

# Operational Readiness



IDAHO NATIONAL ENGINEERING LABORATORY





Operational Readiness Questionnaire

Name: \_\_\_\_\_

1. Do you have an Operational Readiness problem to work?

Yes                       No

2. Do you prefer to work your problem or to work as a team member on another participant's problem?

Prefer own problem

Prefer to work as a team member on someone else's problem

No preference

3. If you prefer to work your own problem would you prefer to work alone or to have other participants assigned to help you?

Prefer to work alone

Prefer to have help

No preference

4. My special interest is in:

Process Safety (like nuclear, oil, solar, etc. systems)

Specify: \_\_\_\_\_

General Safety (like the areas generally covered by an industrial safety engineer)

A specialty area (like radiation protection systems, fire, industrial hygiene, etc.)

Specify: \_\_\_\_\_



## OPERATIONAL READINESS DEMONSTRATIONS

1. Readiness Review, Policies and Procedures - Rockwell Hanford Operations Energy Systems Group
2. Operational Readiness - Albuquerque Operations Office
3. Readiness Review Plan for Purex Startup - Rockwell
4. TFTR First Plasma Readiness Review Plan - Princeton University
5. Operational Readiness Review System - Battelle, Pacific Northwest Laboratories, Richland, Washington
6. Prw-Core 2, Dry Run Cask (Foldout) - Rockwell
7.
  - Quality Manual Readiness Review - EG&G Idaho, Inc.
  - Facility and Process Operational Readiness Review - Exxon Nuclear
  - Pre-Operational Survey - Albuquerque Operations Office
8. UO<sub>3</sub> Facility Ready for Occupancy Use - Rockwell
9. Health Physics Appraisal Program - NRC
10. Safety Division Review Routing Sheet - EG&G Idaho, Inc.
11. Occupancy-Use Readiness Tree - Purex Facility
12. PA Management Consultants Limited, Oil and Gas Division, Windsor House, Aberdeen, United Kingdom
13. Facility Planning - EG&G Idaho, Inc.
14. UNC Safety Instruction Manual - UNC Nuclear Industries
15. Preparation for and Performance of Operational Readiness Reviews - DuPont, Savannah River, Georgia
16. An Integrated Approach to Economical, Reliable, Safe Nuclear Power Production - DOE, Sandia National Laboratories, Albuquerque, New Mexico

# SSDC Seminars/Workshops



## MORT SEMINAR

The MORT Seminar includes traditional safety concepts such as hazard evaluation, human performance, and risk assessment, as well as innovative safety concepts, such as barrier analysis, change analysis, and tracing of unwanted energy transfers. Participants focus on three major concerns: specific oversights and omissions, assumed risks, and weaknesses in the management system. 5 days

### Designed for:

- Safety Professionals
- General and Safety Managers
- Safety Support Staff
- Engineers and Scientists
- Technicians
- System Analysts
- Quality Assurance Personnel

### Prerequisites:

- There are no formal prerequisites.
- General experience in safety, administration or a technical field is desirable.

## A/I WORKSHOP

Subjects included in the A/I Workshop include analytical methods, information collection, risk projection, human behavior, experiences of certified investigators, the role of specialist, administrative considerations and the structure of the investigation report. 8 days

### Designed for:

- Individuals involved in accident investigations and/or technical-administrative troubleshooting.

### Prerequisites:

- The MORT Seminar.

## A/I REFRESHER

A course designed to recertify accident investigators, after 2 years. 3 days

## APPRAISAL WORKSHOP

The program will demonstrate techniques which define audit points in the following areas of the safety assurance system: 5 days

- Management Implementation
- Hazard Analysis
- Work Process
- Human Factors
- Information System
- Safety Services

### Designed for:

- Individuals involved in appraisal and audit activities.

### Prerequisites:

- There are no formal prerequisites.
- General experience in safety, administration or a technical field is desirable.
- The MORT Seminar is desirable but not required.

## MORT-A/I WORKSHOP

Subjects included in the MORT-A/I Workshop include MORT seminar concepts as well as analytical methods, information collection, risk projection, human behavior, experiences of certified investigators, the role of specialist, administrative considerations and the structure of the investigation report. 10 days

### Designed for:

- Individuals involved in accident investigation and/or technical-administrative troubleshooting.

### Prerequisites:

- There are no formal prerequisites.

## A/I REPORTING WORKSHOP

This two-day workshop presents proven methods of investigation of accidents with case studies to practice the techniques. It covers the requirements of DOE Order 5484 in developing the needed information and filling out the proper forms.

### Designed for:

- Individuals who participate in investigating accidents
- Individuals who supervise investigators
- Individuals who review accident reports
- Individuals who train investigators

### Prerequisites:

- There are no formal prerequisites.

## MEDICAL A/I WORKSHOP FOR DOE PHYSICIANS

Provide a systematic approach for physicians involved in consultation services on accident investigation boards. Areas of expertise and assistance would involve the 72 hour profile, psychological factors, physiological factors, environmental factors, and forensic applications in resolving an accident situation. The duration is 3 days.

Designed for:

- DOE and contractor physicians, psychologists, physiologists, and related fields.

Prerequisites:

- There are no formal prerequisites.

#### RISK ANALYSIS WORKSHOP

The seminar format uses and discusses the concept of Risk Assessment and Management, understanding and utilizing selected analytical methods, designing of risk assessment applications for the participants' organizations, and guiding the participants in the performance development of the risk analyses required for safety analysis reports. 5 days

Designed for:

- Individuals involved in risk evaluation and loss control programs.

Prerequisites:

- There are no formal prerequisites.
- General experience in safety, administration or a technical field is desirable.
- The MORT Seminar is desirable but not required.
- Background in simple operational statistics is desirable but not required.

#### OPERATIONAL READINESS SEMINAR

The Operational Readiness Seminar will provide cognizant management a basis for assuring that a project, process or facility is ready to operate and occupy. This assurance should be based on the MORT concepts that minimize oversights and omissions that could lead to unwanted or undesirable effects. 3 days

Designed for:

- Individuals involved in operational readiness review for facilities and processes.

Prerequisites:

- There are no formal prerequisites.
- General experience in safety, administration or a technical field is desirable.
- The MORT Seminar is desirable but not required.

#### JOB AND TASK ANALYSIS WORKSHOP

The Job and Task Analysis Workshop is designed to provide the attendee an understanding of how job and task analysis provides input to total systems human engineering. This is accomplished by lecture and laboratory where the attendee works a task analysis problem attempting to provide answers to specific questions. The attendees spend all the laboratory time actually completing a task analysis and making conclusions from the analysis. 3 days

Designed for:

- Process Safety Analysts
- General Safety Analysts
- Safety Inspection-Enforcement Personnel
- Personnel performing safety audit, appraisal and review functions
- General and Safety Management Personnel
- Personnel involved in generation of safety codes, standards and regulations.

Prerequisites:

- There are no formal prerequisites.
- General experience in safety, administration or a technical field is desirable.
- The MORT Seminar is desirable but not required.

#### ENVIRONMENTAL RISK MANAGEMENT WORKSHOP

The one week workshop presents methods which are useful in evaluating environmental problems and programs, finding areas of weakness, and projecting the consequences of existing programs. It is based on the internationally accepted Management Oversight and Risk Tree (MORT) program and demonstrates some of its most useful techniques in program evaluation and accident investigation. Also included are methods to predict problem environmental areas using both actuarial data and derived risk projections. Approximately 50% of the week will be devoted to actual case studies and in doing the statistical and graphical methods to predict environmental problem areas.

Designed for:

- Environmental Engineers
- Risk Managers
- Environmental Appraisers
- Environmental Regulations
- Hazardous and Radioactive Waste Managers

Prerequisites:

- There are no formal prerequisites.

#### PERFORMANCE MEASUREMENT WORKSHOP

The Performance Measurement Workshop is designed to guide safety professionals in the use of modern computerized safety information systems. 3 days

Using their own job functions and responsibilities as a basis, the participant systematically develops strategies and methods for use of the Department of Energy's Safety Performance Measurement System (SPMS). Also other local and national computerized systems are considered that augment the SPMS.

