

A CONTRACTOR GUIDE TO ADVANCE PREPARATION FOR ACCIDENT INVESTIGATION



EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, Idaho 83415

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Available from:

System Safety Development Center
EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, Idaho 83415

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FOR ACCIDENT INVESTIGATION**

Prepared by

**R. J. Nertney
J. R. Fielding**

**Prepared at
EG&G Idaho, Inc.
Idaho Falls, Idaho 83415**

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ABSTRACT

This report is written as a guide for ERDA contractor organizations to assure adequate advance preparation for accident investigations. This guide considers the requirements of ERDAM Chapters 0502 and 0601, RDT F1-3, other applicable standards, and the ERDA Accident Investigation Manual. In addition, a disciplined investigation protocol is described that can be scaled appropriately and applied to all levels of accidents.

A. Introduction

In order to permit effective accident investigation in accordance with ERDAM Chapter 0502 and the ERDA Accident Investigation Manual, it is necessary for contractor organizations to make a number of arrangements prior to the occurrence of the accident or incident.

This guide is designed to provide a summary of those things which the contractor must preplan and/or do prior to the accident/incident, if the investigation is to proceed in accordance with ERDAM chapters and the methods described in the ERDA Accident Investigation Manual.

Many of the activities discussed actually occur during and following the investigation itself. Planning and the establishment of appropriate software and hardware systems must, however, precede the accident itself, if investigation is to proceed in an effective and expeditious manner.

This guide is related primarily to the Type A and B investigations defined in ERDAM Chapter 0502. The majority of occurrences throughout ERDA are, of course, of a lesser type not requiring Type A or B investigations. Well-planned investigations of the lesser events will, however, result in a more thorough discovery of contributing factors, and can lead to identification and resolution of problems which might otherwise lead to more serious occurrences. The additional fact that many of the lesser events are associated with processes, which are under different levels and types of managerial control than the more serious events, suggests the wisdom of disciplined investigation of a sample of the lesser events.

The guide and tree may be used on a one-to-one basis for planning and preparing for such investigations. Generally speaking, all basic considerations are identical. It is only necessary to remove the constraint relating the tree to ERDAM Chapter 0502 and to substitute the appropriate field organization and/or contractor rules relating to the investigation of lesser events. In these situations, of course, the "board" may, in some cases, consist of groups of investigators who are not formally structured as boards or even of a single investigator. Other parts of the tree may need scaling down in a similar fashion.

B. The Basic Planning Tree

The planning tree (Figure 1) is based upon the contractor completing preplanning and arrangements in eight areas:

- Branch 1.0, Reporting and Classifying Events
- Branch 2.0, Preservation of Evidence
- Branch 3.0, Structuring the Board Charter
- Branch 4.0, Establishing the Board
- Branch 5.0, Conducting the Investigation
- Branch 6.0, Training Personnel
- Branch 7.0, Establishing Reporting Procedures and Controls
- Branch 8.0, Conducting Post-Investigation Activities (related to the Board)

Preplanning and arrangements must be done in accordance with details included in applicable ERDAM chapters and in the ERDA Accident Investigation Manual. Arrangements and planning must also be scoped to include the possible structure of ERDA investigation boards and/or joint ERDA contractor investigation boards and/or contractor boards.

C. Details of the Planning Tree

1. Branch 1.0, Reporting and Classifying Events

This branch deals, in general, with the initial diagnosis of an event as a subject for investigation. Initial diagnosis should generally be "fail-safe" because of difficulties resulting from delayed investigation. Failure to obtain witness statements promptly, failure to preserve evidence, etc., can severely compromise the board's ability to perform an effective investigation.

- 1.1 Criteria for board investigation must be disseminated within the contractor organization in such a way as to assure prompt diagnosis of events. This must include appropriate ERDAM criteria, but need not be limited to those criteria within a given ERDA programmatic area or contractor organization.
- 1.2 Formulae and methodology for evaluating impact, losses, and interests associated with particular events must exist. These formulae include such factors as initial cost, replacement costs, depreciated costs, type and nature of personnel injury, public interest, programmatic impact, etc. Lack of well defined evaluation methodology can lead to serious delays in initiating investigation, ambiguities in the ERDA information systems, overinvestigation of relatively trivial events, etc.
- 1.3 Responsibilities of the various organizational units in detection and classification of events requiring board investigation must be clearly defined. This is particularly important in relating the roles of the line or project organizations to those of the safety organization.

2. Branch 2.0, Methods for Preservation of Evidence

This branch has to do with those controls which assure that important evidence relating to the accident/incident is not irretrievably lost. As indicated in Figure 1, preservation of evidence must be balanced against life and property saving activities as well as programmatic interests. For example, the importance of personnel rescue efforts may override considerations relating to preservation of evidence. Similarly, it may be of greater importance to carry a test sequence through to completion, even though doing so might destroy evidence relating to damage of an expensive test loop component. It should also be noted that the existence, status, and quality of such permanent records systems as as-built drawing files, ODP (Operational Documentary Photography) files, and similar systems may be an important factor in design of procedures for post-accident preservation of evidence. General groundrules for making such trades should be established to the maximum possible degree prior to the occurrence of the accident/incident.

- 2.1 Procedures, as well as the necessary hardware and software to secure and preserve the accident scene, should exist prior to the event. Methods and software necessary to provide for the logging of any alteration of the accident scene should exist. Responsibilities for securing the accident scene should be clearly defined.
 - 2.2 All considerations relating to securing of the accident scene should also apply to the securing of records. These include logbooks, instrument charts, engineering analyses, vendor data, correspondence files, etc.
 - 2.3 Procedures, hardware, and software designed to obtain early participant and witness statements should exist prior to the event. If the situation permits, initial statements should be obtained and recorded before the participants and witnesses leave the accident site.
 - 2.4 Certain evidence is by nature transient. An injured person, for example, must be promptly removed from the accident scene to receive medical treatment. Similarly, progression of an event may lead to alteration of the scene through progress of fire, progressive structural collapse, etc. Procedures, hardware, and software should exist to permit preservation of such evidence through such techniques as photography, sketches, chalk-lining of a victim's position, etc.
3. Branch 3.0, Methods for Structuring the Board Charter
- This branch has to do with the often controversial subject of establishing the board's groundrules for investigation.
- 3.1 Basic investigatory requirements (e.g., ERDAM requirements) should be established within the contractor's control literature prior to the event. Once this is done, procedures and authority for any deviations from the basic requirements should be clearly identified.
 - 3.2 Basic groundrules for the scope of an investigation should also be established. As in the case of investigatory requirements, it is necessary to establish procedures and the authority for expanding or contracting the scope of the investigation.
 - 3.3 The basic authority of an investigating board itself should be established, again, with definition of procedures and authority for any changes in authority of a board.
4. Branch 4.0, Methods for Establishing the Board
- This branch has to do with manning the board and providing the necessary interface facilities and support.

- 4.1 Funding arrangements should be preplanned and should include funding and cost accounting relating to the board and its supporting services, as well as the financial impact on other groups providing witnesses and information to the board.
- The high cost of a formal investigation makes it important that costs be properly identified and controlled.
- 4.2 Arrangements for necessary staff support for the board should be preplanned.
- 4.3 Availability of independent, objective consultants should be established. This is particularly important in the case of exotic, unusual substances and processes.
- 4.4 Criteria for board members should be established and, if possible, pools of individuals eligible for board membership and/or chairmanship should exist prior to the event. Rosters identifying trained investigators should be maintained. Groundrules relating to use of alternate members, relationship of board assignments to a member's regular job, etc., should exist.
- 4.5 The necessary hardware and software packages required by the board members should be preassembled and readily available. The latter should consist of board packages including:
- Guidelines for board chairman.
 - Basic investigating hardware kits.
 - Basic ERDAM chapter references and other procedural material.
 - Facility and process brief sheets or reports.
 - Local "Chamber of Commerce" type information relative to the geographic location (for board members drawn from other sites).

5. Branch 5.0, Methods for Initiating and Conducting the Investigation

These methods are generally specified and described in ERDAM and the Accident Investigation Manual, as modified by the board's specific charter.

- 5.1, 5.2, 5.3 Any special contractor requirements relating to inter-board relationships, contractor personnel's membership on joint or ERDA boards, and to nonmember contractor employees should be specified. This would include, for example, specific contractual union rules requiring presence of union representatives during interview of a union employee, etc.

6. Branch 6.0, Training of Personnel

This has to do with the training of personnel in such a manner as to obtain an effectively functioning system. Such training cuts across all other branches of Figure 1, and ranges from the formal training required for certifying a trained investigator to the minimal training requirements for individuals who play relatively minor roles in the investigation process.

- 6.1 Board members should receive training appropriate to their board role as members, chairmen, or trained investigators.
- 6.2 Consultants and support personnel should receive sufficient basic training in investigatory requirements to permit them to support the board in an effective way. Personnel who might be involved in accidents/incidents requiring investigation should receive training appropriate to their role in the investigative process. This training should be especially focused on their role in identifying and reporting accidents/incidents and on their role in preservation of evidence. The training should emphasize candid, honest presentation of factual information relating to the event.

7. Branch 7.0, Reporting Procedures and Controls

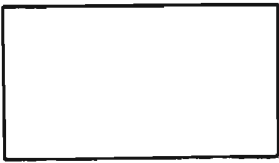
This branch deals with both the structure of formal, authorized reporting procedures and with controls related to informal and/or unauthorized release of information. It relates both to the board and to others in the organization. For example, groundrules should exist relating to response of both board members and other personnel to requests for information received by these personnel directly from representatives of the news media.

- 7.1 Means for initial reporting of events to ERDA, victims' families, and to the news media should be defined. Reporting methods appropriate for support of internal management and employee information systems should also be established. Special contractual and legal considerations relating to information release to labor unions, public authorities, OSHA, etc., should also be included in the preplanning.
- 7.2 Following initial reporting, methods and controls relating to continuing information transmittal must be established.
- 7.3 Resources must be available to permit structure of the board's final report. Contractor controls relating to internal releases, release to ERDA, and maintenance of historical files should be established.

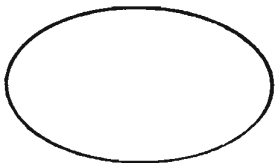
8. Branch 8.0, Post-Investigation Activities

This branch relates to activities potentially requiring board action following completion of their report. This includes such functions as validation that proposed fixes actually fulfill the intent of board recommendations, response to ERDA comments on the report, feedback to information and data stores of information relating to the investigation, etc.

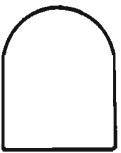
SYMBOL GUIDE TO FIGURE 1



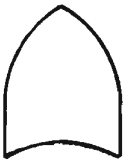
A desired event, preferably stated by a brief and functional description.



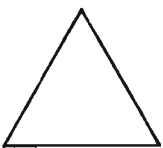
A condition or constraint which affects an event and which is assumed to be satisfied or taken into consideration.



"AND" Gate - All input events on the tier immediately below and connected to the "AND" gate must be satisfied and coexist in order to produce the output event immediately above the gate.



"OR" Gate - At least one input event on the tier immediately below and connected to the "OR" gate must be satisfied in order to produce the output event immediately above the gate.



The transfer symbol is used simply to conserve space and avoid repetition. It indicates that a complete "branch", or series of events, is duplicated and used elsewhere in the analytical tree. A number or letter within the symbol identifies the duplicated branch with the same identification. In this manual, an arrow pointing to the symbol $\longrightarrow \triangle$ indicates that this is the source and that the branch below this symbol is used elsewhere. If the branch is transferred to another page, the page number will be given directly above the symbol. An arrow pointing away from the symbol $\triangle \longrightarrow$ indicates that the source of the transferred branch may be found in that general direction on the page. If a page number is also provided below this symbol, the source must be found on the indicated page.

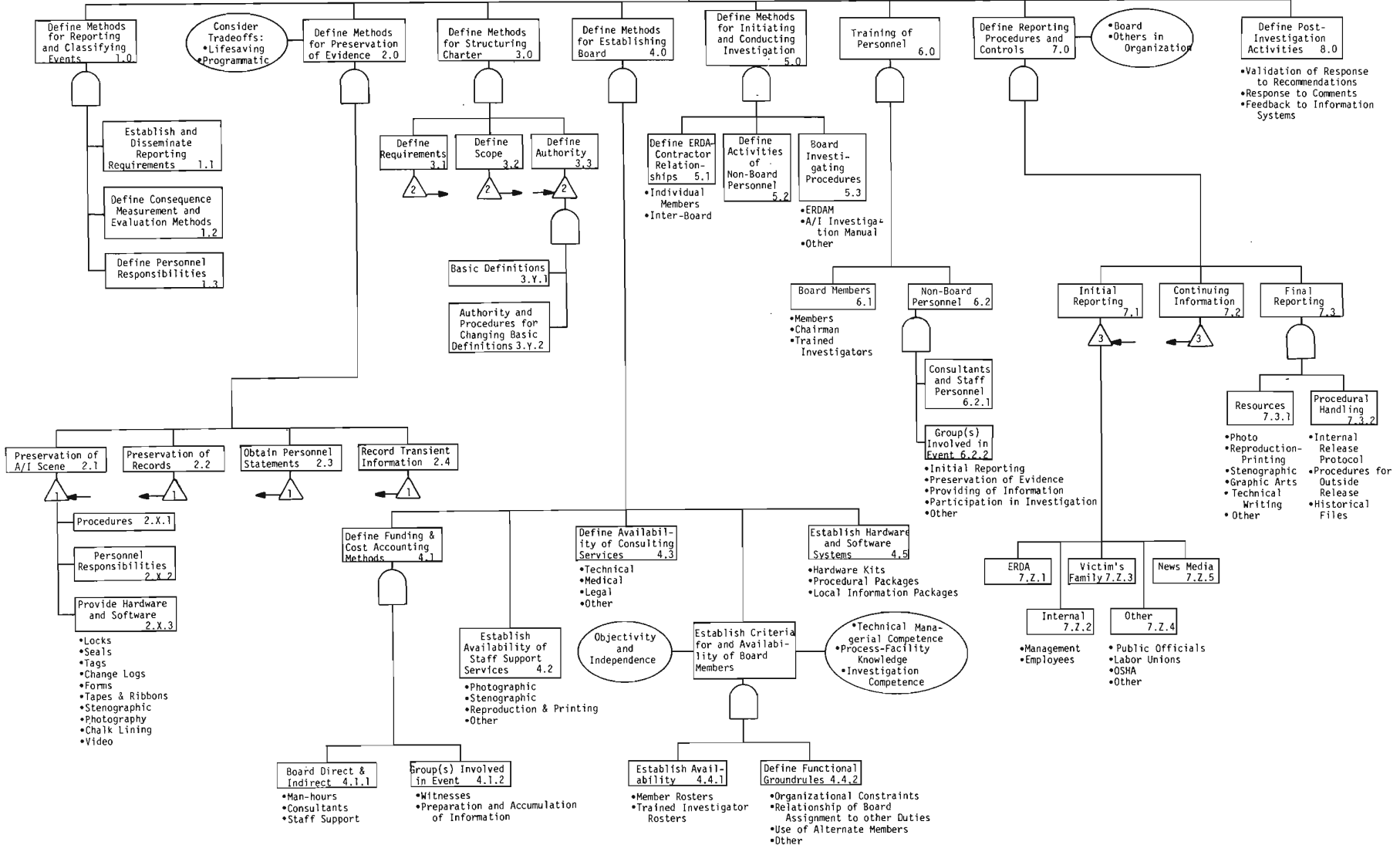
SYSTEM SAFETY DEVELOPMENT CENTER



- ERDA Boards
- ERDA-Contractor Boards
- Contractor Boards

Objective:
Contractor Organization
in State of Readiness
for Accident/Incident
Investigation

- Compliance With:
- ERDAM 0502
 - ERDAM 0601
 - RDT F1-3
 - Other Applicable Standards



OTHER SSDC PUBLICATIONS IN THIS SERIES

SSDC-1	Occupancy-Use Readiness Manual
SSDC-2	Human Factors in Design
SSDC-3	A Contractor Guide to Advance Preparation for Accident Investigation
SSDC-4	MORT User's Manual
SSDC-5	Reported Significant Observation (RSO) Studies
SSDC-6	Training as Related to Behavioral Change
SSDC-7B	DOE Guide to the Classification of Recordable Accidents
SSDC-8	Standardization Guide for Construction and Use of MORT-Type Analytic Trees
SSDC-9	Safety Information System Guide
SSDC-10	Safety Information System Cataloging
SSDC-11	Risk Management Guide
SSDC-12	Safety Considerations in Evaluation of Maintenance Programs
SSDC-13	Management Factors in Accident/Incidents (Including Management Self-Evaluation Checksheets)
SSDC-14	Events and Causal Factors Charting
SSDC-15	Work Process Control Guide
SSDC-16	SPRO Drilling and Completion Operations
SSDC-17	Applications of MORT to Review of Safety Analyses
SSDC-18	Safety Performance Measurement System
SSDC-19	Job Safety Analysis
SSDC-20	Management Evaluation and Control of Release of Hazardous Materials
SSDC-21	Change Control and Analysis
SSDC-22	Reliability and Fault Tree Analysis Guide
SSDC-23	Safety Appraisal Guide
SSDC-24	Safety Assurance System Summary (SASS) Manual for Appraisal
SSDC-25	Effective Safety Review
SSDC-26	Construction Safety Monographs
	26.1 Excavation
	26.2 Scaffolding
	26.3 Steel Erection
	26.4 Electrical
	26.5 Housekeeping
	26.6 Welding/Cutting
	26.7 Confined Spaces
	26.8 Heating of Work Spaces
	26.9 Use of Explosives
	26.10 Medical Services
	26.11 Sanitation
	26.12 Ladders
	26.13 Painting/Special Coatings
	26.14 Fire Protection
	26.15 Project Layout
	26.16 Emergency Action Plans
	26.17 Heavy Equipment
	26.18 Air Quality

SSDC-27 Accident/Incident Investigation Manual (2nd Edition)
SSDC-28 Glossary of SSDC Terms and Acronyms
SSDC-29 Barrier Analysis
SSDC-30 Human Factors Management
SSDC-31 The Process of Task Analysis
SSDC-32 The Impact of the Human on System Safety Analysis
SSDC-33 The MORT Program and the Safety Performance Measurement System
SSDC-34 Basic Human Factors Considerations
SSDC-35 A Guide for the Evaluation of Displays
SSDC-36 MORT-Based Safety Professional/Program Development and
Improvement
SSDC-37 Time/Loss Analysis
SSDC-38 Safety Considerations for Security Programs
SSDC-39 Process Operational Readiness and Operational Readiness
Follow-On
