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**DOE G 414.1-5
3-2-06**

CORRECTIVE ACTION PROGRAM GUIDE

[This Guide describes suggested nonmandatory approaches for meeting requirements. Guides are not requirements documents and are not construed as requirements in any audit or appraisal for compliance with the parent Policy, Order, Notice, or Manual.]



**U.S. Department of Energy
Washington, D.C. 20585**

AVAILABLE ONLINE AT:
www.directives.doe.gov

INITIATED BY:
Office of Environment, Safety and Health

PURPOSE

This Guide is provided to assist Department of Energy (DOE)/National Nuclear Security Administration (NNSA) organizations and contractors in the development, implementation, and followup of corrective action programs utilizing the generalized steps of the “feedback and improvement” core safety function within the DOE Integrated Safety Management System (ISMS) outlined in DOE G 450.4-1B, *Integrated Safety Management System Guide*, and Management/Criterion 3 – Quality Improvement delineated in DOE O 414.1C, *Quality Assurance*.

Information in this Guide suggests nonmandatory approaches for developing and implementing DOE Corrective Action Management Program (CAMP) requirements delineated in DOE O 414.1C, *Quality Assurance*. For more information on the CAMP, see www.eh.doe.gov/camp/index.html.

Throughout the DOE complex there are myriad corrective action programs being implemented. This Guide outlines some of the basic principles, concepts, and lessons learned that DOE managers and contractors might consider in implementing corrective action programs based on their specific needs. The guidance may be considered and applied based on a graded approach considering the significance, criticality, sensitivity, risk, and/or impact of each finding to the mission, safety, and security of the site, the public, and regulatory requirements. The guidance may assist managers and contractors during the course of ongoing work activities, operational events, informal and formal individual and organizational self-assessments, internal and external oversight, investigations, regulatory actions, audits, inspections, worker safety concerns, design reviews, analyses, and other types of incidents or assessments. As used in this Guide, the term, “problem finding” is used to denote an inconsistency, issue, incident, event, concern, or other problem identified during the course of these activities.

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ACRONYMS

| | |
|-------|---|
| CAIRS | Computerized Accident/Incident Reporting System |
| CAMP | Corrective Action Management Program |
| CAP | Corrective Action Plan |
| CATS | Corrective Action Tracking System |
| DOE | Department of Energy |
| ISM | Integrated Safety Management |
| ISMS | Integrated Safety Management System |
| NNSA | National Nuclear Security Administration |
| NTS | Noncompliance Tracking System |
| ORPS | Occurrence Reporting and Processing System |
| QA | Quality Assurance |
| QAP | Quality Assurance Program |

REFERENCES

DOE O 151.1C, *Comprehensive Emergency Management*, dated 11-02-05.

DOE O 225.1A, *Accident Investigations*, dated 11-26-97.

DOE G 225.1A-1, *Implementation Guide for Use with DOE O 225.1A, Accident Investigations*, dated 11-26-97.

DOE P 226.1, *Department of Energy Oversight Policy*, dated 06-10-05

DOE O 226.1, *Implementation of Department of Energy Oversight Policy*, dated 09-15-05.

DOE M 411.1-1C, *Safety Management Functions, Responsibilities, and Authorities Manual*, dated 12-31-03.

DOE O 414.1C, *Quality Assurance*, dated 06-17-05.

DOE G 414.1-1A, *Management Assessment and Independent Assessment Guide*, dated 05-31-01.

DOE O 440.2B, *Aviation Management and Safety*, dated 11-27-02.

DOE G 450.4-1B, *Integrated Safety Management System Guide* dated 03-01-01.

DOE P 450.4, *Safety Management System Policy*, dated 10-15-96.

DOE O 470.2B, *Independent Oversight and Performance Assurance Program*, dated 10-31-02.

DOE Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 98-1 to Address and Resolve Safety Issues Identified by Internal Independent Oversight, dated 03-10-99.

Institute of Nuclear Power Operations (INPO) *Principles for Effective Self-Assessment and Corrective Action Programs*, dated 12-99.

INPO 97-011, *Guidelines for the Use of Operating Experience*, dated 12-97.

1.0 INTRODUCTION

DOE is committed to achieving the Department's mission and goals while ensuring the safety of workers, the public, and the environment. The guiding principles and core functions of Integrated Safety Management (ISM) are an integral part in achieving this commitment. One of the core functions within the ISM is the generalized process for feedback and improvement. This process encompasses the continuous monitoring of work performance and safety to identify problem findings, determine their causes, implement corrective actions to resolve the problems and prevent recurrence, and determine the effectiveness of the corrective actions to ensure successful resolution and prevention of the same or similar problems.

A principal deficiency that led to both the Columbia Space Shuttle disaster and Davis-Besse Nuclear Power Station vessel head corrosion incident was failure to evaluate the causal factors thoroughly and implement effective corrective actions in response to the same and similar identified problem findings that eventually resulted in catastrophic events. Lessons learned in the investigations following both of these events clearly dictate the exigency of maintaining a robust corrective action program that:

- Addresses Management/Criterion 3 – Quality Improvement addressed in Quality Assurance Programs (QAP) delineated in DOE O 414.1C, *Quality Assurance*.
- Identifies, documents, evaluates, and trends problems to ensure the causal factors (to include the root causes) and significance of each problem are understood.
- Develops, tracks, and implements timely corrective actions to resolve the identified problem findings.
- Verifies completion and reviews the effectiveness of the completed corrective actions to ensure that they successfully resolve and prevent recurrence of the same and similar problem findings.

The thoroughness and effectiveness of a corrective action program to resolve and prevent recurrence of identified problem findings may directly impact:

- The environment, safety and health of the site/organization, our DOE workers, and the public;
- Mission accomplishment and operational performance of DOE sites and organizations;
- National security;
- Cost effectiveness of operations; and
- Cost avoidance resulting from repeat violations and civil penalties associated with the failure to effectively correct and prevent problems.

The essence of a successful corrective action program at any level involves a combination of processes, people, and tools for systematic implementation and followup programs. Principal considerations include:

- Keep the corrective action process simple. The process should be clear cut and easy to use, employ user friendly tools, and not require a tremendous amount of manpower or training.
- Involve all personnel as stakeholders in the program. Clearly define roles and responsibilities in identifying and reporting problems, and their importance to the effectiveness of the program in enhancing the mission performance and safety of the site/organization.
- Provide easy access for reporting information across the site/organization to capture vital information.
- Maintain strong management support and emphasis. An active management that demonstrates ownership of the program, encourages employees at all levels in the organization to participate, and is visually involved in directing and setting clear well-defined processes and resources is crucial to the success of the program. The manager responsible for the site/organization implementing the corrective action program should be the overall manager of the program and held accountable for meeting program requirements and suspense dates.
- Periodically assess the effectiveness and direction of the program in meeting goals and objectives.
- Automate data collection and processing wherever possible. This will enhance easier, more accurate, timely tracking and followup.
- Provide timely feedback to include lessons learned on program actions so members can see results and be encouraged to support the process.
- Perform a reliable trending analysis of identified problems and associated causes to identify repeat occurrences, generic issues, and weaknesses at a level before they pose a more significant problem.

2.0 APPLICATION

This Guide is for use by all DOE/NNSA elements and contractors in the conduct of the DOE Corrective Action Management Program (CAMP) and any other corrective action programs as part of the feedback and improvement core safety function within the DOE Integrated Safety Management System (ISMS) established pursuant to DOE P 450.4, *Safety Management System Policy*, and guidance outlined in Appendix G of DOE G 450.4-1B, *Integrated Safety*

Management System Guide; and Management/Criterion 3 – Quality Improvement requirements delineated in DOE O 414.1C, *Quality Assurance*.

3.0 CORRECTIVE ACTION PROGRAM OVERVIEW

Corrective action programs should meet the basic criteria of the generalized process for feedback and improvement within the DOE ISMS. This generalized process, illustrated in Figure 1, includes the following steps.

