positions within FENOC and Davis-Besse are not readily available.
- Within the FE/FENOC Directorate, a matrix structure and the centralization of several functions have resulted in confusion about reporting lines.

- The push toward common processes across all three FENOC sites has created some concern regarding how Davis-Besse's unique needs will be met and what individual roles and responsibilities will be in the future. Additional communication and clarification on these subjects is needed.

2.2 *Performance Objective: Delegation of responsibility with appropriate authority exists in the organization.*

Observations

- The recent decision to reduce the amount of work at the Station that is conducted by contractors is viewed by many as a positive step that will lead to greater ownership and accountability across the functional work groups.
- Standards and expectations for operational excellence that address responsibilities and authorities have recently been developed and communicated to several work groups, including Operations, Maintenance, Engineering, Radiation Support, Training, and Support Services.
- Overall, individuals surveyed believe that taking responsibility is something that is valued and reinforced within the organization. In addition, interviewees generally indicated a willingness to take personal responsibility for their actions and the consequences of the actions.

Areas for Improvement

- Although some examples of delegating responsibility were noted (e.g., the Outage Director delegated responsibility for evaluating CRs), this behavior is neither consistently nor frequently demonstrated. The Davis-Besse organization should be especially vigilant in recognizing and rewarding the delegation of responsibility and the acceptance of ownership.
- Mixed messages given by management with regard to taking responsibility have resulted in uncertainty within some functional groups in the workforce as to the true expectations of management in this area.
    - Many individuals within some functional groups expressed the opinion that they would rather not take a chance by taking on new or additional responsibilities.
    - Individuals in the Radiation Protection/Chemistry, Maintenance, and Security work groups believe that avoiding responsibility is a more valued behavior than other work groups believe.
- Although the contractor reduction initiative was generally viewed as a positive step by Station employees, some individuals expressed concern that the lack of training and development of Station personnel to perform tasks previously assigned to contractors, coupled with a lack of resources allocated to replace the lost personnel, could result in future performance problems.
- Standards and expectations regarding taking responsibility should be developed and communicated to all work groups, consistent with the criterion of delegating responsibility with the appropriate authority.

2.3 *Performance Objective: A management commitment to safety is evident at all levels in the organization.*

Observations

- Personnel perceive that management is placing a high emphasis on issues related to environment, safety and health and that the Station's employees generally have a good awareness of the risks in their work environment.
- Some efforts to institute common processes across the FENOC organization are intended to promote safety. For example, the SAP process should provide a single common database, as opposed to the many separate databases that currently exist.
- New management personnel have been put in place for the purpose of correcting the less than adequate nuclear safety focus demonstrated by previous management.

Areas for Improvement

- Skepticism exists among Station personnel regarding the long-term stability of management's commitment to safety. The long-term strategy to ensure the organization's continued commitment to safety should be effectively communicated to Station personnel.
- Better foresight and planning efforts are necessary in instituting common processes if they are to have the intended impact on safety performance.
    - The timing of on-going Corporate-driven initiatives towards common processes, e.g., implementation of SAP, indicates a lack of sensitivity to the tremendous short-term workload and commitment to safety that are necessary to restart the Davis-Besse Station.
    - Some efforts towards common processes have recently been delayed in recognition of the existing workload at the Station. Large amounts of resources, however, had already been expended in preparation for implementation of these processes.
- The suspension of most non-required training activities within the Station, e.g., maintenance skills training, while continuing training on topics such as SAP, gives a mixed message to personnel regarding what is valued by the organization.
- There is a widespread perception of "them versus us" within the organization, particularly among some senior managers with regard to Station personnel.
    - The Strategic Level of the organization possesses a negative perception of the ability of Station personnel to have what it takes to get the job done.
    - This negative perception existed among previous Senior Management at the Station, it is still perceived to exist by Station personnel, and it continues to be communicated, either intentionally or unintentionally, to the organization. Many personnel believe that it is undermining the staff's confidence and willingness to accept responsibility.
- Additional communication regarding management responsibility and accountability for the reactor head event needs to occur.
    - Senior Management believes they have acknowledged their accountability and responsibility for the reactor head event (e.g., Root Cause Analysis Report on Failure to Identify Significant Degradation of the Reactor Pressure Vessel Head, employee and NRC meetings).

