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Guidelines for Performance Improvement at Nuclear Power Stations

INSTITUTE OF NUCLEAR POWER OPERATIONS

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Foreword

This document is in response to many requests from INPO member utilities for a clearer understanding of the performance improvement function. Additionally, the document reinforces the underlying concept that high-performing nuclear stations seek to continually improve the quality of their operation by identifying and closing important performance gaps.

INPO previously issued AP-903, *Performance Improvement Process Description*, in June 1997. That document overviews many performance improvement processes; however, it does not provide the needed management perspective on how to implement an effective overall approach. Additionally, recent experience has shown the need for a clearer definition of what constitutes excellence in performance improvement.

This document describes excellence in performance improvement. It focuses on the attributes of an effective integrated approach and defines the characteristics of successful individual component processes and activities. The target audience for this document is line managers in nuclear plant organizations. Effective line management involvement and ownership are essential to success in performance improvement activities.

It is not the intention of this document to simply restate existing guidance. Rather, it is intended to provide an additional level of detail beyond previous INPO documents without being unnecessarily prescriptive.

Throughout this guideline's development, an industry Performance Improvement Committee provided valuable input, advice, and document review. INPO acknowledges the significant contribution of this committee by listing the committee members in Appendix A.

This document is issued as a "preliminary" version to allow industry input and subsequent revision, if needed. Nuclear station personnel are encouraged to provide comments on the content and format of this document. INPO intends to revise

the document as appropriate based on industry feedback after about a year of use. Please direct any comments on this document to:

Manager, Performance Improvement and Learning
Institute of Nuclear Power Operations
700 Galleria Parkway, SE, Suite 100
Atlanta, Georgia 30339-5943

As with other INPO guideline documents, this document is intended to be a resource for managers and staff seeking effective ways to improve performance. The process and activities described herein apply to a variety of performance improvement activities. Although some guidance is specific to facilitate consistent implementation, other guidance is more general and provides the opportunity for an array of responses.

These guidelines are intended to stretch the performance of even the best performing stations. Other stations may find that more substantial changes are needed to implement some of the guidance contained herein. INPO expects that member utilities will implement the intent of these guidelines but recognizes that how the intent is met may vary. The Discussion and the Supporting Manager Behavior paragraphs in the document describe the intent.

These guidelines align with performance objectives and criteria described in INPO 05-003, *Performance Objectives and Criteria*, May 2005.

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SECTION I

General Introduction

A. Initial Concepts

INPO has issued several documents that address various aspects of performance improvement in addition to AP-903, *Performance Improvement Process Description*. These include *Principles for Effective Self-assessment and Corrective Action Programs*, December 1999 and INPO 97-011, *Guidelines for the Use of Operating Experience*. Individually these documents have provided valuable insights to advance performance in isolated areas; however, to date no single document has fully integrated the various elements into one workable, management-level guideline. The purpose of this document is to provide guidance that captures industry standards of excellence. By using this document, line managers can compare current station performance and make necessary performance improvements to fill identified gaps.

B. Developing a Performance Improvement Model

A Performance Improvement Model was developed to help determine the content of this document. The model, shown in Figure 1, focuses on achieving results, identifying performance gaps, and developing targeted actions to close the gaps.

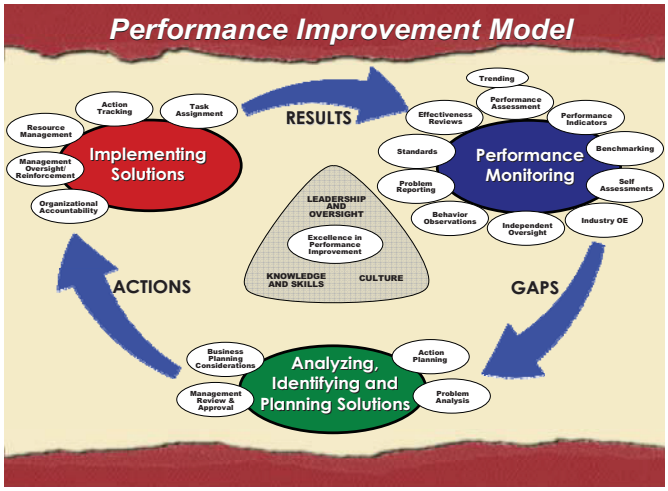

Figure 1

This model – a full-size version is included in Appendix B – identifies the attributes of a good performance improvement process, as follows:

- PERFORMANCE MONITORING – This refers to those activities that assess current performance and identify GAPS between current and desired levels of performance or RESULTS.
- ANALYZING, IDENTIFYING, AND PLANNING SOLUTIONS – This is collection of activities that determine ACTIONS needed to close the GAPS.
- IMPLEMENTING SOLUTIONS – These are the collective activities that result in applying the chosen solutions to close the GAPS.

This document is organized around these three central attributes, which are described more fully in sections III, IV, and V that follow. These attributes can be applied to a variety of performance improvement scenarios, including addressing human performance improvement, improving overall organizational performance, or improving a narrow technical or administrative issue. A station's performance improvement activities, when looked at collectively, are the result of applying this model systematically to many smaller individual problems.

The Supporting Management Behaviors for those activities that comprise these central attributes as well as the associated Warning Flags that may indicate impending problems are included in Appendix C.

C. Important Organizational Traits

A few important organizational attributes are depicted in the center of the model. These attributes – leadership and oversight, staff knowledge and skills, and organizational culture – profoundly affect how the model functions and how it is most effectively applied.

Leadership and Oversight: Strong leadership and oversight, along with a dynamic learning environment, promote effective performance improvement. As can be seen in the Supporting Management Behaviors (Appendix C), managers –and senior site managers in particular – establish and fuel the enthusiasm for organizational learning. They also set high standards that challenge the status quo and ensure that basic processes upon which performance improvement is built are robust, well-supported, effectively monitored, and sustained.

Senior site managers recognize the value of their personal interest in and oversight of performance improvement activities. Throughout this document, importance of strong management oversight is a recurring theme. Some stations use special review boards, such as corrective action review boards, self-assessment review boards, or condition (report) review groups, to provide a challenging management oversight environment. Leaders at these stations frequently chair important review boards themselves. They use these boards to establish and align the management team to high standards that challenge the organization to continuously improve. Such collective review groups, however, are not permitted to undermine or dilute individual line manager oversight and ownership of activities within their groups. Also, while there is value in conducting collective management reviews using a board approach, equally effective management oversight and results can be achieved by other means.

Senior managers, as leaders, help create a "burning platform" vision for change when such an impetus may not be apparent to others. They do this by observing the organization in action, being alert to signs of complacency, and refocusing the organization on continuous improvement through benchmarking, emulation, self-assessment, and a strong use of operating experience. Senior managers also engage the workforce by reinforcing the improvement vision and encouraging worker participation in committees that oversee improvement initiatives. Through informal discussions in the field, managers can gauge the degree of worker engagement. The strategic use of performance metrics and performance

goals is also important to ensuring effective workforce engagement. These metrics and goals set and give wide visibility to progress against important performance targets.

Finally, a crucial aspect of leadership is the ability to envision what does not yet exist, thereby promoting breakthrough performance. This is further explored in Section III.

Culture: Managers consider the organization's culture (norms and values) as they implement performance improvement activities. At successful stations, leaders/managers understand how things are and how things get done. They use that understanding to tailor approaches to the various performance improvement activities by taking advantage of cultural strengths while avoiding problems caused by relying on cultural attributes that are not as strong. For example, a problem solution that relies on individuals taking responsibility for complex actions and carrying them out effectively with little ongoing oversight may not be appropriate in an organization that lacks maturity in self-accountability or that, under pressure, emphasizes production over quality.

Problem reporting is another vitally important aspect of station culture that managers and leaders strongly influence. Leaders understand the importance of a strong problem-reporting culture and ensure it receives the appropriate level of programmatic and day-to-day support. This support, along with robust problem resolution, helps build worker confidence in the value of reporting issues that can help prevent a degraded safety-conscious work environment.

The degree to which the station values the lessons learned from previous industry and internal operating experience is another cultural factor that can influence the outcome of performance improvement activities. The effective use of operating experience pervades operations at stations with strong nuclear safety cultures.

Knowledge and Skills: The knowledge and skills of those implementing key performance improvement activities are

important contributing factors at stations where such activities are routinely performed well. At these stations, cause analysts, self-assessment team members, Corrective Action Review Board members, and line managers are all sufficiently trained on their particular supporting roles. Training is repeated when cause analyses or other indicators determine that knowledge and skills are weak or declining.

Likewise, the knowledge and skill level of the workforce is a key factor in selecting solution alternatives and implementation strategies and in defining areas for focused oversight and performance monitoring. If unplanned retirements of key personnel are depleting the knowledge and skill level of the maintenance workforce, for example, that group may need to address that situation when resolving problems. The strategic use of training can be applied to improve performance, including addressing knowledge retention for foreseeable losses. Additionally, new knowledge and skill needs may need to be addressed to help the workforce effectively implement improvements.

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SECTION II

Excellence in Performance Improvement

Excellence in performance improvement is embodied by the organization that views improving performance as a never-ending journey rather than a finite destination. Such an organization strives at all levels to achieve high levels of performance by effective application in the three key attributes of the performance improvement model (Appendix B) – performance monitoring; analyzing, identifying, and planning solutions; and implementing solutions.