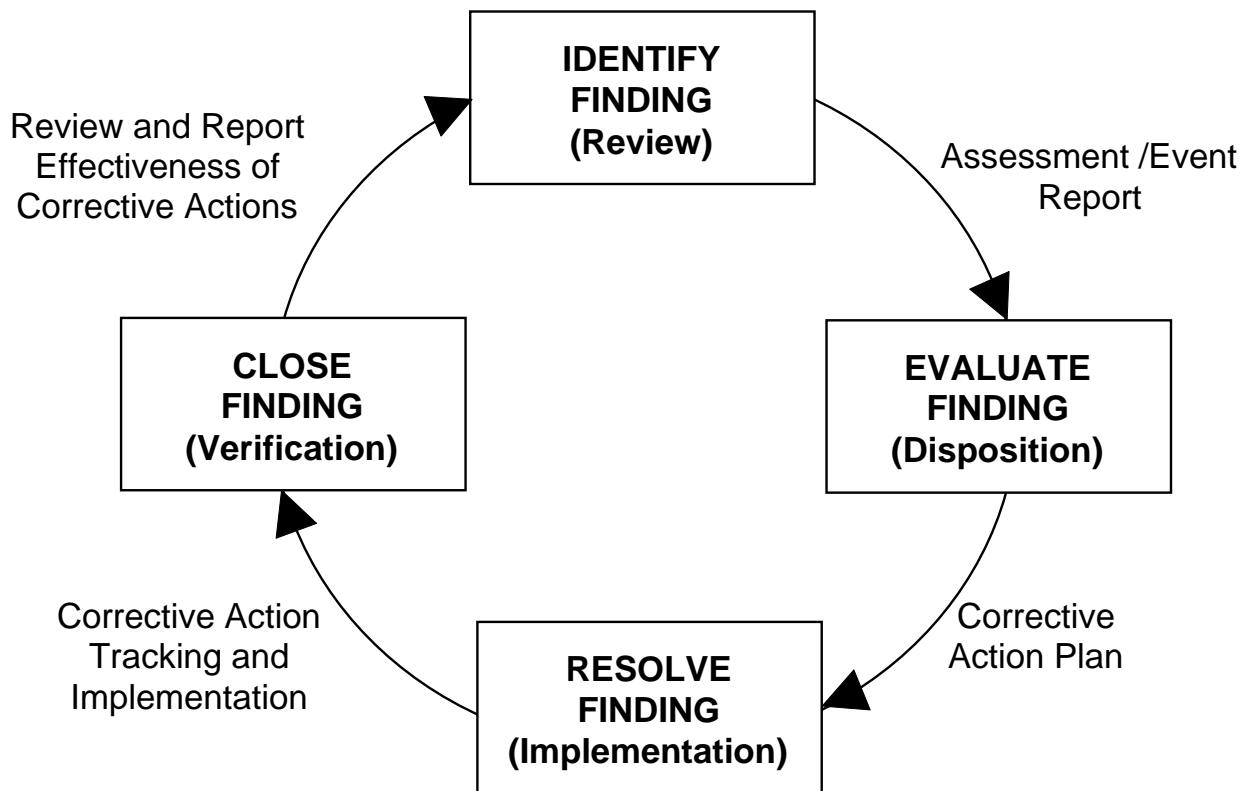


Figure 1. Feedback and Improvement

3.1 IDENTIFY AND REPORT PROBLEM FINDINGS

Identifying and reporting problem findings from a variety of sources to include a specific operational event, internal or external assessment or investigation, observation during daily work performance, and worker safety concern is the first generalized step for the feedback and improvement core safety function. All workers should be encouraged to evaluate performance and safety of workers, products, services, and processes; identify potential and actual problems

(i.e., deficiencies, incidents, malfunctions, weaknesses, failures, etc.) at the earliest possible time before they become more significant; and immediately report these problems. This first step should be formally defined and fully integrated with the site/organization continuous performance and safety improvement strategy. This step is further explained in paragraph 4 of the Guide.

3.2 EVALUATE EACH PROBLEM FINDING AND DEVELOP APPROPRIATE CORRECTIVE ACTIONS AND CORRECTIVE ACTION PLANS

The second generalized step provides the framework for defining a problem by collecting and evaluating relevant information to determine the facts and causal factors (including root causes). The site/organization responsible for the function/activity where the problem finding was identified should have a clear understanding and description of the finding supported by the facts and causal factors in order to develop the most appropriate, timely corrective actions to resolve the finding and prevent recurrence. These corrective actions are then incorporated into the corrective action plan (CAP). Other considerations in corrective action planning should include determining the actual and potential significance, complexity, and impact of the problem finding on the safety, reliability and mission performance of the site/organization and the workers. This second generalized step is considered the cornerstone of the feedback and improvement process core safety function and oftentimes the most difficult and least understood. This step is further explained in paragraph 5 of the Guide.

3.3 CLOSE AND IMPLEMENT CORRECTIVE ACTIONS AND RESOLVE EACH PROBLEM FINDING

The third generalized step in the feedback and improvement core safety function includes closing and implementing corrective actions to resolve the findings delineated in the CAP. Completion and implementation status is tracked and reported to ensure timely and adequate resolution of each finding. The completion and implementation of the CAP can be a tedious process with potential for ineffectiveness in the corrective action process. Although the findings have been identified and detailed plans to correct the findings have been developed, the often long and weary process of actively completing and implementing all of the corrective actions for each finding in the CAP has the propensity to receive less attention as emphasis is shifted to other more immediate initiatives, crises, and requirements. It is important that closure and implementation of the CAP receive continuous management attention, progress monitored and updated, and status periodically reported. This step is further explained in paragraph 6 of the Guide.

3.4 CLOSE EACH PROBLEM FINDING AND DETERMINE EFFECTIVENESS OF CORRECTIVE ACTIONS

The fourth generalized step in the feedback and improvement core safety function includes completion of all corrective actions for the findings listed in the CAP and an independent followup assessment by the responsible site/organization to verify closure and review the

effectiveness of the corrective actions in resolving each finding and preventing recurrence. This followup step is paramount to the success of the feedback and improvement core safety function and corrective action program. The resources (funding, personnel, and time) expended to identify the finding and implement the corrective actions will be fruitless if the causal factors involved in the finding has not been effectively resolved or the same or similar findings recur. There may also be financial costs based on repeat violations and civil penalties associated with the failure to resolve the finding effectively. Most importantly, the potential adverse impact of an unresolved finding to the mission and safety of workers would remain for unsuspecting managers and workers who implemented the corrective actions and presumed the finding was resolved. This step is further explained in paragraph 7 of the Guide.

4.0 IDENTIFY AND REPORT PROBLEM FINDINGS

4.1 GENERAL

Each level of management should actively encourage all workers to assess programs and conditions continuously and report problems or potential problems they identify immediately. The processes for identifying and reporting problem findings should be categorized on a graded approach based on the type, significance, criticality, and impact of the finding on the safety and mission performance of the site/organization. Some of these processes are directed by Headquarters, DOE [i.e., Office of Inspector General Reports, Office of Independent Oversight and Performance Assurance Inspections, Occurrence Reporting and Processing System (ORPS) and Computerized Accident/Incident Reporting System (CAIRS)]. Other processes are regional or local. Each of the levels and categories of problem findings to be reported should be comprehensive, prominently defined, easily understood, and readily accessible to all workers.

Types of assessment activities may range from major topical site-wide oversight inspections and investigations to individual worker safety concerns. Periodic internal and external focused assessments should be structured and planned to include determining what is to be examined; specific assessment activities to be conducted for collecting, analyzing and validating information; and how results, conclusions, and recommendations will be reported and followed up.

4.2 PROBLEM FINDING IDENTIFICATION AND REPORTING PROCESSES

The identification and reporting of problem findings processes should be documented and include the following points:

- Purpose, objectives, scope, and descriptive summary of the overall problem identification process.
- A standardized categorization of types of problem findings to be reported based on the significance, criticality, severity, and potential impact of the problem finding on the safety, security, and mission performance of the site/organization. While many of the identified

problem findings may be opportunities for improvement that can be corrected easily, they should be documented for trending purposes.

- Procedures for reporting each of the levels and categories of problem findings should be comprehensive, prominently defined, easily understood, and readily accessible to all workers. Emphasis should be placed on reporting of problem findings and trends at the lowest level for early resolution before more significant problems occur.
- Reporting procedures should include guidance on **who** (i.e., who performed the activity, who was involved, who should have been involved, who discovered the problem, who is the site/organization responsible for the function/activity where the problem was identified, who was notified), **what** (i.e., what is the specific problem and the impact on safety, security and mission performance, what happened just before the problem, what is occurring now and the potential for occurring later, what were the environmental conditions), **when** (i.e., when did the problem occur, when was management notified, when has the problem occurred before) , **where** (i.e., where did the problem occur, where else could the problem occur, where were the responsible/involved individuals), and **how** to report the identified finding (i.e., telephone number, website, reporting document) including what information needs to be reported (i.e., brief description of finding, hazard category, location), and any immediate actions (if any) and followup actions that should be initiated upon identification (i.e., preserve evidence, contact management/emergency/technical personnel, document or photograph the situation, shut down operations).
- Methods for collecting, preserving, analyzing, and documenting information concerning the identified finding.
- Roles, responsibilities, and composition of assessment individuals and teams based on the type, size, scope and complexity of the assessment.
- Knowledge and skill requirements of selected assessment personnel in both the technical areas being reviewed and the types of assessment processes to be used for identifying findings (i.e., observation, interviewing, performance testing, and validating information). Training and qualification in these knowledge and skill areas should be incorporated into the corrective action program.
- Methods for maintaining communications with those involved in the identified finding to ensure understanding and ownership of information collected. This should include validating the information obtained to verify accuracy.
- Procedures for communicating the results of the identified findings (written and oral) to those organizations and individuals affected. Results of these assessments and investigations should be thoroughly documented to provide clear, factually accurate information on the purpose; scope; results to include positive attributes, opportunities for improvement, and problem findings; and conclusions. These results should also be reviewed to determine applicability to the wider DOE community for possible inclusion in lessons learned programs.

- Procedures for entering the identified problem findings into a corrective action program or other tracking system promptly to monitor resolution and followup. The tracking system should include the reference documenting the findings and description of each finding to include the organization responsible to resolve the finding. A short, one- or two-sentence synopsis of each finding should be included to identify the specific finding for followup reference and tracking. Listing the applicable guiding principles and core functions involved in each problem finding would assist in followup trending and lessons learned activities.