- In contrast, many personnel interviewed perceive that Senior Management has not acknowledged their accountability and responsibility for the reactor head event. These personnel expressed disappointment and frustration that this has not taken place. Staff point out that some of the managers directly involved in the event remain in the organization and have been reassigned to other sites and positions. The reassignments are perceived as indicating that the managers have not been held accountable by the organization.

3. Safety is integrated into all activities in the organization.

3.1 ***Performance Objective: Good housekeeping, material condition, and working conditions exist in the organization.***

Areas for Improvement

- Housekeeping and material condition still present issues for the Davis-Besse Station. Foreign material in the reactor pressure vessel and housekeeping in containment were two specific issues that occurred during the time of the evaluation.
- At the time of the evaluation, Station personnel stated that they had been working extended hours (e.g., 12 hours per day, 6 days a week or 10 hours a day, 7 days a week) for periods of six months and more. Although the hours are in conformance with regulatory requirements and are consistent with industry practices during outages, the long duration of this current outage is unusual. The lack of management communication as to when the situation might change and more regular hours be reinstated was also reported to be problematic. The continuing long work hours have the potential to lead to degraded safety performance.

3.2 ***Performance Objective: The quality of documentation and processes, from planning to implementation and review, is good.***

Observations

- Significant changes to the Radiation Protection procedures are currently underway to strengthen their effectiveness.
- Overall perceptions of the formalization process at Davis-Besse were average to high.
- Most individuals are satisfied with training when it occurs.
- Personnel in the Work Management and Support Services Directorates have a more favorable perception of the formalization process at the Station than other Directorates.

Areas for Improvement

- More consistent expectations regarding the quality of documentation and processes should be established for the Station as a whole.
    - Although perceptions of the formalization process at Davis-Besse were average to high overall, there was considerable variability between functional groups in perceptions on this topic. Personnel within the Plant Directorate had some of the lowest responses with regard to this behavior, indicating that they perceive formalization to be in need of improvement to a greater extent than personnel in other Directorates.

- The process currently in place for procedural changes is perceived by many to be cumbersome and untimely.

- The expectations for developing and implementing common processes need to be formally established and communicated to Station personnel. The perception exists among many personnel that the approach being used to achieve common processes is "the lowest common denominator" approach, and is resulting in inefficient and ineffective processes.
- Coordination of work was perceived by many individuals to be in need of improvement and was often perceived to arise from a lack of communication and proactive behavior.
  - Work groups differ significantly in their perceptions of the effectiveness with which work is coordinated. The Plant Engineering and Design Basis/Rapid Response Team Engineering work groups have some of the lowest perceptions in this area.
  - Work was frequently described to occur in a reactive mode with little planning and preparation to ensure the job will be completed in the most effective manner.
  - Even when conservative decisions were made, e.g., DHR trains, CSA removal, the need for these actions is perceived to have been created by a prior lack of strategic and contingency planning.
  - The work schedule is not perceived to be credible because it is not resource loaded. The schedule also does not include the work to be completed to address over 1400 CRs and the many additional corrective actions associated with the CRs that have yet to be accepted.
- Training quality and the formal integration of safety into the training process could not be assessed.
  - Most training activities have been suspended during the outage with the exception of operator requalification training, SCWE training, SAP training, and supervisory training on nuclear safety and nuclear professionalism.
  - Only about one-fourth of the training staff is currently conducting training while the rest of the group is working in the plant to support the outage.
  - The Corrective Action Program (CAP) has identified several areas in which training is needed but is not being conducted, such as CAP implementation and the Operating Experience program.
  - One area for improvement consistently identified in interviews was instructor skills.

3.3 *Performance Objective: Sets of performance indicators that are tracked, trended, and evaluated exist.*

Observations

- Performance indicators exist for many groups and processes.
- Databases exist for many performance measures, e.g., supervisory observations.