Opportunity is provided for each participant to indicate his or her unfulfilled safety information needs and to offer individual suggestions for SPMS enhancement. It is not a course in computer mechanics and manipulation.

Designed for:

- Safety professionals who wish to upgrade their capability to utilize computerized safety information systems in a job related way.



7/1/87

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# Operational Readiness Workshop

	Day 1		Day 2		Day 3
08:00 09:00 10:00 11:00	<b>Arrangements</b> <b>Basic Trees</b> <b>Operational Readiness theory</b> <b>Practical considerations in building operational readiness trees</b>	08:00 09:00 09:30 10:00 11:00	<b>Homework presentation</b> <b>Flow charting</b> <b>Operational readiness matrix</b> <b>Information systems</b> <b>OR in operating crew</b>	08:00  10:00	<b>Homework presentations and discussions on O/R review material</b> <b>Administrative consideration in conducting operational readiness review and risk analysis</b>
12:00	<b>Lunch</b>	12:00	<b>Lunch</b>		
1:00  4:30 Homework	<b>Laboratory:</b> <b>Construct an operational readiness tree</b> <b>Instructor check trees</b> <b>Modify and complete tree</b>	1:00 2:00  Homework	<b>OR and fellow on Laboratory: Begin design of O/R review material</b> <b>Continue readiness review material</b>		



**PRR-WORKSHOP - INSTRUCTIONS TO PARTICIPANTS:**

1. Read:

- ° SSDC-1, Occupancy Use Readiness Manual, Safety Considerations
- ° SSDC-~~XX~~<sup>39</sup>, Process Operational Readiness and Operational Readiness Follow-on
- ° SSDC-15, Work Process Control Guide
- ° SSDC-27, The DOE Accident/Incident Investigation Manual (Reference only)

2. Pick a problem or an area that concerns you as an FSO. A nagging situation for which there hasn't been a good remedy or something you believe needs to be changed. Make notes on action(s) that have been taken or planned; controls in use or to be used, and any other facts you consider relevant. Bring this material with you. In our business we ought to have a good selection and variety of items.

*Facility Safety  
Offices*

3. Be prepared to discuss your task or procedure that takes someone from Point A to Point Z. You should be familiar with each of the steps involved so that you can explain the process to others. Think of some techniques that could be used to track the status of the task or process.

## A GUIDE FOR CONSTRUCTING

### OPERATIONAL READINESS MODELS

**OVERVIEW.** The purpose of this guide is two fold. First, to give you a general idea of what operational readiness (OR) models are and second to provide you with a standard method for building one.

**DISCUSSION.** The OR process is just a method to organize your resources and job tasks to ensure a base, shop, or facility is ready to start work correctly. It provides a control system that can be used by individuals or a readiness team. The OR process is completely flexible and the degree of detail needed is determined by the user. The format makes it particularly good for use by aircrews who are used to looking at cockpit or control panel type displays. The OR can work together with other types of organized techniques such as MBO, COMPAS, and fault tree analytical methods.

**General Rules.** The following rules are based on the graphic sequences shown in Figure 1:

- The basic goal is to have any operation in a state of readiness.
- Developing an analytical tree which gets progressively deeper in detail showing the things needed to be ready to do a job.
- The tree is used to define a complete set of tasks or functions to attain operational readiness. The amount of detail needed can be varied through the various tiers or levels of the tree.
- The user has a format or matrix to use so the tasks can be related to the individuals or groups who are to do them.
- The matrix is used to track the status of the specific tasks. This results in a chart displaying the state of readiness.

#### PROCEDURAL STEPS

**STEP 1:** Building an Operational Readiness Tree

- This is a multi-tiered "objective" tree.
- The basic objective at the highest point of the tree or apex is to have the mission, shop, or project ready to operate correctly.
- The first tier of the tree always contains three basic "blocks" in a state of readiness:
  - Mission or unit and hardware
  - Mission or unit personnel
  - Mission or unit procedures
- The tiers of the tree may be built to any desired degree of detail and show at each level the condition needed to reach the next higher level. Figures 2 and 3 further show this expansion.
- Use the sequences of activities depicted by the tree to establish implementation responsibilities, and to build the required methods of implementation, i.e., work sheets, flow charts, etc.

**STEP 2:**

- To ensure management has good information and to help track readiness, you draw a continuous line across the tree from the "box to box" showing the complete set of tasks and functions needed to be in "go" or readiness position. This line may shift from tier to tier within the tree but must cross the tree completely. In areas where greater depth or detail is needed, the line is carried through lower tier boxes. If minimal detail is all that is needed use just the upper tier boxes. See figures 1a, 2 and 3.
- Identify the individual(s) or working group that have the responsibilities for completion of the items covered by the boxes.

**STEP 3:** Set up a two dimensional matrix, as shown in Figure 1B (lower right corner). On one side are the tasks established in step 2 and on the other side, the individual or working team who has responsibility for completion of the item(s). It's just a general purpose worksheet designed to control the readiness process.

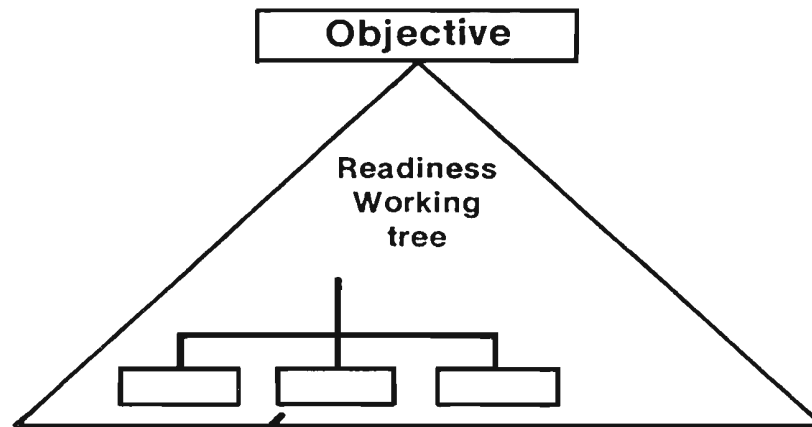
STEP 4: Place a blue diamond shaped symbol indicating "don't know status" in each box where you don't have the answer. Let's you know there's more work to do in these areas before you're in a "go" situation.

STEP 5: Establish a status reporting responsibility for each individual or working team for any matrix box. The person or team must have sufficient information to permit complete evaluation and "clear" all aspects of the box for which they are responsible.

STEP 6: As status reports come in, overlay on the blue diamond:

- A red triangle for "not ready."
- A green circle for "ready."

This material is just to give you an idea on how you work the readiness system. Read it over a couple of times and you'll see it's worth. The Occupancy Use Readiness Manual enclosed in this package is the civilian version of our Operational Readiness and further explains the items discussed in this handout.



- △ Known not complete
- Known complete
- ◇ Status unknown

Work sequence charts

Who	When	What	What
		What	What
			What
			What

Operational readiness matrix

Who	What									
		○	○	○	△	×	◇	×	×	×
		◇	△	◇	○	△	×	×	×	×
		○	△	×	×	×	×	×	◇	×
		×	△	×	×	×	×	×	×	◇
		×	×	×	×	×	×	△	○	○
		×	×	×	×	×	×	△	△	△
		○	○	○	◇	×	×	×	×	×

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1.8



# **Getting Things Off to a Good Start—Operational Readiness**

5 1293

# **How does this Workshop Fit Into the Overall MORT Program?**

S2 2614  
1.2

# What training programs are utilized?

- The MORT seminars
- The accident/incident investigation workshops
- The program appraisal workshops
- Special subjects
  - (A) Risk analysis
  - (B) Operational readiness review
  - (C) Task and job analysis
  - (D) System performance measurement
  - (E) Medical accident/incident workshop
  - (F) CAIRS