5.0 EVALUATE EACH FINDING AND DEVELOP APPROPRIATE CORRECTIVE ACTIONS AND CORRECTIVE ACTION PLANS

Once the problem finding has been identified and reported, it should be evaluated to determine the causal factors in order to develop the corrective actions that will effectively resolve the finding and prevent recurrence.

5.1 EVALUATION OF THE FINDING

The second generalized step in the feedback and improvement core safety function involves:

- Identifying all relevant facts concerning each identified problem finding.
- Validating and analyzing the facts.
- Determining the actual and potential significance, complexity, and impact of each problem finding on the safety and mission performance of the site/organization.
- Determining the causal factors to include the root causes for each finding.
- Assigning a priority for correcting the problem findings consistent with the significance, complexity, and impact of each finding.
- Developing conclusions.
- Reporting the results of the evaluation to be used in development of appropriate corrective actions.

5.1.1 Finding Evaluation Activities

Each problem finding should be evaluated, taking into consideration the following:

- Begin as soon as possible after identification of the problem to obtain and preserve evidence and data that can be used in describing the problem finding and determining the causal factors. Any delays could result in changes, deterioration, or loss of information that may have been a contributing or direct causal factor involved in the problem finding.

- Ensure that evaluating individuals or teams possess technical expertise in the area being evaluated and qualified to conduct analytical techniques for determining causal factors involved in the problem finding and conducting a root cause analysis. Each member should be cognizant of the safety management template of guiding principles and core functions. If, during the course of the evaluation, it is concluded that additional expertise in a technical area is required, the manager should arrange for availability of that expertise.
- Review all information to determine the facts of what actually occurred. These facts should be continuously validated and analyzed individually and together for relevance and accuracy in telling the story of what happened and how. Any missing information or inconsistencies identified during analysis of the finding should be reviewed and followed up.
- Ensure that information and physical evidence collected concerning the identified problem finding (i.e., recorded data on equipment and instruments, inspection and test results, the actual defective item or photographs of it) is verified, documented, and preserved.
- Solicit input from both the assessor who identified the problem finding and the organization or individual responsible for the activity where the problem finding was identified.
- Determine the significance and the potential or actual impact of the problem finding to:
 - Health, safety, and security of the site and public.
 - Compliance with laws/regulatory requirements.
 - Mission performance.
 - Resource costs (funding, personnel, time).
 - Consequences if the finding is not resolved or recurs.
 - Extent the finding has on other activities, facilities, or equipment not directly involved in the finding.
- Consider developing a prioritization process based on the significance, complexity, and impact of each problem finding in determining the sequential order for development and implementation of the corrective actions. Other factors (i.e., resource costs) should also be considered. The prioritization process may include numerical prioritization of each individual finding or establishing a number of priority categories.
- Identify, validate, and categorize the causal factors, which include the events and conditions (who, what, when, where, how, and why) concerning the problem finding. This may include causes that directly resulted in the problem finding, contributing causes that collectively increased the likelihood of the finding but did not individually cause it, and root cause which, if corrected, would prevent recurrence of the finding and similar findings. Additional information on determining causal factors can be found in DOE G 225.1A-1.
- For identified problem findings with lower significance, investing in a rigorous evaluation to identify the causal factors may be deemed unnecessary. The focus would then be on

correcting the immediate or apparent cause without addressing the root cause. If similar problems subsequently occur, trending may assist in identifying the commonalities of the problems in determining their causes.

- Develop conclusions based on the facts identified and analysis of the causal factors to determine the details of what the specific problem is, and how and why it became a problem. The conclusions may also address specific concerns to the site/organization in relation to the identified problem.
- Determine if the same or similar problem findings have previously occurred or been identified. If so, review the assessment or event that identified the problem finding, results of the finding evaluation, and the effectiveness of the corrective actions implemented to resolve and prevent recurrence of that finding. This may include a review of local and DOE-wide corrective action programs (i.e., CAMP) and incident reporting processes (i.e., ORPS and CAIRS). This information should be included in the current evaluation of the problem finding.
- Upon completion of the evaluation and determination of conclusions for significant problem findings based on a graded approach, a quality review and critique of the finding evaluation process should be conducted to validate the facts and causal factors, which include root causes in support of the conclusions. Any identified inconsistencies should be reexamined and resolved before development of corrective actions.

5.1.2 Trending Identified Problem Findings

Identified problem findings and their associated causes should also be analyzed to determine the existence of trends to identify the same or similar occurrences, generic problems, vulnerabilities, and cross functional weaknesses at the lowest level before significant problems result. Trending typically identifies problem categories, responsible organizations, and specific activities or conditions. Benefits of trending include:

- The ability to document historical data consistently in measurable, visible terms;
- Identify changes in performance as they occur; and
- Develop leading indicators that identify degrading trends.

A consistent trend coding system would assist in analyzing the problem findings. This trending data should be constantly analyzed, updated and summarized; and the results should be reported to management.

To assist in analyzing and trending identified problem findings and developing corrective actions, the assessing organization and/or site/organization manager should determine the applicable Guiding Principles and Core Safety Management Functions for Integrated Safety Management outlined in DOE P 450.4, *Safety Management System Policy* for each finding. This will assist managers in identifying broader causal factors that can reduce the potential for similar

problem findings. Input for determining the Guiding Principles and Core Functions may be provided by the assessing individual/organization and/or the individuals evaluating each finding and designing applicable corrective actions.

5.2 DEVELOP CORRECTIVE ACTIONS

Based on the results of the finding evaluation, the responsible site/organization should develop, prioritize, approve, track, and complete all corrective actions in a timely manner to effectively resolve and prevent recurrence of each problem finding.

The levels of significance and impact of each identified problem finding defined during the evaluation of the findings should be major factors in determining the amount and priority of resources (funding, personnel, time, etc.) utilized to implement the corrective actions, and the type and degree of tracking and reporting the status of corrective actions to successful completion.

Considerations in developing corrective actions to resolve each problem finding effectively include:

- Ensure that the causal factors and conclusions from the evaluation of the problem finding are logical and comprehensive.
- The corrective actions should address all aspects of each identified causal factor identified for the problem finding. This may entail one or several corrective actions to resolve the finding. The corrective actions may include both remedial actions (to remedy the finding) and preventive actions (to prevent the same and similar findings from recurring).
- If immediate actions are considered sufficient to correct a minor problem or opportunity for improvement, it may be determined to close the problem finding without further evaluation. The reported problem finding should remain in the corrective action data collection process for trending purposes. This minor problem may be a symptom or indicator of a more significant problem.
- Prioritize the corrective actions based on the significance and impact of each problem finding. Determine the consequences of implementing and not implementing the corrective actions.
- Determine the resources (funding, personnel, time) needed to successfully complete each corrective action. This will also have a major impact on determining the planned completion date of the corrective action.
- Determine if the corrective actions are reasonable and achievable within the ability of the site/organization to develop and implement. If the site/organization does not possess the capability to implement a corrective action (i.e., need of additional resources beyond the capability of the site/organization, development of a directive from a higher or support

organization, etc.) ensure this situation along with an evaluation of the consequences of not implementing the corrective action is brought to the attention of senior management.

- Establish a schedule with projected dates for initiating, completing, and implementing each of the corrective actions. The planned completion date should be reasonable based on priority of the corrective action, availability of resources needed, amount of time needed to close each activity (e.g., publish the procedure, implement the procedure, and train workers on the procedure), and evidence needed to verify closure. Managers should be held accountable for meeting the planned corrective action completion dates.
- If corrective actions will require significant time to complete and implement, develop interim corrective actions and/or compensatory measures that will be implemented pending completion of the corrective action to reduce the possibility of event or condition occurrence. A description of these interim or compensatory actions, to include when they will be implemented, should be addressed in the corrective action plan.
- Each corrective action should be a clear and concise description of the actions to be performed in sufficient detail to allow all personnel directly and indirectly involved in the corrective action to understand the specific activities to be conducted.
- Determine if the corrective actions may need to address generic implications rather than just being focused on a specific component, procedure, or process.
- Determine the feasibility and impact of the corrective actions for a specific finding to the other facilities, operations, equipment, and personnel on the site to ensure that they will not conflict or degrade mission accomplishment, requirements, practices, performance and safety of personnel and activities on the site.
- Clearly specify the corrective action deliverable, which will provide objective evidence that the corrective action is completed (revised procedure, record of completed training). The corrective action should be achievable, measurable, and closeable in order to ascertain when the action has been completed.
- Designate a single, responsible point of contact responsible for managing and coordinating the preparation, completion, and effective implementation of each corrective action.
- Plan what activities or mechanisms can be used to independently verify completion and conduct the effectiveness review of the completed corrective actions for each problem finding.
- Develop a systematic process for tracking and reporting the status of each corrective action to successful completion. For the DOE CAMP, the Corrective Action Tracking System (CATS) database is used to track all corrective actions. Develop procedures for reporting corrective action progress including report format, to whom to report, and frequency of reporting.