The following characteristics are evident in manager behaviors routinely observed in high-performing organizations:

- **Self-critical**
  - proactively seeks opportunities to further improve
  - values early identification of performance weaknesses and shortfalls
  - correctly analyzes and interprets inputs and feedback to promptly identify performance shortfalls
  - believes the least positive performance feedback
  - encourages a questioning attitude among the staff
  - avoids complacency by constantly comparing performance to stretch goals and industry standards of excellence
- **Seeks excellence in performance**
  - avoids being driven solely by compliance to minimum acceptable standards
  - actively seeks gaps between current and desired performance
  - focuses on demonstrating improved performance through results
  - occasionally takes informed risks to achieve "breakthrough" levels of performance
- **Diverse in approach**
  - uses multiple inputs and approaches to assess performance

  - uses innovative, new approaches to resolve problems when appropriate
  - uses benchmarking results to improve performance
- **Prioritizes effectively**
  - addresses issues consistent with their safety and reliability significance, considering both the likelihood and consequences of occurrence; effectively discriminates the important from the unimportant
  - understands that sometimes safety considerations may involve pursuing several issues at the same time
  - manages backlogs so that they do not impede recognition of or response to issues of safety and reliability significance.
- **Develops effective actions**
  - analyzes problems to determine their causes, consistent with their overall risk or significance of recurrence
  - develops actions (or action plans) consistent with the safety and reliability risk of issues as well as overall business objectives
  - considers organizational characteristics and culture when developing planned actions
  - builds appropriate defense-in-depth actions to address important problems
- **Implements well**
  - applies appropriate resources and direction to maximize the likelihood that planned actions will be implemented successfully
  - maintains a bias for action through effective management oversight and accountability and by assigning appropriate corrective action ownership to working-level individuals
  - uses change management principles to help ensure effective implementation of corrective actions
  - monitors progress of improvement actions and acts quickly when implementation shortfalls are detected
  - ensures key stakeholder support follows up with effectiveness reviews of important corrective actions

- **Broad organizational involvement**
  - avoids the assignment or perception of the assignment of performance improvement to a single, central group without appropriate line management involvement and ownership
  - makes appropriate adjustments when key personnel changes are made to support ongoing performance improvement activities

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SECTION III

Performance Monitoring

Performance monitoring activities identify gaps between current levels of performance and desired management or industry standards.

Performance monitoring is unique among the major elements of the Performance Improvement Model because it contains both proactive and reactive components.

The proactive aspect of performance monitoring involves identifying precursor-level problems for resolution before they become larger organizational issues. Included are such activities as self-assessments, use of low-level performance indicators to identify deteriorating performance or behaviors, benchmarking, and routine trending and performance assessment.

The reactive aspect of performance monitoring involves activities such as problem discovery and reporting, corrective action effectiveness reviews, and management review of and response to top-level station performance indicators, such as those depicting lost generation events and significant human performance breakdowns.

Effective managers achieve a blend of both the proactive and reactive aspects of performance monitoring. When proactive measures are not sufficiently used, a station or organization may "live in the past," primarily reacting to emerging problems rather than predicting and resolving issues before they become consequential. Conversely, if management is overly focused on proactively discovering new performance gaps, existing or emergent performance issues that need attention may go unresolved.

A graded approach based on safety and reliability impact can be useful in selecting which performance monitoring activities to pursue. Successful stations focus most of their efforts on those systems, processes, and performance aspects with the highest potential consequence or highest potential gain.

Various elements and activities that collectively support excellence in performance monitoring (shown on the Performance Improvement Model in Appendix B) are addressed below. Each subsection describes the principles and attributes

that make that performance improvement element successful. The DISCUSSION portion of each subsection defines excellent performance in that element. SUPPORTING MANAGEMENT BEHAVIORS showing key management actions essential to success in that element and WARNING FLAGS that may indicate a need to strengthen performance in that element are also separately included in Appendix C.

The elements of overall performance monitoring discussed below are as follows:

- Standards
- Self-assessment
- Performance indicators
- Performance assessment and trending
- Benchmarking activities
- Plant and industry operating experience
- Independent oversight
- Behavior observations
- Problem reporting
- Effectiveness reviews

Establishing effective performance monitoring activities involves the use of diverse and multiple monitoring approaches. Defense-in-depth and the likelihood of identifying performance shortfalls are strengthened when several diverse inputs and methods are used.

A. Standards

Discussion

High standards are used as a baseline to identify gaps and advance performance. They are frequently incorporated into top-level business goals, and are realistic, achievable, yet challenging. These may include broad station management standards, best industry practices, industry operating experience

lessons learned, selected regulatory requirements, and management expectations for a particular activity.

Stations avoid comparing their performance only to practices that are internal or only to practices within their fleet of plants. This reduces the likelihood of missing important opportunities to embrace new, higher standards from outside the organization. Stations consider comparing their performance or practices to other industries; for example, benchmarking contamination control practices with the pharmaceutical or microchip manufacturing industries.

Members from outside the station or line organization periodically participate on self-assessment teams to add diverse performance standards. Such outside involvement protects high-performing stations from becoming overly dependent on internal standards as a basis for defining performance gaps.

Benchmarking and self-assessment against industry standards of excellence are not solely relied on to identify performance improvement opportunities. Individually and collectively, managers and leaders consider areas where existing performance, while perhaps acceptable, could be significantly improved through a "breakthrough" approach. In some cases, the potential for performance breakthroughs is discovered during benchmarking outside the nuclear industry.

Ingenuity, innovation, and a willingness to try new approaches are among the attributes that come into play when breakthrough performance improvement is considered. An example of this is the vision and subsequent achievement of short-duration yet effective refueling outages within the industry.

B. Self-Assessment

Discussion

The guidance in *Principles for Effective Self-Assessment and Corrective Action Programs*, December 1999, articulates, at a high level, an effective approach to self-assessment and discusses different types of self-assessments. The discussion below supplements and expands on that guidance.

Self-assessment activities, whether they are focused or ongoing as part of the daily activities necessary to support plant operation, are critical of performance and identify performance shortfalls.

Self-assessments also appropriately identify worthwhile activities to close performance gaps and reinforce desired behaviors. Gaps between actual performance and desired performance are captured in the corrective action system for analysis.

Self-assessment-identified enhancements to current performance are tracked to action completion. Any enhancement not acted upon is dispositioned with a basis as to why action was not taken. An example of an enhancement would be a procedure or process that works as written, but that could be done more efficiently and in a manner that would be clear to an inexperienced worker. One simple yet effective way to disposition enhancements, including those for which no action is planned, is to annotate the item's disposition—referencing, as appropriate, corrective action documents or other tracking numbers—in the final, management- approved version of the self-assessment report.

A prioritized, long-range, "living" self-assessment plan drives the self-assessment effort. The plan embodies a variety of self-assessment methods to identify performance gaps to internal and external standards, and, perhaps, standards outside the nuclear industry. The plan strategically targets some known or potential site performance issues for further investigation while pursuing other areas in a mostly exploratory manner. A long-range, living plan also does the following:

- integrates assessment efforts, taking credit both for those that are internally-conducted and others that are externally driven, such as regulatory inspections, plant evaluations, accreditation team visits, assistance efforts from INPO, WANO peer reviews, and off-site safety review group reviews

- blends some proactive self-assessments with others that are driven by actual or suspected current performance weaknesses
- appropriately plans follow-up self-assessments at routine intervals of some areas—In this manner, the self-assessment becomes an effectiveness review (see item J. below).
- is flexible and accommodates emergent assessment needs, perhaps dropping a scheduled lower-priority, proactive self-assessment to make room for the emergent need—This might be necessary if an external assessment or inspection activity points out a need to explore a particular aspect of performance in more detail.
- uses a "graded approach" to scheduling self-assessment activities—This approach gives the most weight and importance to self-assessments of those programs and activities that result in the greatest organizational risk if done incorrectly. "Risk" in this context comprises the risk to nuclear safety, industrial safety, radiological safety, and plant reliability. It also includes an estimate of the likelihood of significant performance shortfalls. This likelihood can be inferred, in part, from trending and other performance monitoring inputs, such as regulatory inspection reports, INPO plant evaluation and accreditation team visit reports, and performance indicators.
- aligns with the overall station performance level, recognizing the natural tension between assigning resources to assess performance and using those same resources to fix identified problems—Plants at different levels of performance will likely seek different balances of self-assessment activities and problem resolution efforts. For example, a plant experiencing significant performance weaknesses may choose, in the near term, to devote more effort to addressing known issues than to defining new issues to resolve. It is important in such situations that self-assessment efforts provide a focus on the quality of corrective actions. Another plant performing well overall may choose to conduct a wide range of self-assessments in

different functional or cross-functional areas to help avoid organizational complacency.

To help ensure quality results, participants on self-assessment teams have strong technical competence and analysis skills and, for team leaders, strong leadership and facilitation abilities.

Managers oversee the planning and implementation of self-assessments to ensure they focus on key site issues and that completed self-assessment activities are of a high quality.

C. Performance Indicators

Discussion

Both station- and department-level management use an established set of performance indicators to oversee and monitor current and past performance for evidence of declining trends. INPO 01-005, *Indicators of Changing Performance*, December 2001, provides information on how member utilities can enhance their use and selection of performance indicators.

Managers select performance indicators to monitor "critical attributes" on an ongoing basis. These indicators communicate what is important to the organization and what the performance standard is. By their nature, performance indicators will effect change and drive performance toward the standard.

Periodic management reviews challenge performance indicator trends, determine why performance is declining, identify actions to remedy declining performance, and clearly assign accountability for implementing corrective actions.

Managers also periodically review and challenge performance indicators to ensure they provide ongoing value and stimulate the right performance level through appropriate selection of performance thresholds. Some performance indicators that are no longer relevant because they resulted in achieving and sustaining the desired level of improvement are eliminated. New indicators are periodically added to address emerging areas of interest.

Indicators support overall industry performance monitoring efforts (for example, WANO performance indicators). They also support local performance issues or management focus areas. For example, a station experiencing problems with excessive valve packing leakage may adopt an indicator to measure effectiveness in resolving such leaks. As a second example, plants can use performance indicators to help reduce out-of-service control room annunciators.

Some indicators may line up with business plan objectives and help management gauge progress in meeting those objectives.

At the department level, performance indicators depict lower level performance trends and support department management focus areas.

Responsibility for meeting performance goals measured by indicators is clearly assigned and understood.

