SAFETY ENGINEERING
COMMAND AND CONTROL EVALUATION
SEA 95-05
July 12, 1995

SAFETY ENGINEERING
ROOT CAUSE REPORT

Southern California Edison

Clarification of Purpose
Root Cause Evaluations

This report is intended to be self-critical including the use of hindsight to identify all errors and the sources of those errors. The root causes identified in this report were discovered and analyzed using all information/results available at the time it was written. All such information/results were, of course, not available to the organization/personnel during the time frame in which relevant actions were taken and decisions were made.

The purpose of using such a self-critical approach is to provide the most comprehensive analysis possible for identifying "lessons learned" as a basis for improving future performance to the highest attainable level. The use of an open, documented self-critical analysis program is imperative in the nuclear power industry and cannot be compromised or confused with a management/personnel prudence assessment.

This report does not attempt to make a balanced judgement of the prudence/reasonableness of any of the actions/decisions taken by vendors, utility organizations/management or individual personnel based on the information that was known/available to them at the time they took such action or made such decisions.

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EXECUTIVE SUMMARY

PURPOSE

On April 6, 1995, two events occurred in which weaknesses in procedural adherence, command and control, and communications were identified as a cause. The first event involved the failure to perform an interim alignment as described in the procedure for shutdown cooling. The second event involved the failure of Operations to verify that the reactor coolant system oxygen was less than 0.1 ppm before exceeding 250°F.

The purpose of this report is to provide an assessment of the command and control structure, including communications, that are present in the Control Room at the San Onofre Nuclear Generating Station Units 2 and 3.

METHOD

Assessment Engineering used field observations, interviews, and analyses of recent Operations events to establish the current command structure, information flow, and communications at SONGS. Operation procedures were reviewed to learn management expectations, top nuclear plants (SALP 1 and INPO 1) were benchmarked, and NUREG/CR-5953, "Studies of Human Performance During Operating Events" was reviewed to characterize organizational effectiveness for control room activities.

RESULTS

Lines of Authority. Although the lines of authority adequately reflect the non-outage command structure, the outage command structure is not always adequately described. During outages, when coordinating supervisors are added for outage support, the chain of command is

sometimes disrupted. This results in a degradation of overall understanding of plant status and reduced control of activities.

Performance Expectations. Performance expectations are not always clearly and concisely stated. The large volume of administrative guidance reduces effectiveness of procedures. The crews are not balanced in experience and style.

Formality. A different level for formality exists during simulator scenarios and routine plant operations. The criteria utilized to implement access restrictions during critical activities is not specified. Entries for administrative purposes are allowed to continue, but access for personnel performing plant-related activities are restricted.

Fundamentals. Operations' expectations for system knowledge have created an environment that limits performance. The low expectations for fundamentals, system, administrative, and technical specification knowledge hinder problem solving. The activity level and greater number of problems faced by operators in an outage present a special challenge which tests their problem solving abilities and knowledge of fundamentals.

Communications. Communication standards are not consistently implemented. A different style of communication exists for the simulator and the control room. Communication standards are inconsistently enforced by supervision.

Coordination. Details of how to coordinate activities are not clearly communicated. This results in varying degrees of success as different crews utilize different approaches for coordination of activities.

INTRODUCTION

As demonstrated by the 552-day record run of Units 2 and the 436 day run (as of July 12, 1995) of Unit 3 during cycle 7, the Operations Department has a commendable on-line operating record. However, during the Unit 2 cycle 8 refueling outage, Operations performance, when measured against the continually rising standards of excellence, did not keep pace. Outages require increased work control and coordination. To handle these differences, Operations modifies their normal organizational structure and methods. Management of these changes from non-outage to outage periods has been an influence in several documented events (Reference 1).

On April 6, 1995, two events occurred in which weaknesses in procedural adherence, command and control, and communications were identified as a cause. The first event involved the failure to perform an interim alignment as described in the procedure for shutdown cooling (Reference 2). The second event involved the failure of Operations to verify that the reactor coolant system oxygen was less than 0.1 ppm before exceeding 250°F (Reference 3). As a result of these events, Safety Engineering was assigned the action to perform an evaluation of the Unit 2 and 3 command and control structure. At the NRC exit, the Vice President of Nuclear Generation committed to the performance of this independent assessment.

SCE subsequently received two Notice of Violations (Reference 4) for these events. For the event involving shutdown cooling, the NRC concluded that

> "[t]he event revealed problems with your [SCE] licensed operators' command and control and communications in the control room. We note that your own root cause assessment made findings that were similar to ours. Contributing to the specific deficiencies in command and control associated with this event are interface with the organizations you established to supplement work control during the outage."

The purpose of this report is to provide an assessment of the command and control structure including communications that are present in the Control Room at the San Onofre Nuclear Generating Station (SONGS) Units 2 and 3. Recommendations for enhancement are included.

METHODOLOGY

Assessment Engineering used field observations, interviews, and analyses of recent Operations events to establish the current command structure, information flow, and communications at SONGS. Operation procedures were reviewed to learn management expectations, top nuclear plants (SALP 1 and INPO 1) were benchmarked, and NUREG/CR-5953, "Studies of Human Performance During Operating Events" was reviewed to characterize organizational effectiveness for control room activities.

Observations. Over sixty hours of control room and simulator operations were observed. Functions and positions within the control room were observed for all five crews during mode changes and other high profile events. Particular attention was paid to the sources of direction and work flow into and out of the control room. These observations are documented in Attachment 1.

Interviews. Interviews were conducted with management and bargaining unit personnel in the Operations division. Operations managers and supervisors who provide direction to the control room were interviewed. A summary of interview comments is documented in Attachment 2.

Evaluation of Recent Events. The events evaluated included those documented in Root Cause Evaluation 95-05, "Trend Analysis of Operations Outage Performance Analysis," and in recent Operations Division Evaluation Reports.

Document Reviews. The expectations, as documented in SONGS procedures and policies, were utilized to define the expected command structure, information flow, and communications.

Industry Experience Rev iew. Assessment Engineering visited three Nuclear Plants to bench mark control room organization, coordination, and culture. The chosen plants were rated SALP 1 and were sites with two units and a common control room. This criteria resulted in only operating Westinghouse plants being selected. Representatives from six additional SALP 1 plants were surveyed by telephone to verify our conclusions

about successful plants. A matrix of responses from top performing plants is shown in Attachment 3. Good practices found at these top plants are shown in Attachment 4.

NUREG/CR-5953, "Studies of Human Performance During Operating Events". The Nuclear Regulatory Commission analyzed sixteen events at nuclear power plants that were challenges to operating crews. As part of this evaluation, they developed a model that shows the major elements of control room operations. This model, shown in Attachment 5, depicts the flow of information and work into and out of the control room. Interfaces with other work groups and the human-machine interface with the power plant are displayed. We utilized this model to structure our evaluation of command and control in the SONGS control room.

1992 Command, Control, and Communication Action Plan. In 1992, several requalification examination failures at other utilities identified problems with command and control. NRC and INPO identified similar findings at SONGS. As a result, a working group was formed to address the issue and developed the following problem statement.

> "Good Operating Practices (GOP) are not always perceived as standards by all operators and training instructors"

Actions taken by the working group improved the shift superintendents' command and control during implementation of emergency operating instructions and off-normal events. Information developed by this working group was utilized to better understand the command and control issue.

ANALYSIS

COMMAND AND CONTROL

When used in the context of this report, command and control is defined as "the exercise of authority by the control room team." The command and control structure is further defined as "the procedures and resources required to exercise that authority." Utilizing these definitions and a review of SONGS good operating practices, procedures and directives, the command and control evaluation was divided into the following topics for analysis.

- Lines of Authority
- Performance Expectations
- Formality
- Fundamentals
- Communications
- Coordination

Standards, observations, industry review, and conclusions are discussed for each topic.

There are several differences in work control and coordination during outages verses on-line operations. To handle these differences, Operations modifies their normal organizational structure and methods. This analysis identifies the differences between on-line and outage periods when these differences result in an adverse effect on command and control.

LINES OF AUTHORITY

Standards. The lines of authority within Operations are delineated in a series of procedures and documents. Each crew position is described and defined within a procedure written for that position which includes authority, responsibility, and duties. This set of procedures defines duties by position, such as Shift Superintendent or Nuclear Plant Equipment Operator, but not by watch station.

Other procedures define the lines of authority within the Operating crew and between Operations and other site organizations. These procedures define the responsibilities for

each position in order to establish accountability. The organization chart for shift manning depicted in the shift manning procedure is shown in Attachment 6.

Two Control Room Supervisors (CRS) and one Work Process Supervisor (WPS) report to the Shift Superintendent (SS). One CRS is responsible for each of the units. The WPS is responsible for the work control process. The WPS is responsible for informing the CRS of work on his unit. The observed chain of command for power operations is shown in Attachment 7.

During outages, the WPS also supervises a crew of plant equipment operators who perform operational activities, at times, outside the cognizance of the unit CRS. Additional coordination personnel (e.g. outage coordination and equipment control) provide support to augment on-shift supervision for specific activities. At times, these coordination personnel provide direction to on-shift operators. Attachment 8 shows the observed chain of command for outage periods.

Knowledge of Standards. Interviewees were questioned about the current chain of command as specified in the shift manning procedure. Many interviewees could not identify the location of the organization chart or explain the chain of command identified therein. The current organization chart does not accurately depict the expected chain of command on shift. During observations and interviews, it was clear, however, that operations personnel were consistent in their understanding of the chain of command during power operations.

Observations. During normal power operations, the control room chain of command structure is similar to the NRC model shown in Attachment 5. During outages, additional coordination supervisors (outage coordination and equipment control) are added to facilitate the extra volume of work. Utilization of coordination supervisors to direct operators, at times, interferes with the control room operators' understanding of status and causes a breakdown in command and control.

During outages, direction to the control room comes from several sources. At times, direction for field operators comes from coordination supervisors and other Operations management personnel. This can cause control room personnel to lose understanding of plant status.

The April 6, 1995, event described in ODER 2-95-15, "RCS Flow Diversion During Termination of Shutdown Cooling" is an example of a breakdown in command and control caused by the CRS's wrong assumption that the WPS was directing him to proceed with alignment to remove the shutdown cooling system from service.

Industry Review. The normal control room chain of command is maintained during non-outage and outage periods alike. Additional coordination support is added during outages outside the control room chain of command. These supervisors are used to prepare information and status for the control room to smooth and accelerate implementation of activities. Approval of specific tasks assigned to coordination personnel must still go through the CRS rather than a separate work process supervisor.

Conclusion. Although the lines of authority, as described in procedures and in practice, adequately reflect non-outage command structure, outage command structure is not always adequately described or effectively implemented.

During outages, when coordinating supervisors are added for outage support, the chain of command is sometimes disrupted. This results in a degradation of overall understanding of plant status and reduced control of activities.

PERFORMANCE EXPECTATIONS

Standards. There are more than 500 pages of documentation related to standards and expectations for operations. As a result of the volume of information and the variety of possible locations for documenting standards and expectations, it is very difficult to locate a specific standard.

There are several examples of confusing, overlapping or inaccurate administrative expectations. The Stop, Think, Observe, and Perform Program is proceduralized in three separate Operations documents. There is an on-shift position identified as the Control Room Coordinator, which no longer exists. The title of SRO operations supervisor is defined in an ambiguous way, and used differently in separate procedures. Duties for several of the shift positions are contained in more than one location. In general, the procedures that contain expectations for on-shift Operations personnel are unclear.

Expectations for performance are not always stated or differentiated for outage periods relative to non-outage periods.

Knowledge of Standards. Some operators had difficulty or were not able to identify where expectations for their performance were stated. Several times, operators expressed their willingness to do what was required if someone would tell them what was expected.

The April 6, 1995, event described in ODER 2-95-15, "RCS Flow Diversion During Termination of Shutdown Cooling" demonstrates confusion on the administrative expectations for operators. Operators did not realize that performing procedure steps out of order was outside management expectations. This misunderstanding occurred because procedure writers have not consistently followed the specified method of defining when steps can be performed out of order. This inconsistency led operators to think that it was acceptable to perform steps out of order unless the procedure stated otherwise.