Workers/organizations who identified the problem findings and other personnel affected by the finding should receive feedback concerning the followup of the problem findings and corrective actions. This helps motivate workers to continue using the corrective action program process. The feedback may be direct or through an information management system.

5.3 DEVELOP CORRECTIVE ACTION PLANS

5.3.1 General

A written corrective action plan (CAP) formulating a description of the corrective actions should be developed to assist in management of the corrective actions. The extent of detail for the CAP should be determined based on the significance, impact, number, and complexity of the problem findings and corrective actions to resolve the findings. The CAP should be written by the site/organization that was assessed or where the event occurred, and should be approved by the senior manager authorized to provide the resources (funding, personnel and time) needed to implement the corrective actions successfully within the time specified in the plan.

Based on the extent of detail determined for inclusion in the CAP, the site/organization manager may consider implementing applicable portions of the general CAP content guidance outlined in paragraph 5.3.2, CAP content considerations for each finding (paragraph 5.3.3), and CAP content considerations for each corrective action (paragraph 5.5.4.). The CAP should delineate a clear understanding and ownership of each reported problem finding, detailed description and ownership of the corrective actions developed in response to each finding, the process for tracking and reporting the status of CAP completion, and overview of corrective action effectiveness review activities to ensure successful resolution and recurrence prevention of each problem finding.

The site/organization corrective action program process should outline specific timeframes for the following:

- Development and approval of each CAP by senior management. Sufficient time should be allotted from the time the assessment/incident report is transmitted in order for the appropriate lead manager to evaluate each finding, develop corrective actions for each, and publish a proposed CAP for approval. For example, the DOE CAMP prescribes a 60-day suspense from the date of the transmittal forwarding the event/assessment report for the proposed CAP to be developed and approved by the designated senior manager.
- Completion of corrective actions in the CAP. Each corrective action listed should include a planned completion date. That date should include sufficient time to review all evidence for determining successful completion of the corrective action.
- Completion of followup corrective action effectiveness reviews to be completed (see paragraph 7 for explanation of corrective action effectiveness reviews).

5.3.2 Corrective Action Plan Contents

Information contained in each CAP may include:

- Executive summary of the CAP. This may include description of the event/assessment report that resulted in identification of the problem findings, synopsis of the findings, results of the finding evaluations, synopsis of corrective actions, and outline of the overall process from approving and completing the CAP.
- If the CAP and corrective actions are to be tracked and reported, a unique numbering system that correlates the assessment/event report with the specific findings and corrective actions should be considered. The numbering system may include identification of the site/organization (i.e., “SR” for Savannah River), date of assessment/event report (i.e., “02/24/2006”), type of assessment/event (i.e., “ES&H” for environment, safety and health), and title of report (i.e., “Self Assessment of Environment, Safety and Health Inspection of Buildings 202, 203 and 204 in February 2006”).
- Responsible organizations and managers to approve and manage implementation of the CAP.
- Description of other organizations and managers involved in development and implementation of the CAP, if applicable.
- Description of each reported problem finding.
- Description and results of the finding evaluation (see paragraph 5.3.3).
- Description of each corrective action (see paragraph 5.3.4).
- Description of how the CAP and associated corrective actions will be tracked and reported to completion.
- Planned CAP completion date when all corrective actions are to be completed.
- Process for requesting changes or extensions to corrective action planned completion dates, effectiveness reviews, or other activities listed in the CAP after approval.
- Synopsis of followup corrective action effectiveness review to be conducted.

5.3.3 Corrective Action Plan Contents for Each Problem Finding.

For each reported problem finding, the CAP may address:

- Clear and concise statement description of the finding, which can be entered into a tracking system.

- Narrative detailed description and discussion of the problem finding (i.e., background, significance and impact of the finding on the site/organization and other sites/organizations, considerations, and conclusions).
- Organization and manager responsible to monitor the problem finding evaluation, development and implementation of the corrective actions, and followup effectiveness reviews of the corrective actions to ensure effective resolution of the specific finding.
- Extent of condition describing pre-existing conditions prior to identification of the problem finding. This may include deficiencies and proficiencies of the activity that may have a bearing on the finding.
- Description of the problem finding evaluation and results to include discussion of causal factors identified. This may include background, facts, evaluation activities, and description of causal factors identified (to include root causes) for each problem finding.
- Applicable guiding principles and core functions associated with the problem finding.
- Applicable functional or technical area associated with the problem finding.
- Assignment of a unique finding numbering system for tracking and reporting. The number should include identification of the CAP for each problem finding.
- Site/organization and manager responsible for correcting the problem finding.
- Description of the followup corrective action effectiveness review that will be conducted to ensure successful resolution of the problem finding and prevention of recurrence.

5.3.4 Corrective Action Plan Contents for Each Corrective Action

For each corrective action developed, the CAP may address:

- Clear and concise statement description of the corrective action, which can be entered into a tracking system.
- Narrative detailed description and discussion of the corrective action (i.e., background, detailed description of the corrective action to include phases of the actions to be implemented and expected results, resources involved, compensatory measures to be implemented until completion, and other considerations).
- Assignment of a unique corrective action numbering system for tracking and reporting. The number should include identification of the event/assessment report and each problem finding to which the corrective action pertains.
- Action deliverable which would be a planned product that provides objective evidence that the corrective action is completed (i.e., publication and dissemination of the revised procedure).

- Name and organization of individual responsible for the preparation and implementation of the corrective action.
- Planned start date of when the corrective action will be initiated. In some instances, the start date of one corrective action may depend on the completion date of another corrective action. In this instance, it may be preferable to establish a relation start date (i.e., 30 days after completion of corrective action number xxx, rather than a definitive date).
- Planned completion date of the corrective action.
- Process for verifying closure of the corrective action.

5.3.5 Corrective Action Plan Approval

The CAP should be approved by the senior manager authorized to provide the resources (funding, personnel, and time) required to successfully implement the corrective actions within the time specified in the plan.

Upon approval of the CAP, consideration should be given to forwarding it to the employee or assessing organization that identified the findings for review and comment. The employee or assessing organization would be cognizant of the background and factors concerning the findings, and would be able to review and comment on the CAP from their perspective. This corrective action feedback is also an incentive for employees to know their efforts of identifying and reporting findings are being followed up and reinforces the desired behavior of problem identification by all employees.

Disputes between assessed and assessing employees or organizations concerning CAP development, implementation, or completion should be resolved at the lowest possible organizational level. If informal discussions successfully resolve the dispute, the resolution should be documented in a mutually agreeable way. If the dispute cannot be resolved in informal discussions, it should be elevated to the minimum extent necessary to reach resolution through the organizational level of management hierarchy.

If problem findings identified in the assessment/event report and/or corrective actions to be addressed involve multiple sites/organizations, it may be feasible to designate a lead manager to coordinate and approve a single comprehensive CAP by mutual agreement of all applicable senior managers. Other sites/organizations would forward their portions of the CAP and status of corrective action activities to the designated lead manager for consolidation.

6.0 CLOSE AND IMPLEMENT CORRECTIVE ACTIONS AND RESOLVE EACH PROBLEM FINDING

It is imperative to the success of the corrective action program that corrective actions developed and approved in the CAP are continuously monitored and the status reported to successful completion and implementation. Upon evaluating each finding, developing corrective actions to

resolve the findings, entering them in a CAP, and receiving management approval of the CAP, the third generalized step in the feedback and improvement core safety function begins.

The completion and implementation of all corrective actions to resolve each reported problem finding in the CAP usually demands the most time and is the most tedious phase of the corrective action program. During this time, other pressing issues and commitments will require the attention of managers and workers. To ensure that planned corrective action completion dates are met and actions are implemented, managers should continuously direct, prioritize, and sufficiently staff CAP completion and implementation activities. Managers assigned responsibility for each corrective action should be held accountable to track and report successful completion progress, and to notify senior management of any problems encountered that could affect scheduled completion dates.

Periodic (i.e., monthly or quarterly) site/organization-wide reports and senior management briefings on the status of the corrective action plan may also be considered.

Changes, extensions, and exceptions to any of the corrective actions in the CAP should be authorized only by the senior manager who approved the CAP, as outlined in paragraph 5.3. Change requests should include an explanation for the proposed change and what specifically is requested for change. If the request includes a change in the corrective action planned completion date, the specific revised completion date requested should be listed with explanation for that date. Approved changes should be entered in the tracking and reporting system as soon as possible.

6.1 TRACKING AND REPORTING THE STATUS OF CORRECTIVE ACTION PLAN IMPLEMENTATION

An integral part of a successful corrective action program is the capability to maintain a systematic approach for tracking and reporting the status of the corrective actions to successful closure and implementation. This may be accomplished manually or electronically.

Maintaining and updating this information provides consistent data for tracking and analyzing program status and trends. The process used to track and report corrective action progress should be readily accessible and provide sufficient data to appraise, analyze, and report the status of corrective actions affecting the safety, mission performance, and security of the site/organization.

Characteristics of an effective corrective action tracking and reporting system for consideration include:

- The number of data elements to enter, track, trend, and report information should be standardized and relevant for the reader to fully comprehend what, how, when, and by whom the problem finding will be effectively resolved so it will not recur. An excessive number of data elements to track and report may become too cumbersome and complicated, and may over-burden the ability of the system to provide qualitative and consistent information.