Areas for Improvement

- Performance indicators need to be more consistently tracked and trended.
- Individuals perceive that they have insufficient time or resources to devote to tracking and trending performance indicators.

- Databases for performance measures are not consistently used to obtain information, only to enter the required data.
- The perception exists that there is a lack of integration across the various databases, which may also be inhibiting their effective use for performance improvement.

3.4 *Performance Objective: The use of self-assessment is evident.*

Observations

- A self-evaluation process exists at the Davis-Besse Station.
- Functional area reviews for the Operations, Maintenance, Engineering, and Radiation Protection Work Groups were recently conducted.
- The need to conduct systematic self-assessment activities is recognized.

Areas for Improvement

- Expectations regarding the continuous use of self-assessment have not been established or communicated. Self-assessment is currently conducted inconsistently across the organization and some groups do not conduct self-assessments.
- Few groups perceive that they have the time or resources needed to conduct systematic self-assessment activities.

3.5 *Performance Objective: The integration of all types of safety is evident in the organization.*

Observations

- Industrial safety statistics indicate that the Station is a good performer.

Areas for Improvement

- An integrated conception of and approach to all types of safety is one of the key attributes of an effective safety culture and this concept is not currently evident at the Station.
    - Attitudes towards nuclear and industrial safety differ at all levels of the organization.
    - Some members of Senior Management express the belief that nuclear safety is different from industrial safety.
    - The perception of how and when to integrate risk management with other safety-related activities is not well understood.
- Although industrial safety statistics indicate that the plant is a good performer, interviewees note that the statistics do not show the complete picture.
    - Data do not include contractor activities and contractors often conduct some of the more hazardous jobs.
    - Data do not include accidents that do not cause lost time at work.
- Davis-Besse is not applying the positive lessons learned from implementing an effective industrial safety program to improving the existing nuclear safety program.

3.6 *Performance Objective: A knowledge and understanding of the work processes exists.*

Observations

- In general, groups such as Operations, Plant Engineering, Work Control Outage, Design Basis/Rapid Response Team, and Radiation Protection/Chemistry, feel they have a good understanding of and familiarity with the work processes and operations beyond their own jobs.
- Efforts in the area of succession planning were initiated.

Areas for Improvement

- Activities related to ensuring that a sufficient number of personnel with the necessary knowledge, skills and abilities are, and will be, available to conduct work safely at the Station have been stopped during the current outage. The cessation of systematic efforts in this area is especially problematic due to the extensive organizational changes that have taken place since the outage began, the length of the current outage, and the aging workforce. Strategic planning for long-term staffing needs must be conducted to ensure that personnel are qualified to perform their job responsibilities and that institutional memory is captured as personnel leave the site.
- Some groups have less familiarity with work processes and operations beyond their own jobs and less understanding of the consequences of system failure than others. This is particularly true within Maintenance, Security, and FE/FENOC Other work groups.

4. A safety leadership process exists in the organization.

4.1 *Performance Objective: There is visibility and involvement of management in safety-related activities.*

Observations

- A management field observation program is in place.
- Management presence in the field was indicated by a number of individuals to have increased.
- The Operations and Quality Services/Performance Improvement work groups tended to have the most positive perceptions regarding management communications within the organization.

Areas for Improvement

- The field observation program is not being implemented consistently across the various work groups. A reason for the inconsistent implementation was not identified by the team.
    - The number of observations required of supervisors per week varies by group.
    - Personnel describe seeing management in the field primarily when large jobs are being performed rather than on a regular basis.
    - Personnel from groups outside of the Plant and Work Management Directorates often could not recall recently seeing their supervisors or managers in the field.
- The effectiveness of management involvement in safety-related activities depends on communications. Results from this evaluation indicate that significant differences exist

between work groups on several aspects of communication. These differences include trust in communications from the individuals with whom they interact; perceived accuracy of the communications from individuals with whom they interact; the desire for interaction; and overall satisfaction with their communications. The Radiation Protection/Chemistry, Maintenance, Security, and Plant Engineering work groups generally had the lowest perceptions within the organization regarding these aspects of communication.