Observations. During observations, many performance differences were noted between operating crews. Interviews also revealed a noticeable inconsistency in the way expectations are interpreted. Crew compliments are not routinely balanced for experience or style.

Industry Review. At the plants visited, there are approximately 100 pages of guidance on expectations and standards for operations. Expectations for positions are laid out by watchstation. The better approach to administrative requirements was to state how to accomplish a task in addition to who was responsible for the task. The standards are concise and the written expectations are specific, and operators were aware of these standards.

Six of the top nine plants surveyed routinely balance operating crews to adjust for experience and styles of crew members.

Conclusion. Performance expectations are not always clearly and concisely stated. The large volume of administrative guidance reduces effectiveness of procedures. The lack of consistent and clear expectations cause some operators to be unsure of

managements' expectations. The crews are not balanced in experience and style. This lack of balance in crew experience levels is a contributor to inconsistent crew performance.

FORMALITY

Standards. The standards for formality are documented in several Operations Division procedures including: procedures delineating authorities, responsibilities, and duties for each on-shift position; procedures for control room access and conduct; and procedures for professional operator development and evaluation.

Observations. Observations of simulator training indicated that a different level of formality existed during Emergency Operating Instruction training. A much higher standard was apparent in annunciator response and communications.

The culture at SONGS is such that annunciator response is delegated to an individual. Therefore, others do not look up to ascertain the nature of each alarm. This approach to annunciator response adds an air of informality.

Control room access to outside groups is frequently limited, based upon an undefined criteria for critical evolutions. Those personnel who must come to the control room to do business usually wait in line. However, administrative personnel enter the control room unimpeded.

During outages, the atmosphere in the control room can be described as cluttered and harried. The demeanor of some operators is, at times, informal as characterized by their communications and appearance. The size and configuration of the control room, as well as the activity level, amplify the appearance of disorder during outages.

Industry Review. At the best plants visited, control rooms can be described as formal and calm. The demeanor of the operators can best be described as confident and their communications consistently formal. In seven of nine plants surveyed, the control room operators can be identified by position because of uniforms or a specific badge. This visual aid helped personnel entering the control room quickly identify the individuals with which to communicate.

Access to the board areas is authorized by reactor operators, but control room access is seldom or never restricted. In seven of nine plants surveyed, maintenance personnel entered the control room to interface with operators prior to beginning any work.

At the plants visited, control room operators look up when an alarm sounds and call out the reason for the alarm. This enhances the appearance of formality.

Conclusion. A different standard for formality exists during simulator and plant operations. During outages, a general appearance of disorder is present. The criteria utilized to implement access restrictions during critical activities is not specified. As a result, inconsistent application of access restrictions may occur. Entries for administrative purposes are allowed to continue, but access for personnel performing plant-related activities are restricted. Annunciator response is not consistently implemented and adds an air of informality.

FUNDAMENTALS

Standards. In the Operations training program, the knowledge required for each position is limited specifically to tasks identified for that position. The contents of each level of training are targeted to meet the requirements of the task analysis. As a result, each level of operator qualification meets the minimum standard for that watch station and not the knowledge requirements for the next step up in the chain of command. This approach to training has resulted in a less-than-optimal level of fundamentals and systems knowledge for the organization. For example, fundamentals include a range of basic concepts from analyzing heat transfer and fluid flow to reading elementaries.

Observations. During observations, both in the control room and the simulator, many instances of inadequate problem solving were identified. Outage periods present many problems which result in challenges that expose weaknesses in fundamentals knowledge. First time evolutions, such as those controlled by temporary procedures described in SO123-O-23, "Control of System Alignments" (0-23s), create additional challenges that require significant knowledge of system interactions and familiarity with infrequently used technical specifications.

In addition, several recent events have occurred which demonstrate a lack of system and fundamentals knowledge. These include:

- o The April 6, 1995 flow diversion event (ODER 2-95-15)
- o Inoperability of MFIVs in mode 3 (LER 2-95-002)
- o Turbine lube oil pumps secured with turbine on gear (ODER 2-95-04)
- o Inadequate clearance boundaries for the AVR (ODER 2-95-06)
- o HPSI pump events (ODER 3-94-11and ODER 2-94-17)
- o Shutdown cooling heat exchanger not vented (ODER 2-95-08)
- o LPSI pump air binding (ODER 2-95-12)

The weakness in fundamentals, systems, and administrative knowledge was also identified and documented in Root Cause Evaluation 95-05, "Trend Analysis of Operations Outage Performance."

In addition to MFIV inoperability in Mode 3 documented in LER 2-95-002, there are two other events that demonstrate a need to improve familiarity with technical specifications.

- o Emergency chill water unit removed from service without entering action statements for all effected components (LER 2-94-004)
- o Inadequate work authorization evaluation for boric acid make-up pump resulted in unrecognized technical specification action entry (ODER 3-94-23)

Industry Review. At the plants visited, the knowledge level at each position within the Operations group was notable. As an example, the Control Operator interviewed at one facility possessed the knowledge typically expected only of supervisors at SONGS.

Problem solving is a normal operator task at these facilities. At eight of nine plants surveyed, fundamental skills such as reading electrical logic diagrams is routine and is integral to requalification programs. The operators are expected to know information beyond the minimum required to perform their specific tasks. In general, responsibilities are pushed to the lowest possible level.

At eight of nine plants surveyed, PEOs attend simulator training. At some plants, they are given a chance to manipulate controls, and at others, they participate by acting as PEOs in the field. At nine of nine plants, PEOs are encouraged to spend time in the control room observing activities and participating in administrative tasks.

Conclusion. Operations' expectations for system knowledge have created an environment that limits performance. The low expectations for fundamentals, system, administrative, and technical specification knowledge hinder problem solving. The activity level and greater number of problems faced by operators in an outage present a special challenge which tests problem solving abilities and knowledge of fundamentals. The use of many 0-23s creates additional challenges requiring significant knowledge of system interactions and familiarity with infrequently used technical specifications.

COMMUNICATIONS

Standards. Communication standards within the Operations organization are defined as good operating practices and are proceduralized. The communication standard describes a three-legged communication process which includes the message, repeat back, and acknowledgment. This standard is the only documented communication standard for the Operations group.

Internal practices for routine daily communications do not require the formal communication identified in the standard. In abnormal or critical situations, it is expected that the standard be followed. On many occasions, regulators have praised communications and annunciator response utilized by operators in emergency or simulator situations.

Observations. Observations in the control room and the simulator reveal inconsistent implementation of the standard. Each crew demonstrated different levels of formality with communication. In some cases on the simulator, five-legged communications were used by the same crew where others used no repeat backs at all.

Industry Review. At the plants visited, each had a single communication practice that was used in the plant and the simulator under all conditions. All utilized three-legged communications. The implementation of the standard was delegated to the lowest levels and eight of the nine plants utilized management monitoring to reinforce the standard.

Conclusion. The communication standards are not consistently implemented. More than one practice exists for the acceptable style of communication, and standards are inconsistently enforced by supervision.

COORDINATION

Standards. Coordination refers to determining plant status, prioritizing work, and assigning responsibilities. Specific activities such as the pre-shift brief and tailboards are described, but the expected sequence and methodology for coordinating shift activities are not always addressed.

Assignment of responsibilities for task completion, such as defining who reads and implements procedures in the control room during normal operations, are not delineated. The procedures for duties and responsibilities define reporting chains and responsibility, but not how to accomplish the task. Additionally, expectations for coordination of the increased number of tasks and activities during outages are not clearly expressed.

Observations. Several examples were noted where the crews did well coordinating personnel resources for the accomplishment of specific task assignments. In addition, tailboards were frequently performed and effective at ensuring activities were well coordinated. However, the lack of clear expectations results in inconsistencies between crews. Each crew has developed their own approach to coordination of activities. On one crew, a common set of status and priorities were generated after shift turnover and then tasks were assigned and tracked. On another crew, no specific priorities were set and each supervisor was left to determine status and priorities on his own.

The shift relief procedure specifies that a post turnover tailboard is to be held in the control room with all available operators. On the outage unit, the post turnover tailboards were not always consistently performed. The combination of the pre-shift brief and post turnover tailboard does not ensure a comprehensive understanding of daily status and priorities.

The relationship of the CRS and the CO is not clearly defined. On one crew, the CRS performed a task that on another crew was delegated to the CO. Procedure implementation on the simulator, during periods when the emergency operating instructions were not in use, varied from crew to crew.

The WPS was utilized differently from crew to crew. On one crew, the WPS and CRS were encouraged to work together and share status. On another crew, the CRS and WPS were not observed to communicate. The WPS position has recently been defined in the CRS duties and responsibilities procedure. In this procedure, the position is identified as Work Process CRS (WPCRS). In other Operations procedures, the title remains WPS. Responsibilities for the WPS position are defined in more than one document.

Industry Review. At eight of nine plants surveyed, there are no pre-shift briefs. The standard for a beginning of shift briefing is a meeting in the control room after turnover with each crew member describing status in his or her area. The SS concludes with a summary and administrative items.

At all nine plants, complete status and priorities for the day are reviewed with the entire crew. At seven of nine plants, Maintenance personnel attend the shift briefing. At the conclusion of these meetings, each of the operators understands what is going on throughout the plant, as well as in their specific areas. The person expected to perform a task is identified.

Conclusion. As described above in the section entitled Lines of Authority, specific duties are defined. However, details of how to coordinate activities are not established. This results in varying degrees of success as the different crews utilize different approaches for coordination of activities.

The size of the control room at SONGS prevents conformance to the industry practice of having a beginning-of-shift brief for all operators on the crew in the control room. The pre-shift brief and post turnover tailboard do not always ensure operators understand the status and priorities for the day.

ACTIONS REQUESTED

Based on field observations, interviews, analysis of recent operations events, and comparison to other top performing plants, the following actions should be taken.

PRIORITY	ACTIONS TO BE TAKEN
Short Term (before Unit 3 cycle 8 outage)	LINES OF AUTHORITY o Specify, in writing, the chain of command for the outage. o Require that off-shift personnel coordinate their recommendations with an on-shift SRO. PERFORMANCE EXPECTATIONS o Provide written expectations for each watch station that support the Unit 3 cycle 8 outage. FORMALITY o Establish additional screening of personnel entering the control room by informing all site personnel of the correct contact within operations for the type of activity involved. o Communicate management expectations on annunciator response. FUNDAMENTALS o Minimize use of temporary procedures (O-23s). Prior to using 0-23s to support activities requested by other organizations, require approval by the manager of the requesting organization. o Provide supplementary training on problem solving. An example is provided as Attachment 9. COMMUNICATIONS o Require a single practice for all operations, i.e. normal and abnormal operations; in the control room, in the plant, and in the simulator. Implementation of this practice should be delegated to first-line supervisors. COORDINATION o During the outage, modify the pre-shift brief so that the on-coming SS summarizes priorities for the shift. o Ensure auxiliary NPEOs receive a briefing prior to beginning shift activities. o Ensure each watchstander speaks at the turnover tailboard to provide operators an overall understanding of status.

PRIORITY	ACTIONS TO BE TAKEN
Long Term	LINES OF AUTHORITY o Update the organization chart to reflect the current on-shift reporting chain for power operations and outage periods. PERFORMANCE EXPECTATIONS o Identify which procedures should contain expectations for crew and individual performance and consolidate these expectations. o Provide written expectations for each watchstation, including power operations and outage periods. o Initiate the practice of balancing crew experience and styles on an annual basis or any time personnel changes are made. FORMALITY o Evaluate administrative processes that require persons to enter the control room and eliminate these entries. FUNDAMENTALS o Identify fundamental core competencies that support problem solving such as reading elementaries and pump curves. Integrate these core competencies into requalification training and simulator training. o Include systems training in requalification training programs. o Ensure NPEOs participate in simulator training. o Utilize NPEOs in the simulator booth as in-plant operators. o Consider qualifying operators for the next higher position.