- The process for populating data elements should be clearly promulgated and enforced.
- The system should employ information technology that implements user-friendly, controlled access to the system and flexible reporting.
- A dedicated, highly reliable, automated database system may be the most cost-effective approach for tracking the CAP implementation, and it may significantly enhance the data collection, storage management, and processing of data and information in a timely manner. For the DOE CAMP, the Corrective Action Tracking System (CATS) is used. (See <http://www.eh.doe.gov/camp/index.html> and review CATS Users Guide).
- A basic and simple process requiring minimal training and easy access to enter and retrieve data by both the computer technical expert and novice entry level member up through senior management will allow for increased participation and involvement by all personnel involved in identifying the findings and implementing corrective actions.
- The system should contain an automated workflow or a relationship capability for linking findings to corrective actions.
- The system should contain a pre-designed reporting capability for generating summary statistics and reporting timely, consistent, and accurate corrective action information.
- The information to be entered into the system should be consistent with simple, well defined data elements and attributes for the data to be entered. Unorganized and inconsistent data collection significantly reduces the usefulness of the data. Guidance for the type of information to enter into the system should be thorough, clearly defined, and easily understood with a minimum of training and instruction.
- Access security to the data should be an integral component of the system. Access should be limited to only those with a need to know. That may include members involved in the identification of finding and implementing the associated corrective actions. The corrective action information may delineate vulnerabilities of a site or organization and should not be available to the general population. Editor access to the system for updating data should be restricted to those registered personnel authorized by their management to access and enter only data involving the specified sites or organizations for which they have received authority. For the CATS, registration is required for both readers and editors.
- The system should possess the capability to pinpoint problem areas and track trends. It should maintain historical data that supports ongoing problem resolution, trend analysis, and recurrence control activities.
- The system should allow flexible reporting, CAP changes and status, and real-time visibility of open and closed findings and corrective actions.
- The system should be able to integrate and link with other applicable databases.

- The system should be capable of conducting a flexible interactive search and retrieval of information for tracking and trending corrective action program status.
- The system should be continuously monitored, feedback requested from users, and changes made to ensure the system is meeting the needs of the users and the objectives of the corrective action program.
- Strong management support and participation in the operation and funding of the tracking and reporting system is critical to the effectiveness of the system.

6.2 TRENDING CORRECTIVE ACTION PLAN RESULTS

Identified problem findings and associated causes outlined in the CAP should be trended to assist in identifying repeat occurrences, generic issues, and vulnerabilities at the lowest level before more significant problems result. Trending may include problem categories (i.e., the Guiding Principles and Core Safety Management Functions for Integrated Safety Management outlined in DOE P 450.4, *Safety Management System Policy*) responsible organizations, and specific activities or conditions. Other finding categories and functional areas applicable to the site/organization may also be feasible to trend.

Trending the identified problem findings and their causes may assist in documenting historical data in measurable and visible terms, identifying changes in performance as they occur, and developing leading indicators that identify degrading trends.

The trend data should be periodically reviewed, analyzed, and summarized in a report, and disseminated throughout the site/organization to assist in review and followup. A trending code system for the categories may be developed and disseminated to provide consistency using a standard set of codes and categories that are clearly defined. The information should also be credible, comprehensible, useful, adjustable, and flexible.

7.0 CLOSE EACH FINDING AND DETERMINE EFFECTIVENESS OF CORRECTIVE ACTIONS

Upon completion and implementation of the corrective actions delineated in the CAP, the fourth generalized step in the feedback and improvement core safety function consists of verifying the completion of corrective actions for each finding, and determining effectiveness of the corrective actions in successfully resolving and preventing recurrence of each finding. While the third generalized step in the feedback and improvement core safety function focuses on successful completion and implementation of each corrective action, the fourth generalized step focuses on each finding and the corrective actions implemented to resolve that finding (i.e., have the corrective actions collectively resolved the causal factors, including the root causes involved in that specific problem finding and will they prevent recurrence?)

One of the most significant problems and most frequently cited weakness of the feedback and continuous improvement core safety function of ISM and Management/Criterion 3 in the QAP is the lack of followup to determine the effectiveness of corrective actions in successfully resolving

and preventing recurrence of identified problem findings. This problem has been identified and reported in myriad surveys, followup assessments, lessons learned, investigations, reviews, and actual incidents within DOE, other federal agencies, and organizations across a broad spectrum of industries. The problems that led to the Columbia Space Shuttle accident and Davis-Besse reactor pressure-vessel head corrosion event had previously been identified and reported, and corrective actions had been developed and implemented. However, followup reviews to verify completion and determine the effectiveness of the corrective actions were not conducted.

The objectives of the corrective action effectiveness review are:

- Verify the successful closure of each finding.
- Determine if the corrective actions for each finding have effectively resolved the causal factors involved in the finding and will prevent recurrence of the same or similar findings.
- If the corrective actions have not effectively resolved the finding or prevented recurrence, determine the reasons the corrective actions are ineffective. This would include a review of the problem finding evaluation, development of the corrective actions, and implementation of those corrective actions.
- Identify revised or additional corrective actions to effectively resolve the finding and prevent recurrence.
- Collect and followup data relative to the corrective action effectiveness review for subsequent analysis and lessons learned.

Reasons for ineffective corrective actions may include:

- The site/organization did not fully understand or adequately state the identified problem finding, or did not accept ownership.
- The causal factors (including root cause) were not all identified or were incorrectly identified.
- The causal factors were misunderstood (e.g., no one on the finding evaluation team had the technical expertise to comprehend some of the causal factors identified).
- The causal factors were all correctly identified, but inadequate or insufficient corrective actions were developed in response to the finding evaluation.
- The corrective actions were not adequately closed or not implemented as intended (e.g., the revised procedure was published but not adequately promulgated or understood by the workers).
- The corrective actions were not implemented in a timely manner.

7.1 OVERVIEW OF CORRECTIVE ACTION EFFECTIVENESS REVIEWS

The corrective action effectiveness review should be an independent evaluation to determine effectiveness of the corrective actions in resolving the problem finding at the lowest practical level. The focus of the review should be on whether the sum of all the corrective actions implemented for a specific problem finding effectively resolved that finding, not on individual corrective actions. Each corrective action may be individually effective, but the finding may not be effectively resolved. If it is determined that the corrective actions have not effectively resolved or prevented recurrence of a finding, the review should identify the reasons and recommend whether the corrective actions need to be revised or what additional corrective actions should be developed and implemented. If there are several corrective actions determined to be ineffective, the overall corrective action process should be reviewed.

If various corrective action effectiveness review activities will be conducted over an extended period of time utilizing several review participants, it may be feasible to appoint a lead corrective action effectiveness review manager to coordinate and followup the review activities.

The lead corrective action effectiveness review manager would be able to coordinate review activities with other organizations and managers to ensure that adequate personnel, funding, and equipment resources to conduct the reviews will be made available within a scheduled time. Other managers responsible for findings and corrective actions in the CAP would coordinate their review activities and forward the results of the corrective action effectiveness review to the lead corrective action effectiveness review manager for consolidation of the review report.

The lead corrective action effectiveness review manager should develop an effectiveness review plan (see paragraph 7.2), and coordinate the selection and scheduling of review participants as discussed in paragraph 7.3. Considerations for the conduct of the effectiveness reviews are delineated in paragraph 7.4. Some effectiveness review activities that may be considered are described in paragraph 7.5. Considerations for conducting an analysis (paragraph 7.6), validation (paragraph 7.7), reporting (paragraph 7.8), and followup (paragraph 7.9) of the corrective action effectiveness review are outlined.

The corrective action effectiveness review should be initiated as soon as practical. As the corrective actions for each finding are completed, the effectiveness review for that finding should be conducted. A specified time for completion of the corrective action effectiveness review should also be determined by the corrective action effectiveness review manager (i.e., six months after all corrective actions for all findings have been completed - the CAP completion date). The scheduling and status of the review activities should be tracked and periodically reported to completion. This will assist managers in being cognizant of review progress and any changes or followup activities that need to be implemented.

7.2 DEVELOP CORRECTIVE ACTION EFFECTIVENESS REVIEW PLANS

The lead corrective action effectiveness review manager should develop a written corrective action effectiveness review plan delineating the scope and objectives of the review, how the review will be conducted, schedule of activities within a planned timeframe, and how the review

report will be formatted and tracked to completion. A general outline of the effectiveness review plan should be initiated during the development of the CAP. A detailed plan should be developed, approved by the effectiveness review manager, and implemented as corrective actions for each finding in the CAP are completed. The corrective action effectiveness review plan may include:

- Description of each finding and the causal factors to include root causes that the corrective actions were to resolve. Possible conditions that should be reviewed as indicators of unresolved or recurring findings may also be described.
- A listing of completed corrective actions to review for each of the findings. A sufficient number of corrective actions should be identified to allow an objective, accurate assessment of effectiveness in resolving the findings and preventing recurrence. A 100-percent review of every corrective action may not be necessary to determine effectiveness in resolving a specific finding.
- Types and description of effectiveness review activities to be conducted for each finding. Resources (personnel, funding and time) for conducting each activity should also be addressed.
- A clear definition of the acceptance criteria for determining effectiveness of the corrective actions reviewed.
- Responsible manager to coordinate and conduct each of the effectiveness review activities for each finding.
- Planned start and completion dates for each of the effectiveness review activities.
- Process for tracking the status and documenting the results of the effectiveness review activities to include how the activity was conducted, effectiveness review participants, results and conclusions of the review, the review rating levels, and review recommendations.