The indicators chosen include some that are backward-looking yet can be used to predict future performance if certain assumptions hold true. An example would be the industrial safety accident rate or measures of precursor behaviors. Managers can use these indicators to adjust the emphasis placed in these areas. Other indicators, such as fuel reliability, may be of value primarily for their information on the plant's current state.

Performance indicators are chosen to avoid undesirable consequences. Otherwise, additional indicators are used to monitor for the occurrence of such consequences.

Effective performance indicators typically have the following attributes:

- quantifiable (measurable)
- based on performance data that is readily obtained
- clearly defined and easily understood
- limited in number so that management reviews focus on the most important performance measures

- relevant to current station or industry performance challenges
- challenging with their targets

D. Performance Assessment and Trending

Discussion

Performance assessment involves analyzing the issues contained in a wide variety of documented performance information, including the following:

- corrective action data or data trends
- self-assessment or benchmarking results
- observation data, by both station personnel and external groups
- performance indicator information
- lower-tier issue reporting systems (for example, simulator issue tracking, personnel contamination occurrences)

Line managers use periodic performance assessments to:

- detect performance issues at a low level before they become consequential
- assist in resource management by identifying and eliminating low-value assessment or monitoring activities
- assist in identifying the most risk-significant or important issues on which to act
- identify issues needing further analysis and intervention, and
- assist in identifying and resolving cross-organizational performance issues.

Traditional statistical trending that monitors, by graphical or other means, the frequency of cause codes, event codes, and keyword flags supports the performance assessment function.

Problem event codes are trended to detect actionable adverse trends as are cause codes assigned during root cause analyses. Additionally, some stations trend causes identified during apparent cause analyses when a high confidence in their accuracy exists or when the station simply desires to increase the trending dataset size because root cause analyses are infrequently performed. Trends can then be analyzed using a combination of techniques, such as cognitive analysis, additional statistical trending, binning, and a comparison of apparent performance issues against existing action plans, to identify where those issues may already be addressed.

Cross-organizational issues that may escape detection at the individual line department level are identified through structured cross-organization discussion forums or are separately derived by independent analysis of trend aggregates across all station departments.

The results of line department performance assessments are shared with the senior site management team at periodic intervals, such as monthly or quarterly. Effective performance analysis efforts typically identify two or three worthwhile adverse performance trends or gaps for action each review period. These issues are analyzed and prioritized and action plans developed as appropriate, as discussed in the next phase of the model. (See Section IV.)

Some stations, in addition to identifying adverse trends for action, capture trends in a “monitoring” status. Such trends are those that may not yet rise to the significance level of others but are flagged for observation so they are not forgotten. Others in this category may be emerging trends that need further observation before the need for action is decided.

The performance improvement or corrective action group may independently validate the performance assessment conclusions of line management.

E. Benchmarking Activities

Discussion

Periodic benchmarking ensures that the station does not become isolated, but stays connected to the rest of the industry. Seeking and drawing from the experience and practices of other organizations that are achieving success in an area, both within and outside the nuclear industry, helps management learn about different and better ways to achieve results.

Managers oversee development of a strategic benchmarking plan. The benchmarking strategy takes advantage of known opportunities for industry interfaces (such as industry meetings or participation in courses or seminars) as well as sharing self-assessment resources with others in the industry. The strategy also considers participating in INPO plant evaluations, WANO peer reviews, accreditation team visits, assistance efforts, targeted visits to other stations, and benchmarking through direct, utility-to-utility contact in specific areas. The strategy considers both known areas of performance weakness, for which the purpose may be to find solutions, and other areas where performance has been strong, for which the purpose might be to identify gaps or better ways of performing an activity in order to avoid complacency.

Managers require and review written plans for major benchmarking activities, such as visits to other sites, to ensure the plans are thorough and specific and are likely to yield effective results. Such plans outline the scope, objectives, and deliverables of the benchmarking effort.

Similarly, managers require and review reports of completed benchmarking activities to approve those practices to be implemented and the bases for those not to be implemented, as well as to ensure effective tracking of performance gaps (through the corrective action system).

Managers take advantage of “reverse” benchmarking opportunities by routinely asking station visitors to share their observations regarding areas for further improvement.

A composite review of benchmarking lessons learned may be conducted to reinforce the need to take action on the results and to ensure that broad cross-disciplinary lessons learned or cultural or other organizational contributors are not overlooked.

F. Plant and Industry Operating Experience

Discussion

Operating experience provides an opportunity to proactively learn from both internal and external mistakes and mishaps. Thorough application of internal operating experience can reduce the likelihood of consequential recurrence of an event. Rigorous use of industry operating experience helps ensure problem identification and correction before consequences from a previously unseen weakness occur. Managers can also use operating experience to set standards of comparison, as discussed earlier in the subsection on self-assessments.

Appropriate screening and review of incoming industry operating experience is important to identifying opportunities to effectively apply the experience of others. Typical sources of industry operating experience include INPO publications; SEE-IN documents; regulatory letters, bulletins, and notices, and vendor manuals and bulletins.

Other sources of operating experience are internal events and near misses. Key to effective use of internal operating experience is the timely communication of this experience to those planning or performing similar work.

The implementation of selected Significant Operating Experience Report (SOER) recommendations is periodically assessed. Such assessments or effectiveness reviews focus not only on the accomplishment of specific activities, but also on whether the intent of the recommendation continues to be achieved.

INPO 97-011, *Guidelines for the Use of Operating Experience,* provides additional useful information on this subject.

G. Behavior Observations

Discussion

Management values and uses behavior observations as a performance monitoring tool. A principal benefit of such behavior observations is increased manager and supervisor presence with workers in the field. They help managers better understand worker challenges, concerns, and actual performance. Behavior observations can also bring to light organizational weaknesses that may not be obvious by other means. An additional important benefit is the gathering of information on precursor-level undesired behaviors that, if assessed and addressed effectively, can help prevent events.

Some stations also use peer-to-peer observations in areas such as industrial safety, as a tool to increase ownership of behaviors at the worker level and to reinforce the ongoing importance of performance improvement efforts.

Results of the behavior observation are captured and included in site trending or performance assessment activities (see item D above). Adverse behavioral trends identified by management during performance assessment activities are documented for further analysis in the corrective action system.

Positive behaviors that are captured can then be appropriately reinforced. Negative behaviors provide an opportunity for on-the-spot coaching and feedback.

Individual line managers oversee the scope of behavioral observation activities in their organizations. Managers define the behavioral attributes to be observed; create a reporting and feedback scheme so that workers observed receive direct feedback; and ensure the results are captured—confidentially where appropriate—for further analysis.

Station management considers the use of observations targeted on current management emphasis areas, such as behaviors determined to need improvement as identified by trending activities or other performance monitoring efforts.

H. Problem Reporting

Discussion

The document *Principles for Effective Self-Assessment and Corrective Action Program* acknowledges that a strong problem identification bias is an essential organizational characteristic. Senior site management is responsible for establishing and nurturing a strong problem reporting culture.

Senior management promotes a vision of problem reporting that emphasizes the corrective action program as the principal day-to-day problem reporting system. Other problem reporting options, such as the employee concerns program, are also made available to the staff.

If the station uses lower-tier reporting systems, management acknowledges and controls those systems and establishes clear guidance for their use. Managers oversee these systems, ensuring by periodic reviews that they do not contain problems that should be reported through the corrective action system.

I. Effectiveness Reviews

Discussion

Management uses effectiveness reviews as a tool for determining if past improvement efforts have resolved specific performance gaps. A subset or special category of self-assessment, effectiveness reviews focus on determining if the specific actions taken to address performance gaps had the desired effect. They can also identify implementation weaknesses in areas other than the specific area in which they were initially targeted.

Managers use effectiveness reviews, which are typically very narrow in scope, to gauge the effectiveness of improvement in areas such as the following:

- completed corrective actions to prevent recurrence of significant problems or address adverse trends

- actions taken in response to selected previous self-assessments
- as a feedback mechanism on the effectiveness of change management efforts
- implementation of SOER recommendations

Some effectiveness reviews, such as those reviewing actions to prevent recurrence of significant problems, may be driven by an existing process requirement. However, managers recognize the value of performing effectiveness reviews for other important improvement actions and do not limit their use to only corrective actions to prevent recurrence.

As noted above, effectiveness reviews focus not only on the completion of specific actions, but also on the results achieved. Where the reviews indicate that corrective actions may not have been effective, additional condition reports are initiated to address the shortfalls. (Some stations may have different names for the basic corrective action reporting document. For consistency in this document, the term "condition report" is used.)

Stations occasionally assign effectiveness reviews to independent groups to perform, particularly for repetitive issues where correction has been problematic. At other times, they retain ownership with the organization originally assigned the action that is being reviewed. Either method may be effective, as long as sufficient focus is maintained to resolve the problem.

Many stations find that identifying and assigning effectiveness reviews concurrently with approval of corrective actions to prevent recurrence helps ensure that specific and targeted reviews are performed for important corrective actions.

J. Independent Oversight

Discussion

Line management values independent oversight as a performance monitoring input. Such oversight is typically provided by the quality or nuclear assessment organization(s) (or other on-site

groups that have sufficient organizational independence) or by independent external groups such as an off-site safety review group and nuclear committees of the Board of Directors. The value of such independent groups is their ability to bring different experience, including experience at other stations, to bear. This can result in identification of cultural, process, leadership, and other performance insights that station management dealing with day-to-day performance challenges does not readily recognize as an opportunity to improve. As such, independent oversight groups add important defense-in-depth to the station performance monitoring effort.

To provide effective independent oversight, the quality organization routinely conducts performance-based field observations to supplement its audit and compliance-focused role.

Off-site safety review groups maintain a strong safety focus and avoid becoming overly focused on regulatory compliance matters.

Independent, high-level oversight organizations routinely use some individuals external to the utility to provide an external perspective.

Senior managers ensure line managers give full and careful consideration to the findings of independent oversight groups and that actions are taken to appropriately address issues raised by those groups.