REFERENCES

1. Root Cause Evaluation 95-05, "Trend Analysis of Operations Outage Performance," dated March 20, 1995

2. Licensee Event Report 2-95-005, "Loss of Pressurizer Level Due to a Valve Alignment Error," dated May 8, 1995

3. Licensee Event Report 2-95-006, "Reactor Coolant System Dissolved Oxygen Out of Specification," dated May 8, 1995

4. NRC Inspection Report 50-361/95-06; 50-362/95-06 and Notice of Violation, dated June 2, 1995

5. Operations Division Experience Report 2-95-15, "RCS Flow Diverted During Termination of Shutdown Cooling," dated April 14, 1995

6. Operations Division Experience Report 2-95-04, "Turbine Lube Oil Pump Secured with Turbine On-Gear"

7. Operations Division Experience Report 2-95-06, "Inadequate Clearance Boundaries" (in progress)

8. Operations Division Experience Report 3-94-11, "HPSI 3P019 Operated at Runout Conditions"

9. Operations Division Experience Report 2-94-17, "HPSI 2P017 Operated Without CCW Flow"

10. Operations Division Experience Report 2-95-08, "Shutdown Cooling Heat Exchanger Not Vented" (in progress)

11. Operations Division Experience Report C-95-10, "Loss of Instrument Air to Radwaste"

12. Operations Division Experience Report 2-95-12, "Inadequate Venting of ECCS Suction Header"

13. Operations Division Experience Report 2-94-23, "BAMU WAR Boundary Inadequate"

14. Licensee Event Report 2-94-15, "ECWS Inoperability Not Recognized"

15. Licensee Event Report 95-002, "Entry Into Technical Specification 3.0.3 Due to Soft Seating of the Main Feedwater Isolation Valves in Mode 3"

ATTACHMENT 1 - OBSERVATIONS

CONTROL ROOM OBSERVATIONS
(Indicators)

Plant Status	Mode 3, preparing for Mode 2
Lines of Authority	*Ops Rep called CO and directed him to do Attach (auto start). CO said he did not want 3 things going on in CR at the same time. CO told CRS. CRS told CO that if Ops Rep wants something done, he needed to come in and push buttons himself.* *Ops Rep asked CRS if he could ask ACO to cycle valve. CRS said yes.*
Performance Expectations	CRS told CO he needed to get signatures for surveillances. CO sat at desk and reviewed paperwork. CRS made calls to check for completion of steps. CRS told CO to continue reviewing procedure.
Formality	*While in tailboard, control room received an indication that turbine was off turning gear. CRS did not notice because he was involved in tailboard. MO Rep notified CRS of problem. CRS checked it and said it was only an indication problem. CO was reviewing procedure for removing control rods.* *Cog Engr stood at door asking to see CO. ACO was in CR and told him to go to 51 desk.*
Fundamentals	*ACO told SS they may have breaker problems (with pump 75). SS asked CRS if he was aware of breaker problems. CRS said he would ask WPS to investigate and write MO. CRS said he had been researching problem. Later, ACO told CO they would rack breaker in and out and if that didn't work, they would call Electricians. ACO called PEO and asked him to try pump 75 again.* *Cog Engr entered CR and told CO 2MP141 had an oil leak and oil covered the floor. 2MP141 was running. CRS described problem to SS.* *Ops Rep entered CR and asked CRS status of auxiliary feed pumps for VT-2. CRS told him who was STEC contact.*

Communications

ACO, CO, CRS. Flow test of MP140. ACO described attachment and what he intended to do. CRS clarified communications. CO and CRS asked ACO to describe the intent of the procedure.

CO ask Cog Engr to come in for tailboard for 2MP140. ACO told PEO he would start 2MP140. Ask him if he completed procedure requirements. PEO told him what he intended to do and ask ACO if that was correct. ACO said OK. CRS joined tailboard when it was in progress. PEO asked if should shut down the pump right away. ACO said to wait 30 minutes. CRS gave PEO caution on possibility of blow out of flexitalic gasket and told him to get out of room for startup.

Coordination

OMD, HP, Security, CRS. Walkdown of containment prior to closure. CRS and control room knew nothing of this tailboard before 3 persons entered control room. OMD asked to do walkdown at 1600. CRS did not know if Operator was required for walkdown. Said he would check procedures to see if 1 or 2 Operators should accompany them on walkdown.

Other

ACO, CO, CRS. ACO asked to start 2MP140, then 2MP504. CRS said to do 2MP504 first for IST.

Construction I&C came in and asked CO if they could install transmitters for Engineer's tests. CO ask if they had approval and they said "yes."

CRS directed CO to watch rods. CO said "Do you still want me to answer phones?" CRS said "no, I will answer the phones. You should only worry about control rods."

Staff Rep brought in list of Mode 2 restraints and gave to Asst Plant Supt. and CRS. CRS reviewed list.

Two Computer Techs entered and asked CO if they could open cabinet.

Ops Rep came in CR and told CRS packing plug is ajar. Told CRS we may need fermanite before we go critical.

First MO Rep gave me a copy of a 1-page management oversight sheet that included GOPs. Said he seldom completes one but it may help me with my observations.

Plant Status	Mode 4
Lines Of Authority	*PEO came into CR. CRS told him to go out to turbine building to check limit switch problem.* *MO Rep told ACO to put both pressurizer P & T on chart recorder.*
Performance Expectations	Management personnel spent most of their time reviewing drawings, hard copies of e-mails, and computer printouts. Both completed management oversight sheet (1 page containing GOPs). *MO Rep spent time troubleshooting a problem with a chemistry indicator.*
Formality	Two Maint. I&C Techs came to doorway. CO went over to door and Techs ask him if they could continue with their test. They said they would not bring in any alarms like they did yesterday. Techs also said they would need to enter CR periodically. CO said OK. CO called Chemistry to see if they had taken their sample. Later, a Chem Tech entered CR and asked ACO to sign a Chemistry memo.
Fundamentals	SS asked MO Rep if they needed to call Cog to see if pump is OK. SS said he would call. PEO called CR and said he found gland steam seal valve 2152 and it was partially closed. From drawings, CO, CRS, and SS determined it should close automatically. The ACO was watching the plant and was not involved in this problem solving. PEO called CR and said MP019 was ready to start. CO verified everything was ready by asking PEO questions from the pump start guide placard on the CO desk. SS asked Mgmt Oversight person if they needed to call STEC Engineer to see if pump is OK. SS said he would call Cog.
Communications	CO asked ACO to check pressurizer level. *ACO asked other ACO if he could increase by 1/2% outflow. Other ACO asked why and when first ACO explained, second ACO said OK.*

ACO told CO what he would do to swap non-critical loop to Train A. CO announced the swap and SS repeated the announcement. SS, CO, and other ACO watched.

When CO talked to PEO on microphone, he said "I understand you are at 2HV6512." PEO repeated valve number.

U2 CO notified U3 CO that U2 was experiencing some unusual indications with CCW flow. U3 CO said they should notify him if a similar phenomena was noted at U3.

CO told CRS when salt water cooling pump was isolated with no leaks.

PEO called CO and told CO what step of the salt water cooling pump IST procedure he had completed.

CO told CRS salt water cooling pump was checked for leaks and none were found.

Other

CO, PEO, STEC. Cog Engr came into CR for tailboard for salt water pump IST. Cog ran tailboard. PEO was going to take vibration readings. CO left meeting for ½ minute. Cog said last time he did test, he got pump cavitation. CO stopped tailboard briefly so he could talk to another PEO (at BAMU pump). CO said they could resume tailboard after he looked at flow indicators and after he talked to PEO at BAMU. After test, Cobb came back to CR and ask if he could check after IST conditions. ACO checked and CRS signed Cobb's procedure.

Cog Engr came into CR and ask CO to do a test (MP019 IST). STEC Cog ran the tailboard and the CO, CRS, PEO, listened. CO asked what flow rate and STEC answered 30 gpm by throttling. CRS asked if they needed O2 monitor. Cog checked his badge on tailboarding to verify he had covered everything. Cog gave CR copy of the test procedure.

Cog Engr entered CR and asked them to vent a charging pump. He explained the situation to CRS, SS, ACO, and Management Oversight (low charging pump flow).

CRS and SS watched start of BAMU pump. ACO watched instruments. ACO told CO he was making small adjustments to BAMU flow.

CO called PEO to checkout BAMU pumps. PEO said he would check back with CR when he finished.

PEO asked CRS how to complete procedure. Ask if he should put "Mode 3" or "out of range."

SS asked CO if they put up any tags to indicate an open flow path. The CO said no, but he made a log entry. SS said it would be a good idea to make the tags, so the ACO did so.

When MO Rep #1 was replaced by MO Rep #2, he gave him status using handwritten notes.

Plant Status

1230 Mode 4
1530 Mode 4

Lines of Authority

OCC directs that Vacuum and Feedpumps will be the priorities for the shift.

MO directs that the MSIVs be opened, not directed by procedure.

Performance Expectations

SS directs WPS to prepare for, tailboard , and supervise drawing vacuum, CRS not involved or informed.

WPS searching for lost WARs, went to SS who eventually located it as the CRS had previously been working on it. Task transferred, not all informed.

MO rep now ask CRS "what's up with AFW", can we get moving? This is the same initiators as the diversion event.

MO Rep directing the SS. Previous MO Rep did not. Skillful questions are guiding the control room activities.

SS on this shift makes a list of priorities/tasks on the white board and then makes copies for interested parties, such as CRS and OCC. No assistance from the rest of the team.

The standard (unwritten) is that the WPS handles the secondary plant.

MO rep doing a good job, coaching , going to the critical activities to observe. But also gives direction to speed them up.

Does not appear that outage coordinator looks at scheduled surveillance or reviews each procedure for impact ahead of time.

Formality

Annunciator rings for ~3 min and no one looked up.

Control room demeanor and atmosphere very good, very professional.

Fundamentals

After tailboard for drawing vacuum MO Rep asked what vacuum is expected initially. No one know SS guessed 27" answer looked for is 4 ". Also trying to determine if the vacuum pump will auto start when DC is turned on, no prints used, gave up and dropped it.

MO Rep discovered procedure concern earlier, new TCN to SDC procedure that corrected concerns with diversion event created new problem that could have resulted in improper sequence once again.

During tailboard for drawing vacuum a procedure problem is identified regarding a precaution requiring a specified flow rate through the gland steam condenser. The crew can not decide what to do. MO Rep summarizes for them but will not make the decision. The SS decides to call the Cog. gets bad advise and is going to make the wrong decision, MO Rep intercedes and redirects them. Overall spent 30 min. and choose the wrong path.

Received letdown back pressure alarm. Initial problem solving but ACO can not resolve, so he drops it. All involved now. The solution is feedwater addition and RCS shrink. 10 min later MO rep figures it out via PMS. Control room operators had much difficulty associating SG change with RCS change.

Observed the ACO, with cross-checking by CO, on gland steam supply, alarm on pressure they were surprised and should not have been.

Observed communication of AFW start, PEO very clear and thorough. ACO using pump start card, very tentative he is asking very odd questions of PEO and repeating previously answered questions, appears to be afraid to start the pump. Can hear the frustration in the PEOs voice. The ACO starts the pump although he is clearly unsure.

MO Rep discovered procedure concern earlier, new TCN to SDC procedure that corrected concerns with diversion event created new problem that could have resulted in improper sequence once again.

Found yet another procedural requirement for Condensate mini flow. This one helps so they will use it. No stated bases for their decision. Many procedural conflicts.

The order concern on procedure use comes up often, most procedures do not appear to support our expectation on sequencing.

PEOs need time in the CR, they do not communicate as expected because they are talking to a unknown location.

Communications

CRS walking through the check valve testing at the boards, good use of drawings on boards.

ACO reviews plan on feed pump testing earlier assignment. Call this a tailboard, but it was more a review of planned sequence only,--use micro discussions and not enough good tailboard practices.

Overall the Vac tailboard was good. Led by EC person and he used the check list. Only concern was system knowledge level.

CRSs both Units discuss RCS O2 concerns, removal, and analysis.

CO to PEOs good job on the radio uses unit and repeats. Its clear where the communication focus has been.

MO rep coaches COs on communication with PEOs, wants final positions of valves to be overtly stated. Coaches CRS on not loosing big picture.

Coordination

CRS discusses surveillance and valve testing work load with MO Rep and the fact that no one plans for it.

OCC discusses vv testing from Red Book with CRS. Was just informed by CO and assumed someone else was taking care of it. No one checking ahead for routine activities and impact on plan for the shift etc.

OCC, CRS, WPS working to manage limited manpower and long list of expected tasks.

SS, CRS work on reassigning position to operators based on experience levels. Actual turnovers performed to facilitate this.

	CRS informed that IST check valve testing was a priority and he acknowledged, but when questioned did not understand why, or exactly what was to be done. CO complains that Surveillance are entering the control room in bulk in Red Book, more than is realized by supervision. *Much information lost in turnover, seems as though they are starting from scratch.*
Other	MO Rep, coaching/teaching the board operators on PZR heaters and boron. Also cautioning regarding new procedure errors introduced when diversion event TCN was issued. CRS calls OCC to gets maint to sign off on S/G RVS operability to go up. Clear that need to sign was not anticipated. OCC in the control room reviewing the night letter status and plans. The SS does not attend meetings (0800). Very isolated. Borrowing people form Equipment Control to support drawing vacuum. A single ACO assigned to perform surveillance only for the shift

Plant Status	Mode 4
Lines Of Authority	WPS entered control room and provided direction to the CRS on opening the MSIVs, the CRS questioned and disagreed. The WPS states that Ops Management had directed SS to do so. It is dropped and they make moves to open MSIVs, concerns were not addressed. CRS spends much time briefing the CO so that the CO can lead the tailboard on the check valve tests. Much time invested, but correct chain was used, this appears to not be their normal approach, they are changing slowly.
Performance Expectations	MO Rep evaluating failed LPSI check valve test for mu072. Problem solving relative to TS action and which ones apply, in the control room. STA and SS not involved. *Observed turnover between MO Reps. Appeared as though he were a SS turning over. I asked and was told that each person*

does the MO REP position differently and most are running the control room to some degree.

CO asks permission and receives it , to allow operations of controls on the board. The ACO owns the board.

Again the WPS is handling the secondary plant long path recirc, and feed pump testing.

CRS and WPS working closely together, very big difference from previous observations.

The CRS, at least on this crew is making it hard for the CO to function. The CRS is taking the tasks away and doing them himself. There is a need to be clear expectations stated for the CO and CRS positions.

The MO Rep is involved with details much of the time, no real oversight and the big picture can be lost.

MO Rep was making decisions and moving the shift. Much faster now that decision making has moved to MO Rep.

Twice SS gave direction to the MO REP which involving real work expected to be done. And the MO REP went to work.

CRS asks MO Rep for feedback on tailboard. MO REP suggested more of a hands off approach to allow the CO to grow. Advise taken as criticism and brief argument erupts. CRS eventually accepts the valid feedback.

Formality

Observed reasonable annunciator response on hotwell low level. Then they dropped it. No one discussed if there was a concern and it was not followed up on or pursued until prompted by MO REP.

Fundamentals

Tailboard on check valve 072 retest and flush. Options covered and primary focus was management of the people. Little technical detail. The appearance is that the coordination of the people and procedure is what is being done and little focus on the equipment and expectations or results.

Feedwater pump stopped and turning gear failed to engage. Problem solving involved review of collective memory of the group, racking breaker in and out. No prints used and eventually called for help.

	As in previous observations the starting of the LPSI 16 was shaky. The ACO was very unsure and asked many trivial questions of the PEO. Finally started the pump and did not get the expected response (they displayed much surprise) as not all valves were correctly positioned per the PMP. The focus is wrong, personnel were over managed, pump start was over scrutinized, and the valves were out of position. SS intercedes to correct misoperations. I observed no feed back to those involved in the error.
Communications	SS leads tailboard on failed check valve, plan to attempt to reseat. The procedure is being prepared. Drawings on board are used extensively. Very clear. Observed a very brief tailboard on the feed pump overspend test. Check list was not used and the tailboard was inadequate. *CO communication to field weak, on radio. PEO asked for locations, after detailed tailboard. These details should have been covered in the tailboard.* MO Rep comes in control room and briefs crew on second plan to seat check valve 072. New 0-23 being prepared.
Other	MO REP calls OPG and directs needed PMPs for check valve testing and potential shutdown, the shutdown procedures do not work as written. Crew told they are on hold pending guidance from Management. STEC Management arrives and all but CRS leave control room to brief him. Decision on mechanical agitation of check valve is focus of discussion. Correctly group decides not to wait on this. SS to brief CRS on final plan. MO REP states that the crews are all operating much more conservative now and verbatim following procedures. It makes it difficult as the procedures are not written to be used this way?

Plant Status	Mode 4, NOP, vac., long path
Lines Of Authority	*Observed turnover including prebrief. Prebrief was orderly and concise, the crew was back from 7 off and nothing special was done. Unit ready to go to mode 3. Result is that it will take hours for the new crew to be ready to move the plant. Staff not*

providing effective support. During turnover the control room is somewhat noisy, but its due to the numbers of people talking quietly. Turnover complete at 1500.

WAC questions the need to perform local verification versus the routine control room verification, CRS firmly explains that the mode change changes the significance and therefore the need.

OCC relating priorities to MO REP for the night. Had incorrect plant status, Vac., was corrected and MO REP set new priorities on the spot.

Performance Expectations

CO asks ACO for permission to operate controls on the board. SS, CRS, WPS for outage unit meeting in SS office. Review their turnovers and construct a single prioritized work list for crew. CRS and WPS agree on responsibilities and assignments.

CRS and WPS working closely together, very big difference from previous observations.

New MO REP and he acknowledged that each Rep does the job differently, very similar to the SS and each shift being different.

Discussed the difference regarding joint effort and better communication, SS requires this and CRSs do not like as it is not required on all shifts.

WPS in the control room very often, as is the SS. Much better feeling group, they know the status and share the same view.

Fundamentals

Observed very clear direction CO to ACO on operation of overboard valves. ACO acknowledges and precedes to operate with CO checking. Good communication, but CO called out wrong valve and ACO operated it anyway. SS waits a moment and stops everything for some training. Very clear on his expectations and what should have happened. The coaching was aggressive and the CO was offended. Point was made and those involved will remember.

Elementaries never used to this point.

Communications

Observed the off going CRS give status to on coming CO on gland steam, communication was incomplete and was not acknowledged. I believe the information was lost.

WPS enters the control room and informs CRS of EDMR closure.

Coordination	SS requires the WPS, with CRS assistance, prepare a list of plant equipment readiness for mode change. Reviewing boards, alarm links, and other pertinent status. Appears to be a very good practice and is in addition to procedural requirements.
Other	SS reviewing COS log and questioning CO on items. CRS questions CO on status of AFW surveillance as it is marked NA and is needed for mode change. CO replies it was signed for the shift before so they must take their word for it and it is out of their hands. CRS repeats the concern and they do not know how to find surveillance that have left the control room, they agree to do the work over versus look for the filed surveillance. Much more involvement in the details of operations by the SS on this shift.

Plant Status	Mode 4 328 degrees 368 psi Holding due to spray valve problems.
Lines Of Authority	*CRS states that things are OK now that the crews are going slow and only trying to do one thing at a time. As soon as the push is on again they will have more problems.* ACO has a problem (RV leak in radwaste) found with computer alarm. Did not inform CR and worked through it by himself. Informs CRS directly after directing field operators to take action. Out side the normal chain of command, but good problem solving.
Performance Expectations	*Very low activity, but MO REP reviewing procedure changes* and *not observing the crew.* Now MO REP doing his E-mail in CR. *2 hours into shift and WPS has yet to appear in the CR.* Long discussion with SS on current control room atmosphere. Operators are forced to follow procedures now and resolve problems because of the managers in the control room. He states that clearly the CRSs were not following the procedures in the past, as they must stop and PMP when they just went ahead before.

MO Rep states that PMPs are because they just worked around procedure problem until the managers were there to watch, they were not following the procedures before.

Formality

CRS questions the need for the ACO (senior CO) to eat at the COs desk. Although never told to move he gets the message and moves back by me at the computer console.

Alarm button pushed without looking up and then not called out when eventually identified.

Fundamentals

SS drills ACO on expected response if SBCS were to fail. Seems like a new thing as the ACO acts very surprised. His answer is inappropriate. He states he would get annunciator response out and transfer responsibility to the CRS. Would not try to analyze the situation.

SS now asks same question on SBCS of CO. Again they do not respond in earnest and take it as a joke. SS does not enforce proper response and allows the exchange to end without getting a response to his question.

PEO comes to the CR with question on Shiftly Surv. He does not know if AFW is required to be operable in the current situation. ACO did not know and asks CO, the CO stated no and they went on. Later discovered it was (procedure). They do not know TS. Needed last shifts surv., but its gone and where they do not know.

CO requested Chemistry for pri/sec leakrate. Chemist comes to CR and states they continue to inform the CR that it can not be checked unless the plant is at steady state conditions. The CO and CRS accept this and are discussing PMP. No discussion of how the test is performed and why it can not be done, they must accept the statement because they don't know. Discussing a PMP. At the very end WPS identifies the basis and the facts that the leakage is way below what's required. Could NA the step, but in stead take the administrative route and call Management for a PMP.

Training focusses on EOIs and normal operations is ignored.

Communications

The ACO (senior CO) informs the CO of intent to operate control on secondary and is acknowledged.

ACO adjusts SG level while telling the CO what he is going to do. CO barely glances up.

Coordination

There is no post turnover discussion on where the crew is going. I ask the WPS and he said they just " MINI GROUP IT".

Other

Discussion in CR CRS,SS,CO - Procedures very weak except the routine daily surveillance etc.

Now evaluating how to close out VCT N2 purge procedure. Again have to PMP as the procedure is not user friendly and does not allow them to stop if desired.

When crews learn information by operating the plant on a start up etc, it is not shared with the other crews.

Feedback on crews performance written by Management is read to CR. Feedback was not specific, CRS needs to always coach the ACOs on good practices as an example.

MO Rep out of the CR for 15 min. and at the same time the CRS is in WAD. No oversight but me.

The one message this crew believes that Ops Manager shared during the stand-down was "think of the consequences before you act".

ACO states that management is focused on pounding the operators and not preventing another occurrence.

ACO states that things will not get better until people want to changes. He sees GOP as a good tool but not one that management truly endorses.

MO Rep reviewing a PMP to transition between GOIs. Largest PMP I have ever seen, several hundred pages and OPG staying into the night to prepare. They review this document without the old version for comparison, this makes the review as scan and less effective.

SIMULATOR OBSERVATIONS

Plant Status

Same scenario as before. Reactor trip, fire, loss of 480V bus, LOP, and steam break.

Lines Of Authority

SS directs common CO to manipulate breaker, CRS was not informed.

Formality

The CRS calls for normal alarm response, very good practice and response was good by board operators.

Status briefings held at reasonable intervals.

During the response to and debrief subsequent to the first scenario, no one questioned why the reactor tripped. The instructor did not bring it up either. When questioned he agreed that it was a combination of simulatoritus and bad practices at the simulator.

Fundamentals

SS identifies all of the TS that apply, including 3.0.3.

Racked in charging pump, to swap trains, surprised again! The pump auto starts. The start was clearly unexpected.

SS in elementries, this is the first time I have seen a elementary out during a observation. Was used to review loads on the bus that was lost.

CRS directs the ACO to close ADV on SG with no AFW flow, ACO clearly does not understand and takes action after second time direction was given.

Communications

CO to CRS to CO communication on charging pump very clear, feedback, and acknowledged.

SS intercedes in communication between the CRS and CO, several directions were given and with no feedback some of the actions were not carried out.

CRS directs ACO on SG feed control, feedback was yes. The structured 3 legged communication does not come natural.

Steam break causes much action and SS in common area. Some breakdowns in communication due to activity level, SS returns and generally calms down the atmosphere.

RX trip is first event. Rod position and power decreasing called out. Standard pause while the boards are checked and prior to reporting. Periodically a unexpected status is called out, such as normal EFAS and charging status.

The operators begin to report post trip status(6 min. after trip). Good communications repeat backs, CRS ensures specific information is transmitted. SS identifies PZR level alarm and directs the heaters be energized. SS provides guidance to board operators on appropriate communications.

	CRS confers with SS and announces Standard RX Trip. CRS asks crew for list of failures, none given.
Coordination	*CO asks for turnover and instructor gives verbaliy, no written turnover used, very informal.*
Other	Instructor leads discussion of last training and lessons to be learned. The last training was 2 months before. Focus was control room control and oversight. This is slightly different than the GOP, may be changed to better fit the training environment. This discussion included changes to the EOIs, technical changes to the plant, and GOP. SS leads debrief after first simulator scenario. Much discussion on condensate pressure and operation of the FFPCD SS directs return of CCW , again in addition to procedural guidance. Aligned boric acid to charging pump suction. CRS got SS approval, but again many actions in addition to procedure. The post training review focused on the Fire AOI, not only did it fail to deal with the event the point IDs for the computer were not up to date. SS directs the CRS use the Fire AOI, he had not gotten it out, believe this to be related to Staff person acting as a CRS, new scenario which begins with fire in DG MCC. SS selects new CO for second scenario. Many action prompted by the SS, not the procedure? SS assigns positions to crew for the day The loss of bus resulted in loosing the running charging pump and the AOI restarts a charging pump, but does not address that letdown was also lost. CO is in charging and letdown procedure independent of direction. CRS can not make AOI work, SS authorizes deviation. This was stated as a long standing problem.
Plant Status	Same scenario as before. Reactor trip, fire, loss of 480V bus, LOP, and steam break.

Performance Expectations	*Co on different side desk than last time and assisting the CRS. Also keeping a log.*
	When decision to shutdown is made the procedure is transferred to the CO, again different than last group.
Formality	*Again the crew does not ask or consider why the reactor tripped, no realism.*
	Turnover sheet barely used and then stuck away, little realism.
	ACO calls for normal annunciator response!
Fundamentals	The CO very quick to diagnose problems when 480V bus is lost due to the fire. The SS made these diagnosis on the last crew.
	Crew closely examining the impact of lost equipment, as a result of the lost 480V bus.
	SS identifies 2 hr. TS action, last crew found 3.0.3.
	ACO directed to start AFW pump and tries, no power. Again appeared to be surprised
	CO and ACO assist CRS with suggestions and strategies.
	The response of this group was sharp to the reactor trip, ready to report in 3 min.
Communications	ACO aligning AFW, very good tailboard with PEO.
	Very crisp communication from board operators on reactor trip.
	CRS noticed PZR level alarm and ask CO to repeat feedback on step just complete, very skillful.
	ACO feedback to CRS not only includes what was requested, but why it should be done.
Coordination	*Common CO acting alone reset LOVs relays and caused equipment to change status. Much confusion. There was a disconnect between the crew on the Unit and the common CO, they were acting independently. The SS did not stay on top of it due to activity level.*
Other	The crew decides not to return letdown and start charging pump as required, different approach than last crew.

Immediately on loss of switchyard SS directs the MSIVs to be closed. Not clear why and in addition to procedural guidance.

SS does not help CRS with EOIs this time.

The instructor brief prior to beginning training focused on the removal of the operating strategy book due to an INPO observation, and the need to expect the response of the plant.

Instructor comments this is most disciplined of crews.

The simulator is not like the control room, operator aids on the desk are not the same, out dated?

Not using the Fire AOI at all.

On LOP DGS responded differently, simulator problem, comparisons between crews now difficult as scenario diverges from expected.

Plant Status

Full power, Loss of inst. bus

Formality

Alarm is silenced and not called out or acknowledged by others.

Fundamentals

SS request the ACO to get elementary during the loss of inst. bus. Again the one line used to identify loads.

CRS reviewing the procedure with the crew to determine controllers in manual etc as a result of the loss of inst. bus. Procedure does not cover all components that must be manipulated and are effected. Instructor must stop scenario and help with actual plant status versus what is stated in procedure.

CRS reviewing the list of components lost, no TS evaluation considered. This must be the first time for loss of this inst. bus.

Identify indications of SG leak. Simulator froze to discuss options and strategy. Management expectation shared by Instructor, so the procedure was not followed to the letter.

Discussion on how to align the air ejector monitor. Instructor points out that it is specified in procedure, again the operators do not appear to be familiar with the procedure.

During rapid shutdown Reactor is ahead of Turbine and symptoms are being treated separately.

CO tries to start charging pump, pump trip after a couple of second, effected by inst. bus and not expected by operators.

Crew missed loss of COLSS. Eventually pointed out by common CO, seemed to be keeping it a secret. Procedure did not cover it.

Communications

CRS repeating back all communications, loud and clear.

CRS direction to ACO to place SBCS to manual, ACO clarifies master controller to manual and is acknowledged.

Report from the field on which breaker tripped is not clear. SS intercedes and guides communication to breaker number and specifics.

Chemistry calls with location of leak, EO-88, SS announces to Control Room. Including EPIP classification.

Very clear but informal communication, no repeats etc, on charging pump alignment.

Other

SS holds tailboard prior to taking action to ensure crew understands status and direction plant is headed.

Tailboard for shutdown, with Inst. bus lost very difficult. CRS has trouble with integration of procedures. SS assist and specifies specific strategies for important lost functions or components. Instructors assist on technical information that is missed, feed pump speed program etc. Input from STA and Instructor critical to success and freezing the simulator made it work.

Instructor questions PZR level band and crew has not established one. He guides them to charging and letdown procedure for specified band. Procedure is inadequate for the task.

Rapid shutdown guidance contained in procedure is inadequate, as much additional assistance from everyone present was required.

SGTR diagnosed and attachments identified for implementation. Will cool down on ADVs.

During the critique the SS inquires about other crews response and states need to be the same, first time this has been stated. The AOI for loss of inst. bus needs work, as it did not mesh with the other procedures required to support a rapid shutdown.

	Initial turnover- no clearances, history, and little realism. SS guides board check and specific equipment to be concerned with. SS participates in board walk down.
Plant Status	Full Power, Loss of Inst. Buss, SGTR, Rapid Shutdown
Performance Expectations	Critique - The instructors states that a standard must be established. CRS states that someone just needs to tell them what is expected. SS says yes we do. *Throughout the scenario the instructor presented information as managements expectations. The information was new to the SS and this established a situation where the instructor was the leader, not the SS.*
Formality	Annunciator response on SG radiation alarm called out and acknowledged.
Fundamentals	On loss of inst. bus immediately got out one lines to determine loads lost. Good technical discussion on the loads that were lost. *The discussion on actions required for the load drop was more basic than the last crew. Much time spent on PZR level versus RCS temperature etc.* *Both groups missed the failure of the Turbine CVOL, general weakness on turbine knowledge or monitoring.* *Simulator froze the crew can not continue as PZR level and RCS temperature can not be kept in required band. CO starting and stopping charging pump during load drop appears to be the cause. Actually slower than last group but not able to keep going. Initiate new plan to align 2 charging pumps to RWST and continue. Again different than last crew.* *ACO has overfilled the SGS and little steaming so the simulator is frozen for discussion. The discussion that follows is on the possible ways to proceed, not what the procedure says to do.* *CO request to secure the third charging pump because letdown is not in service. CRS does not understand why and is considering the suggestion, he is distracted from procedure.*

	CO now asks to secure RCPs, all these request are in addition to procedure and not helping.
Communications	SS announces SAE.
Coordination	SS will declare SSAM and clear bus, this is different than last group.
Other	New set of pressurizer level numbers used again, 3rd set I've heard today. Immediately placed the Air Ejector monitor in bypass, no discussion and different than last group. Missed failure of COLSS again. This group elects to not transfer buses prior to shutdown and leave the Cond pump 53 off versus start it. These are both different than last group. Froze again to discuss tripping and actions required, most of these pauses are requested by the SS. Froze the simulator to discuss load drop with the crew and instructor. The crew missed many important items and it appears to be incomplete follow through on the loss of bus procedure.

ATTACHMENT 2 - INTERVIEW SUMMARY

M. Management **O. Operators**

1. Is there direction from more than one source during a normal shift?

M. Yes, and there is an added danger when using management monitoring. Sometimes when we see something (someone fumbling), we coach them. CRS can get direction from OCC and SS. The CO can get direction from CRS and SS. The WPS can get direction from SS and OCC.

M. CO takes direction from the CRS. In the past, SS would also give CO directions. Outside people go to CRS and bypass the SS. People are always asking CO to do something and Operations tries to accomodate but it erodes what Operations is trying to accomplish.

M. Yes, I would expect direction to come from the SS to the CRS to the CO. I have seen management go outside this chain.

M. Yes, they don'torder, they just say they would like something done. Once when the NRC was watching, I told the crew they may want to start that pump first. The crew took that as an order.

M. I have seen the SS and CRS give direction to the CO at the same time about status. Usually, either the SS or CRS is there at the time. I have not seen SS follow up and give direction.

O. Yes. If you are watchstander, direction comes from the CO or ACO. You also get direction from the SS or other supervisors, including the WPS.

O. I follow procedures. The procedures give us a goal. Should come thru CO.

O. Yes. ACO, CO, and CRS.

O. Good on line. It changes during outage. During outage, we interfaced with 2 extra guys who dealt directly with us.

2. Describe the chain of command in the CR / organization.

M. The PEOs say they are outsiders and are told they can't go in the CR.

M. The SS and CRS need to know what is happening in the CR all the time. The CRS should tell outsiders to call the SS so the SS can understand what is required and what needs to be done for the day to manage resources. The CRS needs to convey info to the CO and ACO.

M. Should go from the SS to the CRS to the CO. This is not always utilized. The SS is a middleman on too many occassions. The CO should direct Operators. The CRS should not interact with PEOs or ACOs.

M. This morning, for example, I learned about the oscilations. The SS was at the 0800 meeting. Management wanted to wait until the meeting ended so the SS could tell the CRS how to fix the oscillation.

O There is a management oversight in CR now. It has been such that Management Oversight person appears to play CRS. They have made the CRS into a management CO. They have pushed decisions up a level.

O. When the WPS tells us to do something, it messes up the chain of command. During the outage, I took direction from SRO (WPS or other management guys)

3. Do assignments match technical knowledge and experience?

M. PEO should understand plumbing. COs lose knowledge of plant details and component locations. The longer they are in the control room, the more they forget.

We need to balance a weak CRS a with strong CO. The CRS just needs to ask the right questions. They do not need technical knowledge, just where to go to get information.

M.. I have seen instances where this does not match. We do not make an effort to fix this when we make work schedules. The strengths and weaknesses within crews has never been balanced. We need to balance ACOs and COs. We are hesitant to do a shuffle of personnel because of union contracts and vacation schedules.

M. In some cases, the CRS is junior and malleable. Less experienced CRSs may look to other CRS or WPS for direction. The CO position usually matches ability.

M. I have not observed any situations when a person with more experience gives directions and he has a subordinate role.

O. Yes in CR. Out in the field, no.

O. Yes and no. Some do, some don't. Some more senior than me do. Others do not. I may need to back them up and challenge them. CRS would probably bring it up if I didn't.

O. Yes. Guys who will work, get all the work. Other guy gets only a little work. It maybe a union thing. You can get a turnover from a guy, and you know the guy did not want to do his job. When regeneration is going on in the full flow, certain people do not do all they need to do. Sometimes, I have to do others' work.

O. They need to explain why we need to do something. We should not be told to do it because they said to do it. This keeps guys from going beyond their job.

4. In your position, from whom do you receive most information on plant status?

M. At my desk, I get most of my information from the night letter. I get current information from the management oversight person in the CR or from the SS.

M. Usually the CRS knows the most. Some SSs keep on top of things, but we give them too many administrative tasks.

M. I go to the CR before the turnover meeting. I talk to the SS later. I attend the meeting. I want to go the CR myself to get the information.

It depends on the time of day. I can get information from Equipment Control. I come in before the night shift ends so the SS has a chance to talk to me. I then go to the 0800 turnover meeting.