7.3 CORRECTIVE ACTION EFFECTIVENESS REVIEW PARTICIPANTS

The Corrective Action Effectiveness Review Lead Manager should select and structure a sufficient number of effectiveness review participants to ensure that appropriate technical, administrative, and operational expertise is available to adequately meet review objectives and conduct each review activity. Review participants should possess the technical skills and operational knowledge of the area they will review, and be proficient or receive training in administrative and operational skills needed to conduct the review activities (i.e., interviewing, observing, and analyzing).

The review participants may be comprised of Federal and/or contractor personnel and should be independent from the identified finding and the corrective actions implemented to resolve the finding. This may include coordinating the use of qualified personnel external to the organization or site being reviewed.

Each of the effectiveness review activities may be conducted by any number of personnel representing the site or other locations based on the size and complexity of review activities needed to verify closure and thoroughly assess the effectiveness of the corrective actions in resolving each finding and preventing recurrence. Review participants may be called upon intermittently for different portions of the review depending on their areas of expertise and availability.

The Corrective Action Effectiveness Review Lead Manager may decide to select an individual to manage the planning, conduct, administration, logistics, and reporting of the review. This may include:

- Coordinating and recording all review activities and results.
- Assembling and managing effectiveness review participants.
- Monitoring and delegating effectiveness review participant activities.
- Developing a final effectiveness review report.

If management of effectiveness review activities transfers from one person to another, all plans, records, and other reports and activities should also be transferred to maintain consistency and continuity of review activities.

7.4 CONDUCT OF THE CORRECTIVE ACTION EFFECTIVENESS REVIEWS

Corrective action effectiveness review activities participants should consider the following guidance in the conduct of the reviews:

- The corrective action effectiveness reviews of selected completed corrective actions for each problem finding may be initiated at any time during CAP implementation and may take place over an extended period. This may be after all corrective actions for the specific finding are completed, as selected individual corrective actions for the problem finding are completed, or when all the corrective actions for all findings are completed.
- Factors in determining when to schedule effectiveness review activities include:
 - The number and complexity of problem findings and associated corrective actions in the CAP.
 - The significance and impact of each problem finding and associated corrective actions to site/organization safety, mission operations, and security.
 - Resource (funding, personnel and time) requirements and availability to conduct the effectiveness reviews for specific corrective actions. For example, verifying completion and determining effectiveness of an additional procedure incorporated to ensure protective grounding for a specific hazardous work requirement may be scheduled

immediately and conducted by a couple of personnel in a day. A review of the effectiveness of a revised emergency response process directive and training program for the emergency response team may include a performance test scheduled during the conduct of the site annual emergency response exercise and will involve several performance test evaluators.

- Length of time before corrective actions for each finding and all findings in the CAP are scheduled for completion.
- Effectiveness review participants should begin the corrective action effectiveness review by examining each finding and the causal factors identified. The causal factors, including the root causes of each finding, are the basis for development of the corrective actions and should be thoroughly understood.
- Effectiveness review participants may survey any combination of activities deemed appropriate for conducting a thorough effectiveness review, including those activities listed in paragraph 7.5 and any other activities deemed appropriate to verify closure and accurately determine the effectiveness of corrective actions in resolving and preventing recurrence of the finding. For example, an effectiveness review of completed corrective actions involving implementation of a revised training program may include review of lesson plans and attendance records, observation of training, testing trainees' performance knowledge and skills, interviewing participants about their perceptions of the training, and reviewing hands-on application of training.
- The review participants should be provided copies of appraisal reports, approved CAP and effectiveness review plans, and descriptions of corrective actions to be reviewed, including action descriptions, deliverables, completion date, completion evidence, and the name of the responsible manager.
- While conducting the review, participants should communicate closely with the personnel who developed and implemented the corrective actions to ensure an understanding of the corrective actions implemented. The review should determine closure verification and corrective action effectiveness at the performance level where practicable (e.g., not only to verify that the procedure was published, but to determine if the workers understand and have effectively implemented the corrective action procedure).
- The review participants should verify whether corrective actions are fully implemented as described and have been effectively documented, disseminated, received, and understood by the organizations and individuals affected. This should include scope (all applicable organizations, systems, programs, etc.), schedule (timeliness), and extent (i.e., temporary vs. permanent).
- The review participants should determine whether the newly implemented corrective actions have been challenged in response to an identified problem (i.e., the same or similar

circumstances or conditions to those in the identified finding or an operational failure). Has sufficient time elapsed since implementation of the corrective actions for the same or similar problem or failure to occur? If the same or similar problems occur, the causal factors need to be analyzed to determine if they are also the same or similar to the previously identified finding.

- The review participants should determine whether completed corrective actions comply with applicable laws, regulations, directives, and other applicable requirements.
- The review participants should review selected samples of corrective actions for each finding both individually and collectively, to verify closure and effectiveness in resolving findings and preventing recurrence. For example, individual corrective actions may be ineffective or indeterminate, but collectively they may have effectively resolved a finding. Conversely, even if all the corrective actions have been individually effective, the original finding may not have been adequately resolved and the collective corrective actions may be ineffective in resolving the causal factors contributing to the finding. In this situation, new or revised corrective actions may need to be developed and implemented.
- If the conditions for implementing a corrective action can occur only under specific conditions or at a specific time, the review participants should determine whether those conditions occurred. If not, the review participants should determine the feasibility of testing corrective action effectiveness under simulated conditions. If not feasible, review participants may include a description of the necessary conditions in their report and recommend that the review be conducted later, when those conditions will occur. For example, if the effectiveness review team recommends the most realistic and cost effective way to review the effectiveness of specific corrective actions just completed for a specific finding is to observe the annual site-wide emergency response exercise scheduled in 8 months, the lead manager will need to decide on the recommendation and other review alternatives. If the corrective action effectiveness review is due to be completed in 6 months, the lead manager may decide to extend the planned review completion date. This decision should be annotated and followed up.
- If the initial sample of corrective actions indicates problems in their closure and/or effective resolution of the problem finding, the review participants should expand the sample of completed corrective actions to analyze the status of the finding.

7.5 TYPES OF EFFECTIVENESS REVIEW ACTIVITIES

Several types of review activities to determine the effectiveness of corrective actions are available for use by the review individual(s) and/or team(s). Effectiveness review participant members should carefully plan activities to ensure a thorough and accurate verification of closure. In some instances, it may be feasible to use more than one type activity in order to cross-check conclusions and enhance validity of review results. Types of activities review

participants may use, individually and collectively, during the conduct of the effectiveness review include the following:

- **Documentation Review**

New and revised directives, records and reports developed and implemented in conjunction with the CAP should be reviewed to determine whether they clearly and accurately portray changes made to resolve the findings and prevent recurrence of the same or similar findings.

Although a document review may not determine the effectiveness of corrective action implementation, it can be used to followup and cross-check other effectiveness review activities, such as observations of performance and interviews.

The review should include copies of other internal and external oversight activities, self-assessments, investigations, operational exercises and events, and other assessment and operational activities involving the finding and/or corrective actions since the corrective actions was completed.

The documentation review may include:

- Documents that contributed to the original findings to ensure they have been appropriately revised or deleted.
- Organization charts, policies, procedures, and other directives that define how programs and activities are to function.
- Internal and external inspection data, audits, self-assessments, and other reviews that included examination of implemented corrective actions or identified recent similar occurrences/recurrences of any findings since the corrective actions were completed.
- Material applicable to the appraisal report findings and corrective actions such as reports of performance trends and lessons learned input.
- Records of maintenance, codes and standards, design change packages, drawings, reports, repair, training, logs, and other accounts of events.

A listing of documents reviewed and comments should be maintained on file by the Corrective Action Effectiveness Review Lead Manager as part of the effectiveness review report. The review participants should also determine and annotate whether corrective action documents were effectively disseminated, received, and understood by the organizations and individuals affected.

- **Performance Indicators**

The corrective action effectiveness review team should identify, review, analyze, and trend applicable performance indicator data that can help assess the performance of corrective

actions to resolve findings and incidents that could be construed as a recurrence or the same or similar findings (i.e., unplanned radiation exposures, environmental releases, etc.) and other events.

The findings and their associated causes may be tracked and trended to identify repeat occurrences, generic issues, events, and vulnerabilities gathered from assessments, event investigations, and reportable observations, and to help assess the performance of completed corrective actions in effectively resolving reported findings and incidents. Trending can also analyze factors that result in better than expected performance.

The analysis and trending of information should focus on the causal factors of the findings. Sources of information that can be used to track, analyze and trend may include a review of local and DOE-wide corrective action programs (i.e., CAMP), incident reporting systems (i.e., ORPS, NTS, CAIRS); internal and external assessment and investigation results, and other reportable observations and incidents.