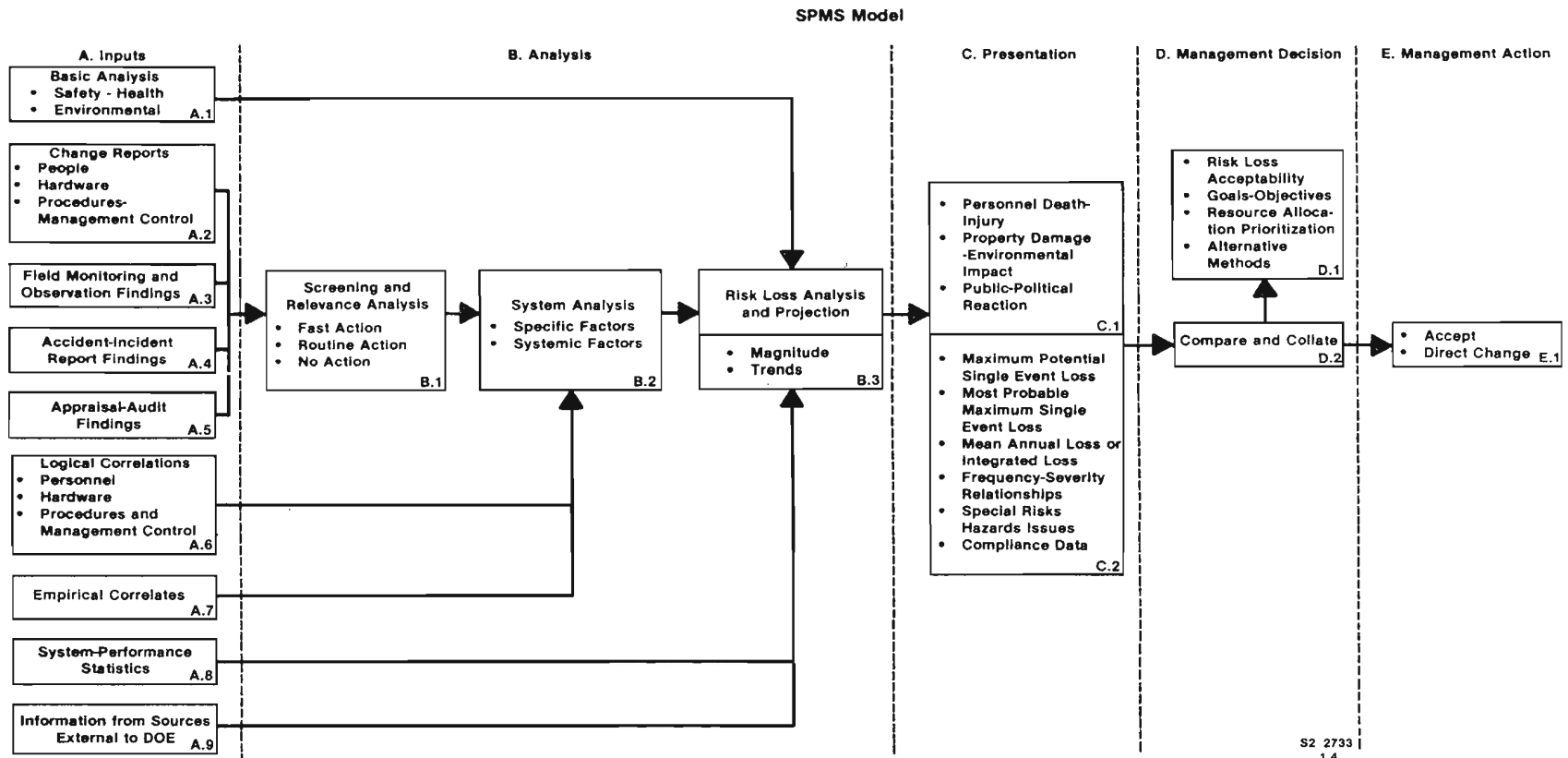
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1.3

*Computerized Acc/Inc Reporting System*

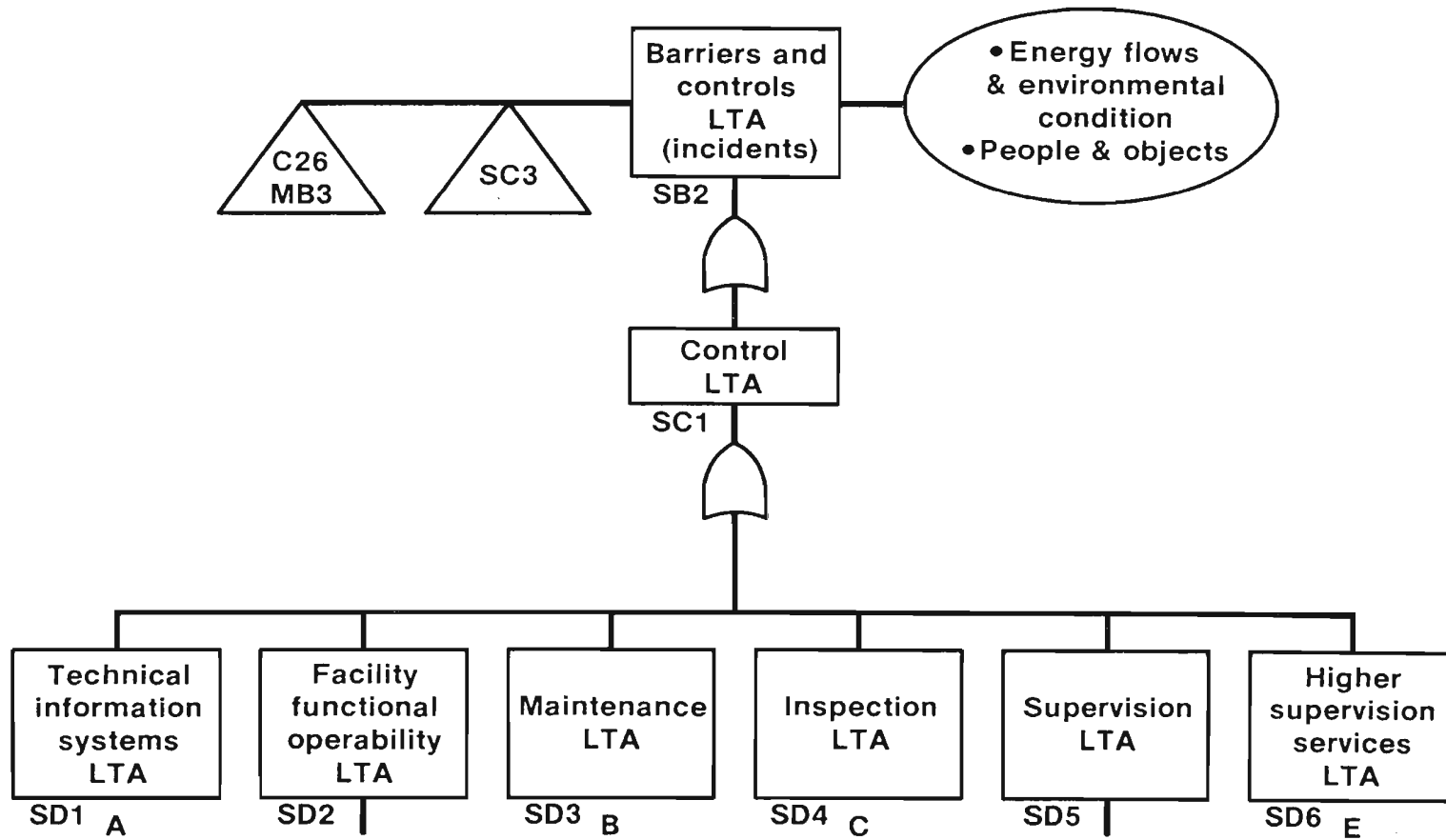
# **What This Workshop Will do for You**

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## How do the ES&H Program Pieces Fit Together?