M. I call the SS for status.

O. If we are doing normal watches, we don't know status on the unit. We find out thru PA or from increased activity.

O. Direct observation or by reviewing logs, O-23s, annunciator compensatory actions.

5. Has management oversight changed the CR? How?

M. The level of formality and amount of cross checking is different now. They were more casual before MO. The people in the CR operate under the "big lie." They think they can be informal and then conduct themselves and communicate formally when the need arises. There is also more procedure compliance now. They cant's sigh off a step before the preceding step is signed even though the job is complete.

M. We see little things and remind them to step back and watch what is going on.

M. There has been little impact from MO. Two crews were good before and improvement is not necessary on those two. The other three do not take MO seriously. Two crews understand procedures. One crew does not look at procedures. One SS dodges bullets and has a good CRS.

They are now following procedures. Before MO, they tried to cut corners. If they do not know the basis for procedures, they are less likely to follow them. If they know why things are in the procedure, they will do them.

M. Yes, significantly due to the process changes. Maybe the improvement is only temporary due to management presence. I can see the ACO ask someone to come over and doublecheck his board. I can see the Operators describing what they want to do to others. Some of the management oversight persons will be Sss. Acting in the management oversight role will give them a new perspective. The CR is also more familiar with management personnel as a result of management oversight in the CR. The lack of command in the CR has been helped by management monitoring.

M. They are aware that management monitoring has told them something. Because we are there, there is a difference. I heard the CO tell a Maintenance worker he was being rated and the worker should not come into the CR. I have see some differences but maybe that is because of our presence.

The effort has fallen off as far as rigorous following of procedure sequence. They are thinking more about when they use a PMP. They are using broader interpretation.

O. There has been a shift since the SS moved into the control room, but it is still not perfect. There are also other changes since SS went into CR. For example, we now have to ask permission to go between ACO and boards.

6. **Who controls activities in the CR?**

M. Mainly the CRS. Sometimes the SS.

M. CRS should. SS and CRS need to review resource requirements.

M. Depends on the group. Should be the CO.

M. We want the SS to control activities, but management monitoring personnel tend to get involved in controlling activities. Management gets involved.

My expectation is that the SS controls activities, but it varies by crew. Some SSs coming off shift may not meet that expectation. The CRS may change the plant and the SS may not know.

M. The CRS gives direction to the CO. The CO runs the procedure. I have seen all direction go through the CO, but sometimes, it comes from the CRS. The formality varies. On one shift, they make a sheet with a plan and then discuss it with the SS.

O. CRS

O. CRS. But it is not consistent on all crews. One CRS is in control of his control room. If he does not know, he will find out. It is like a true oversight with that crew.

O. On our crew, CRS controls activities. Our CRS is a controller and tries to take charge.

7. Which position or person has the complete picture of plant status?

M. SS and CRS are supposed to.

M. CRS should have status of his unit. SS should know status also.

M. Should be the CRS. CO should also know.

M. My expectation is that the SS has the complete picture, but it varies by crew. Some SSs coming off shift may not meet that expectation. The CRS may change th e plant and the SS may not know.

M. The CRS has the most complete picture. The CO is distracted more. The SS has the big picture, but not much about each plant.

O. Depends on the person. Usually the CRS has the complete picture. SS may know, but I would not know if he knows.

O. CO

8. Are the procedures good? Which ones?

M. We are still changing shiftly surveillance procedures and I do not know why. Surveillance and ECCS procedures are pretty good.

We get bogged down with procedure reviews. I have seen the CO and CRS both review a PEO's log sheet in detail which I do not think is necessary. They should assume PEOs are doing a good job. All alignments have CO or CRS review.

M. No, routine procedures are pretty good, but the ones we don't use very often have problems (refueling procedures, for example). PMPs are appropriate for condition procedures are in. We could accept them as they are, but there is critisism for doing that.

M. They are very detailed and give a lot of direction. They are cumbersome if you don't understand. Today, we were in 4 procedures at a time. It would be better if the evolution was covered by one proecure.

Signoffs should be more for placekeeping than for sighnoffs. Signoffs should not tie our hands. We need more flexibility to do steps out of order.

O. No. Some are good. They try to dictate everything using procedures. There is no flexibility, and management tries to control every possibility through procedures.

O. No. All bad. Every time I do something new, I have to submit a PRR. I don't know if PRR is ever implemented. There is no feedback. I see some of them incorporated, but for others that I think are more important, I don't see any changes.

9. **Are the expected standards on shift clear to you? If so, so did you learn the standards and where are they stated?**

M. The standards send a mixed message because they are always left for intrepretation.

M. GOPs are beat into Operators. Each SS wants to do things his own way. Each is strong and they are hard to standardize. They each think they know the best way. Some standards such as compliance with T/Ss and procedures are fixed.

M. My expectations are clear. One SS said he does not know where the standards are located. They are in many places.

Command and control standards are not so clear. I know them when I see them.

M. Yes, they are stated in Professional Operator Development Program. Also in CR access and conduct. We only need to tell people where it is. We don't need to develop it.

O. We all know them. We have trained on communication standards. It is all in the procedures, but sometimes, I find it hard to communicate using the standards. Management thinks we should do as we are told and not think. If something goes wrong, we are then expected to think.

O. I read the standards, I learn them in classroom, I hear them in briefs. They are in the GOPs. More and more, I am seeing people following communication standards.

10. **Who should conduct tailboards?**

M. We expect the CO to run tailboards. There are exceptions - there was recently a 1-hour talk on AVRs run by the AVR people.

M. The CO should conduct them, but it depends upon the difficulty of the task. For big or important tasks, the SS or CRS should run the tailboards.

M. Typically the CO. The ACOs do it for training. I can imagine cases where the CRS leads the tailboard, but it is better if he watches to see if everything is covered. We also need someone to critique the tailboard.

M. The CO and that is what I have witnessed. This is a new change within ght last couple months. The CRS does some coaching.

O. It depends on the evolution. PEO should run some tailboards if he is conducting the evolution. The CO and CRS can see what kind of picture he has and can add their input. There should always be an oversight person there .

O. CO, but for more routine work, the person performing the job should conduct the tailboard.

O. CRS should not conduct tailboards for simple evolutions.

11. Who owns the boards (controls)?

M. ACOs. The CO tells the ACO he should do something on his board.

M. The ACO manipulates them and the CO cross checks.

M. The CO. The ACO monitors. The Co may not be keeping close touch, but the ACO can go to the CO if there are any problems.

M. The ACO seems to own the boards. We have not nailed it down. The CO informs the ACO if he touches anything.

O. ACO, but CO monitors.

O. CO owns them , but does not like to touch them. He acknowledges alarms, but ACO is delegated ownership of boards.

12. Who owns the procedure (in use)?

M. We want the CRS to control procedures.

M. CO should always be in charge of procedures. The CRS got stuck with procedures because the CO needs to stop every 5 minutes for verbatim compliance. Procedures are not obstacles - the information is there, but they need improvement. Operators need to recognize when they can move ahead and change the procedures later.

M. It should be the CO.

M. In the past, it was the CRS, but we have accepted a change now (CO now). It still varies depending on the CRS.

O. Varies. If I am going to do something, I get my own. If I find out in the brief, I find out what we will be doing, so I get the procedure.

O. Recently moved to CO.

13. Who holds the control room command function?

M. There are plans to move the SS into the CR. Presently, there is a burden for the CRS to explain to SS what is going on.

The CR looks bad. We need to change the appearance of the CR to send a good message. There are incredible differences between shifts, but we have accepted this because there are differences with people.

M. The CRS controls the CR.

M. The CRS. The SS when he is in the CR. Putting the SS in the CR will not blur this and may even make it better, like in the simulator.

M. The CRS. Moving SS to the CR will blur this. The TS says the SS has the command and control function. TSIP says CRS will have it.

O. CRS. They only give it up to the other CRS.

O. SS since he is in the control room now.

14. What would you change if you could regarding the control room structure?

M. The SS and CRS understand priorities. The CRS conveys priorities to the crew. The CRS needs to inform the SS when things change, so the SS can change priorities. We will be moving the SS into the CR.

M. It is hard to be a supervisor and live with someone. You tend to share duties. When the SS moves into the CR, we don't want him to control. We just want him to observe activities and coach.

O. Get rid of management oversight representative. Push decisions down. There are good people there, but they don't allow them to make decisions. On some crews, CO runs the crew. Management thinks he does not need to know everything. There are inconsistencies between crews. All COs are different. This causes problems in field. OK to do something for one CO, but not the other. I tell them all everything so they can decide what they need?

O. ACOs don't dwell in CR. The extra one is in the lunchroom now that the SS displaced him in the control room. During activities, the ACO goes into the control room, but he stays out more often.

15. Describe the WPS position.

M. The SS should undestand what the WPS is doing and needs to control that position. Outsiders know to go to the WPS, but the SS is not always informed of all activities. The WPS is responsible for coming into the CR to update the CRS on what is happening.

M. The WPS reports to the SS. He talks to the CO and to the SS.

16. What would you like to see from our evaluation?

M. Change level of detail in procedures

M. I would like to see other ways that work, a fresh look. From other plants, I would like to know if management expectations are clear, how they are stated, and how they give feedback.

M. I have no expectation. I would like to know who runs procedures, how busy the CRS is, does the CRS review procedures, and does the CO review surveillances?

18. Do you observe the simulator?

M. Rarely

M. I try to observe.

19. What is your long term vision?

M. Event free operation. I would like to see ownership by Operators and others (EC). People think things are out of their control.

M. Condtinious monitoring with 1 crew for 6 weeks. I want to fill out a report card and get a snapshotof their performance. I would also like to implementate CR formality, decorum and standards. Communication neeeds to be bolstered.

I would encourage supervisors to implement standards. We will develop new standards based on management monitoring observations and communicate them to Operators.

I would liketo expand the observation program to different locations other than the CR.

We will make changes for the Unit 3 outage and more for after the outage.

20. Have you seen direction for each watch station?

O. No, you are suppose to get direction from your trainer and procedures. For the most part, we went through procedures. The process is there, but we don't work each station often. We change watch stations every time we change shifts.

21 Describe the pre-shift brief and post-turnover tailboard?

O. Pre-shift brief with crew (includes expectations, surveillances). All PEOs are there. We go to our respective supervisors for turnover. CO runs meeting. CRS is also there.

O. CO should have gotten everything and breaks it down for us depending on what each person needs. Have to see what is applicable. They only state what is turned over, not what we can get from rounds.

O. CO leads the brief. Its our time to read the log. I tell him what I got on my face-to-face turnover. He tells us what is expected during our shift. He tells me what he got turned over from his turnover. We are all there until the end of the meeting.

O. Radwaste operator checks in with common CO and checks with other two COs. All PEOs come to the control room. I think it is pretty good as it is. Cannot remember skipping the turnover tailboard. It may get delayed, but it is usually at 0645.

22. Is communication of information from management open and free?

O. We get quite a bit from SS on E-mail.

O. We interface with Waldo every 5 weeks. I asked my SS for training on NCDB, but I may have to ask again. He shook his head and did not give me any feedback? One Assistant Plant Superintendent is approachable.

23. Do you spend time in the control room?

O. I do not feel welcome. We should not always be in there.

24. What can be done to standardize activities between crews?

O. Management is trying to remedy by switching people between crews.

O. What I see as the biggest difference is where crews go to hang out. Some crews go to the full flow. Some stay out of sight. May do this to avoid cleaning things, etc.