Basic attributes of a trending program may include:

- The data should be consistent with a set of clearly defined codes and categories to be analyzed.
- The data should be credible using reliable and verifiable sources.
- The data should be comprehensible in terms of being meaningful and recognizable to the recipients.
- The data should be useful outlining a clear picture of problems and associated causes in manageable terms.
- The data should have codes assigned to make it more specific, searchable and consistent.
- The trending system should be adjustable and flexible to allow the establishment of new codes and categories when appropriate.

A listing of performance indicators and data reviewed, and results of the data analyzed should be maintained on file by the manager as part of the effectiveness review report.

- **Work Observation/Facility Tours**

Observing work is a subset of performance testing and may even be better because it is not “staged.” In some situations, observing work performance may be the most accurate and valid review of effectiveness when specific, observable workforce duties and activities are critical to effectively resolving certain findings.

The review participants will observe personnel performing actual duties and special activities as applicable to assess real time application and validate closure and effectiveness of completed corrective actions in resolving the finding and preventing recurrence.

To determine performance efficiency, review participants should possess the technical skills and operational knowledge of the work being observed. They should understand what they are to observe and should comply with all safety standards and not interfere with workers or activities under way while they are observing the work.

If the opportunity for observing actual duties and activities has not occurred, the review participants should schedule the observation time for when it will occur or develop simulated conditions to observe work performance.

A description of the work observed (who, what, when, where, and how), purpose, and results should be maintained on file by the Corrective Action Effectiveness Review Lead Manager.

- **Performance Testing**

Performance testing or exercises can be used to determine the capabilities of personnel and/or equipment to perform specific activities in both actual and controlled situations. This technique can be used when capabilities that need to be tested are not scheduled to be performed during the conduct of the effectiveness review (e.g., when a piece of equipment operates only at specific times or for specific situations) or when timeliness and appropriateness of responses to contingencies need to be tested (e.g., an evacuation drill). These functions may be tested to validate effectiveness of critical corrective actions to ensure that they effectively resolve a finding and prevent recurrence.

Although performance tests will vary in size and complexity, they should be planned with clear objectives and scope, measurable performance indicators, evaluation criteria, safety, and control. They should also be coordinated and approved by management.

As is true for work observation, review participants who review performance should possess technical skills and operational knowledge to ensure that they can determine performance efficiency. Review participants also should understand what they are to observe, comply with all safety standards, and not interfere with workers or ongoing activities.

A description of the performance test conducted (who, what, when, where, and how), purpose, and results should be maintained on file by the Corrective Action Effectiveness Review Lead Manager as part of the effectiveness review report.

- **Interviews**

Management and worker interviews can provide valuable information about their understanding and involvement with the corrective actions implemented and the effectiveness of those corrective actions in resolving the finding and preventing recurrence. Interviews should be a part of the effectiveness review and can be used to followup and cross-check other data collected. The interviews may also provide the review participants a better understanding of interviewee perceptions, knowledge, and attitudes.

The review participants may conduct both formal and informal interviews throughout all phases of the review. The interviews should include a representative cross section of managers, workers, and support personnel at various levels. Interview questions should be open, not leading.

Information received by review participants during the interview should be confirmed by summarizing it with the interviewees at the conclusion of the interview to ensure that information imparted is appropriately captured. The information received in interviews also should be verified by using other sources of information obtained during various phases of the effectiveness review.

Summaries of the interviews should be maintained on file as attachments to the effectiveness review report. A listing of numbers and types of personnel interviewed and a synopsis of results relative to each finding should be maintained on file by the Corrective Action Effectiveness Review Lead Manager as part of the effectiveness review report.

7.6 ANALYSIS OF CORRECTIVE ACTION EFFECTIVENESS REVIEW CRITERIA

Throughout the review process, the review participants should continuously analyze, discuss, and followup on data to reach logical conclusions about closure and the effectiveness of the corrective actions. The guiding principles and core functions of integrated safety management may be used as a tool in the analysis.

Recurrence of a previously reported finding before the effectiveness review is complete does not necessarily mean the corrective actions are not effective. Similar problems may result from causes different from those previously identified. Causal factors for the recurrence will need to be reviewed to determine whether they are the same as factors previously identified.

When corrective actions are determined to be ineffective or only partially effective, the review participants should document the basis for conclusion and recommend a course of action to resolve the situation. Possible causes for ineffectiveness may include:

- Causal factors incorrectly identified.
- Causal factors correctly identified but corrective actions inappropriate.
- Corrective actions not fully implemented or not implemented as stated in the CAP.
- Corrective actions not implemented in a timely manner.
- Corrective actions creating new or different problems.
- Organization/personnel lacking understanding or not accepting ownership of finding.

7.7 VALIDATION OF THE CORRECTIVE ACTION EFFECTIVENESS REVIEWS

Data collected during the effectiveness review should be continuously validated to ensure factual accuracy of the information, and review participants should maintain objectivity throughout the review.

The review participants also should maintain continuous communications with site managers and DOE Federal and contractor personnel knowledgeable of the corrective action areas and programs being reviewed.

Data collected, observations, interpretations, concerns, and conclusions should be shared and validated with site/organization personnel informally during and after collecting and analyzing the information and formally during a review participant out brief to site management. This approach will assist the review participants in evaluating the corrective actions accurately and allow management to be knowledgeable of and able to explain the information collected.

7.8 CORRECTIVE ACTION EFFECTIVENESS REVIEW REPORTING

A formal report documenting results and recommendations of the effectiveness review for each of the problem findings should be developed for approval by the site/organization within the time initially specified for completion of the review.

The report may address the following for each finding:

- Corrective action effectiveness review activities and results. This may include the number and description of the problem finding, list and description of completed corrective actions reviewed for the finding, and dates and description of effectiveness review activities conducted.
- Effectiveness review team conclusions of the corrective actions implemented for each problem finding and the ability of the corrective actions to effectively resolve the findings and prevent recurrence.
- Synopsis of data collection results that support the conclusions of the review.
- Identification and explanation of specific corrective actions not effectively implemented and/or determined ineffective in resolving the problem finding and preventing recurrence.
- Effectiveness review rating and explanation of the rating for the finding. (See paragraph 7.8.1.)
- Effectiveness review team recommendations for followup.

A suggested outline for reporting the results of the corrective action effectiveness review for each problem finding is presented at Attachment 1.

The corrective action effectiveness review report may include a cover page with the separate reports for each finding. The cover page may include a summary outlining an overview of the effectiveness review dates, activities, conclusions, overall rating, general recommendations and annotated approval of the report by the site/organization manager. A suggested outline for reporting the results and approval of the corrective action effectiveness review is presented at Attachment 2.

7.8.1 Corrective Action Effectiveness Review Ratings:

A suggested outline of corrective action effectiveness review rating levels is outlined below.

- **Effective**—Corrective actions are closed and have resolved and are expected to prevent recurrence of the problem finding effectively. No new corrective actions are recommended.
- **Partially Effective**—Corrective actions are closed and have partially resolved the problem findings and/or may not prevent recurrence. Additional or revised corrective actions are recommended to resolve and effectively prevent recurrence of the finding.

The basis for this determination and an explanation of the recommendations and suggested additional or revised corrective actions should be documented in the final report.

- **Ineffective**—Corrective actions (either closed or not closed) have not resolved and/or will not effectively prevent recurrence of the problem finding.

The basis for the rating should be explained in the report for each finding.

When identified causative factors have not recurred or cannot be conclusively determined and/or adequately recreated in a controlled situation for performance testing, the effectiveness rating may be indeterminate. That conclusion should be noted in the report with recommended followup reviews and/or additional corrective actions to be implemented to enhance the effectiveness of the corrective actions.

7.8.2 Courses of Action for Partially Effective and Ineffective Corrective Actions

Recommended courses of actions for identified partially effective and ineffective corrective actions for a specific problem finding may include:

- Implement specified compensatory actions while the causal factors involving the problem finding and effectiveness of corrective actions are reexamined.
- Reanalyze the causal factors for the problem finding.
- Reexamine the noted ineffective corrective actions and determine why they did not effectively resolve the problem finding.
- Schedule and conduct a followup effectiveness review of revised or additional corrective actions that are developed and implemented.

- Document results of the new effectiveness review and followup recommendations upon approval of the review report.

7.8.3 Corrective Action Effectiveness Review Report Approval

The site/organization manager may approve the effectiveness review report or direct additional review activities before approval. Upon approval, the report should be disseminated to personnel/offices with direction/guidance as determined by the site/organization manager.

A copy of the report and supporting documents (e.g., records, photos, drawings, test results) should be maintained on file by the site/organization manager.

7.9 FOLLOWUP OF THE CORRECTIVE ACTION EFFECTIVENESS REVIEW

Upon approval of the effectiveness review report, recommendations outlined in the report should be implemented and followed up as directed by management. Approved recommendations involving revised and new corrective actions for specific findings may be implemented by:

- Developing a revision of the completed CAP delineating new or revised corrective actions for specific findings. This information should be annotated in the CAP with a description of the new or revised corrective actions and their planned completion dates.
- Developing a new CAP for specific findings, listing new and revised corrective actions.