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SECTION IV

Analyzing, Identifying, and Planning Solutions

The purpose of analyzing, identifying, and planning solutions is to develop appropriate actions to resolve performance gaps identified through various performance monitoring activities as well as those gaps that become self-revealing and are captured as condition reports after the fact.

Because performance gaps range from major station performance weaknesses to minor adverse behavior trends, the level of activity needed to complete analysis and corrective action identification and planning can vary widely. Additionally, because some performance shortfalls are more important than others, there is a need to choose which issues to address first and to select solutions that integrate well with the overall level of station performance and the management business planning focus areas.

The elements of analyzing, identifying, and planning solutions discussed below are as follows:

- Problem Analysis
- Action Planning
- Management Review and Approval
- Business Planning Considerations

Because problem analysis, action planning, and management review and approval are so closely intertwined, these are discussed separately but share a common set of Supporting Management Behaviors and Warning Flags in Appendix C.

A. Problem Analysis

<u>Discussion</u>

Problem analysis, using tools or combinations of tools such as root or apparent cause analysis, job-task analysis, common cause analysis, event investigations, human performance error investigations, and process analysis, uncovers the underlying causes of problems or adverse trends, commensurate with their significance.

Effective issue prioritization and management reviews are used to focus the organization and ensure that:

- the problem statement is correct so that the right issues are being addressed
- needed cross-disciplinary coordination and support are applied, and
- an integrated approach to performance improvement is followed such that highest-value improvements for the station are fully supported.

Root cause analyses are performed for significant problems (as defined by the station). Such problems typically include significant programmatic breakdowns; repetitive failures of Maintenance Rule components; and important events, such as a loss of or reduced core cooling, unplanned reactivity changes, or other events of the type listed in the Significant Event Screening Criteria in INPO 94-001, *Significant Event Evaluation and Information Network (SEE-IN) Program Description*.

Root causes identified are not superficial. They go beyond obvious problem causes (for example, an inappropriate worker act or equipment failure) to identify the fundamental cause(s) of why the act or failure resulted in a consequential event.

Root cause analyses determine actions to prevent recurrence of the event or problem. They achieve this by either preventing recurrence of the root cause(s) or by erecting sufficient barriers to prevent a recurrence of the root cause from becoming consequential. Root cause analyses additionally identify other actions to address selected, high-importance contributing causes that may provide additional defense-in-depth.

Root cause and selected apparent cause analyses identify organizational contributors to events. These include failed barriers, such as the use of previous industry or internal operating experience; flawed decision-making; deficient processes or procedures; and cultural concerns.

Apparent cause analyses identify corrective actions intended to minimize the likelihood of a consequential or unplanned

recurrence of the identified deficient condition or similar deficient conditions with similar causes (for example, inappropriate act or specific failure mode). They also may address one or more of the contributing causes, consistent with their importance, to further strengthen the barriers that can prevent the same or similar problems. Apparent cause analyses are often used to gain a better understanding of what happened or to determine the causes of lower-level performance gaps or adverse trends so that action can be taken to avoid a more serious event.

Root cause analyses specify the completion of effectiveness reviews of actions to prevent recurrence and other high-importance corrective actions as determined by management. Some stations also require effectiveness reviews of important corrective actions determined during apparent cause analyses. Typically, individuals conducting the analysis who are most familiar with the problem and its causes and contributors determine the scope of these reviews is determined at the time the cause analysis is completed.

Common cause analyses are performed for a series of similar occurrences, to better understand the common elements that need to be addressed or the underlying issues that may not have been identified when the occurrences were examined in isolation. Such analyses thus proactively seek to prevent future events by implementing more comprehensive corrective actions.

Extent of condition and cause are appropriately evaluated in all root cause analyses. Extent of condition is also evaluated in apparent cause analyses for repetitive equipment issues important to safety and reliability. These help identify areas where the same condition or cause could exist and to help focus the organization on what areas require further review. For example, the actions to address the extent of condition for a problem in which a valve gland follower was found cracked because of a material defect would be very different for one where the cause was found to be a deficient maintenance practice in which the follower was overtorqued.

Lower-significance issues are typically assigned an immediate cause or causes based on the facts known at the time of problem

identification. Corrective action for those issues focuses on correcting the deficient condition and may or may not correct the cause(s). Trending and performance assessment are relied on to determine if an adverse trend exists or emerges that needs more rigorous analysis and corrective action.

The risk or seriousness of the issue to safe and reliable plant operation drives the scope and depth of any type of cause analysis. This "graded approach" helps tailor the resource expenditure to the seriousness of the problem. Management reviews assure that problem statements are correct before analysis begins, so that the right issue is addressed. Management also ensures that the scope of a problem to be investigated is clearly specified.

B. Action Planning

Discussion

Action planning, an element related to problem analysis, selects and plans corrective actions to address performance gaps typically found in the form of problem causes and contributors, consistent with their significance. Planned actions to address problems are captured in the corrective action program.

Effective corrective actions specified in cause analyses share several characteristics. They are:

- SMART (that is, Specific, Measurable, Agreed-to by stakeholders, Realistic, and Timely)
- focused on fixing the identified problem
- directly linked to identified causes or contributors
- assigned to individuals for responsibility so that accountability is clear
- within the control of the assigned individuals or their organizations (See Section V.)
- compatible with the organizational culture and within the existing staff knowledge and skill base—Factors such as technical staff skills, supervisory burden, and the

knowledge and skill of the workforce are also important in developing corrective actions. This compatibility is selectively enhanced by involving worker teams in development of corrective actions or action plans.

- assigned due dates consistent with the risk or importance of the situation or condition being addressed
- incorporate appropriate industry and internal operating experience — Networking and benchmarking are also used in dealing with difficult or persistent issues to maximize learning from the experience of others.

Determining corrective actions to a problem often occurs in response to a condition report and the associated problem analysis. In other instances, management creates written action plans directly based on a more proactive or forward-looking approach to performance improvement.

Problems and problem contributors selected for correction are those of highest priority and importance from the standpoint of preventing problem recurrence and reducing the station's vulnerability to events. Each contributing cause not addressed, including organizational contributors, as well as the basis for taking no action is documented in the corrective action system.

Because of the interrelationship of action prioritization and due dates with other station initiatives, each due date extension receives at least the same level of approval as the assignment of the original date. Many stations require escalating levels of management approval for extending corrective actions beyond due dates.

Backlogs of corrective actions and open, unresolved problems are kept low enough to avoid impeding management's ability to identify and respond to issues of safety and reliability significance in a timely manner. At the same time, managers maintain awareness of lower priority issues in the backlog through periodic reviews and assessments. Issues are typically not permitted to linger unresolved in a backlogged status for extended periods of time.

C. Management Review and Approval

Discussion

Focused management reviews promote alignment and understanding of the following:

- the statement of the problem to be solved, as discussed earlier
- standards and expectations for the conduct of cause analyses, including such aspects as applying extent-of-condition and extent-of-cause analyses to more important problem analyses
- the link between specified causes/contributors and the corrective actions specified
- the degree to which major improvement actions and initiatives align with business objectives (see subsection D below) —These reviews ensure that resource expenditures are recognized and are appropriate to the issue's significance and that sufficient resources are available to address these issues.
- the actions to prevent recurrence of significant problems and selected other important corrective actions

These reviews may be conducted by a management team, a special review board (such as a Corrective Action Review Board), or individual managers, depending on the significance of the issue. Typically, manager teams review problem statements and identified causes and contributors for significant problems and corrective actions to prevent recurrence of such problems prior to implementation because they tend to be more resource intensive and often require cross-disciplinary support.

Such reviews promote the following:

- consistency of quality and approach
- thorough challenging of the analysis and intended corrective actions

- management team buy-in to analysis results and planned corrective actions, particularly to the extent that those actions need cross-functional support—This builds needed line ownership for the quality of the outcome.

Training and frequent practice help ensure a high level of knowledge and skill among those performing or reviewing problem analysis or problem analysis results.

D. Business Planning Considerations

Discussion

Important station business and strategic planning considerations are integrated with day-to-day corrective action program activities involving problem analysis and corrective action identification, self-assessments, and benchmarking.

Business planning activities embrace and rely on the same steps (gap identification; solution analysis, identification, and planning; and solution implementation) shown in the performance improvement model in Appendix B. The difference is that business planning addresses issues that are often forward-looking, strategic in nature, and larger in scope. Approval of such issues therefore often dictates how much additional work the station can handle.

For these reasons, assigned due dates for corrective actions associated with issues of lesser importance consider other major station activities, evolutions, and initiatives already in progress or included in the business plan. For example, scheduling a series of actions to address an important problem for completion in the middle of a planned refueling outage may be unwise if there is no reason to do so. Similarly, specifying extensive revisions to normal operating procedures during a time when a major change to owner's group guidelines will affect the emergency operating procedure content could overtax procedure-writing resources.

Major business plan initiatives are also considered when approving corrective action scope. For example, if a primary business plan focus area is a "back to basics" emphasis on crisp

execution of fundamentals, management reviews challenge important, resource-intensive corrective actions to ensure their consistency with the current business plan focus.

Business planning strategically addresses, where appropriate, recurring issues and important gaps identified through performance monitoring activities. In this respect, those activities "feed" the business planning process. Business planning and problem analysis and corrective action planning are linked, for example, in long-term, resource-intensive efforts to revise complicated processes. This linkage helps achieve a better balance between procedure level of detail and changing workforce experience levels, or adopt more effective approaches to human error reduction.

SECTION V

Implementing Solutions

The purpose of implementing solutions is to carry out the actions developed in response to identified gaps in order to improve performance.

An appropriate sense of urgency to improve performance is essential to keep improvement efforts from languishing. The workforce often easily understands that actions implemented to close consequential gaps in plant performance are important. The workforce may not as readily appreciate the importance of actions to address smaller performance gaps. Leaders, therefore, often serve as the motivators to create a bias for action when seeking a higher performance level (in the absence of consequences at current performance levels), by clearly communicating the initiative vision and the need for the improvement actions.