ATTACHMENT 3 - INDUSTRY QUESTIONNAIRE RESULTS

PLANTS SURVEYED

Byron
Grand Gulf
St. Lucie
Davis - Besse
Sharron Harris
Turkey Point
Diablo Canyon
North Anna
Limerick

QUESTIONAIRE

QUESTION	RESPONSES OF SALP 1 PLANTS	RESPONSES OF SALP 1 PLANTS	SONGS
1. Do you have a brief before the shift turnover?	Yes - 1	No - 8	Yes
2. Do you have a brief before the first rounds?	Yes - 6	No - 3	Yes
3. Where is the location of the brief? If in the control room, what is the size of the control room?	Contr room - 8 Large - 4 Medium - 2 Small - 2	Other - 1	Conference room
4. Do other groups attend the brief?	Yes - 7	No - 2	Yes
5. Who leads the meeting?	SS - 8	CRS - 1	SS
6. Do supervisors turnover at the same time as bargaining unit?	Yes - 6	No - 3	Yes
7. Are shift coordination and prioritization expectation details stated?	Yes - 9	No - 0	No
8. Are completed surveillances available for review in the control room?	Yes - 3	No - 6	No

QUESTION	RESPONSES OF SALP 1 PLANTS	RESPONSES OF SALP 1 PLANTS	SONGS
9. Is an abnormal status board maintained?	Yes - 7	No - 2	No
Where is the board located?	Contr room - 4 SS office - 3		
Is the board used to prioritize shift activities?	Yes - 1 No - 6		
10. Are crews balanced to adjust for experience, styles, etc.?	Yes - 6	No - 3	No
Frequency of shift rebalance?	Annually - 2 As required - 4		
11. Are expectations for communications, tailboarding, daily activities, and annunciator response stated?	Yes - 9	No - 0	Yes
Are these expectations proceduralized?	Yes - 9		Yes
Are these expectations in one location?	Yes - 9		No
12. Do you have any performance reward programs, such as shift of the quarter or operator of the month?	Yes - 4 (for individual performance)	No - 5	Yes
13. Do the crews compete against one another?	Yes - 0	No - 9	No
14. Do operators routinely read electrical drawings?	Yes - 8	No - 1	No
Is reading of electrical drawings part of requalification training?	Yes - 8	No - 1	Yes (classroom instruction)
15. Do NLOs attend simulator requalification training?	Yes - 8	No - 1	Sometimes (recently added)
Do NLOs answer the phones in the simulator booth?	Yes - 8	No - 1	Sometimes (recently added)

QUESTION	RESPONSES OF SALP 1 PLANTS	RESPONSES OF SALP 1 PLANTS	SONGS
16. Do control room operators routinely rotate to non-licensed outside positions to maintain proficiency?	Yes - 5	No - 4	No
17. Do NLOs spend scheduled time in the control room?	Yes - 3	No - 6 (not scheduled, but encouraged)	No
18. Is there specific training conducted on communications and communication expectations?	Yes - 9	No - 0	Yes
19. Is the control room ever closed to work groups other than operations? What are the criteria for closure if access is restricted?	Yes - 6 (very seldom) Critical activities (startup and shutdown) - 5 Theater rope - 1	No - 3	Yes
20. Are NLOs routinely allowed in the control room to observe?	Yes - 8	No - 1	No
21. How do you ensure shift workers stay alert?	Observation - 3 Gym - 2 Training - 1 Stress Mgmt - 1 NA - 2		Observation
22. Is there an exercise facility on site?	Yes - 6	No - 1 Planned - 2	No
23. Is the SS in the control room or an outside office?	Outside - 5 Combination - 2	Contr room - 1 (in one of 2 control rooms)	Both

QUESTION	RESPONSES OF SALP 1 PLANTS	RESPONSES OF SALP 1 PLANTS	SONGS
24. How many SROs are on each crew?	2 unit sites Total of three, two in CR, one out - 4 Total of four, two in CR, two out - 1 Total of four, two in each CR - 1	1 unit sites Total of three, all in CR - 1 Total of three, two in CR - 1 Total of 4, two in CR, two out - 1	Four
25. Is there an administrative SRO?	Yes - 7	No - 2	Yes
26. Who is the point of interface for the other site organizations?	SS - 5	Depends on activity - 4	Depends on activity
27. Are the practices for communication the same for off normal and normal plant conditions?	Yes - 9	No - 0	No
28. Are communications maintained at the same standard in the control room as the simulator	Yes - 9	No - 0	No
29. How do you ensure that professional communications are maintained in normal, off-normal, and simulator situations?	Coaching and management observations - 8	Periodic meetings - 1	Coaching and management observations
30. Are visual aids, such as position name tags, used to identify control room operators or supervisors?	Yes - 7 (some use uniforms or photos)	No - 2	Yes (board with names)
31. Is there a work authorization issue point outside the control room?	Yes - 7	No - 2	Yes
32. Do all maintenance personnel enter the control room to receive authorization to begin work?	Yes - 7	No - 2	No

ATTACHMENT 4 - GOOD PRACTICES NOTED DURING BENCHMARKING

The way plants do business is influenced by several factors including location, union contracts, and external factors. We observed the following practices which help the plants achieve top performing status. These practices should be considered for implementation at SONGS because they are proven practices at successful plants.

- At one plant completed surveillances were copied and maintained in the control room to allow the operators the option of reviewing the previous document prior to beginning a surveillance or as needed when problems arise.
- 5 out of 9 SALP 1 plants routinely rotated the control room operators to the outside non-licensed jobs in order to maintain proficiency.
- 7 out of 9 SALP 1 plants maintained a abnormal status board to make the abnormal conditions visible
- At the top rated facility, an operator aid was maintained which provided a collection point for technical information which is difficult to locate or frequently used. This aid included graphical displays of component performance, fuse information, simplified diagrams, historical data, and much more. This type of aid would provide a boost in the technical knowledge of the entire control room and retain information for the department, that once would have stayed with a single shift.
- 6 of the 9 SALP 1 plants surveyed had exercise facility on site
- One plant had a program to allow fitness breaks during shift
- All plants surveyed planned to increase focus on how to remain alert on shift
- The decisions are made at the lowest appropriate level.

ATTACHMENT 5 - NRC MODEL

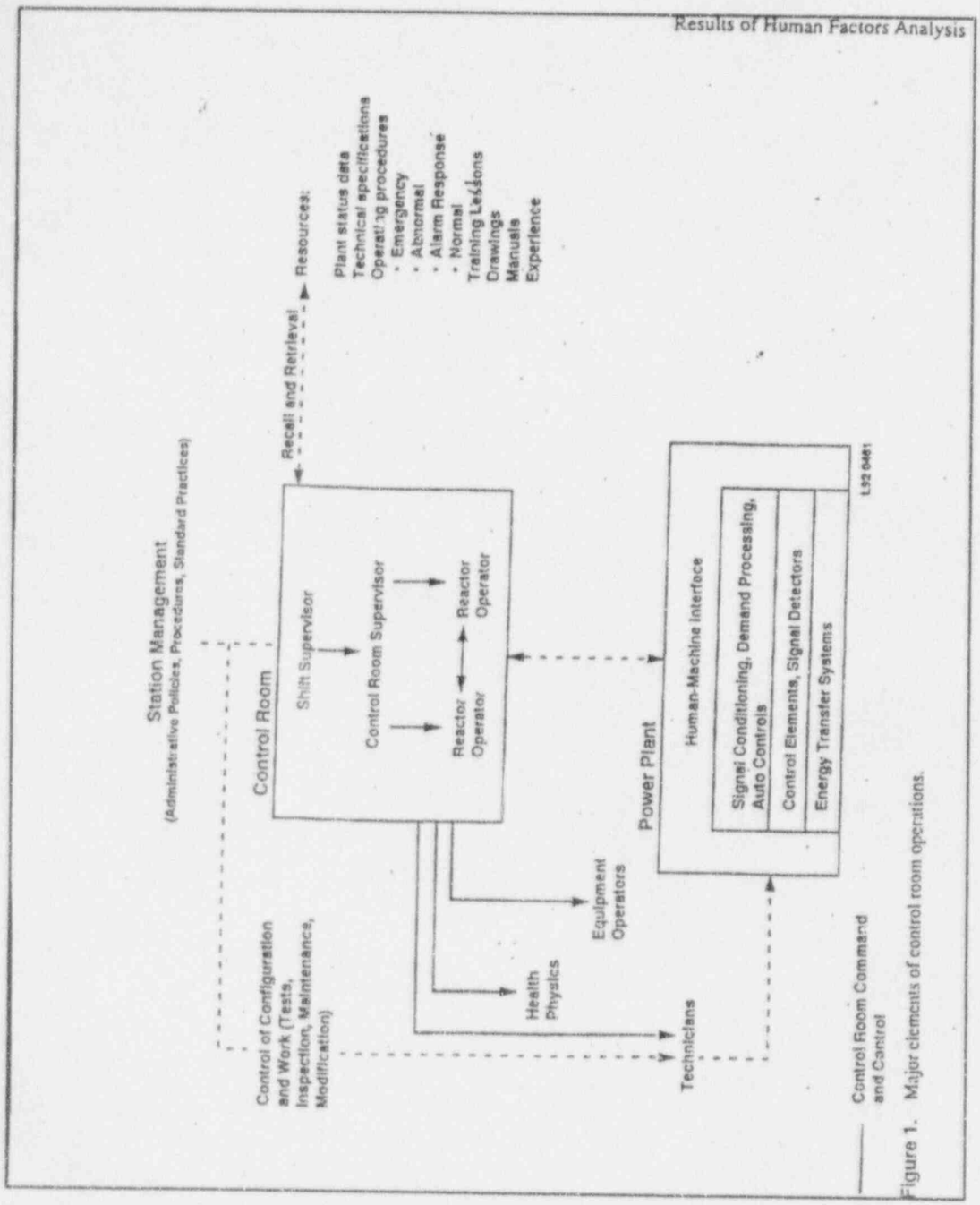
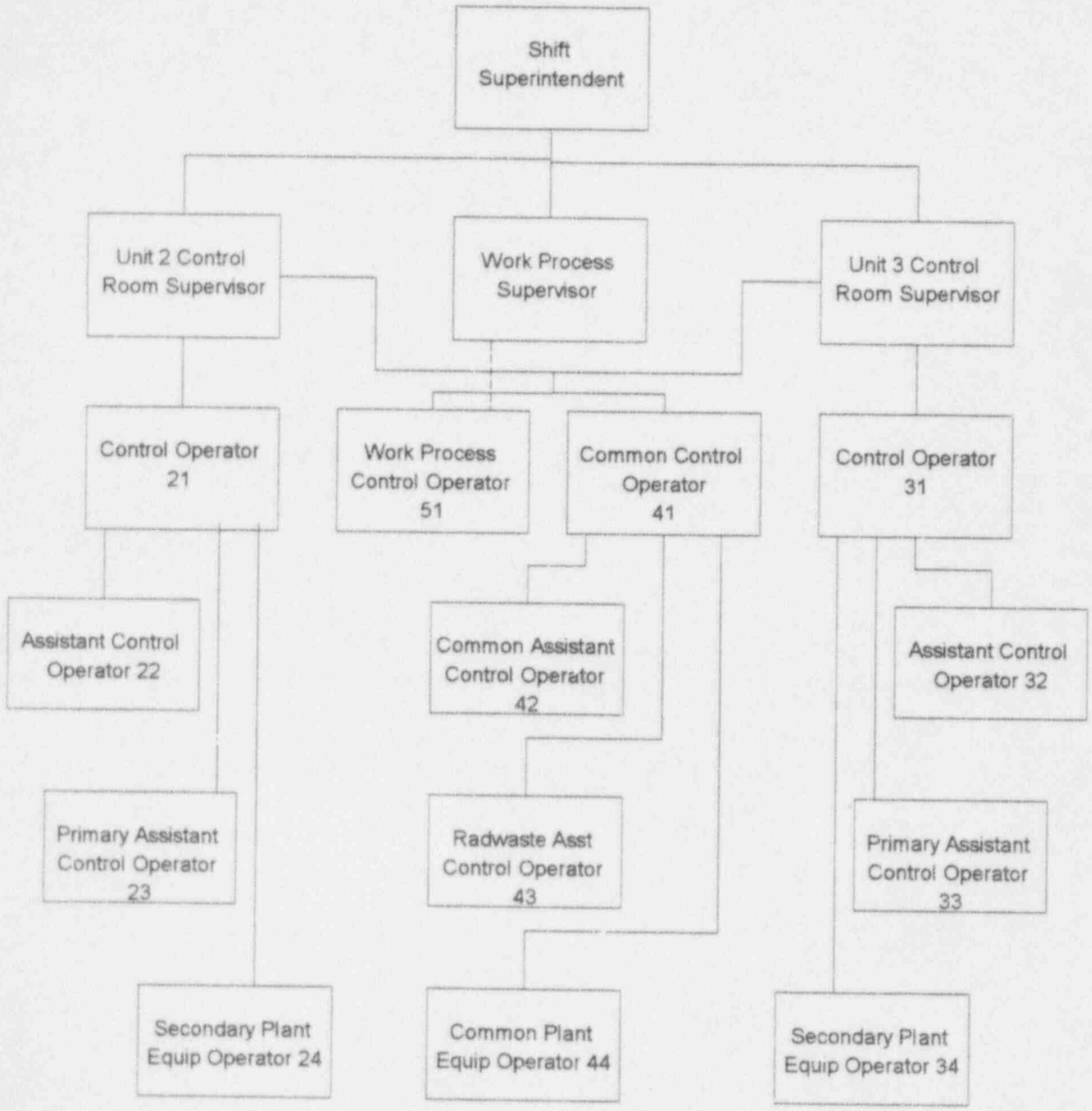
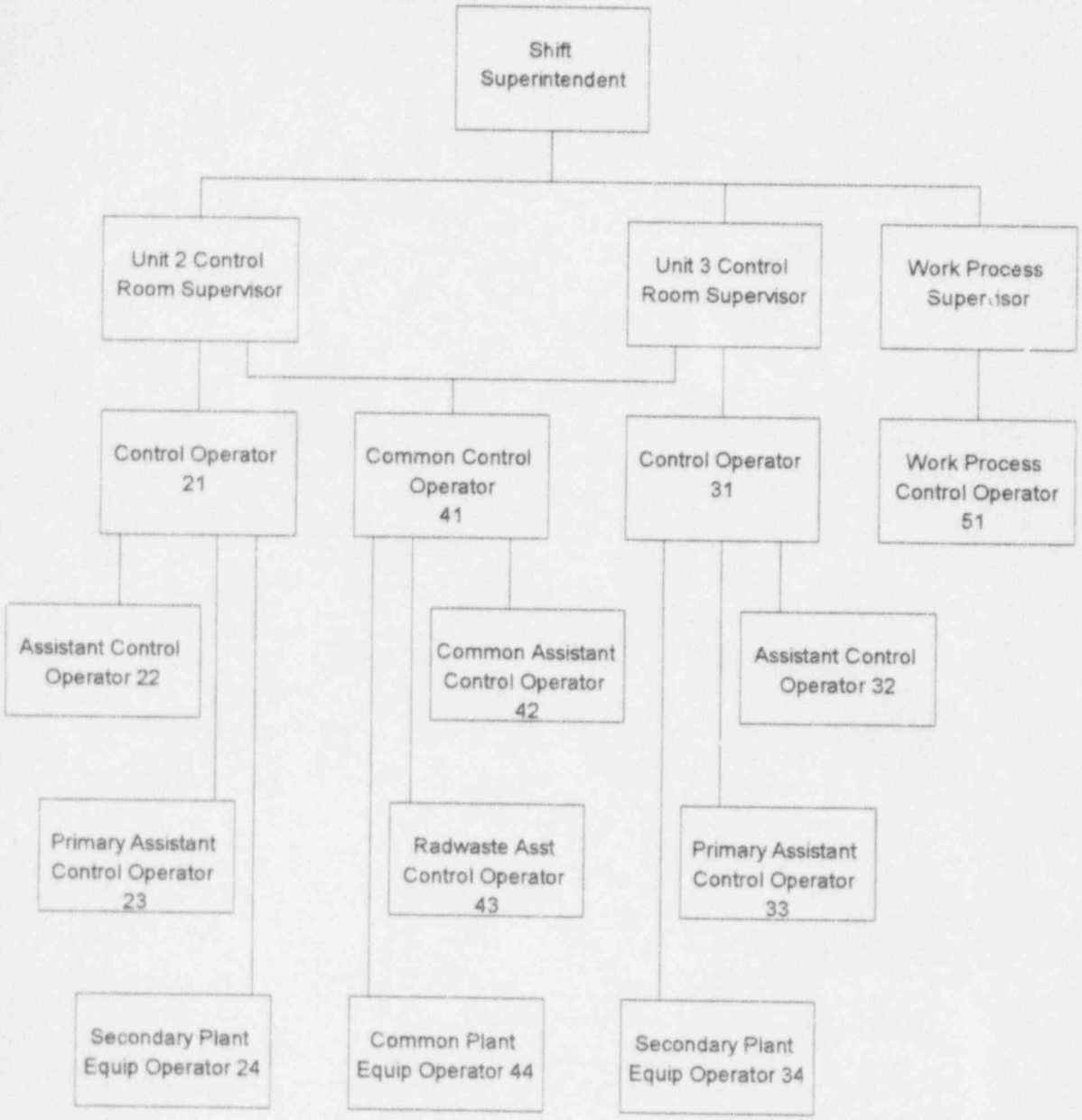