8.0 GENERALIZED CORRECTIVE ACTION PROGRAM PROCESS

In summary, the generalized procedures for development, implementation, completion, and followup of a corrective action program are illustrated in Figure 2. The extent and degree of implementing each of these procedures explained below is at the discretion of management based on a graded approach of the significance and criticality of the identified problem finding. They include the following:

- Upon receipt of an event, observation, or assessment report, the manager responsible for the site/organization conducts a thorough evaluation of the reported findings and determines the causal factors contributing to each.
- Based on the results of the finding evaluation, a comprehensive corrective action plan (CAP) should be developed listing the corrective actions to address each finding in the report.
- The CAP should be submitted for approval by the senior manager authorized to provide the resources (funding, personnel, time, etc.) necessary to implement the corrective actions successfully. A specified timeframe for development and senior manager approval of the CAP should be included in the corrective action process. The DOE CAMP requires Secretarial Officer approval within 60 calendar days from the date of the transmittal forwarding the assessment report.

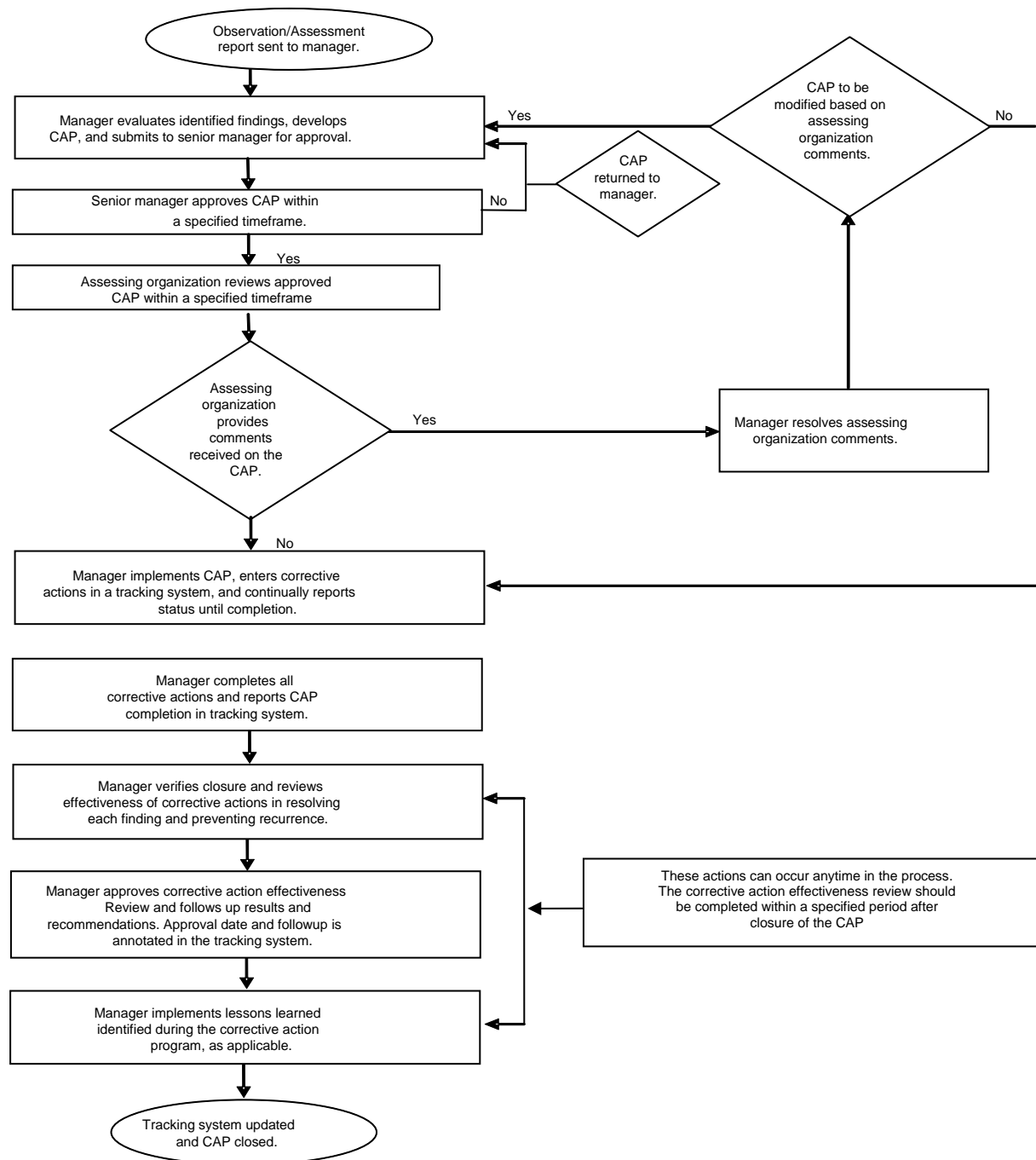


Figure 2. Corrective Action Program Process

- The senior manager approves the CAP. If the senior manager does not approve the CAP, it should be returned to the site/organization manager for followup action and be resubmitted to the senior manager. Upon approval of the CAP, the site/organization manager should forward a copy to the organization/individual that conducted the assessment/observation for review and feedback. If the assessing organization/individual provides comments concerning the CAP, they should be reviewed by the site/organization manager who will determine if any modifications of the CAP should be made based on the comments. Major modifications involving additional resources may need to be reviewed for approval by the senior manager.
- The responsible site/organization manager implements the approved CAP, enters the findings and associated corrective actions into a tracking system, and ensures the status of corrective actions is effectively tracked and continuously updated to closure.
- Upon completion of all corrective actions in the CAP, the responsible site/organization manager reports completion in the corrective action program tracking system.
- The responsible site/organization manager conducts an independent review of the completed corrective actions implemented for each finding to objectively verify closure and ensure that each finding was effectively resolved and will not recur.
 - New or revised CAPs should be documented, approved by the site/organization manager, tracked, and status reported to completion. Upon completion of the revised or new corrective actions for each problem finding, a corrective action effectiveness review of the corrective actions for the specific findings should be conducted, approved and followed up.
- The responsible site/organization manager approves the corrective action effectiveness review and follows up results and recommendations of the review. This may include implementing additional courses of action for partially effective and ineffective corrective actions (see paragraph 7.8.2). The manager should annotate approval and results of the review in the CAP tracking system. Depending on the extent of additional corrective actions determined, the site/organization manager may decide to develop a revised or additional CAP and conduct another corrective action effectiveness review of the new corrective actions for the specific findings.
- The responsible site/organization manager develops and applies lessons learned identified from the observation/assessment findings, corrective actions in response to the findings, and results of the corrective action effectiveness reviews, as applicable. Implementation of lessons learned may occur at any time during the corrective action program process.
- Upon reporting approval of the corrective action effectiveness review and completion of followup activities, the responsible site/organization manager closes the CAP.

9.0 FOLLOWUP OF THE CORRECTIVE ACTION PROGRAM

The overall corrective action program should be continuously monitored and assessed for effectiveness in reporting, evaluating, resolving and preventing recurrence of identified problem findings. Continuous site/organization feedback on the status and success of program implementation should be emphasized.

Senior site/organization management should ensure all managers are held accountable for completing and determining the effectiveness of the corrective actions in response to identified findings, and for ensuring that the resources necessary to address the findings are available.

CORRECTIVE ACTION EFFECTIVENESS REVIEW OF REPORTED FINDINGS

Assessment Report Title and Date:

Assessment Finding Number/Description:

Dates Corrective Action Effectiveness Review for the Finding was conducted:

Corrective Action Effectiveness Review Team Leader and Participants:

Explanation of effectiveness review participant activities:

- Description of each review activity to include review participants, review activities (i.e., list/description of documents reviewed, people interviewed, description of performance test conducted, etc.), and time/dates review conducted.
- Any problems encountered during review activities (i.e., specific activity could not be observed and one of the critical conditions for observation could not be simulated; specified logs or records of maintenance could not be found).
- Results and conclusions of each review activity.

Corrective Action Effectiveness Review Conclusions: Delineation of deductions derived from the facts and analysis of the effectiveness review results for the finding.

Corrective Action Effectiveness Review Rating: Rating of corrective action effectiveness to resolve the finding and prevent recurrence - Effective, Partially Effective, or Ineffective. (If the corrective actions were rated partially effective or ineffective, explain the reason and circumstances).

Recommendations: Recommended courses of action based on conclusions and rating of the corrective actions for the finding. Include any additional followup activities that should be conducted, if applicable. If the rating is partially effective or ineffective, include revised and/or additional corrective actions that should be considered for implementation.

CORRECTIVE ACTION EFFECTIVENESS REVIEW RESULTS AND APPROVAL

Assessment Report Title and Date:

Corrective Action Effectiveness Review Overview:

- Scope of effectiveness review
- Number and types of findings reviewed
- Types of effectiveness review activities conducted
- Period of time from initiation of the effectiveness review to completion
- Synopsis of effectiveness review conclusions, ratings, and recommendations

Corrective Action Effectiveness Review Overall Rating:

Followup Actions to Be Initiated as a Result of the Corrective Action Effectiveness Review:

Overall Recommendations for Executive Actions:

Signature and Date of Corrective Action Effectiveness Review Approval by Lead Manager: