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See Rpt.

SUBJECT: Rev 0 to Procedure 79PR-0IP01, "Palo Verde Nuclear Generating Station Incident Investigation...." W/890123 ltr.

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102-01101-DBK/TDS
January 23, 1989

DONALD B. KARNER
EXECUTIVE VICE PRESIDENT

U. S. Nuclear Regulatory Commission
NRC Document Control Desk
Washington, D.C. 20555

Reference: (a) Letter from Robert Pate to D. B. Karner dated November 30, 1988

(b) Letter from D. B. Karner to U. S. Nuclear Regulatory Commission dated December 23, 1988 (102-01075-DBK/TDS)

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket No. STN 50-528 (License No. NPF-41)
STN 50-529 (License No. NPF-51)
STN 50-530 (License No. NPF-74)
Incident Investigation Program
File: 89-003-493

Reference (a) requested that ANPP provide a written description of the proposed Incident Investigation Program. A generic overview of the program was provided in Attachment 'B' of reference (b) and ANPP committed to provide the details of the program's implementation upon final approval of the procedure. The applicable procedure is attached for your review.

If you have any additional questions, please contact me or Timothy Shriver of my staff at (602) 393-2521.

DBK/TDS/kj

Attachment

cc: J. B. Martin

A001
1/1

PVNGS INCIDENT INVESTIGATION PROGRAM	79PR-0IP01	Revision 0

RECORD OF REVISIONS

REVISION	DATE	REASON

TECHNICAL REVIEW SIGNATURE — DATE 1/19/89

LEAD MANAGER REVIEW — DATE 1-19-89

PRB REVIEW SIGNATURE, IF REQUIRED — DATE 1-19-89

APPROVED BY: J G Haynes — DATE 1/19/89

Effective Date:

DN-4568E/0506E

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A001

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This program establishes the method used by ANPP to conduct investigations and specifies the various procedures used to conduct an investigation. The program also specifies the following important aspects of investigation conduct:

1.1.1 Establishes what constitutes a problem requiring resolution by some form of investigation.

1.1.2 Defines the categories for which investigations shall be performed and the management involvement required for each category.

1.1.3 Establishes the responsibilities for conducting investigations.

1.1.4 Ensures that the appropriate Administrative Controls are exercised so there is consistency in all investigations performed.

1.1.5 Provides guidance for the use of applicable Administrative Control procedures that ensure that the investigations are complete, timely, accurate and reviewed and approved by the appropriate management.

1.1.6 Defines the interface with the NRC regarding investigation results.

1.1.7 Defines the role of oversight groups in the investigations.

1.2 Goal

The following represent the statement of the goals for this program:

1.2.1 For all investigations performed, the causal factors and the primary contributing cause will be identified Additionally, all contributing causes will be identified and corrective action completed to preclude recurrence.

1.2.2 Investigations will be performed objectively at the appropriate threshold to ensure that any causes for recurring events are resolved.

1.2.3 Results will be produced as expeditiously as practicable and dissemination of those results will be timely.

1.2.4 Disciplinary action is administered by line management in accordance with 01PR-0EM02, Employee Relations Administrative Program.

1.3 Scope

This program is applicable to all departments and covers a broad range of incidents. The only exceptions to the use of this program as the means to do an investigation are Fitness for Duty investigations, Security investigations and Occupational Safety investigations.

2.0 RESPONSIBILITIES

2.1 Personnel involved in an event being investigated are responsible for the following items:

2.1.1 Reporting any abnormal event, near miss or other problem condition to either their supervisor or manager, and generating a PRS form in accordance with 79AC-0IP05, Incident Investigation Action Tracking and Closeout.

2.1.2 Participating in the investigation in providing information about the event (e.g., interviews, personnel statements event meetings, etc.).

2.1.3 Ensuring that all information pertaining to the situation is provided to the Incident Investigation Team.

2.1.4 Preserving physical evidence, to be transferred to the Incident Investigation Team custodian, if it may be required to be retained for examination.

NOTE

Event categories are defined in Section 4.0.

2.2 The Investigation Director is the Plant Manager, or other director level individual designated by Vice President of Nuclear Production, for Category 1 and 2 investigations and the responsible manager of the primarily affected department, or as designated by the Responsible Director, for Category 3.

For Category 1 and 2 investigations outside the power block activities, the Investigation Director will be the Director of the organization most affected. The Investigation Director is responsible for the following items:

2.2.1 Verification that the classification of the investigation category is appropriate for the investigation to be performed. The investigation category may be upgraded or downgraded if necessary.

2.2.2 For plant transient event-initiated investigations, determining whether or not the Management Response Team is required to be called out.

2.2.2.1 Call out requirements for the Management Response Team are specified by the matrix in Appendix C. As a minimum the departments indicated will send a representative, preferably the manager, to respond to the call out and report to the Investigation Director. The overview groups are also notified of the event.

2.2.3 For plant transient event-initiated investigations, determining the required expertise for initial call out of members of the Incident Investigation Team.

2.2.3.1 The members of the Incident Investigation Team will be called out based on the duty roster maintained by the Incident Investigation Coordinator. Selection of individuals should be done considering the areas of expertise required for investigation of the event. The duty roster will contain previously designated individuals qualified in all phases of incident investigation with additional information on their specific area(s) of expertise. The duty roster will be maintained in the duty STA's area in each Unit STSC. This will ensure that it's available for use by the Control Room and plant management as necessary.

2.2.4 For Category 1 & 2 investigations approval for unit restart is completed by the Investigation Director. For uncomplicated events, the determination to proceed with restart may be made prior to resolution of all open items. A classification is made on which items affect plant restart and those are then completed first. Following their completion restart is allowed.

2.2.5 Selection of Incident Investigation Team members for events other than described in section 2.2.3 and 2.2.4 is accomplished by the following:

2.2.5.1 The Investigation Director is responsible to determine what expertise is required for the specific investigation.

2.2.5.2 The Investigation Director is responsible to determine what investigative techniques will be implemented.

2.2.5.3 Based on the expertise and investigative technique knowledge requirements, the Investigation Director is responsible to select the members of the Incident Investigation Team.

2.2.5.4 The Investigation Director is responsible for the selection of the Incident Investigation Team Leader for Category 1 and 2 investigations.

2.2.6 Ensuring that pertinent information is presented in the report.

2.2.7 Ensuring that physical evidence is preserved by appointing a custodian from the IIT membership that will provide evidence preservation.

2.2.8 Ensuring that information that may come out of the preliminary results is relayed to other organization units that may be affected in a timely manner. This allows the other units to take immediate corrective action, if it's necessary, to prevent recurrence.

2.2.9 Specifying investigation due dates and approving action plans utilized in the investigation prior to implementation.

2.2.10 Based on results from the investigation, deciding what other organizations may be required for cross-discipline reviews and approvals.

2.2.11 Reviewing and approving the investigation results in the form of a Incident Investigation Report for Category 1 and 2 investigations (Category 3 investigation reports are approved by the Responsible Director). This includes obtaining concurrence on corrective actions and action plans from managers impacted.

2.2.12 Ensuring all pending items that require corrective action are forwarded to the STA Supervisor to be implemented in the Incident Investigation Report database for tracking and closeout.

2.3 The Incident Investigation Team Leader is responsible for:

2.3.1 Assembling the Incident Investigation Team (IIT), as necessary, to review the incident and the available data.

2.3.2 To identify the relevant areas of investigation and present them to the Investigation Director.

2.3.3 To ensure that investigation techniques are used correctly.

2.3.4 Preparation of the Incident Investigation Report per 79DP-9IP01, Incident Investigation Report Preparation.

2.3.5 Notify the Investigation Director if additional assistance is necessary to meet the investigation completion date.

2.4 The Unaffected Unit Duty STAs are required to respond in the event of a Category 1 or 2 plant-related event. They will be responsible for the following in their response.

2.4.1 Contacting the designated Investigation Director for the affected unit at the direction of the Shift Supevisor. The Affected Unit Duty STA shall perform the required STA function of assisting the operating crew in the transient event mitigation and recovery.

2.4.2 Notification of the Management Response Team, if required by the Investigation Director, and the Incident Investigation Team members as the Investigation Director has specified.

2.5 The STA Supervisor shall act as the Incident Investigation Coordinator and has the following responsibilities:

2.5.1 Provide personnel to act as the core membership of the Incident Investigation Team for Category 1 and 2 investigations.

2.5.2 Provide resources to facilitate Category 3 investigations performed by the primary affected department.

2.5.3 Maintain the Incident Investigation Tracking System in accordance with 79AC-0IP05.

2.5.4 Provide preliminary review comments to be documented for Category 3 investigations to assure investigation report quality is maintained with feedback to applicable Director if quality is lacking.

2.5.5 Provide coordination for completed Problem Resolution Sheets in accordance with 79AC-0IP05.

2.5.6 Distributing completed Incident Investigation Reports per 79AC-0IP05.

2.5.7 Maintaining Incident Investigation Report files until all actions are closed per 79AC-0IP05, then turning over closed report files to NRM-DDC per 84AC-0RM05, Document/Record Turnover Control.

2.6 The Director of Plant Standards and Technical Support is responsible for the following:

2.6.1 Acting as the Lead Manager, per 01AC-0AP01, including assuring revision and document maintenance for the Incident Investigation Program, based on results of adequacy reviews conducted by Plant Standards and Control.

2.6.2 Acting as the Chairman of the PRB in providing guidance to the Board on scope of review and other responsibilities per 03AC-0AP06, Plant Review Board.

2.7 Managers with corrective actions specified in an Incident Investigation Report are responsible for the following:

2.7.1 Concur with corrective actions specified for their areas and the schedule for implementation.

2.7.2 Meet the specified due dates or provide adequate justification to the Plant Manager or Responsible Director in accordance with 79AC-0IP05, Incident Investigation Action Tracking and Distribution.

2.8 Managers and Supervisors are responsible to support the Investigation Director according to the following:

2.8.1 Providing personnel to assist in the Incident Investigation when requested.

2.8.2 Assuring that individuals involved in the cause or any immediate corrective actions for the event are available to provide information to the Incident Investigation Team as necessary.

2.9 Each individual that is selected to serve in the capacity of an Incident Investigation Team member for Category 1 and 2 investigations is qualified and included on the Incident Investigation Roster. They have the following responsibilities:

2.9.1 Perform the investigation using the techniques specified by the Investigation Director and in accordance with 79DP-0IP02, Incident Investigation Methods.

2.9.2 Participate in the investigation when called upon to do so, as a representative of their discipline or department.

2.9.3 Provide On-Call support as assigned by their department management.

2.9.4 With exception of the Investigation Director, once assigned as an Incident Investigation Team member for Category 1 and 2 investigations, the investigation shall be their primary job function. Other normal responsibilities must be delegated or reassigned.

2.9.4.1 For Category 3 investigations, team members may have other duties. However, the completion of the incident Investigation Report should have a high priority in order to meet schedule requirements of 3.11.

2.10 Individuals selected to serve as members of the Management Response Team have the following responsibilities:

2.10.1 Assist in the specification of immediate corrective actions for the other units for Category 1 and 2 investigations to be published in the Event Summary Document.

2.10.2 Review and concur with the Event Summary Document including the Event Description, Events and Causal Factor chart and the preliminary Investigation Action Plan.

2.10.3 Provide management oversight during the initial phases of the investigation.

2.11 The HPES Coordinator has the responsibility to coordinate the evaluations of human performance in investigations that are associated with personnel performance in accordance with Human Performance Evaluation, 79AC-0IP04.

2.11.1 For Human Performance Evaluations conducted during the course of an investigation, the HPES Coordinator acts as a facilitator for the Incident Investigation Team actually performing the HPE analysis.

2.11.2 For Human Performance Evaluations conducted after the investigation report is issued, and for personnel performance issues identified through the PRS, the HPES Coordinator coordinates the performance of the HPE analysis using personnel trained to perform HPE analyses.

2.12 The Compliance Manager has the responsibility for providing information from any category of investigation to the NRC while the investigation is ongoing.

2.13 Quality Assurance will periodically monitor investigations being performed to ensure that the investigations have identified contributing causes and have adequately addressed all issues related to Quality.

2.13.1 Any additional concerns identified by QA during their monitoring of the investigation process shall be communicated to the Investigation Director.

2.14 The Nuclear Safety Group (NSG) has the responsibility to perform the only offline, ex post facto review of Category 1 and 2 investigations.

2.14.1 Any additional concerns identified by NSG during their review of the investigation shall be communicated to the Investigation Director.

2.15 Independent Safety Engineering (ISE) has the responsibility to overview the investigation process for Category 1 and 2 investigations.

2.15.1 ISE will perform a review of the Operating Experience database for similar industry events (for Category 1 and 2 investigations). This review will identify similar inhouse and industry events which are applicable. The results of this review will be presented to the Investigation Director for Incident Investigation Team. This review can also be performed for Category 3 investigations, if requested.

2.15.2 ISE will determine if the details of the event should be entering into the INPO Network Information System.

2.15.3 ISE also has the responsibility to conduct Special Investigations in accordance with 92GB-0NS01, ISE Surveillance and Special Investigations, as requested by the Vice President of Nuclear Production, the Plant Managers, or the Director of Nuclear Safety and Licensing.

2.16 The Plant Review Board has the responsibility to provide an in-line review for Category 1 and 2 investigations to assess impact on nuclear safety and review unit operation for any safety significant trends. Of particular interest to the PRB is the review of the Nuclear Safety Assessment for the event. The review of the PRB also provides an inter-disciplinary review of the completed report and serves to identify applicability or conflict with other units. PRB review is not required for Category 3 and 4 investigations as these have a lesser impact on nuclear safety.

2.17 The System Engineer has the following responsibilities:

2.17.1 Conduct the necessary investigations for Category 4 investigations to resolve Engineering Evaluation Requests in accordance with Engineering Evaluation Request, 73AC-0EE01.

2.17.2 Conduct the necessary investigations for Category 4 investigations based on trends identified by the Failure Data Trending Program by completing a Root Cause of Failure EER per 73AC-0EE01.

2.17.3 Provide engineering expertise as requested during the conduct of investigations.

2.17.4 Act as an Incident Investigation Team member when his/her system has had a major failure which aggravated the consequences of the event.

2.18 The Radiation Protection and Chemistry Manager has the following responsibilities:

2.18.1 Ensuring that incidents involving overexposure or inadvertent radiation release are investigated appropriately by performing a review of those incident Investigation Reports.

2.18.2 Assuring that the Incident Investigation Team has a qualified Radiation Protection member during performance of the investigation.

2.19 The Emergency Planning and Fire Protection Manager is responsible for the following when the Emergency Plan is implemented at the Alert level or higher:

2.19.1 Ensuring the collection and transmittal of all relevant Emergency Plan information (logs, phone notifications, etc.) to the Investigation Director, per his request.

2.19.2 Providing a participant for the Incident Investigation Team.

2.20 The Manager of Training has the responsibility to maintain training files for personnel included on the Incident Investigation Duty Roster.

2.21 The Plant Standards and Control Manager is responsible for:

2.21.1 Providing personnel to perform Category 1 and 2 investigations and to perform in-line review of each Category 1, 2 or 3 investigation to assure adequacy and thoroughness of the investigation, including procedural requirements, proper use of investigative methods, corrective action determination, and report preparation.

2.21.2 Performing a periodic, multi-discipline review of the Investigation Program implementation.

3.0 PROGRAM

3.1 Problem Identification

3.1.1 Problem Identification

Problems may be discovered by any ANPP employee or contractor and for the purpose of this program can be defined as a deviation from an accepted standard that produced or could have produced (near miss situations), unacceptable results.

3.1.2 Problem Response

Depending on the severity of the event, the problem can be resolved by a variety of specific methods. The flowchart contained in Appendix A gives a graphical representation of the methods available to personnel for problem resolution.

Not all problems require an integrated investigation (i.e., some may be resolvable by EER, WR, etc.), but for those that do, a Problem Resolution Sheet (PRS) is completed per 79AC-0IP05. This is the primary method for initiation of Category 3 investigations. To ensure proper application of the PRS, the initiator's supervisor is required to review and concur that an integrated investigation is required.

Appendix D is a simplified flow chart illustrating the process of problem identification and resolution for investigations initiated by an event and for investigations initiated by a PRS.

3.2 Screening Criteria

3.2.1 The screening criteria are based on the impact the problem has on nuclear safety and on productivity. The level of response and management attention is prescribed by the severity of the problem. The more severe the impact, the greater the response level. Appendix B provides examples of past occurrences and their categorizations to assist management in properly categorizing investigations.

3.2.2.1 Category 1 is the highest level of investigation and is for the events with the most severe consequences. The investigation is conducted in accordance with 79AC-0IP01, Incident Investigation, Category 1 and 2 Incidents. This involves situations where ANPP conducts an investigation and external regulatory agencies may also be involved in their own investigation. See section 4.1 for the definition.

3.2.2.2 Category 2 represents a serious event but is usually only covered by an investigation internal to ANPP. The investigation is conducted in accordance with 79AC-0IP01. See section 4.2 for the definition.

3.2.2.3 Category 3 represents an investigation into an event that may have some impact on nuclear safety but to a lesser extent than Category 2 investigations. Investigations of this type may involve events that impact several organizational departments. They are reviewed by the STA Group to provide an objective assessment of investigation adequacy. The investigation is conducted in accordance with 79AC-0IP02, Incident Investigation, Category 3 Incidents. See section 4.3 for the definition.

3.2.2.4 Category 4 represents an investigation into an event that has no impact on nuclear safety and little impact on productivity. It will typically be a problem identified by an individual and resolved by a single problem resolution document. See section 4.4 for the definition.

3.3 Investigative Techniques

Several different methods are available for use in performing investigations. The method or methods used will be determined by the Investigation Director. The following represents the major types of methods but is not intended to be a specification of the only methods that can be utilized. Any other method used should be evaluated prior to the actual investigation to establish the benefits and risks associated. Each of the methods are covered in more detail in 79DP-0IP02, Incident Investigation Methods.

All investigative techniques described below are available to be utilized such that the primary contributing cause and any additional causal factors or contributing causes are also identified.

3.3.1 Event and Causal Factors

This method is used to organize the incident data and to develop the investigation direction in the form of a formalized flowchart of significant events and conditions. It is based on the assumption that incidents are the result of a set of successive events that produce unintentional injury to personnel, damage to property or a loss in productivity. The Events and Causal factor flow chart is used to:

- Validate findings, probable causes and contributing factors,
- Validate the incident sequence,
- Organize the investigation report,
- Illustrate the Sequence of Events in the investigation report.

3.3.2 Energy-Barrier-Target Analysis

This method assumes that hazards (energies) can damage "targets" (things of value such as equipment and people) as a result of inadequate or failed "barriers". Barriers are supposed to keep the targets from harm. When a significant event occurs, it is typically a result of the failure of one or more of the barriers (barriers can be personnel training, procedures, Preventative Maintenance program, etc.). The identification of barriers which have failed can provide insight into the contributing causes of the event.

Category 1, 2 and 3 investigations should be required to include a Energy-Barrier-Target Analysis. This is required to enable trending on failed barriers to be readily accomplished.

3.3.3 Human Performance Evaluation Program (HPES) Analysis

The HPES program, developed by INPO, has been incorporated under the recognition that human performance plays a major role in the performance of plant systems and in the consequences of an event initiated by equipment failures. When human performance is inappropriate it can transform a situation into an event. HPES investigations analyze the "causal factors" which produce the inappropriate human performance.

3.3.4 Management Oversight Risk Tree (MORT) Analysis

The MORT analysis method is a sophisticated and detailed approach to the identification of factors which can result in adverse consequences. The implementation of MORT integrates the results of the three previously discussed methodologies into one overall set of conclusions regarding the causes of a specific incident. The unique aspect of the MORT method over traditional methods of identifying the causes of an event is that a greater focus is placed on management's role and responsibilities in preventing adverse consequences.

3.4 Qualifications

3.4.1 Individuals involved in the performance of Category 1 and 2 Incident Investigations shall be trained in the investigative techniques being used and in the conduct of interviews. Team members should also have expertise in the areas being examined. Additional team members may be specified due to their expertise in a specific area but are not required to be trained in investigative techniques as long as there is at least one team member for each technique used to conduct the investigation.

3.4.2 Individual involved in the performance of Category 3 Incident Investigations shall either be trained in the techniques being used in performance of the or have extensive experience obtained by direct involvement in past investigations. They should also have expertise in the area(s) being examined.

3.5 Interview Conduct

3.5.1 Interviews will be conducted as directed by the Investigation Director or his designee and should be conducted one on one if possible. For Categories 1 and 2 the initial interviews shall be conducted as soon as possible after the event depending on the degree of involvement for the individuals involved in the event. In all cases where it is immediately determined that an individual requires an interview, unless extenuating conditions exist, the interview will be performed prior to the individual leaving the site, if the event was identified during the individual's shift.

To ensure adequate shift coverage, it may be necessary to call in relief personnel so that individuals involved in the event can be interviewed.

3.5.2 Personnel statements shall be obtained from all personnel involved in the event. This includes any individuals that may only be witnesses as well as all participants. The statement will consist of the individual's recollection of the event and the circumstances surrounding it. Personnel statements will be used by the Investigation Team in developing areas to be pursued during interviews and critiques.

3.5.3 Event meetings can also be held when a group of people participated in or witnessed the event. The event meeting shall be held after review of the personnel statements and any individual interviews.

3.5.4 Interview conduct is covered in more detail in 79DP-0IP02, Incident Investigation Methods.

3.6 Preservation of Physical Evidence

NOTE

The custodian of information or material pertinent to the investigation should ensure that the area/information/material is maintained such that evidence is not destroyed. This may be accomplished by tape barriers, use of Security, locked areas, quarantined areas, parts staging, or collection of documentation.

When an event or situation occurs that requires investigation, efforts will be made to preserve any physical evidence that will be required to perform the investigation. This may take the form of quarantining an area of the plant (in the event where major equipment damage has occurred), or retaining parts when disassembling a component that will require a root cause of failure determination. A custodian will be appointed by the Investigation Director, initially an unaffected Unit duty STA, when it is necessary to preserve evidence, to ensure protection of physical evidence is accomplished.

3.7 NRC Information Interface

3.7.1 To ensure that the NRC receives accurate and timely information, Compliance will be the point of contact.

3.7.2 Compliance shall act as a liaison between the Investigation Director and NRC in obtaining information to the NRC and relaying information requests from the NRC.

3.7.3 A Compliance representative should participate in any event meetings held to aid in providing accurate information to the NRC.

3.7.4 For Category 1 and 2 event investigations, the Compliance Manager shall contact Region V and offer to conduct a briefing at Region Headquarters and with the resident inspectors regarding the event and preliminary investigation status and initial findings. This may also include the concerns identified and what the investigation action plan covers.

3.8 Sources of Plant Data

3.8.1 In the performance of Category 1, 2 and some Category 3 investigations, plant operational response data is vital. This information comes from several sources and includes analog data as well as sequence of event and alarm type data. The category-specific investigation administrative control procedures, 79AC-0IP01 and 79AC-0IP02, specify which sources are to be used and when they're required.

3.9 Personnel Errors

3.9.1 Any Category 1 or 2 event determined to be due to personnel error (inappropriate action), resulting in a problem should be analyzed using HPES in accordance with 79AC-0IP04, Human Performance Evaluation. The HPE analysis can be conducted by the Incident Investigation Team while the investigation is in progress or can be delayed to be performed by the HPES Coordinator after issuance of the Incident Investigation Report at the Investigation Director's discretion.

3.9.2 At the discretion of the Investigation Director, personnel errors may also be evaluated using a peer review group as described in 79DP-0IP02, Incident Investigation Methods.

3.10 Information Dissemination

3.10.1 The Investigation Director has the responsibility to ensure the distribution of information in the form of a final report. Distribution will be as specified in 79AC-0IP05. The format of each investigative report will be specified by the administrative control procedure governing the investigation but will consist at least of the following parts:

3.10.1.1 The event description and sequence of events will describe the event chronology both in the form of a narrative and as an itemized chronological sequence.

3.10.1.2 The concerns and the corrective actions taken to resolve the concerns. Each concern will reflect a difference from normal either from an equipment, personnel or document standpoint. The corrective actions will be those actions that specifically address the concern and should prevent recurrence.

3.10.1.3 The schedule for completion of each corrective action with the assigned organization will also be included.

3.10.1.4 An executive summary will also be developed that summarizes the event description and lists the concerns and corrective actions. For Category 1 and 2 investigations, an Events and Causal Factors Summary will also be included.

3.10.1.5 A personnel performance evaluation will be developed that summarizes the analysis of the performance of personnel involved in the event.

3.10.1.6 A nuclear safety assessment will be included which specifies the challenges to nuclear safety caused by the event.

3.10.2 To ensure that information is immediately available during Category 1 and 2 investigations, an Event Summary Document will be developed. This will include the concerns and corrective actions identified and as many contributing causes as are identified in the early stages of the investigation. It will also include the immediate corrective actions, if any, for the other units. This preliminary event summary shall if called out initially, and approved by the Investigation Director prior to distribution and should be issued within 24 to 36 hours of the commencement of the investigation in accordance with 79AC-0IP05.

3.10.2.1 If the event is sufficiently severe and the probability high that a similar event will occur in another unit, the Investigation Director will notify the other units verbally of the investigation findings as soon as they are available.

3.10.3 If the event is uncomplicated per the Investigation Director's determination, plant restart may be allowed prior to final Incident Investigation Report completion and approval. If plant restart is being approached in this manner, then all items that are required to be corrected prior to restart shall be identified and verified to be complete. This determination is documented in the Event Summary Document in accordance with 79AC-0IP01.

3.11 Incident Investigation Report Completion Schedule

3.11.1 The investigation shall be completed and the report issued according to the time limits specified below. Exceptions to these required time intervals shall be justified and can only be authorized by the Investigation Director's management.

3.11.2 Time limits vary according to investigation category and are as follows:

Event Summary Document 24 to 36 hours from initiation of the investigation

Category 1 - 21 days from initiation of the investigation
Category 2 - 21 days from initiation of the investigation
Category 3 - 28 days from initiation of the investigation

It is expected that the investigation will be complete and the final report in draft form, ready for review and concurrence in 14 days from initiation of the investigation.

3.12 Action Tracking and Closeout

3.12.1 All identified corrective actions that are not complete at the close of the investigation shall be entered in the Incident Investigation Tracking System in accordance with 79AC-0IP05.

3.12.1.1 For Category 1 and 2 investigations, any corrective action items left not completed following the close of the investigation will be determined by the Plant Manager to not impact the continued safe operation or restart of the Unit.

3.12.2 Action due dates shall be met or adequate justification made to the STA Supervisor and the Investigation Director for not meeting the date. These justifications shall be included in the Incident Investigation file.

3.13 Trending

3.13.1 Quarterly Trend Reports for completed investigations will be generated on the basis of contributing causes. These trend reports will be provided for PRB review in accordance with Technical Specification 6.5.1.6 and forwarded to executive management and the Unit Plant Managers in accordance with 79AC-0IP05. If there's no apparent reason for the trends noted, an investigation into the cause(s) will be initiated.

3.13.2 Annually a review will be performed by the Plant Standards and Control department to evaluate the adequacy of the Incident Investigation Program. This review will be looking specifically at Program effectiveness in determining and implementing corrective actions to prevent recurrence.

4.0 DEFINITIONS AND ABBREVIATIONS

4.1 Category 1 Investigation

Events which require Category 1 Investigations are those that require implementation of the Emergency Plan at the classification level of Alert or higher or that may result in a level I violation of NRC requirements.

This category of investigation requires the highest level of management overview and offline assessment. For this type of investigation the Plant Manager for the unit involved in the event or alternate designated by Vice President Nuclear Production fulfills the position of the Investigation Director. There may also be participation by external agencies (e.g., NRC), in the preparation of external reports. The Incident Investigation Team Leader may be used to coordinate the investigation in accordance with Investigation Director direction. Each manager designated to participate by the Investigation Director is required to provide documented investigation results for their assigned area.

4.2 Category 2 Investigation

An event has occurred that is not as safety significant as Category 1 but still requires a detailed investigation due to the potential for Nuclear Safety impact. This category includes all anticipated operational occurrences that challenge fission product barriers but do not cause barrier failure (see below for examples). Additionally all reactor trips and inadvertent ESF actuations, (see list below) that do not result in an Alert classification of the Emergency Plan, as well as any major breakdowns in controls such that a level II or III violation can be expected to be received are Category 2.

Some examples of more specific events that may be subject to a Category 2 Investigation follow:

1) Implementation of the Emergency Plan as a Notification of Unusual Event,

2) Anticipated Operational Occurrences

   a) Increase in Heat Removal by the Secondary System

      i) Feedwater Control System malfunctions that result in large decrease in FW temperature or increase in FW flow

      ii) Steam Bypass Control System malfunction that results in a Main Steam Isolation Signal

      iii) Steam Line Break that results in a Main Steam Isolation Signal

      iv) Stuck open Main Steam Safety Valve

   b) Decrease in Heat Removal by the Secondary System

      i) Steam Bypass Control System malfunction that results in one or more main steam safety valves opening

      ii) Loss of load from >75% without reactor power cutback

      iii) Inadvertent closure of Main Steam Isolation Valves at power

      iv) Loss of Condenser Vacuum causing main turbine trip

      v) Feedwater piping system rupture

c) Decrease in RCS flowrate

i) Trip of one or more RCPs

ii) RCP shaft seizure or break

d) Reactivity and Power Distribution Anomalies

i) Uncontrolled CEA withdrawal

ii) CEA misoperation, outside Tech Spec action limits

iii) CVCS malfunction that decreases boron concentration outside SD margin limits.

e) Increase in RCS inventory

i) Inadvertent SIAS

f) Decrease in RCS inventory

i) Rupture of instrument line from Reactor Coolant Pressure Boundary

ii) Stuck open or weeping Primary Safety Valve exceeding Tech Spec limits

iii) Steam Generator Tube leakage greater than allowed by Tech Specs

3) ESF Actuations

a) Safety Injection Actuation Signal

b) Containment Isolation Actuation Signal

c) Containment Spray Actuation Signal

d) Main Steam Isolation Signal

e) Recirculation Actuation Signal

f) Auxiliary Feedwater Actuation Signal 1 and/or 2

4.3 Category 3 Investigation

Category 3 events represent a potential or real challenge to site or unit productivity and possibly nuclear safety. Events in this category have resulted in sufficient impact on operation that corrective action must be taken to prevent future occurrence.

These events are typically characterized by being confined primarily to one organizational department. The Investigation Director is the Affected Manager of the department which was most significantly impacted as designated by the Plant Manager or Director in accordance with 79AC-0IP05. The STA section may be requested to act as a facilitation resource and is consulted by the Investigation Director during the performance of the investigation. The Investigation Director uses his own personnel to conduct the investigation in accordance with 79AC-0IP02.

Some examples of events requiring a Category 3 investigation follow:

1) Violation of Administrative Controls which results or potentially results in reduced generating capability or a level IV or V notice of violation,
2) Error in work activities which results in significant increase in manhours lost caused by inadequate design work (e.g., Site Mod, Temporary Mod, Plant Change Package), maintenance work (e.g., corrective or preventative), procurement activities, material control or engineering (EERs),
3) Operational occurrences that result in significant manhours to correct/cleanup (e.g., overfill of tank),
4) Non consequential events with outside reporting requirements (e.g., EPA, personnel injury),
5) Events that are reportable per 10CFR50.73 that do not meet the Category 1 or 2 requirements,
6) Unplanned entry into an ACTION statement.

4.4 Category 4 Investigation

Types of events that could be categorized as Category 4 do not require the formality of an integrated investigation. These could be near-miss situations in which the individual performing a task almost takes an inappropriate action but catches the mistake prior to performance.

A number of corrective action documents currently exist that perform investigations of limited situations and specify corrective actions. This type of investigation is most often noticed at the individual level and relies on each member of the plant staff to report problems. Situations at this level do not impact nuclear safety nor do they significantly impact power production. Oftentimes they may involve near-miss situations, engineering or design problems, or equipment failures.

The following listing identifies the mechanisms in place to perform Category 4 investigations:

1) Work Request/Work Order, 30AC-9ZZ01
2) Engineering Evaluation Request, 73AC-0EE01
3) Instruction Change Request, 03GB-0AP01
4) Human Performance Evaluation, 79AC-0IP04
5) Technical Specification Interpretation, 79AC-9NS09
6) Licensing Document Change Request, 93AC-0LC01
7) Radiological Controls Problem Report, 75AC-9RP03

The following discussion describes the above mechanisms for problem resolution.

Failures of equipment which do not result in more complicated plant events are investigated using the work control process. A work request reports the problem and a work order is written to rework the component. Work control items are tracked to closure on SIMS, Station Information Management System.

For equipment covered by the Technical Specifications, any failure is additionally investigated by a Root Cause of Failure Engineering Evaluation Request (EER). Failure Data Trending also compares PVNGS equipment failures to industry average for each component. Any component that exceeds this average is evaluated and if necessary root cause determined via a Root Cause EER.

The EER is an engineering action document that is used to perform root cause evaluations for equipment failures. Corrective actions are specified to address the contributing causes. These actions are implemented using a work request or Instruction Change Request. EERs are tracked to completion.

The Instruction Change Request (ICR) is initiated to identify a problem that exists in a procedure or task. The request is forwarded to the lead manager for the applicable document for resolution. If a change is necessary, it's implemented in the next revision of the document.

Human Performance Evaluations are used to evaluate personnel performance. Each corrective action specified by the evaluation is tracked to implementation.

Technical Specification Interpretations are used to document research done into the basis for Tech Specs and provide a method for personnel to obtain information about the Tech Specs. They also provide a uniform application of the Tech Specs. Each interpretation is tracked to its completion.

Licensing Document Change Requests (LDCRs) are used to resolve problems with the Tech Specs or the FSAR. Each LDCR is tracked to its implementation into the licensing document.

Radiological Controls Problem Reports (RPCRs) are used to identify and correct degraded radiological controls practices caused by personnel or equipment problems. These reports are initiated by Radiation Protection personnel and provide for written or verbal response from the affected department supervision regarding corrective actions taken.

4.5 Near-Miss - A situation or problem which could have (but didn't) result in adverse consequences or unacceptable results.

4.6 Inappropriate Action - Human behavior, action or failure to act that transforms the human performance situation into an undesirable event.

4.7 Event Meeting - A meeting held between the participants in an event and the investigation team to ensure that all information known by the event participants is provided to the investigation team.

4.8 Investigation Director - Individual in management or supervision designated to have the lead responsibility in the conduct of the investigation.

4.9 HPES - Human Performance Evaluation System. A system which provides for the analysis, understanding and correction of human performance errors in order to achieve improved safety, reliability and availability.

4.10 Problem - An identified deviation from an accepted standard which produces or could have produced unacceptable results.

4.11 Nonconsequential - An event in which damage did occur or could have occurred of a nature that is insignificant with respect to nuclear safety, plant productivity, or equipment operation but still requires some form of investigation to prevent recurrence.

4.12 Consequential - A significant event which occurs characterized by a degradation of nuclear safety or plant productivity.

5.0 REFERENCES

5.1 Implementing References

5.1.1 79AC-0IP01, Incident Investigation Category 1 and 2 Incidents

5.1.2 79AC-0IP02, Incident Investigation Category 3 Incidents

5.1.3 79AC-0IP04, Human Performance Evaluation Analysis

5.1.4 73AC-0EE01, Engineering Evaluation Request

5.1.5 30AC-9ZZ01, Work Control

5.1.6 79AC-0IP05, Incident Investigation Report Actions and Distribution

5.1.7 79DP-0IP02, Incident Investigation Methods

5.1.8 01AC-0ZZ02, Review and Approval of Nuclear Administrative and Technical Manual Procedures

5.1.9 84AC-0RM05, Document/Record Turnover

5.1.10 03GB-0AP01, Instruction Change Request

5.1.11 75AC-9RP03, Radiological Controls Problem Report

5.2 Developmental References

None

6.0 APPENDICES

6.1 Appendix A - Problem Identification Flowchart

6.2 Appendix B - Investigation Categorization Examples

6.3 Appendix C - Investigation Responsibility Matrix

6.4 Appendix D - Process Flow Diagram for Investigations

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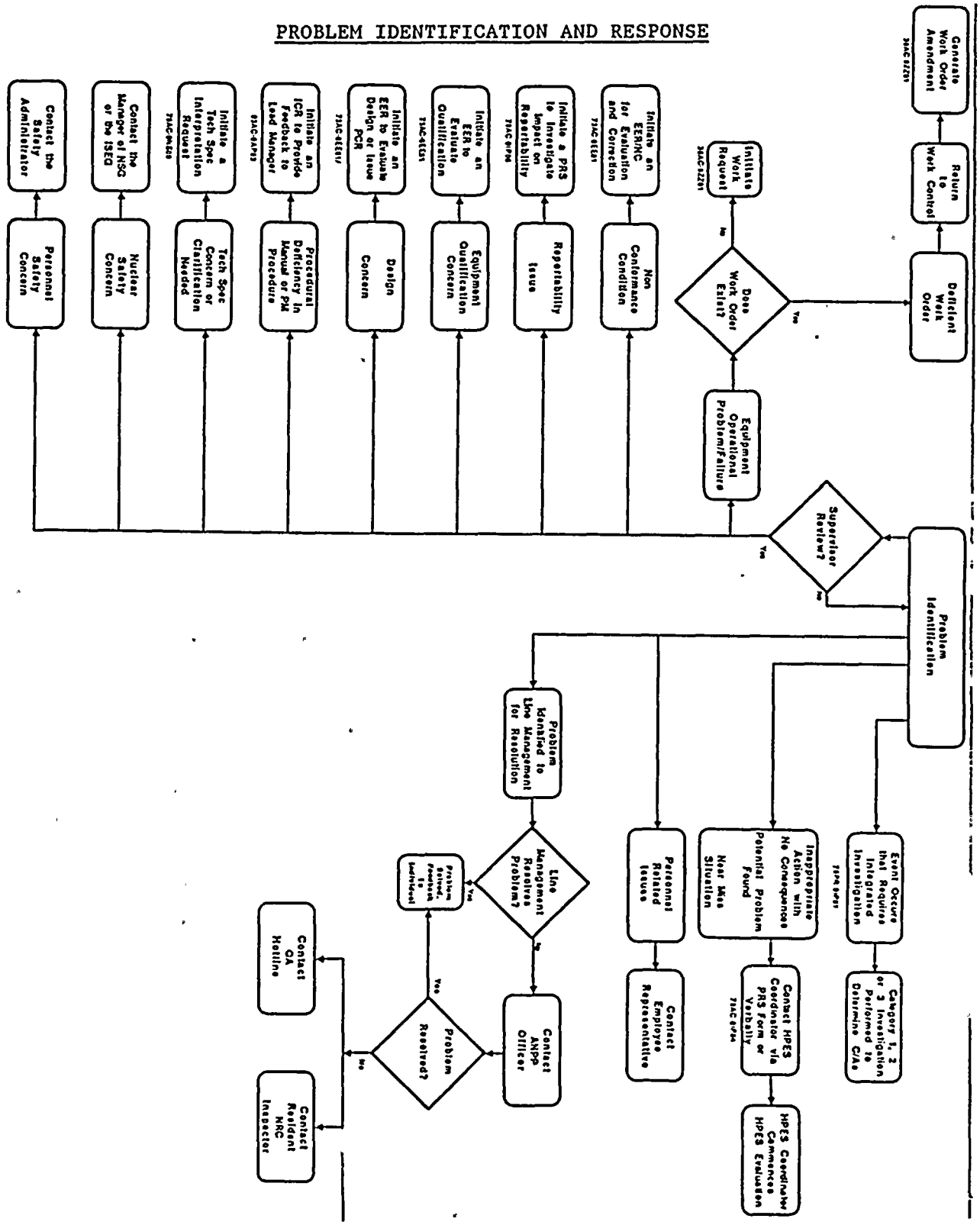
PROBLEM IDENTIFICATION AND RESPONSE



INVESTIGATION CATEGORIZATION EXAMPLES

EVENT GENERAL	CONSEQUENTIAL CATEGORY 1	CONSEQUENTIAL CATEGORY 2	NON-CONSEQUENTIAL CATEGORY 3	NON-CONSEQUENTIAL CATEGORY 4
E-PLAN ALERT OR HIGHER	X			
NRC LEVEL 1 VIOLATION	X			
RX TRIP		X		
T/G TRIP-RX PWR CUTBACK				
-W O COMPLICATIONS			X	
-WITH COMPLICATIONS		X		
NUE		X		
NRC LEVEL II & III VIOLATIONS		X		
ENTRY INTO 3.0.3 RESULTING IN UNIT S/D			X	
HISTORICAL OPERATIONAL OCCURENCES				
-CNDSR TUBE RUPTURE W/ RX TRIP		X		
-GRAVITY CTMT SPRAY			X	
-S.D COOLING ANOMALIES AT MIDLOOP			X	
-NCW TEMP. EXCURSION DUE TO VLVING ERROR			X	
-CW CANAL OVERFLOW INTO PUMP PIT			X	
-CW PUMP SUCT SCREEN INSTLTION ERROR			X	
-UNPLANNED RX VESSEL HEAD BUBBLE IN MODE 5			X	
-HEAT TRACING CNTRLR TEMP CHANGED			X	
-CLEARANCE HUNG ON INCORRECT VALVE			X	
-RCP DECON SPILL IN FUEL BLDG			X	
-LOSS OF INSTRUMENT AIR DUE TO DRYERS			X	
-WRF DILUTE CAUSTIC LOSS			X	
HISTORICAL ERRORS IN WORK ACTIVITIES				
-WASTE GAS HEADER RAD RELEASE/NUE		X		
-FOREIGN MATERIAL IN SG #1 IN U3			X	
-RCP OIL FILTER INSTALLATION ERROR			X	
-RCP IMPELLERS TORQUED INCORRECTLY			X	
-FUSE REPLACED W/O DOCUMENTATION			X	
-TRANSIENT MATERIAL NOT REMOVED			X	
-FUEL BLDG DOOR KNOCKED OFF TRACK			X	
-HDTP DAMAGED DUE TO LUBRICATION			X	
-TAGGING ERROR-POTENTIAL TURBINE TRIP			X	
-VLV BONNET INSTALLED INCORRECTLY			X	
-MSIV LIMIT SWITCH NOT CORRECTED			X	
-FUEL BLDG DOOR DAMAGED BY TRUCK			X	
-PURIFICATION FILTER DROPPED DURING TRANSPORT			X	
-EC OIL COOLER VLV MISPOSITION			X	
-UNQUALIFIED PERSONNEL PERFORMED ST			X	
-HALON ACTUATION IN COMPUTER ROOM			X	
-CO PUMP BEARING PROBLEM				X
10 CFR 50.72 ISSUES				
-MSIV FAST OPEN			X	
-EW A PUMP FAILURE ON START DEMAND			X	
-PASS DECLARED OP INCORRECTLY			X	
-SG VLV MOD RENDERED AFA-P01 INOP			X	
-LOP/DAMAGE TO CALVERT BUS			X	
-MECH INTERFERENCE CEA #56			X	
-CREFAS/CRVIAS/CPIAS			X	
-OVEREXPOSURE			X	
WORK REQUEST/WORK ORDER				X
EERs				X
RP PROBLEM REPORT				X

INVESTIGATION RESPONSIBILITY MATRIX

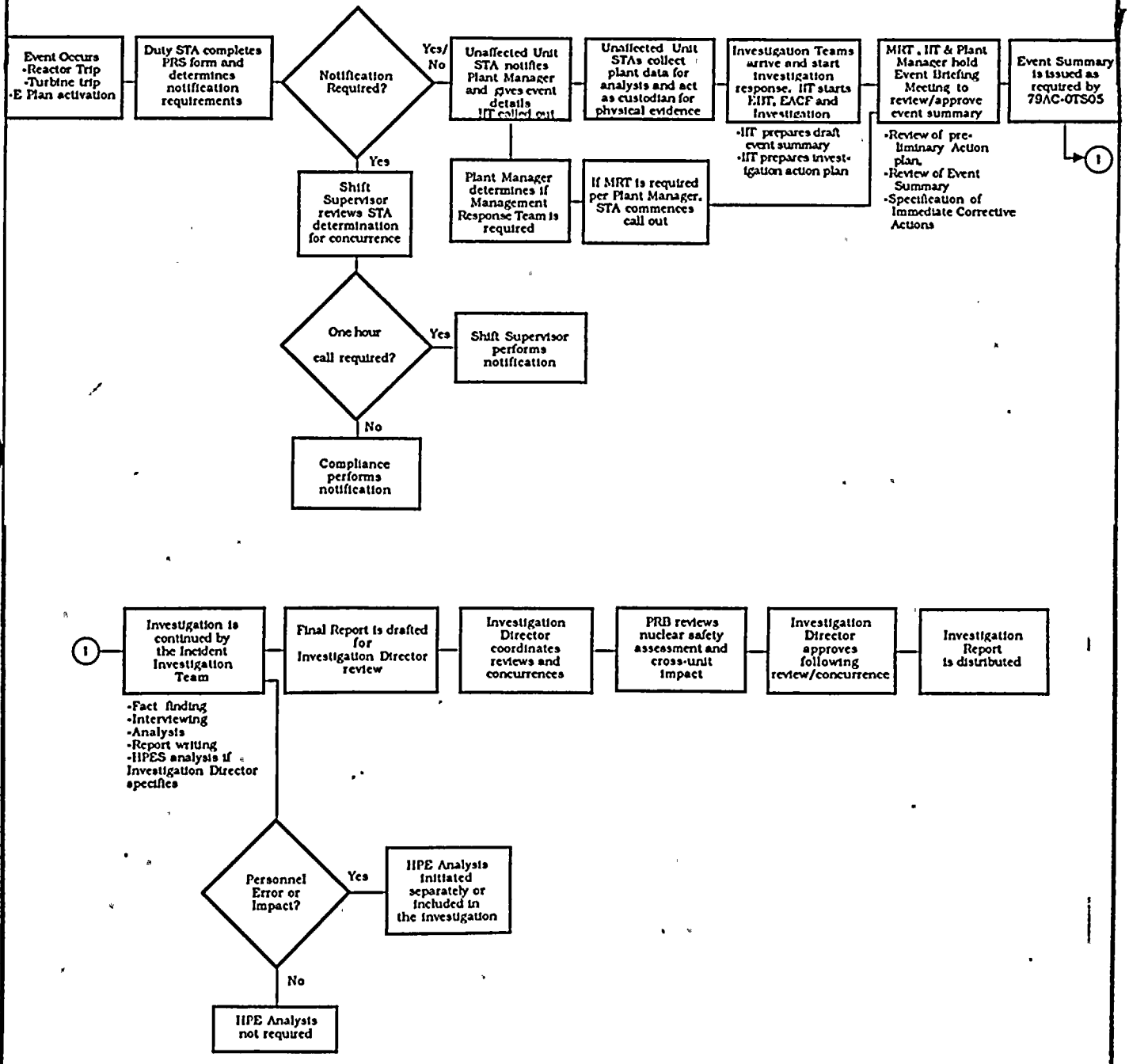
INVESTIGATION PROGRAM RESPONSIBILITIES

PROGRAM RESPONSIBILITY	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4
INVESTIGATION DIRECTOR	UNIT PLANT MGR*	UNIT PLANT MGR*	DEPT MGR*	SYSTEM ENGR PLANNER COORD HPES COORD
MANAGEMENT RESPONSE TEAM	UNIT OPS UNIT MAINTENANCE UNIT WORK CONTROL ENGINEERING EVALUATIONS PLANT STANDARDS OR RP/CHEM STDS ANY OTHERS SPECIFIED BY PLANT MANAGER	UNIT OPS UNIT MAINTENANCE UNIT WORK CONTROL ENGINEERING EVALUATIONS PLANT STANDARDS OR RP/CHEM STDS ANY OTHERS SPECIFIED BY PLANT MANAGER	N/A	N/A
INVESTIGATION TEAM MEMBERS	Members of the Investigation Team will be selected from the list of qualified Incident Investigators. Members will be selected by the Investigation Director and the IITL. Some members may not be on the qualified list but are selected due to their expertise in a certain area.**	Members of the Investigation Team will be selected from the list of qualified Incident Investigators. Members will be selected by the Investigation Director and the IITL. Some members may not be on the qualified list but are selected due to their expertise in a certain area.**	AS ASSIGNED	N/A
OVERVIEW	QA NSG ISE COMPLIANCE	QA NSG ISE COMPLIANCE	N/A	N/A
ADDITIONAL SUPPORT GROUPS	TRAINING DEVELOPMENT LICENSING NUCLEAR ENGINEERING EMERGENCY PLANNING	TRAINING DEVELOPMENT LICENSING NUCLEAR ENGINEERING	N/A	N/A
INTERVIEWING	DESIGNATED BY ID	DESIGNATED BY ID	DESIGNATED BY ID	N/A
ACTION TRACKING	STA	STA	STA	N/A
INCIDENT INVESTIGATION COORDINATOR	STA	STA	STA	N/A
PLANT REVIEW BOARD	REVIEWS INVESTIGATION REPORT	REVIEWS INVESTIGATION REPORT	N/A	N/A

* OR OTHER QUALIFIED INDIVIDUAL AS DESIGNATED BY MANAGEMENT

**THE SELECTION OF MEMBERS WILL BE DEPENDENT ON THE TYPE OF EVENT (E.G., A RADIATION RELEASE OR OVEREXPOSURE SHALL REQUIRE PARTICIPATION BY A QUALIFIED RP DEPARTMENT MEMBER, EITHER RP STANDARDS OR RPM DESIGNEE. SIMILARLY THE MAJOR FAILURE OF A PLANT SYSTEM WHICH AGGRAVATES EVENT CONSEQUENCES WILL REQUIRE PARTICIPATION BY THE SYSTEM ENGINEER)

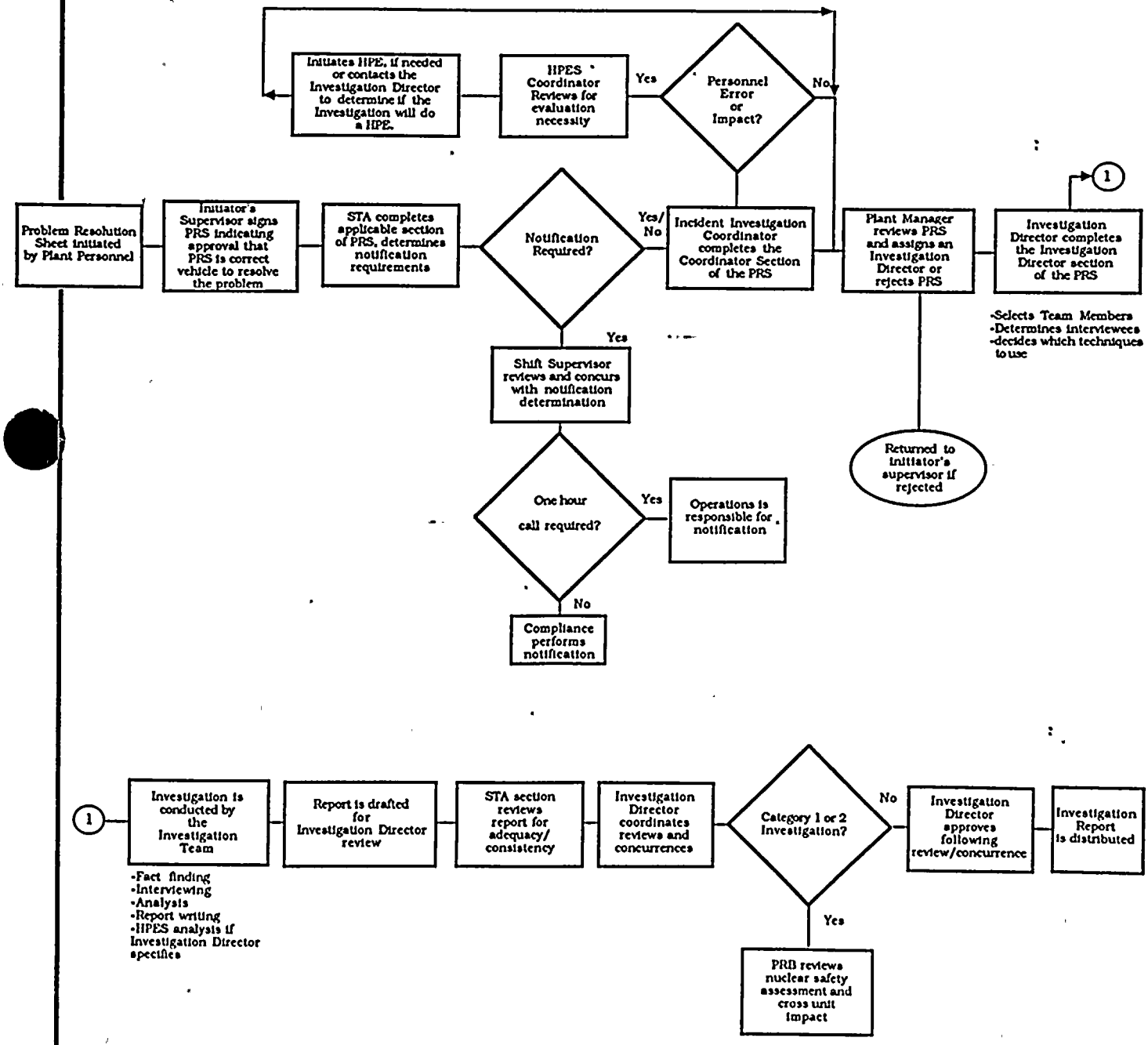
PROCESS FLOW DIAGRAM FOR EVENT INITIATED INVESTIGATIONS



Event-Initiated Investigation

Investigation Initiation and Performance

PROCESS FLOW DIAGRAM FOR PRS INITIATED INVESTIGATIONS



Investigation Initiation and Performance for PRS-Initiated Investigations