# Contributory Events



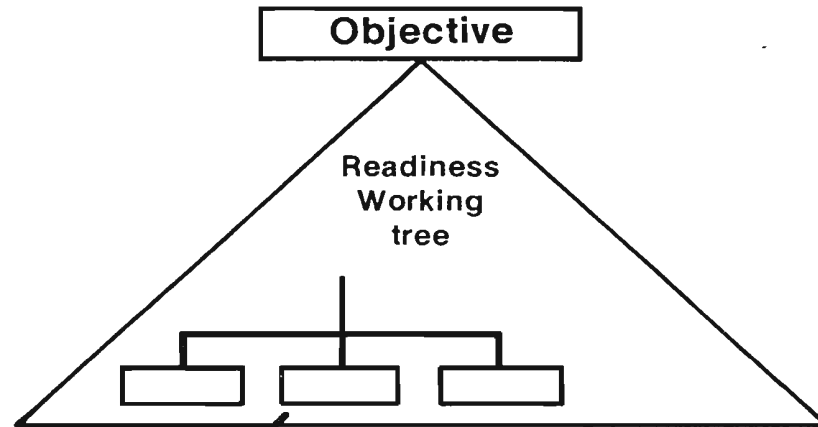
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# Operational Readiness Workshop

The objective of this workshop is to provide participants with the tools and application of methods for assuring operational readiness for new or modified energy systems.

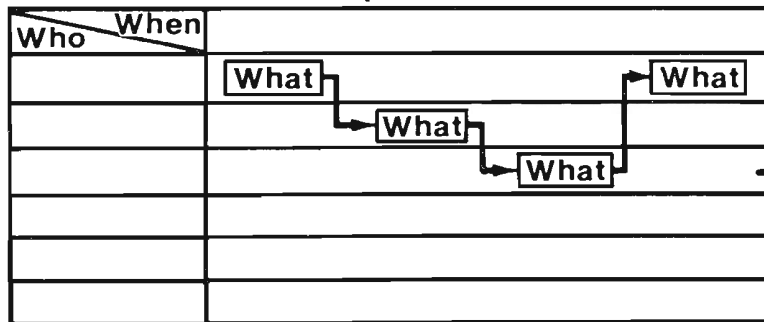
This will be done through lectures and participative exercises relating to:

- Development of operational readiness analytical trees.
- Use of work flow charts and diagrams.
- Development of operational readiness matrices.
- Reporting to management.



- △ Known not complete
- Known complete
- ◇ Status unknown

Work sequence charts

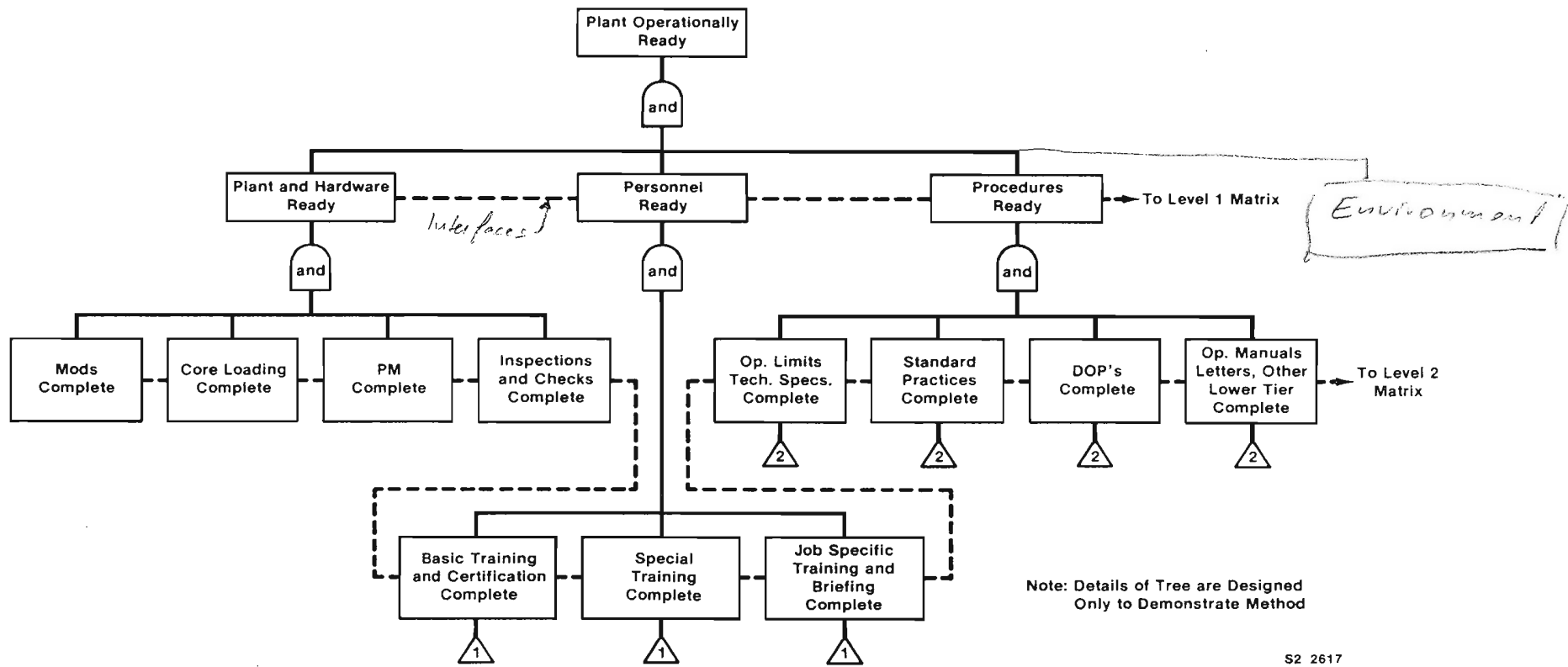


Operational readiness matrix

Who	What												
		○	○	○	△	×	◇	×	×	×	×	×	×
		◇	△	◇	○	△	×	×	×	×	×	×	×
		○	△	×	×	×	×	×	×	×	×	◇	×
		×	△	×	×	×	×	×	×	×	×	×	◇
		×	×	×	×	×	×	×	△	×	×	○	○
		×	×	×	×	×	×	×	△	△	△	△	△
		○	○	○	◇	×	×	×	×	×	×	×	×

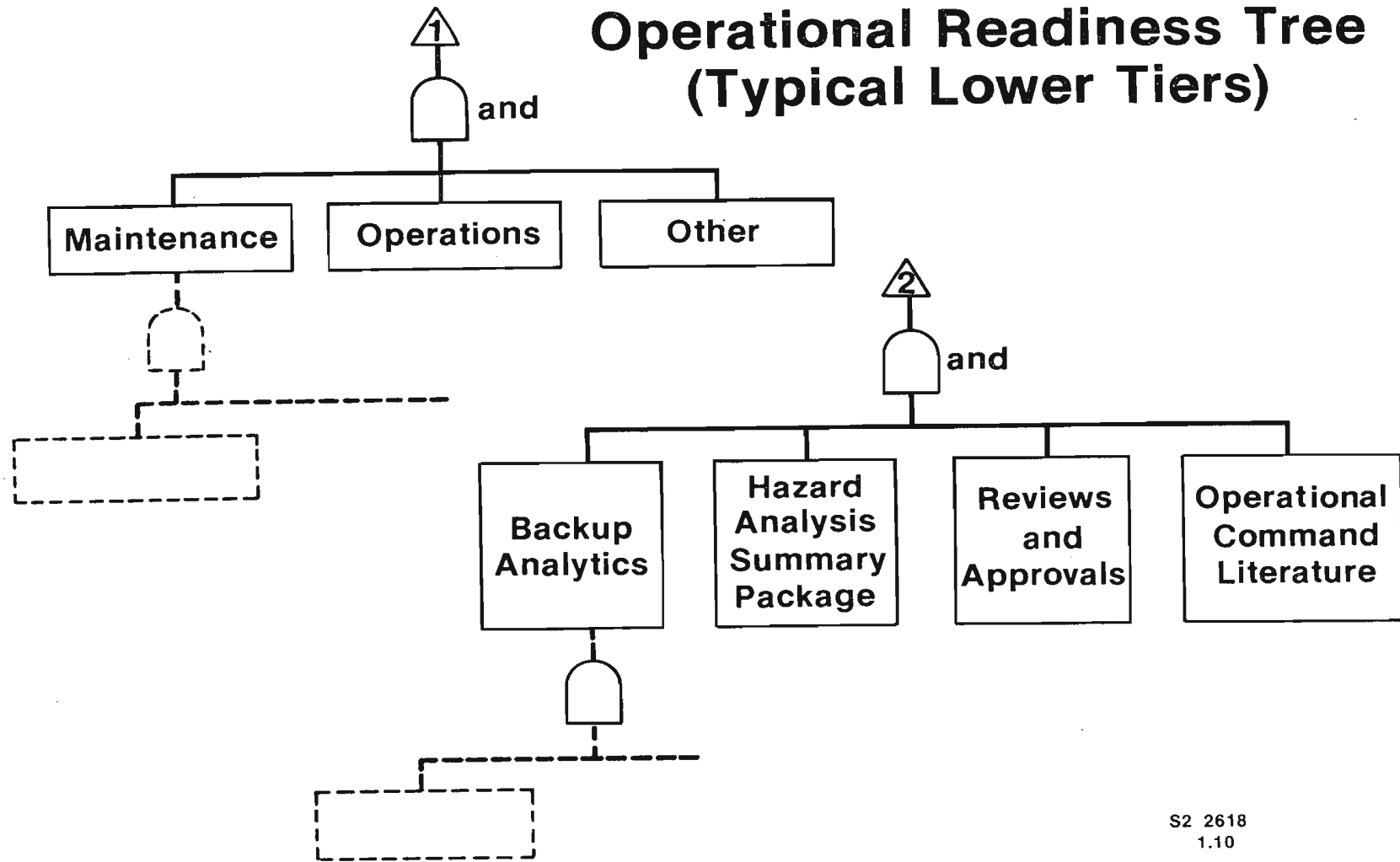
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2.20