Implementing solutions begins after the identified performance gap has been analyzed, the solutions chosen, the tasks prioritized with due dates assigned, and all actions approved by management (refer to the Performance Improvement Model, Appendix B). It entails the detailed assignment, scheduling, implementation, management involvement, oversight, and reinforcement of the improvement actions. These activities, if not well done, can undermine the effectiveness of the entire improvement effort.

Line managers own and drive successful implementation efforts to achieve success in performance improvement, using various supporting processes and tools to assist in the effort. Success is evident when identified performance gaps are closed. Effective managers focus on achieving timely closure of the gaps and, equally, on the quality of those closure actions. They recognize that the thoroughness with which actions are implemented determine the effectiveness of improvement efforts. Senior managers reinforce and reward high-quality, well-implemented corrective actions that improve performance.

The elements or considerations relevant to successful solution implementation are discussed in the following subsections:

- Task Assignment
- Resource Management
- Action Tracking
- Management Oversight, Involvement, and Reinforcement
- Organizational Accountability

Each of these important aspects of implementing solutions to performance gaps is further discussed below. Although some were mentioned earlier, they are primarily discussed in this section because, for purposes of this document, they are part of implementing solutions.

A. Task Assignment

Discussion

Managers and/or supervisors are involved in task assignment to the degree necessary to ensure personnel assigned tasks are qualified (where applicable) and possess the talent, knowledge, experience, and skill to fully understand and carry out the actions being assigned to them. Manager involvement varies depending on the task, but high levels of involvement are necessary for complex tasks or tasks involving considerable process changes. Whether the task involves work in the plant or in the office by an engineer, a pretask briefing is one method managers and supervisors use to clarify and focus implementation efforts. Such briefings provide a forum for the line manager and supervisor to interact with those assigned actions and to ensure all have a common understanding of the actions to be performed and the expected outcomes.

Complex actions and actions involving cross-functional process or program changes are assigned to personnel with sufficient organizational and management skill to recognize and compensate for vulnerabilities that may inadvertently arise as a result of the changes. Likewise, technically qualified and experienced are assigned to revise technical aspects of the plant. Managers and supervisors increase their oversight and the frequency of their involvement where levels of knowledge and skill of those implementing the actions are less than optimum.

For tasks affecting many groups, assembling a cross-disciplinary project team to implement the actions may increase effectiveness. Such teams help ensure important aspects of implementing the actions are not overlooked and also promote teamwork among the workforce.

B. Resource Management

Discussion

Management considers the availability of suitable resources when implementing solutions to improve performance. This ensures that improvement actions are properly resource-loaded and coordinated with all the involved groups. The assurance of resource availability helps avoid a variety of undesirable consequences, the most typical being unforeseen schedule delays because other groups were unable to provide the needed support.

When, through resource loading or schedule slippages, it becomes obvious that the resources are not available to support assigned due dates, management revises the schedule, supplements the resources from outside the station, or uses a combination of both to regain the schedule. In making these choices, managers weigh the most effective course of action. They consider the tension between doing the work internally to keep costs down and ownership high and contracting supplemental resources for portions of the work to take advantage of special expertise or to augment resources to complete the work in a timely manner.

Managers also consider the potential training and oversight demands associated with using supplemental personnel. In stations where supervision is already heavily taxed, managers may choose a different approach to supplemental worker supervision (for example, obtaining supplemental supervisors to oversee supplemental workers) to enable the station supervisors to focus on their routine responsibilities.

This approach, however, may place more burdens on line management and the quality organization for periodic quality audits and reviews of the work. Stations successful in balancing

these considerations have been deliberate in their decision-making and persistent in ensuring that the work is done to a high level of quality, regardless of the group doing the work. (See INPO AP-930, *Supplemental Personnel Process Description*, Revision 1, for additional discussion on the use of supplemental personnel.)

C. Action Tracking

Discussion

Managers and supervisors establish methods to track the status of improvement actions and measure implementation progress against expectations. Line managers routinely share progress in implementing important improvement actions with fellow managers and senior station managers. This raises awareness of the cross-functional implications of task implementation and communicates any remaining challenges to the implementation plans.

Actions are systematically tracked to completion. In many cases, the tracking vehicle will be the station's corrective action process. In others, the station work management system may provide sufficient status measurement and controls for addressing equipment and facility issues. These methods, however, may be less useful for tracking progress of major projects such as administrative improvements, minor equipment issues, and enhancement activities. For such activities, some stations use alternate tracking systems. In these instances, managers ensure that sufficient oversight exists so the tracking method is updated and accurate and that shortfalls in implementing the actions receive appropriate management attention and are not "hidden" in the alternative tracking process.

Ultimately, management decides what systems will track the various categories of performance improvement activities. Many stations have found that simplifying and minimizing the number of tracking systems help establish the controls necessary to ensure that items cannot be closed from one tracking system to another without appropriate management review and approval.

D. Management Oversight, Involvement, and Reinforcement

Discussion

Principles for Effective Self-Assessment and Corrective Action Programs states, "Senior site management frequently monitors corrective actions to ensure:

- The age of outstanding corrective actions is reasonable.
- Resources necessary to address open corrective actions are available.
- Managers are held accountable for completing corrective actions."

Managers use established task tracking methods and reports to encourage the organization to maintain a bias for action. Effective monitoring also enables senior management to direct resource reallocation or other appropriate recovery measures in a timely manner.

When it becomes obvious that a single organizational group or a series of planned actions are falling behind, more detailed analysis is performed to determine the cause. If the cause is a shortage of resources, managers ensure that the outstanding work is characterized and that the most important actions are being taken first. If the rate of progress is still unacceptable, managers adjust the available resources by some of the means discussed earlier.

If supplemental personnel are used to develop and implement performance improvement actions, managers ensure that appropriate oversight means are established so the actions are of high quality and remain on target.

E. Organizational Accountability

Discussion

A strong culture of accountability exists in the organization. The notion of accountability as used here does not just apply to the manager with primary responsibility for completing a task. It also applies to managers providing cross-functional support. This accountability ensures that needed support is available and well coordinated, and that the whole organization is aligned around the right major priorities. It involves the concept of ensuring mutual success through mutual support.

Site management understands the culture of accountability within the organization and takes appropriate measures to strengthen it over time. In cases where a strong organizational culture of accountability is still being established, site managers ensure that sufficient interim direction and increased oversight are provided.

SECTION VI

Improving Performance – An Integrated Case Study

This section depicts how various performance improvement tools and techniques shown in the model in Appendix B can be used in an integrated manner to drive improvement in an area where performance is deficient.

Postulated Scenario

This discussion is presented from the perspective of a station operations manager. During periodic performance assessment activities (see Section III), an apparent problem has emerged: elevated numbers of component mispositionings. An indicator of this problem is a steady increase over the past several months in condition reports assigned to operations because of components found out of position during clearance and tagging operations, during normal system operations, and during, in one instance, operator response to an off-normal condition. The operations manager believes the performance needs attention but seeks additional validation and information to help develop a solution. The operations manager directs that a condition report be written documenting the adverse trend for further analysis.

Use of Performance Improvement Tools

Benchmarking

To establish that the trend being observed really exceeds industry norms, the manager assigns and approves a benchmarking study. As a result, contact is initiated with a few stations strong in plant status control based on recent contacts at industry meetings and from a check of benchmarking contacts on the INPO member Web site. A visit to some these stations to explore current practices and improvement opportunities is conducted.

Through these activities, a level of "good" performance in managing the status of plant systems and components is established. Additionally, approaches used by other plants in addressing similar issues are explored. Copies of procedures used by other plants that perform well in this area are obtained.

Self-Assessment

To ensure the problem is fully defined, the operations manager requests that a non-operations former shift manager conduct a self-assessment of operations configuration management and status control. This activity both confirms that the number of out-of-position components is increasing and defines some potential contributing factors, including possible training shortfalls associated with filling out clearance and tagging sheets.

Cause Analysis

Using the adverse trend condition report as the driver, the operations manager directs a common cause analysis of a series of recent component out-of-position events. This analysis is conducted by a vertical slice of operations personnel, aided by the station corrective action organization staff, who possess special knowledge of common cause analysis techniques. The analysis results are captured in the adverse trend condition report narrative and retained as part of the supporting documentation for that condition report.

Although a root cause analysis was not performed in this case, the insights provided by the common cause analysis identify an array of issues that need to be addressed to restore performance to within acceptable bounds. Included are issues with field operator and clearance preparer training, procedure clarity, and component labeling, as well as distribution of clearance and tagging activities among the various operations shifts.

Continuing Problem Reporting

Managers reemphasize with the workforce the need to report configuration control shortfalls via condition reports. This emphasis on strong problem reporting will help ensure that all known issues are identified for trending, analysis, and corrective action as appropriate.

Performance Indicators

Managers review existing performance indicators to ensure they provide sufficient detail to measure configuration control attributes effectively and thoroughly. Additional metrics are added, if needed, to gain additional perspective into specific, relevant performance aspects.

Action Planning

Because the actions are far reaching and some are potentially costly, the operations manager directs the preparation of a detailed action plan showing activities and projected milestone dates. An action plan owner is assigned within operations to drive the accomplishment of the plan and to provide single-point accountability for its successful completion. Included in the plan are some procedure rewrite actions that will strengthen the procedure barriers to events by clarifying the normal and mode-specific system configurations for a number of safety- and nonsafety-related systems. This solution has a relatively high associated cost.

Management Review and Approval

Because the nature of the problem requires the support of several site organizations (chemistry, because chemistry technicians position certain valves; maintenance, for making and affixing new labels for selected components; engineering, for determining the desired system lineup in certain off-normal situations), the operations manager presents the action plan for management team review, challenge, and concurrence.

Other managers provide comments that sharpen the focus on the action plan and bring additional industry experience to bear. Ultimately, the plan is approved for implementation, and those aspects involving work management system support are passed to that system for action.

One aspect of the plan—the procedure rewrite activities—is judged to be so significant that special resources and funding are needed. That action is passed to the business planning process.

Business Plan Considerations

Included in the long-range station business plan as an emergent item is a procedure upgrade for 25 system normal operating procedures. The cost and scope of this effort is added to the plan as a 15-month project for which most of the funding is budgeted for the following year. As a business plan initiative, the project owner (action plan owner) provides progress updates at the monthly management monitoring meeting.

Implementation Activities

The assigned project owner interfaces with the work management system to arrange for selected in-plant labeling improvements. These improvements involve component access during outages when high energy fluids, high temperatures, and dose are minimized. Other labeling changes are accomplished on line as minor maintenance work. (See AP-928, *Work Management Process Description*, for additional details.)

Ongoing Performance Monitoring

As improvements are being made, problems continue to occur and are documented in new condition reports. Because these new condition reports address a problem already being pursued, the emergent condition reports are reviewed by management and then closed without specifying additional action beyond the immediate corrective action, using as justification for the closure the active adverse trend condition report and ongoing improvement project. Such condition reports are then included in trending efforts to gauge the degree of improvement being achieved.

These trending activities reveal a declining level of out-of-position components, but the incidence rate remains higher than desired.

Effectiveness Review

Although not typically required for common cause analysis actions, an effectiveness review is directed against those actions

considered to be completed. The effectiveness review determines that the actions were completed but that some actions were too narrowly focused and did not achieve the expected results. Those actions are reopened and performed again. An additional condition report is written to document the narrow approach to corrective actions.

Periodic Management Reviews

As corrective actions progress, senior site management, as well as the rest of the management team, reviews progress via the monthly management review meeting project status report from the procedure revision project manager and by reviewing the trend of the mispositioned component indicator. These reviews ensure ongoing, cross-disciplinary ownership of and support for the improvement effort.

If faltering progress is detected during these reviews, senior site management pursues the cause and remedies, including possible resource adjustments, if warranted.

Closure of the Gap

At some point, through completion of the defined activities, performance is restored to within acceptable bounds. At this point, the adverse trend condition report is closed and normal performance monitoring resumes.

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APPENDIX A

INDUSTRY WORKING GROUP

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Members of the industry working group formed to advance industry performance improvement efforts include those listed below. The working group met in February 2004, May 2004, and September 2004 for detailed discussions and breakout sessions that culminated in the information contained in this guideline.

Name: Bill McCollum (chair) Title: Sr. Vice President, Nuclear Support Plant: Duke Energy Corporation E-Mail Address: wrmccoll@duke-energy.com Phone Number: (704) 382-8983	Name: Dave Bannister Title: Plant Manager Plant: Fort Calhoun Station E-Mail Address: dbannister@oppd.com Phone Number: (402) 533-6625
Name: Larry Bryant Title: Plant Manager Plant: Watts Bar Nuclear Plant E-Mail Address: lsbryant@tva.gov Phone Number: (423) 365-8216	Name: Tim Gilder Title: Integrated CAP Manager Plant: Comanche Peak Steam Electric Station E-Mail Address: tgilder1@txu.com Phone Number: (254) 897-6338
Name: Sharon Wheeler Title: Lead Self-Evaluation Specialist Plant: H. B. Robinson Steam Electric Plant E-Mail Address: sharon.wheeler@pgnmail.com Phone Number: (843) 857-1584	Name: Eric Katzman Title: Manager, Performance Improvement Plant: St. Lucie Nuclear Power Plant E-Mail Address: eric_katzman@fpl.com Phone Number: (722) 467-7237
Name: Caroline McAndrews Title: Nuclear Oversight & Assessment Division Manager Plant: San Onofre Nuclear Generating Station E-Mail Address: mcandrcm@songs.sce.com Phone Number: (949) 368-9307	Name: Vern McGaffic Title: Performance Improvement Superintendent Plant: Callaway Nuclear Plant E-Mail Address: vjmcgaffic@cal.ameren.com Phone Number: (573) 676-8762
Name: Pat Russell Title: Fleet Performance Improvement Director Plant: Nuclear Management Company, LLC E-Mail Address: patrick.russell@nmcco.com Phone Number: (269) 764-2013	Name: Larry Sanders Title: Training Manager Plant: Fermi-2 Nuclear Generating Station E-Mail Address: sandersl@dteenergy.com Phone Number: (734) 586-4121
Name: Chris Schwarz Title: General Manager, Plant Operations Plant: Indian Point Energy Center E-Mail Address: cschwar@entergy.com Phone Number: (914) 734-5221	Name: Matt Sunseri Title: Vice President, Oversight Plant: Wolf Creek Nuclear Operating Company E-Mail Address: masunse@wcnoc.com Phone Number: (620) 364-4008
Name: Jim Whyte Title: Director, Performance Improvement & Nuclear Oversight Plant: Ontario Power Generation E-Mail Address: james.whyte@opg.com Phone Number: (905) 839-1151 ext. 5838	Name: Dr. Terry Williams Title: Director, Nuclear Organizational Effectiveness Plant: Dominion Generation E-Mail Address: terry_williams@dom.com Phone Number: (804) 273-2905
Name: Andy Winter Title: CAP Program Manager Plant: Exelon Corporation E-Mail Address: andrew.winter@exeloncorp.com Phone Number: (610) 765-5851	

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APPENDIX B

PERFORMANCE IMPROVEMENT MODEL

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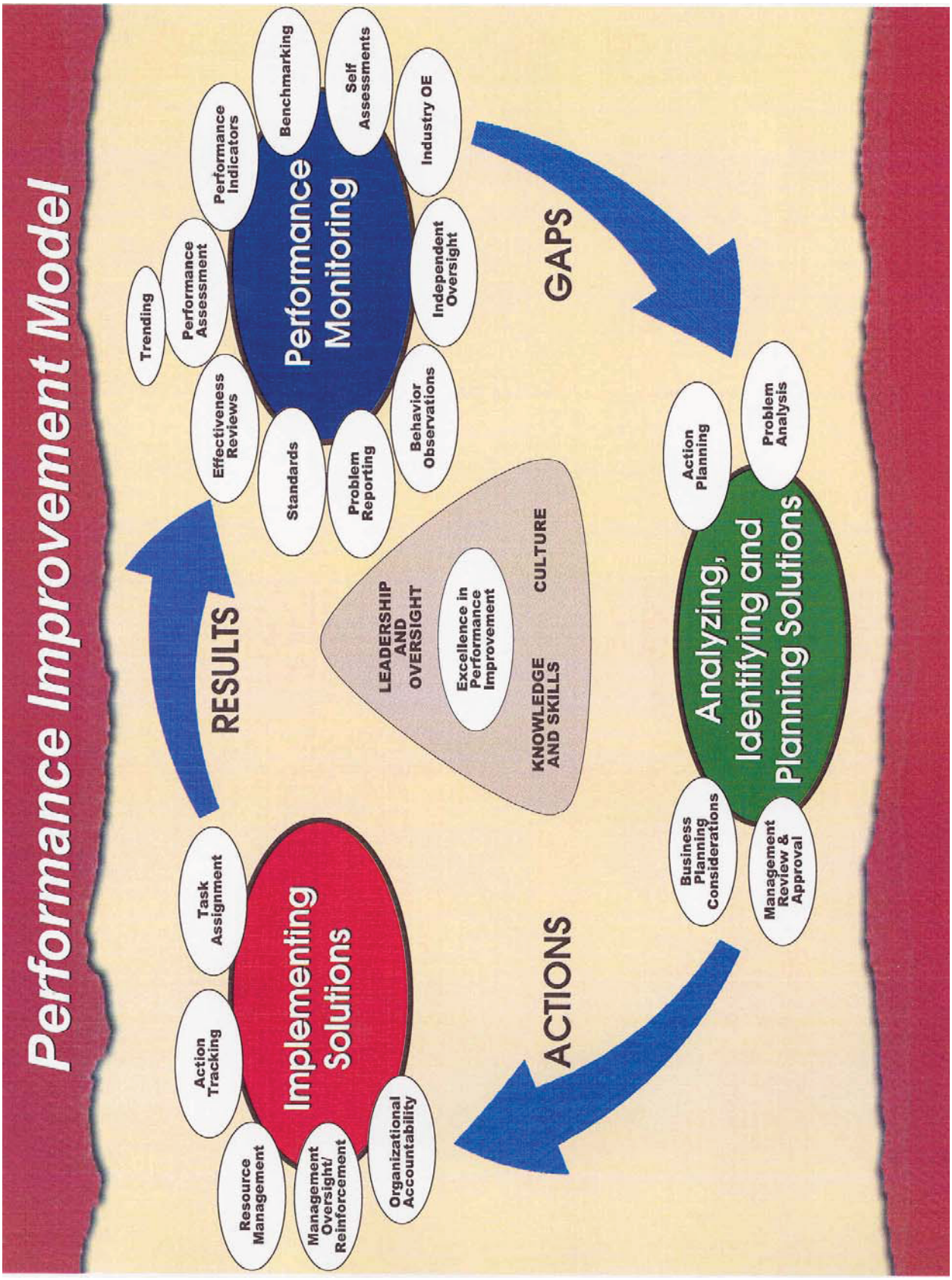
Performance Improvement Model
Trending
Performance Assessment
Effectiveness Reviews
Performance Indicators
Benchmarking
Self Assessments
Industry OE
Independent Oversight
Behavior Observations
Problem Reporting
Standards
Performance Monitoring
RESULTS
GAPS
LEADERSHIP AND OVERSIGHT
Excellence in Performance Improvement
CULTURE
KNOWLEDGE AND SKILLS
Action Planning
Problem Analysis
Analyzing, Identifying and Planning Solutions
Business Planning Considerations
Management Review & Approval
ACTIONS
Task Assignment
Action Tracking
Implementing Solutions
Resource Management
Management Oversight/ Reinforcement
Organizational Accountability

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APPENDIX C

SUPPORTING MANAGER BEHAVIORS AND WARNING FLAGS

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Supporting Manager Behaviors and Warning Flags

This attachment provides a convenient depiction of supporting senior site and line manager behaviors for the various activities discussed earlier in this document that comprise effective Performance Monitoring; Analyzing, Identifying and Planning Solutions; and Implementing Solutions. The attachment also depicts Warning Flags that can help managers see when performance may need special attention because it is outside industry norms. This attachment is intended to help managers identify ways they can have a positive influence on performance in these areas important to overall performance improvement. Unless otherwise stated, the behaviors indicated apply to station line managers. Applicable senior site manager behaviors are identified as such.

PERFORMANCE MONITORING

A. Standards

Supporting Manager Behaviors

- Set attainable, high standards for organizational performance.
- Seek out and embrace appropriate external standards as a further basis of performance comparison.

Warning Flags

- Station managers seem comfortable with or rationalize current performance despite evidence of decline or a gap to standards of excellence.
- Station managers overly focus on how far they have come, rather than on the gaps to excellence remaining to be closed.
- Self-assessment efforts do not detect obvious performance issues, or external groups identify performance shortfalls.

B. Self-Assessment

Supporting Manager Behaviors

- Be involved in selecting self-assessment topics to ensure planned assessments add value to improving performance and align with the overall strategic direction of station business planning.

- Support self-assessment activities in a proactive manner by assigning strong team leaders and members.
- Provide clear expectations for the scope, objectives, conduct, quality, and depth of self-assessment efforts.
- Oversee the quality of completed self-assessments, either individually or as part of a collective review board, challenging self-assessments that identify few opportunities for improvement or that reach conclusions that are contrary to other performance indications.
- Ensure performance gaps identified through self-assessment are captured in the corrective action system for analysis.
- Address each recommendation and enhancement through effective action tracking or close items with a documented basis for taking no action.
- Promote an organizational culture that values self-assessment as tool to improve performance. Establish self-assessment quality before quantity in building this culture.

Warning Flags

- Completed self-assessments routinely identify few areas for improvement or primarily identify strengths in existing practices.
- Line managers cannot readily identify improvements made as a result of self-assessment activities.
- Scheduled self-assessments are frequently cancelled, rescheduled, deferred, or otherwise impacted because other resource demands are perceived to be higher-priority. For example, some self-assessment team members are pulled from the team at the last minute, or a self-assessment is repeatedly postponed due to team staffing issues.
- Large backlogs of incomplete, overdue, or rescheduled corrective actions exist from previous self-assessments.
- Self-assessment teams have little or no industry representation.
- The self-assessment team lacks skilled, knowledgeable, and credible members.

C. Performance Indicators

Supporting Manager Behaviors

- Avoid placing too much emphasis on performance indicators to the exclusion of other means of performance monitoring.
- Believe the "worst indication" until actual performance is validated and do not rationalize indicator information to reduce its significance.
- Nurture an environment that values performance measurement and monitoring as a way to drive performance improvement. Promote the notion that "what is measured improves."
- Managers understand the drivers for current performance and take actions to minimize undesirable or unintended drivers.

Warning Flags

- Some performance indicators typically used at other stations are not used, and areas of deficient performance usually monitored by such indicators are unidentified by other means.
- Indicators measure performance but do not clearly depict acceptable and unacceptable performance levels.
- Management feedback on performance indicator results does not challenge the organization to improve. The management team accepts deteriorating or flat performance without comment and does not exhibit ownership or responsibility for such performance.
- Managers recognize but do not act on adverse performance trends.
- Historically good performance, depicted by performance indicators, is used to justify a lack of action on recent declining trends evident by other means.

D. Performance Assessment

Supporting Manager Behaviors

- Senior site managers establish a climate in which performance assessment by line managers is encouraged and used to drive performance improvement.
- Select department-specific data sets and sources to analyze.
- Understand and address actionable trends detected during performance assessment activities within their organizations.
- Personally conduct or oversee the performance assessment effort and be accountable for the results.
- Encourage and promote performance assessment as a valued method for determining performance gaps and driving improvement, both cross-organizationally and within their line organizations.

Warning Flags

- Managers cannot articulate the key performance gaps or issues identified by performance assessment activities within their organization.
- Managers demonstrate weak ownership for performance assessment results and delegate performance assessment oversight and analysis functions to lower-level personnel in their organizations.
- Performance assessment does not consider all relevant data such as observation program results, self-assessments, performance indicators, and statistical trending results.

E. Benchmarking Activities

Supporting Manager Behaviors

- Promote and take strong ownership for benchmarking efforts within their organizations, using them strategically to improve performance.
- Insist on a disciplined approach to planning benchmarking activities that ensures a high likelihood of successful results with actionable recommendations to close performance gaps.

- Require and approve written benchmarking plans and the implementation of benchmarking results to close performance gaps.

Warning Flags

- Benchmarking is conducted infrequently, or managers cannot cite specific examples of improved performance through benchmarking.
- Benchmarking efforts result in few worthwhile improvement ideas and often seem more focused on justifying the "status quo."

F. Plant and Industry Operating Experience

Supporting Manager Behaviors

- Actively promote the use of operating experience by ensuring its use is built into appropriate department processes and by expecting personnel to be knowledgeable of relevant operating experience in their area.
- Establish an effective operating experience screening process to ensure incoming operating experience is reviewed and associated lessons learned are used to improve performance, consistent with their significance. INPO 97-011, *Guidelines for the Use of Operating Experience*, can assist in this regard. Create and encourage a bias toward learning from operating experience.
- Ensure that operating experience screeners are sufficiently knowledgeable to understand the technical and administrative subtleties that can arise.
- When important station events occur, ask (or ensure event investigation or cause analysis teams ask), "Why did our review of previous relevant operating experience not prevent this event?"
- Following internal events, consider the value to the industry of sharing the lessons learned and, when appropriate, share that information through Nuclear Network®.
- Encourage the use of operating experience as an input to self-assessment planning. Conduct sufficient questioning to ensure the range of operating experience considered is appropriate for the self-assessment objective(s).

- Provide oversight to the implementation of Significant Operating Experience Report recommendations, review the actions taken, and ensure the actions are appropriate to meet the recommendation intent. Avoid delegating the interpretation of intent for these important recommendations.
- Task personnel conducting assessments or SOER recommendation effectiveness reviews to focus broadly on the results attained as well as completion of specific recommended activities.
- At a minimum, periodically review those SOER recommendations contained in INPO 02-003, *Selected Significant Operating Experience Report Recommendations 1980 – 2002* (or current edition), to ensure ongoing effective implementation.

Warning Flags

- Better use of internal or industry operating experience may have prevented important events at the station.
- SOER recommendation implementation is incorrect, incomplete, or the status is unknown to the station until independently reviewed or revealed by a challenging event.
- Self-assessments conclude that performance in an area is generally satisfactory, without considering or citing the operating experience lessons learned considered in the assessment.
- Event information that could help others in the industry is not shared via Nuclear Network.

G. Behavior Observations

Supporting Manager Behaviors

- Establish, encourage, and value behavior observations to gauge the effectiveness of performance improvement efforts.
- Set high standards for the conduct of behavioral observations and ensure those performing the observations are conducting them to those standards.

- Periodically use paired observations to ensure subordinates conducting the observations are identifying appropriate strengths and performance gaps.
- Create a hospitable environment for behavior observation by emphasizing to workers and supervisors the positive benefits. Avoid using observation results in a punitive manner except in cases of willful or malicious misconduct.
- Sufficiently oversee and participate in behavior observation programs to ensure the programs provide valuable insights. They periodically adjust observation attributes consistent with changing needs.

Warning Flags

- Behavior observations are conducted, but the results are not used effectively as an input to performance assessment.
- Targets for conducting behavior observations are frequently missed.
- Employees view behavior observations negatively, believing the observations are punitive in nature or offer no useful feedback.
- Observations of behaviors are predominantly positive, yet managers and supervisors readily identify equipment or process shortfalls.

H. Problem Reporting

Supporting Manager Behaviors

- Senior site managers emphasize that problem reporting and resolution using the corrective action program is "core business" for the station and unequivocally support, endorse, and expect strong line management ownership of the program.
- Senior site managers, during sessions with workers, periodically check worker receptivity to and confidence in the corrective action program as a problem-solving vehicle, and take decisive action to address worker concerns.
- Emphasize the value of problem reporting to improving station performance and to the trending and performance assessment effort. Emphasize that problems corrected on

the spot can also have value for assessing organizational performance and determining where broader corrective action may be needed.

- Routinely ask, when confronted with a new problem, "Have you written a condition report on this?"
- Provide workers feedback (or easy access to feedback) on the resolution of problems they report.
- Monitor problem reporting within their organizations. They take action to address indications that problem reporting is not seen as an effective way to resolve issues.
- Acknowledge and reward selected problem reporting to emphasize that management values such input.

Warning Signs

- Staff members report that they do not write condition reports because the problems only come back to them for resolution.
- Workers do not write condition reports, complaining that repeatedly reported problems do not get resolved.
- Overall trends in generating new condition reports are declining, but backlogged corrective actions remain high.
- The station experiences increasing numbers of self-revealing equipment problems and other adverse conditions or events.

I. Effectiveness Reviews

Supporting Manager Behaviors

- Use effectiveness reviews to provide specific, focused oversight and follow-up of important improvement actions.
- Review and question the basis for effectiveness review conclusions, ensuring they focus on performance results obtained and not just actions completed.
- Use the results of effectiveness reviews to adjust problem resolution actions, where appropriate.

Warning Flags

- Effectiveness reviews miss performance deficiencies, such as obvious shortfalls in SOER recommendation implementation.
- Effectiveness reviews are ineffectively tracked or allowed to go overdue.
- Significant problems recur, even though prior effectiveness reviews concluded the actions taken were effective.

J. Independent Oversight

Supporting Manager Behaviors

- Senior site managers establish and continually reinforce the notion that input from the quality organization and independent oversight groups is a valued and important part of performance monitoring.
- Senior site managers encourage healthy dialog among line managers and independent oversight groups to foster free and open exchange of recommendations and learning.
- Use input from the quality organization and other independent groups to adjust their improvement efforts and performance assessment activities.

Warning Flags

- Presentations to and interactions with external oversight groups are contentious and are viewed by line managers as adding little value.
- The subcommittee structure of independent oversight groups is perceived as pitting one line manager against another, thus damaging teamwork.
- Independent oversight input lacks substance, provides insufficiently critical feedback where warranted, or is overly focused on matters of compliance rather than standards of excellence.
- Critical, accurate input from the quality organization or independent review group is not acted on in a timely manner consistent with its importance, allowing important identified performance gaps to linger.

ANALYZING, IDENTIFYING, AND PLANNING SOLUTIONS

A. Problem Analysis, Action Planning, and Management Review and Approval

Supporting Manager Behaviors

- Senior site managers create and encourage a strong organizational bias for action and sense of urgency for completing problem analysis. They establish within the staff an understanding that problem resolution is "core business."
- Create and reinforce a strong organizational expectation for the use and sharing of operating experience and networking/benchmarking in corrective action development and planning, to reduce the potential for specified actions missing the target.
- Reinforce the importance of identifying organizational contributors to important events and challenge through questioning such contributors to ensure they are well understood.
- Review newly-initiated condition reports to build awareness of developing problems and ensure proper condition report screening, classification, and prioritization.
- Review and approve condition report problem statements before analysis commences to ensure the problem statement is clear before analysis commences.
- Manage the scope and depth of problem investigation, consistent with the importance of the issue. Consider escalating the analysis of repetitive, important issues to find and correct the root cause.
- Review and question root cause and selected apparent cause analyses for thoroughness. Approve corrective actions to be taken to prevent recurrence of important issues, actions to address important contributors, and actions resulting from apparent cause and adverse trend analyses.
- Review and approve assigned due dates for corrective actions resulting from root cause and apparent cause analyses.

- Ensure that corrective actions specified consider the culture of the organization. Avoid approving solutions that challenge or undercut the established degree of organizational accountability without considering needed compensatory changes in the degree of oversight.
- Use effectiveness reviews to verify that corrective actions to prevent recurrence of important problems have achieved the desired results. Establish review methods for other corrective actions resulting from apparent cause analyses to ensure the actions were completed in a rigorous and thorough manner.
- Review and approve the assignment of incoming issues to "fix and trend" or "close based on actions taken and trend" (or similar categories).

Warning Flags

- Backlogs of incomplete root and apparent cause analyses increase. Important recurring events and equipment failures continue to occur.
- The ratio of self-revealing or externally-identified issues to those identified from within the organization increases.
- Backlogs of open corrective actions are high and increasing.
- Planned backlog reduction efforts overly focus on reducing the "numbers," without establishing a method to focus on the quality, priority, and thoroughness of identified corrective actions.
- Backlog reduction efforts or action due date assignments assign all corrective actions equal importance. Lacking is an approach that ensures the most important corrective actions from a risk perspective are completed first.
- Important improvement initiatives fail because underlying problem causes are not well understood or because corrective actions specified do not align well with the analyzed causes.
- Few organizational contributors are identified for consequential human performance breakdowns or significant events.
- Programmatic weaknesses are rarely pursued as contributors to unplanned failures of important equipment.

- Managers are overly siloed in their reviews of cause analyses. They miss opportunities to work as a team to improve organizational performance or look broadly at cross-functional organizational issues.

B. Business Planning Considerations

Supporting Manager Behaviors

- Emphasize and demonstrate the importance of achieving consistency of purpose, strategy and direction, and integration of improvement priorities. Develop and articulate an overall improvement vision and/or strategy and, as small gains are achieved, tie these gains to the vision/strategy to build commitment to help sustain performance improvement.
- Avoid detracting from improvement momentum by approving actions or resource expenditures that are not well aligned with existing improvement initiatives.
- Consider the change management aspects of complicated corrective actions to ensure the actions are well thought out and embodied, as appropriate, in station business plans. Ensure business plans capture major improvement initiatives involving considerable cross-disciplinary support.
- Consider and address first issues that expose the station to the greatest vulnerability. Specifically:
  - Continually challenge new improvement initiatives from an "are we taking on too much?" perspective.
  - Establish performance indicators that clearly depict progress in important new focus areas so that progress (or the lack of it) is apparent from the early phases (discussed in more detail in Section V).
  - Continually check progress and make adjustments to achieve the desired results.
  - Think through and defer less important improvement initiatives so those targeting high risk conditions can be addressed successfully.
  - Alter the improvement plan in a significant way if warranted by emergent issues.

Warning Flags

- Staff members state the station is trying to do too much and all issues are perceived as being high priority. Correct issue priority determination is hampered because staff members cannot relate their improvement activities to a larger plan to improve station performance.
- Major new initiatives are added to the existing staff workload without considering the impact on ongoing work.
- Business plans and associated budgets are issued late and do not address major, cross-disciplinary improvement initiatives under consideration.
- Senior management and the staff lack alignment on the station's future direction.
- Major improvement initiatives falter due to lack of cross-disciplinary support or insufficient resources.

IMPLEMENTING SOLUTIONS

A. Task Assignment

Supporting Manager Behaviors

- Consider qualifications, talent, knowledge, experience, and skill, as well as a need for developmental assignments, when assigning personnel to perform improvement tasks.
- Adjust the degree of oversight and involvement in action implementation based on the risk-significance and complexity of the action. Consider the skill and experience level of those implementing the actions.
- Interact in advance with supervisors and personnel implementing task actions to ensure understanding of the task scope and purpose and schedule for task completion.
- Form cross-disciplinary project teams where necessary to implement broad corrective actions that result in significant change to cross-functional processes or to the roles or responsibilities of plant organizations.
- Clearly define the expected outcome/result for planned actions and effectively communicate these expectations to personnel involved in implementing the actions.

Warning Flags

- Managers and supervisors complain of insufficient time to oversee their personnel involved in routine and off-normal implementation efforts. Workplace observations may confirm this condition.
- Those assigned to implementing actions are unclear on the expected results and/or the expected time frames for completing the actions.
- Personnel cannot clearly explain the scope and reasons for the actions they are implementing.
- The knowledge, skill, and experience of personnel assigned to tasks are either not discussed or are found to be inappropriate.
- Management monitoring and oversight are insufficient for the risk and significance of the corrective actions.

B. Resource Management

Supporting Manager Behaviors

- Ensure that resource requirements for implementing improvement actions are fully identified and understood.
- Where required resources exceed resources available, adjust schedules and/or resources as necessary.
- Identify and discuss resources needed from other groups with the Supporting Managements to ensure agreement prior to finalizing the schedule.
- Where supplemental personnel are used, managers identify and develop training and oversight plans that ensure the timeliness and quality of products.

Warning Flags

- Undefined or unresolved resource requirements and workload mismatches occur.
- Action plans lack appropriate resource integration, loading, and supporting group concurrence.
- Other managers supporting complex actions are unaware of, or have not scheduled, the cross-discipline resource support necessary to complete their portion of the improvement effort.

- Where supplemental personnel are used, training and oversight needs are not clearly defined and resourced, or oversight plans are not developed.

C. Action Tracking

Supporting Manager Behaviors

- Establish and use appropriate tracking methods for implementing improvement actions.

Warning Flags

- Status reports for performance improvement action implementation are few and are sparse on details.
- The status of important improvement activities is unknown or not routinely discussed. Projected shortfalls in timeliness are not clearly presented to the management team for resolution.
- Awareness of the status of important action implementation is lost or obscured by transfer between tracking systems without appropriate controls.

D. Management Oversight, Involvement, and Reinforcement

Supporting Manager Behaviors

- Encourage formal and informal updates on improvement implementation status. Create a climate that encourages upward communication of perceived shortfalls in quality or timeliness of corrective actions being implemented.
- Frequently observe the progress of key improvement actions personally as a check on the accuracy of physical progress reporting.
- Avoid overemphasizing timeliness at the expense of the quality of the actions being implemented.
- Establish forums to discuss important implementation initiatives and their progress. They conduct frequent progress reviews on important action plans.
- Require appropriate in-process reviews of closure quality to ensure the organization remains focused on the need to complete corrective measures in a quality fashion.

- Senior site managers monitor the timeliness of problem resolution and corrective actions. They provide the resources necessary to ensure important issues do not linger uncorrected because of insufficient resources.

Warning Flags

- Work management or other tracking and reporting processes are weak or obscure the true status, impeding management's ability to oversee the progress of key activities effectively.
- Repeated failures occur in the established quality checks, suggesting the organization is overly focused on simply completing assigned actions.
- Challenges to the need for or scope of corrective actions are not raised for resolution by supervisors and managers.
- Slips in assigned completion dates are not reviewed and approved in advance or do not receive a level of review and approval commensurate with that by which the date was initially established.

E. Organizational Accountability

Supporting Manager Behaviors

- Adjust the scope and frequency of oversight activities to the degree of organizational accountability that exists.
- Create a healthy climate in which organizational accountability to implementing sound actions is valued and nurtured.

Warning Flags

- Improvement initiatives frequently fail or miss targets because people do not meet commitments, do not to take commitments seriously, or over commit without realizing the implications. Established oversight methods do not detect these situations.
- Managers do not hold personnel accountable for failure to achieve established targets.
- Managers and organizations are overly siloed, missing opportunities to work as a team to accomplish routine and complex cross-disciplinary tasks. These tasks are often

viewed as the sole responsibility of one implementing organization, and ownership by other departments is lacking.

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