- As previously noted, communications are most typically initiated by individuals at higher organizational levels in the activities observed as part of this evaluation. This suggests that a top-down style of management is inhibiting lower level managers from actively participating in some of these activities.
- The Management and Communication Team Meeting (MCTM) provided an opportunity to observe some behaviors not seen in other activities. This regularly scheduled meeting was cancelled mid-way through the evaluation, however, and it was not obvious where these behaviors would now occur.
    - Communications at the MCTM tended to be more informal and collegial than the communications observed at other meetings.
    - MCTM communications tended to devote a higher proportion of time to discussing safety issues than was observed at other meetings.
    - MCTM communications tended to devote a higher proportion of time to discussing ways that facility operations could be improved than was observed at other meetings.

4.2 *Performance Objective: The involvement and motivation of all staff in the organization is evident.*

Observations

- A predominantly constructive cultural style that promotes behaviors related to teamwork, sensitivity to the needs of others, and professional achievement exists in the Davis-Besse organization. These behaviors are perceived to be valued to a greater extent by individuals within the work groups of Operations, Work Control/Outage Management, Quality Services/Performance Improvement, Project Management Engineering, and Quality Assessment.
- Perceptions regarding organizational commitment, work group cohesiveness, job satisfaction, and communication were also generally higher within the same work groups mentioned above.
- Differences between management and non-management personnel on the variables measured by the survey scales were largely in the direction expected, with managers typically having higher scores on the more positive type behaviors than non-managers. Results based on job position categories were generally consistent with the Management/Non-Management profiles obtained. That is, Directors/Managers and Superintendents/Supervisors had higher scores on the more positive type behaviors than Specialists or Union/Represented personnel.

Areas for Improvement

- Some groups perceived that less emphasis is placed on the behaviors related to the constructive cultural style than others. Survey results indicated that these same groups perceived lower levels of organizational commitment, work group cohesion, job satisfaction, and communications than others. In particular, the work groups of Radiation Protection/Chemistry, Maintenance, Design Basis Engineering/Rapid Response Team, Security, and Plant Engineering tended to believe the organization places less value on constructive behaviors. The consistency of the results for these work groups suggest that they require additional management attention and oversight to promote behaviors related to a positive safety culture.

4.3 ***Performance Objective: A change management process that promotes an orderly transition is evident.***

Observations

- A formal change management process exists at Davis-Besse to manage programmatic changes.

Areas for Improvement

- The informal change management process currently used by Senior Management to effect behavioral change is relatively new and is based on the belief that change can only be brought about through rapid, continuous, unexpected behavior.
    - This is a short-term strategy, is based upon negative reinforcement, and will not provide long-term success in promoting continuous improvement.
    - This informal strategy results in the inhibition of upward communication and in employees being unwilling to assume ownership and accountability for problems and to take risks.
- The unusually large number of differences identified within and between groups in all of the data collected in this evaluation indicates that a consistent message with respect to desired behavioral changes is not being communicated, understood or accepted throughout the organization.
- Opportunities to facilitate development of change management skills among Station leaders through training have been suspended during the outage. Some modules have been presented, but the overall program has not been conducted for the past year.

5. Safety Culture is learning driven in the organization.

5.1 ***Performance Objective: An open reporting culture without blame exists in the organization.***

Observations

- Significant efforts through the SCWE program are being made to establish an open reporting culture without blame at the Station and most personnel express the opinion that raising issues has never been a problem.
- In general, personnel feel that avoiding responsibility for fear of being punished is not a desired behavior within the Davis-Besse organization.

- The increased number of CRs that have been submitted, some of which relate to the topics of management pushback, indicates that personnel within the Davis-Besse organization are comfortable bringing up issues.

Areas for Improvement

- Most employees believe that it is the resolution of issues that has been a problem in the past and that, unless improvements in this area occur, the Station may again experience an apathetic attitude towards reporting.
- Although, overall, personnel do not feel that avoiding responsibility out of fear of being punished is a behavior that is valued within the organization, some skepticism still remains with respect to having a truly blame-free environment, particularly within the work groups of Maintenance and Security.

5.2 ***Performance Objective: The use of organizational and operating experience (OE), both internal and external to the organization, is evident.***

Observations

- OE information, both internal and external to the Station, is distributed and communicated throughout the organization by various mechanisms, e.g., turnovers, e-mails, pre-job briefs, and work orders.
- Personnel from the Plant and Work Management Directorates tended to perceive the organizational learning process in place at the Station in a more favorable manner than individuals from other directorates.

Areas for Improvement

- How OE information is used is not always clear and, in some cases, the presentation of material raises more questions than it answers, e.g., the manner in which OE information is presented on the on-site television screens.
- CRs are not consistently initiated in response to OE information by personnel in the different work groups throughout the organization.
- The effectiveness of OE as part of a learning process at the Davis-Besse station is not obvious based on the evaluation conducted.

5.3 ***Performance Objective: A process that identifies problems and develops and implements an integrated corrective action plan exists.***

Observations

- Efforts have been undertaken recently to provide greater management support and attention to the CAP process.
- Greater interest is evident for training on the CAP system.
- The types of CRs being written contain more management related issues, e.g., more pushback on management, which may be an early indication that the system is gaining organizational acceptance.
- Many of the current CRs were identified during the discovery stages of the outage, but many have also resulted from the increased number of CRs that Station personnel are being encouraged to write to raise concerns.

- The perception exists that some personnel are abusing the CR system for personal reasons. However, there was no indication that these personnel are being discouraged from writing additional CRs or that the CRs they have submitted are given any less attention by management.

Areas for Improvement

- The number of problems identified during this outage currently overwhelms the CAP.
- Individuals at the Strategic Level of the organization have the most negative perceptions of the effectiveness of problem identification behaviors within the Davis-Besse organization.
- Ownership by personnel at all levels of the organization in the CAP process is not yet evident due to the fact that the process is currently perceived to be driven from the top down.
- Timeliness of issue resolution is problematic and must be improved for personnel to be convinced of process effectiveness and to ensure their continued involvement.
- Some individuals interviewed expressed the belief that by writing a CR you are absolving yourself of responsibility and ownership of that issue.

5.4 *Performance Objective: The continuous development of staff, both professional and technically, is evident.*

Observations

- Some efforts have been made to promote staff development, e.g., INPO assignments, visits to other stations, job rotational assignments.
- Training group personnel are currently being used in the plant for the outage.
- The areas of nuclear safety and nuclear professionalism were recently added to the FENOC personnel performance evaluation criteria and training on these behaviors was completed in January, 2003 for all supervisory personnel.
- Criteria related to general safety are included on all performance evaluation forms that are currently used.

Areas for Improvement

- Development of staff through on-site training activities varies across the organization, with almost all non-mandatory training having been suspended during the time period of this evaluation. Although suspension of training activities is not uncommon across the industry during outages, due to the length of this particular outage, the suspension may have negative long-term consequences.
- Although some staff development efforts do occur, as mentioned above, they are not part of a systematic program of professional development. For example, training group personnel are not regularly given rotational assignments to other jobs within the Station.
- Uncertainty exists with respect to whether the areas of nuclear safety and nuclear professionalism will be included in the upcoming personnel evaluation process. Training in these areas was not completed until January, 2003.
- Several personnel were unable to recall if criteria related to safety were included on their performance evaluations.

- Performance evaluations are not conducted consistently across the organization. Some personnel describe an annual, or more frequent, evaluation while others describe not having had an evaluation in a couple of years.
- Many personnel do not see the evaluation process as tied to a professional development plan, because they receive no additional training or oversight as a function of the evaluation.
- Evaluations of union personnel are perceived to be largely ineffective, because they are not tied to compensation. Some management personnel perceive the same ineffectiveness of their own evaluations because of changes that were made by Senior Management on performance evaluation decisions.
- Overall, perceptions regarding the performance evaluation process at the Station were uniformly low.