## Operational Readiness Tree (Typical Upper Tiers)



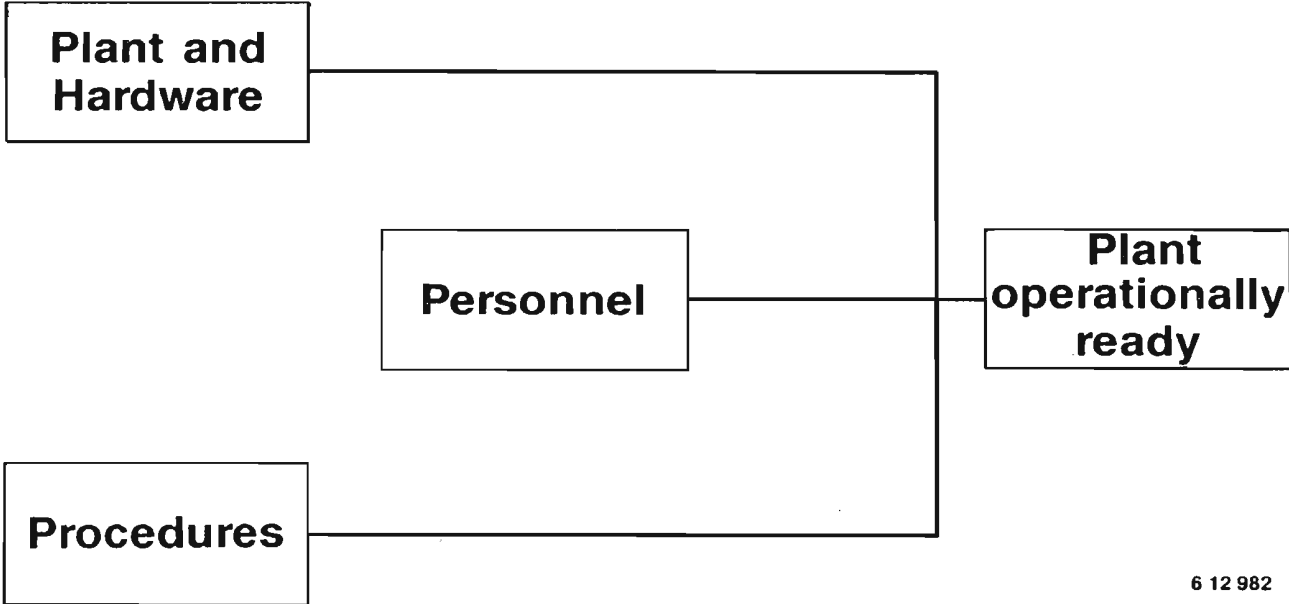
S2 2617  
1.9

# Operational Readiness Tree (Typical Lower Tiers)



S2 2618  
1.10

# Flow Chart



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# Level 1 Matrix

<b>Unit or Ship Hardware Ready</b>	○
<b>Personnel Ready</b>	○
<b>Procedures</b>	◇

**Code:**      ◇      **Status Unknown (blue)**  
                 △      **Known to be "Not Ready" (red)**  
                 ○      **Known to be "Ready" (green)**

6 12 981

## Level 2 Matrix

	DOE	Top Manage.	Staff Divisions		Engineering		OPS			
Plant Mods Complete	○	○	○	◇	○	○	○	○	△	△
Core Loading Complete	○	○	○	△	○	◇	○	○	△	△
PM Complete	○	○	○	○	○	○	○	○	○	○
Inspections & Checks Complete	○	○	○	△	◇	○	○	○	○	○
Operating Limits	◇	◇	◇	○	○	○	○	○	○	⊗
Standard Practices	○	○	△	○	○	⊗			○	○
DOP's	○	○	○	○	○	○	○	○	○	◇
Operating Manuals, Letters, etc.	○	△	○	○	○	○	○	○	○	○
Basic Training & Qualification	○	○	○	○	⊗	⊗	○	○	○	△
Special Training	○	○	○	○	⊗	○	○	○	○	○
Job Specific Training & Briefing	⊗	⊗	○	○	⊗	○	○	○	△	△

- Code: ◇ Status Unknown (blue)  
 △ Known to be "Not Ready" (red)  
 ○ Known to be "Ready" (green)

Note: This Figure is Intended to Demonstrate The "Control Panel" Nature of the Color-Coded Matrix. The Sample Symbols are not Intended to be Logically Consistent

S2 2620  
1.12



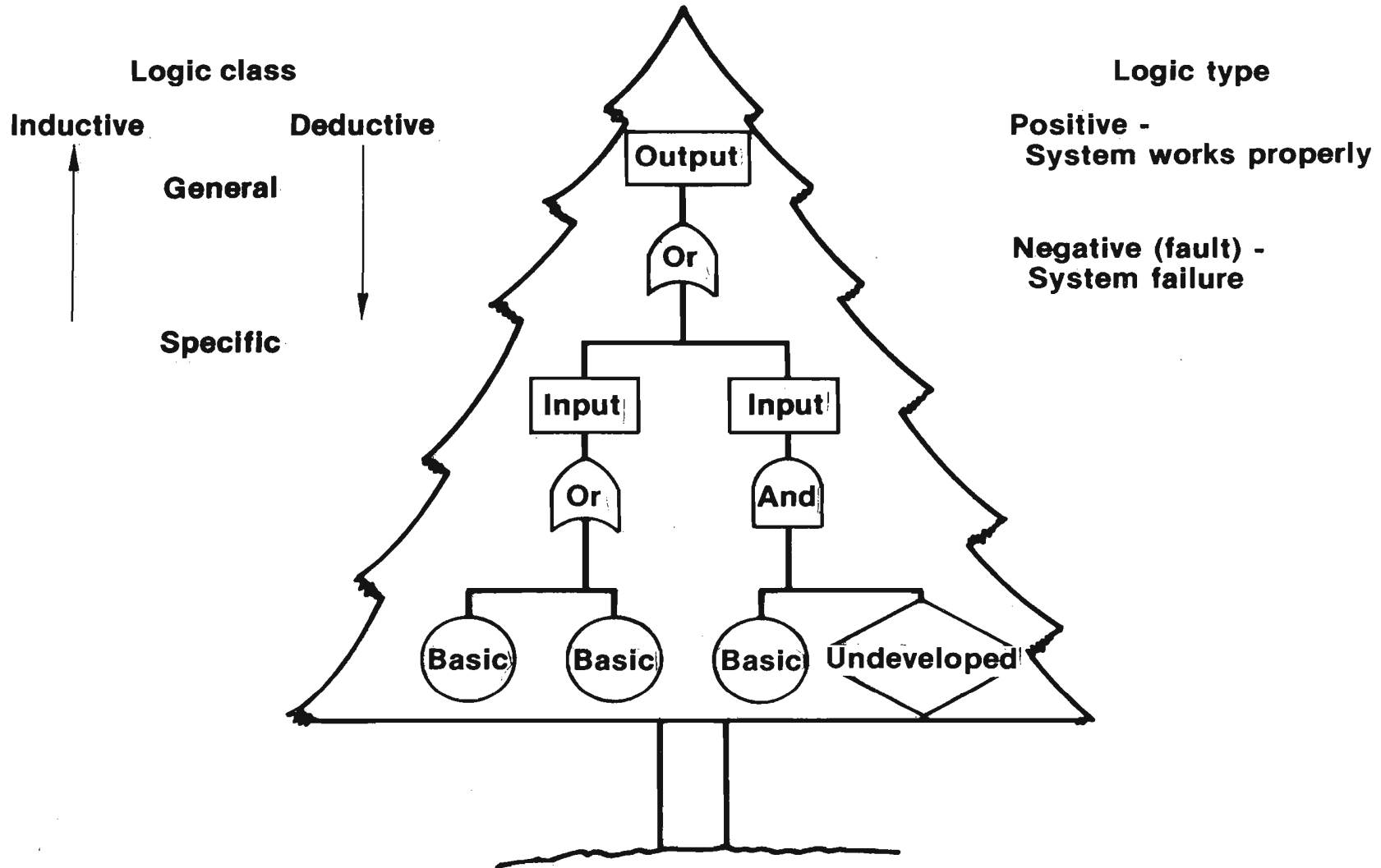
# Basic Tree Analysis

# Tree Defined

- **A graphic display of information to aid the user in conducting a deductive analysis of any system (human, hardware, or environment) to determine critical paths to success or failure**
- **It identifies the details and interrelationships that must be considered to prevent oversight and omissions that lead to failure**

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# The Basic Logic Tree



# **Analytical Tree Uses**

- 1. Display clear thinking**
- 2. Conduct deductive analysis**
- 3. Show relationships and interfaces**
- 4. Identify root causes**

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## **Analytical Tree Uses (cont'd)**

- 5. Determine critical paths**
- 6. Identify system status**
- 7. Provide basis for rational decision making**
- 8. Provide reusable visual record**

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# Analytical Tree Steps

1. Define top event
2. Know system
3. Construct tree
4. Validate tree
5. Evaluate tree
6. Study trade offs
7. Consider alternatives and recommend action

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# Tree Construction Principles

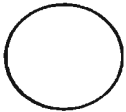
1. Common symbols
2. Keep it simple
3. Keep it logical
4. Expect no miracles
5. Clear concise titles
6. "Best fit" logic gates (*falls under of AND also OR*)
7. Use transfers
8. Sequence from left

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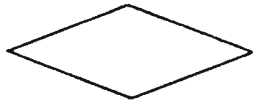
# Event Symbols



General event symbol



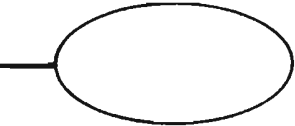
Basic event symbol



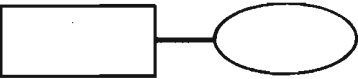
Undeveloped terminal event



Normally expected event



Constraint symbol

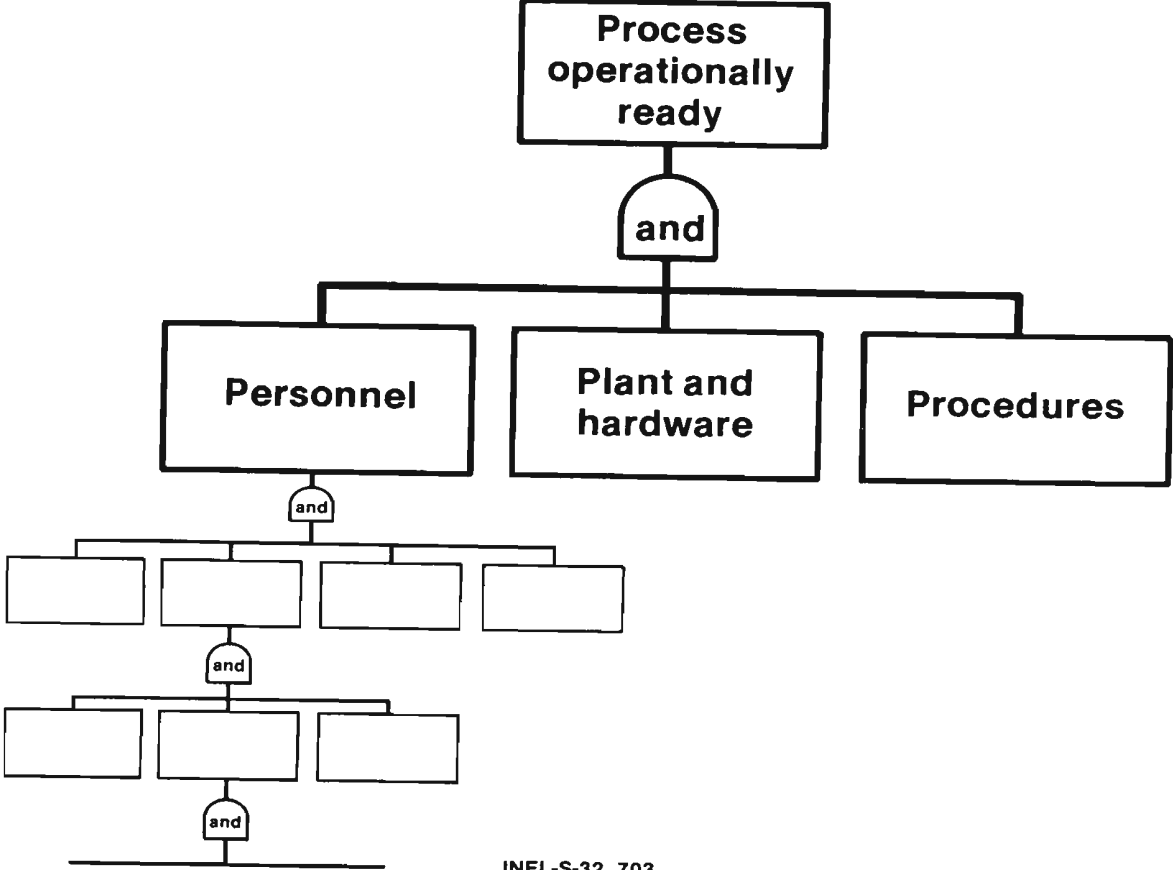


Event constraint

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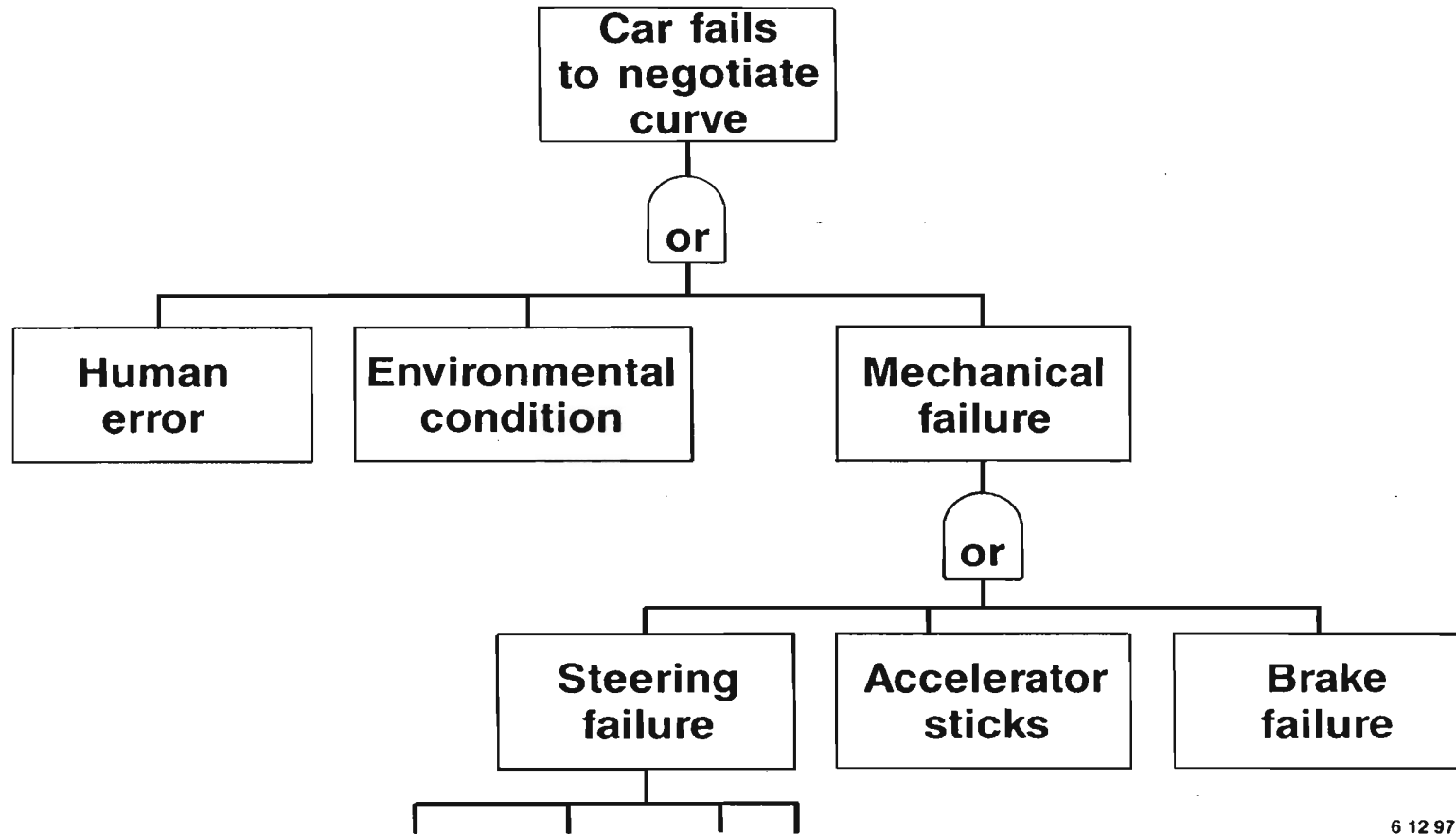
# Analytical Trees

## Objective



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# Fault Tree



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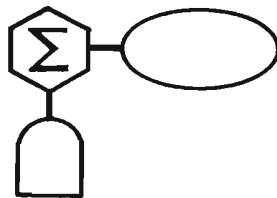
# Logic Gates



And-gate



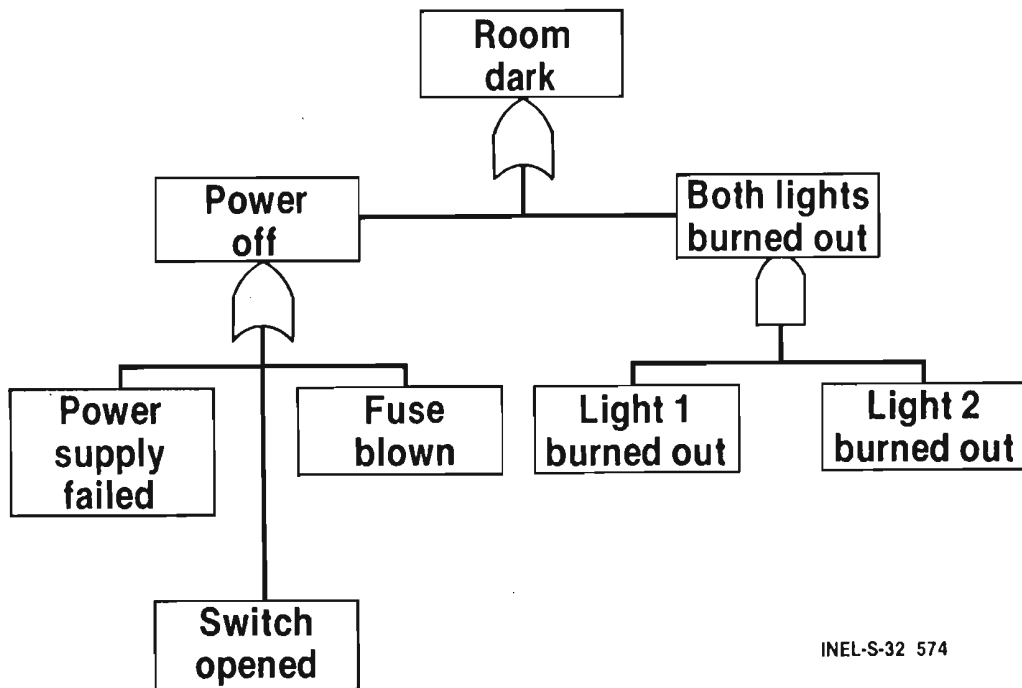
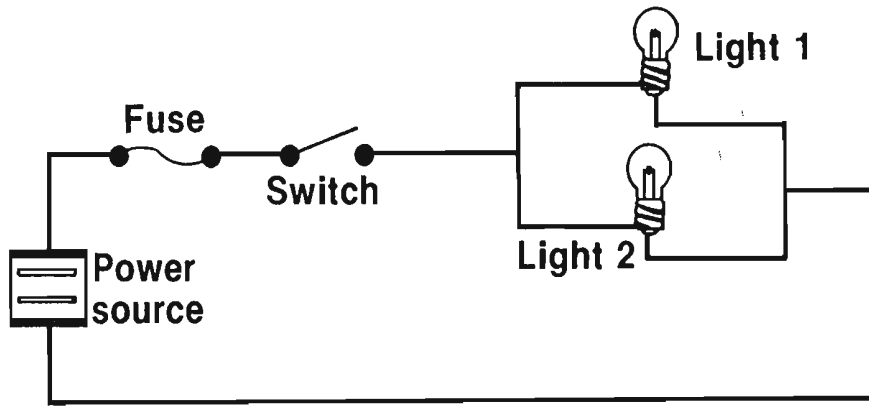
Or-gate