Figure 1. Major elements of control room operations.

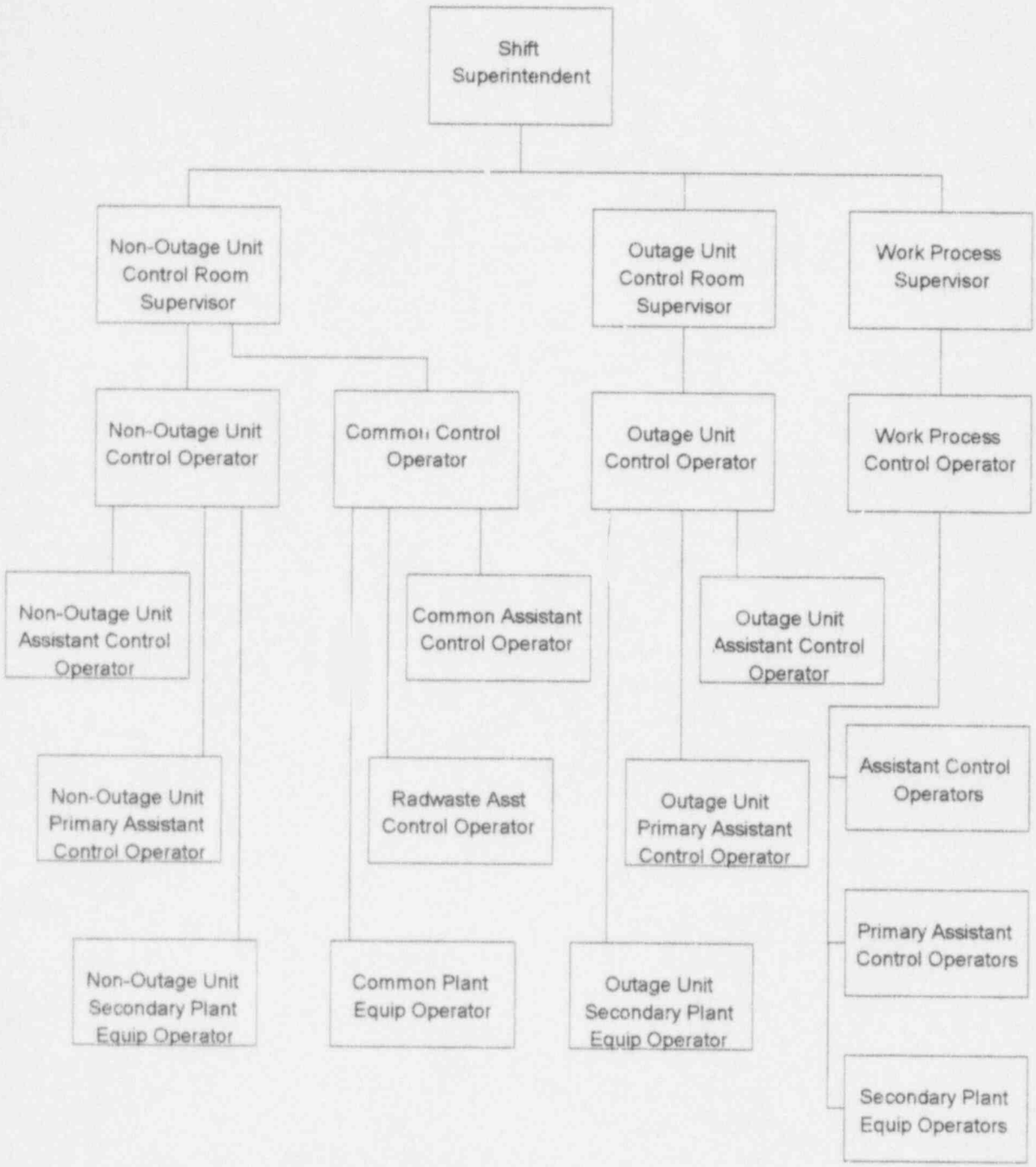
ATTACHMENT 6 - CHAIN OF COMMAND FROM SO123-0-30



ATTACHMENT 7- CHAIN OF COMMAND (POWER OPERATIONS)



ATTACHMENT 8 - CHAIN OF COMMAND (OUTAGE PERIODS)



ATTACHMENT 9 - PROBLEM SOLVING

One of the keys to successful problem solving is to recognize that a problem exists. Often what might at first seem to be a slightly off-normal condition is, in fact, an early warning of a developing problem. Identification of problems is a skill developed by operators as they experience problems and resolve them. Recognition of problems is often dependent on having an expectation for what should be expected or what is normal.

During outages, recognizing an off- normal situation may be difficult as many of the plant conditions with which operators are confronted are first time events for that operator or the entire crew. The situations identified below are examples when the Good Operating Practice (GOP) model for problem solving should be implemented.

- Plant conditions do not match expectations of crew
- Plant conditions do not match procedural requirements or plant picture
- Any active component failure
- Unexpected system or component response
- Reports of off-normal conditions in the plant

When an off-normal condition is identified and the GOP problem solving model is entered,the evolution at hand should be stopped and the plant must be placed in a stable condition. It is assumed in the problem solving GOP that actions required to stabilize the plant and stop the evolution in progress have occurred prior to initiating problem solving.

GOP PROBLEM SOLVING STANDARDS

CRITICAL STEP	GUIDELINES
1. Gather all facts	o All available recorders and meters used? o All involved personnel questioned? o Actual controlling documents including logs, prints, collected?
2. Determine probable causes	o All data considered and explained? o Anomalous conditions isolated and defined? o Help called in as needed?
3. Confirm diagnosis and report	o Action plan developed and recorded? o Procedures developed as appropriate? o Action plan implemented correctly? o Expected results achieved? o Reports and notifications made correctly?

The first critical step, "gather all facts," describes the task of collecting all available information. The intent is to guide the use of all available indications and information. The information that is available includes elementary diagrams and other prints, as well as logs and personnel who may have information.

When performing the second critical step, "determine probable causes," the guidelines specify to call for help as needed. This guideline is intended to encompass notification of supervision and then, if additional help is required, supervision would make the decision to call for outside assistance, such as Station Technical. Informing supervision of problems as early as possible after problem identification will allow more timely response when administrative and technical research is required to solve the problem. This critical step is where the real problem solving takes place. The guidelines attempt to describe the process of determining what is normal or expected such that the current problem or deviation from normal can be identified, understood, and corrected.

The third critical step, "confirm diagnosis and report," characterizes the final stage of problem solving where documentation of actions and results occur. Verification of expected results is a key to successful problem solving.

The variety of problems with which operators are confronted prevents the development of a model that will work for all situations. With all the GOPs, the intent is to provide a base from which operators can build their skills in problem solving. During off-normal event problem solving, additional considerations should be addressed. These are not all inclusive, but provide examples of good practices that improve team problem solving during off-normal events. Some of the additional considerations are listed below:

- Ensure appropriate plant monitoring is continued during problem solving efforts
- Encourage teamwork through utilization of all expertise and knowledge
- Prioritize actions to address probable causes first
- Ensure actions taken do not cause unnecessary plant evolutions
- Document plan and actions taken to prevent subsequent crew from repeating actions
- Preserve information if possible to support determination of root cause at a later time