5.5 *Performance Objective: A questioning attitude at all organizational levels exists.*

Observations

- Employees at the Davis-Besse Station generally are not inhibited in raising safety concerns.
- Some positive examples of a questioning attitude were noted, e.g., questioning the type of oil used for the diesel generators, questioning vendor modifications to equipment.

Areas for Improvement

- The behaviors associated with a questioning attitude were not consistently observed at the Davis-Besse Station.
    - A general reluctance to pushback on Senior Management was observed during this evaluation.
    - Individuals tend to be reluctant to initiate communication in meetings with individuals from higher organizational levels.
    - Seeking out and incorporating information from OE in other organizations and industries was not generally observed to occur.

7 SUMMARY

The existing safety culture at the Davis-Besse Nuclear Generating Station was evaluated against the characteristics identified to be important for the promotion of a positive safety culture in a nuclear facility. Based on the results of this evaluation, the team believes that not all of these characteristics are present at the Davis-Besse Station to ensure the long-term promotion of a positive safety culture.

- Although safety is a recognized value in the organization, it is inconsistently accepted and understood across all levels of personnel. Problems still exist in the transmission, comprehension and implementation of the safety message.
- Accountability and ownership for safety are not yet universally accepted in the organization. Although some individuals readily accept responsibility and take ownership of problems, others are still reluctant to do so.

- Safety is not yet consistently integrated into all activities in the organization. Processes and programs are in various stages of transition, which often reduces their effectiveness.
- An integrated and cohesive organizational safety leadership process does not yet exist. The values and attitudes of the workforce are generally positive, but the many differences found between work groups, and between management and staff, indicate that personnel are not yet aligned with a common set of values. Management's safety goals have not been consistently communicated to nor understood by Station personnel.
- Safety is not learning driven in the organization. Efforts to improve future performance by learning from the Station's past performance, from others' performance, and from the day-to-day implementation of the organization's programs and processes, are not systematic or recognized to be of high value for the organization.

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9 TEAM MEMBERS' BIOGRAPHIES

Following are brief biographies of the team members.

Sonja B. Haber, Ph.D., Psychology, Team Leader (President, Human Performance Analysis, Corp.)

Dr. Haber has been conducting work in the area of human performance analysis for over 25 years. She has been involved in the evaluation and intervention of human performance in various applications. For the last 15 years, Dr. Haber's work has been primarily in the nuclear industry, with an emphasis on the assessment and evaluation of safety culture. She has been extensively involved in conducting fieldwork for the U.S. Nuclear Regulatory Commission, the U.S. Department of Energy, the Canadian Nuclear Safety Commission, and the International Atomic Energy Agency. From 1992 - 1998 she managed and was significantly involved in work related to the organizational and programmatic aspects of training of nuclear power plant personnel in countries of the Former Soviet Union, specifically in the development and transfer

of technology related to the Systematic Approach to Training. This work also included cross-cultural analysis of organizational issues in the areas of safety culture and management and supervisory skills. Most recently she has been conducting safety culture evaluations in various nuclear facilities, providing consultation in organizational interventions including leadership and management training, enhanced communication skills, and developing performance measures for organization and management processes critical to safety culture.

Kay Gallogly (Human Performance Strategies)

Ms. Gallogly has over 16 years experience in the commercial nuclear power generation industry. Her experience has been varied including seven years in the plant in various technical assignments. Her primary focus areas have been corrective action programs, human performance, cultural change and performance improvement. Experience in this arena includes the position of Manager Experience Assessment, Clinton Power Station during the 0350 Restart Activities and plant restart. Her responsibilities in this capacity involved the rebuilding of the Corrective Action Program and other continuous learning initiatives. Ms. Gallogly has also conducted work in the safety arena in a variety of industries including the commercial electric utility industry, steel manufacturing, building construction, and chemical processing.

Whitney Hansen, Rear Admiral

Rear Admiral Hansen has worked in various aspects of nuclear power since 1957, including the nuclear submarine officer's program, the Lockheed Missiles and Space Company's nuclear rocket program, General Electric's Atomic Power Equipment Division, and Exxon's nuclear fuel fabrication company. Since 1978 he has been an independent consultant to the Nuclear Regulatory Commission, the Department of Energy and the commercial nuclear power industry. Specifically, his experience includes participation in Restart Assessment Team Inspections of the Salem Units 1 & 2 Nuclear Power Plants and an Independent Safety Inspection of the Dresden Nuclear Power Station for NRC Headquarters as a member of the Management & Organization teams. Rear Admiral Hansen also participated in a Diagnostic Evaluation of the Quad Cities Nuclear Power Station, again on the M&O team. He has also performed eight other diagnostic management and organization appraisals under contract to nuclear electric utilities. He also participated in a management effectiveness evaluation of the South Texas Nuclear Project and participated in a retrospective management diagnostic of Northeast Utilities' nuclear program and their 3 Unit Millstone Station under contract to the Connecticut Department of Public Utility Control.

Deborah A. Shurberg, Ph.D., Psychology (Human Performance Analysis, Corp.)

Dr. Shurberg has been working within the nuclear industry for over fifteen years, focusing on human and organizational issues which impact facility safety performance. Dr. Shurberg's primary areas of expertise lie in the development and implementation of methodological tools useful for the evaluation and improvement of organizational functioning and in the assessment and evaluation of human resource practices critical to effective organizational performance. Dr. Shurberg also has significant work experience assisting in the transfer of training technologies and techniques proven effective in organizations that place a high degree of emphasis on safety.

She has worked in nuclear organizations in North America, Europe, and countries of the Former Soviet Union. Her work in this area includes cross-cultural analysis of organizational issues, specifically in the area of organizational and safety culture and management and supervisory skills.

Valerie E. Barnes, Ph.D., Psychology, President, PSHA, Inc.

Dr. Valerie Barnes offers more than 20 years' experience assisting organizations to improve performance and decrease the risks associated with their operations. Dr. Barnes obtained her M.S. and Ph.D. degrees in Social/Organizational Psychology from the University of Washington while working in the Organizational Research Laboratory, as well as at Battelle Memorial Institute's Human Affairs Research Centers. After completing her professional training, Dr. Barnes remained at Battelle for eleven years in positions of increasing management responsibility before leaving to form her own company. She has managed and played a key technical role in numerous organizational assessment and improvement projects performed for industrial, government and international clients, primarily in the nuclear industry. Her work has addressed the design, implementation and evaluation of performance improvement programs in such diverse areas as human error reduction, process re-engineering, training, communications, personnel selection, small group performance, leadership and decision-making, as well as the development of techniques to identify and overcome barriers to organizational effectiveness.

Brian C. Haagensen, Managing Director and Executive Vice-President, PSHA, Inc.

Brian Haagensen is a senior management consultant with 30 years of experience in the nuclear industry. He has worked at 75% of the nuclear power plants in the country today. He was the project manager and lead expert for management and organization support to all NRC Diagnostic Evaluations Team Inspections from 1991 to 1995. He personally participated in three NRC Diagnostic Evaluations as the lead management and organization consultant (South Texas Project, Palisades and Maine Yankee). He was a certified NRC Operator Licensing Examiner from 1986 until 1995 and participated in over 75 exams throughout the country. He also supported numerous NRC inspections including emergency operating procedures inspections, Augmented Inspection Teams, Emergency Preparedness Inspections, Exercise Evaluations, Part 21 vendor audits and training inspections. He has an extensive background in corrective actions including support of the Indian Point corrective action program self assessment and preparations for the NRC's 95003 multiple degraded cornerstone inspection. He has received formal training in root cause assessment techniques including MORT, Kepner-Trego, and HPIP. He was the lead operations representative on the NRC's shift staffing study conducted by Brookhaven National Laboratory. He co-authored the NRC's Human Performance Evaluation Process (HPEP) NUREG/CR-6251. He has a Masters of Science degree in physics and was a nuclear submarine officer from 1974 to 1982.