Summation-gate

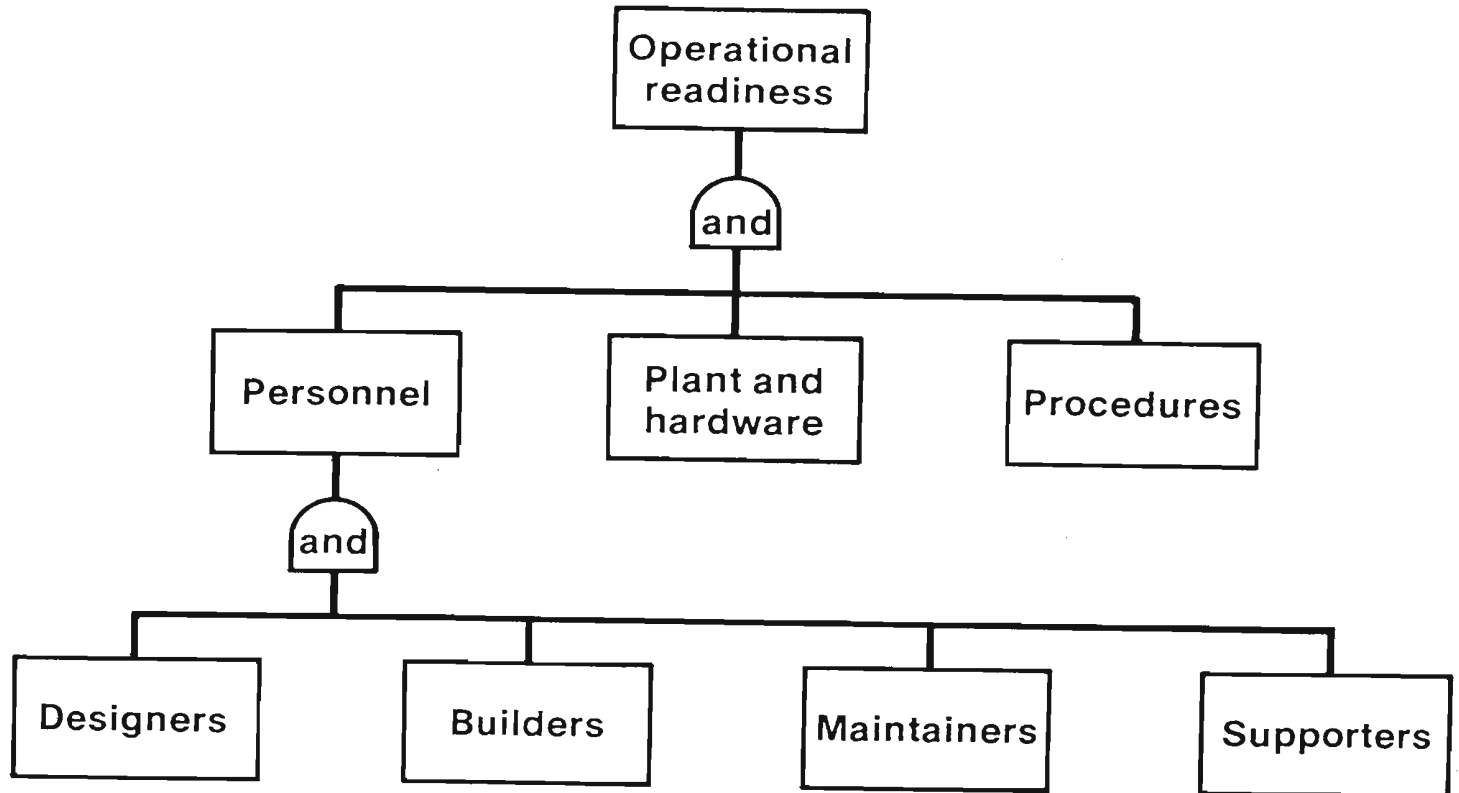
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# And-Gate and Or-Gate Logic



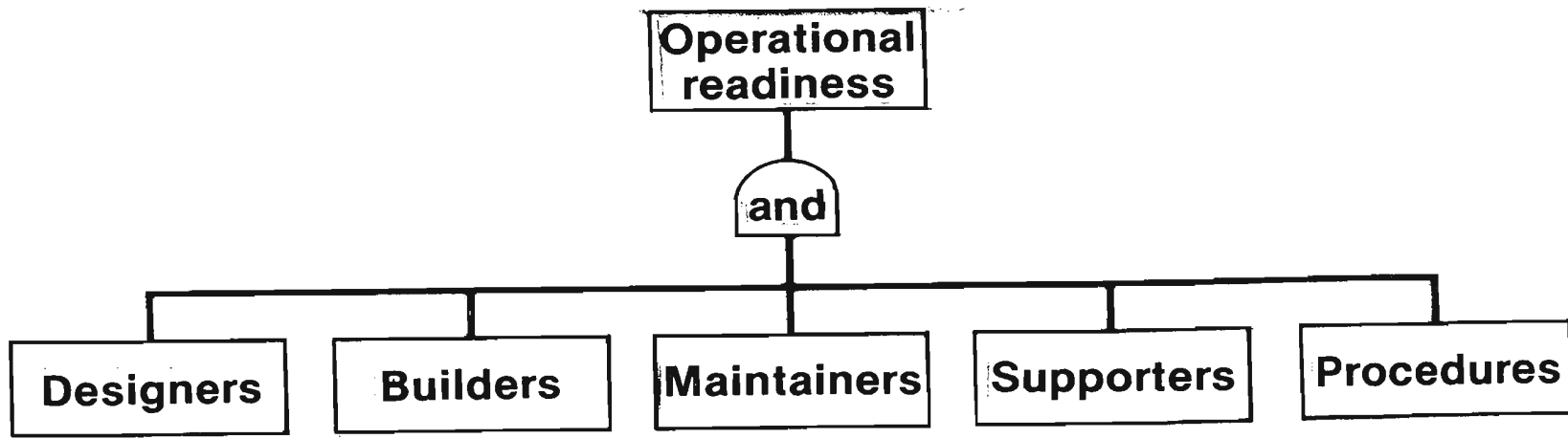
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# Proper Logic



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# Improper Logic



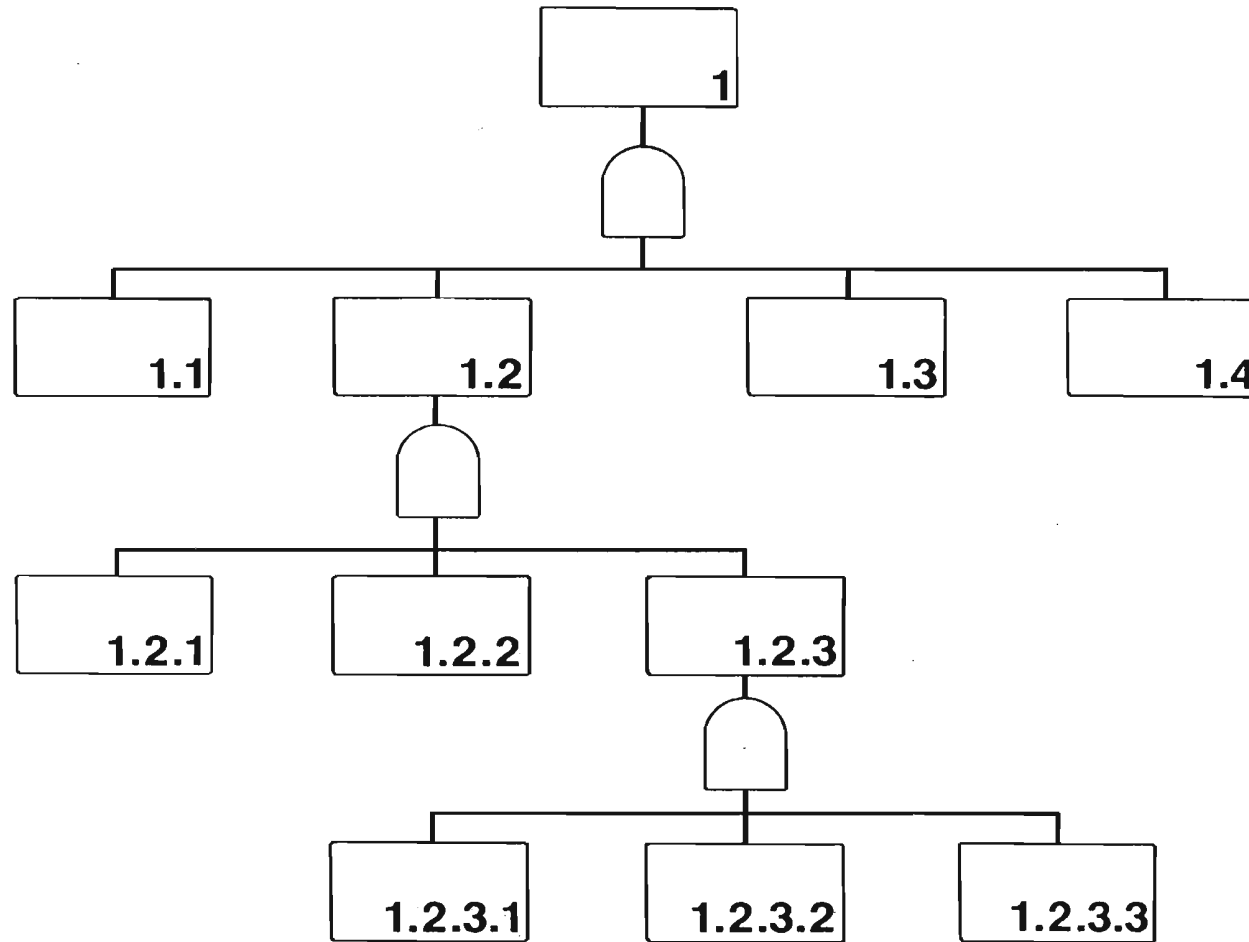
4 1358

# Tree Numbering System

1. Dewey decimal
2. Alpha numeric

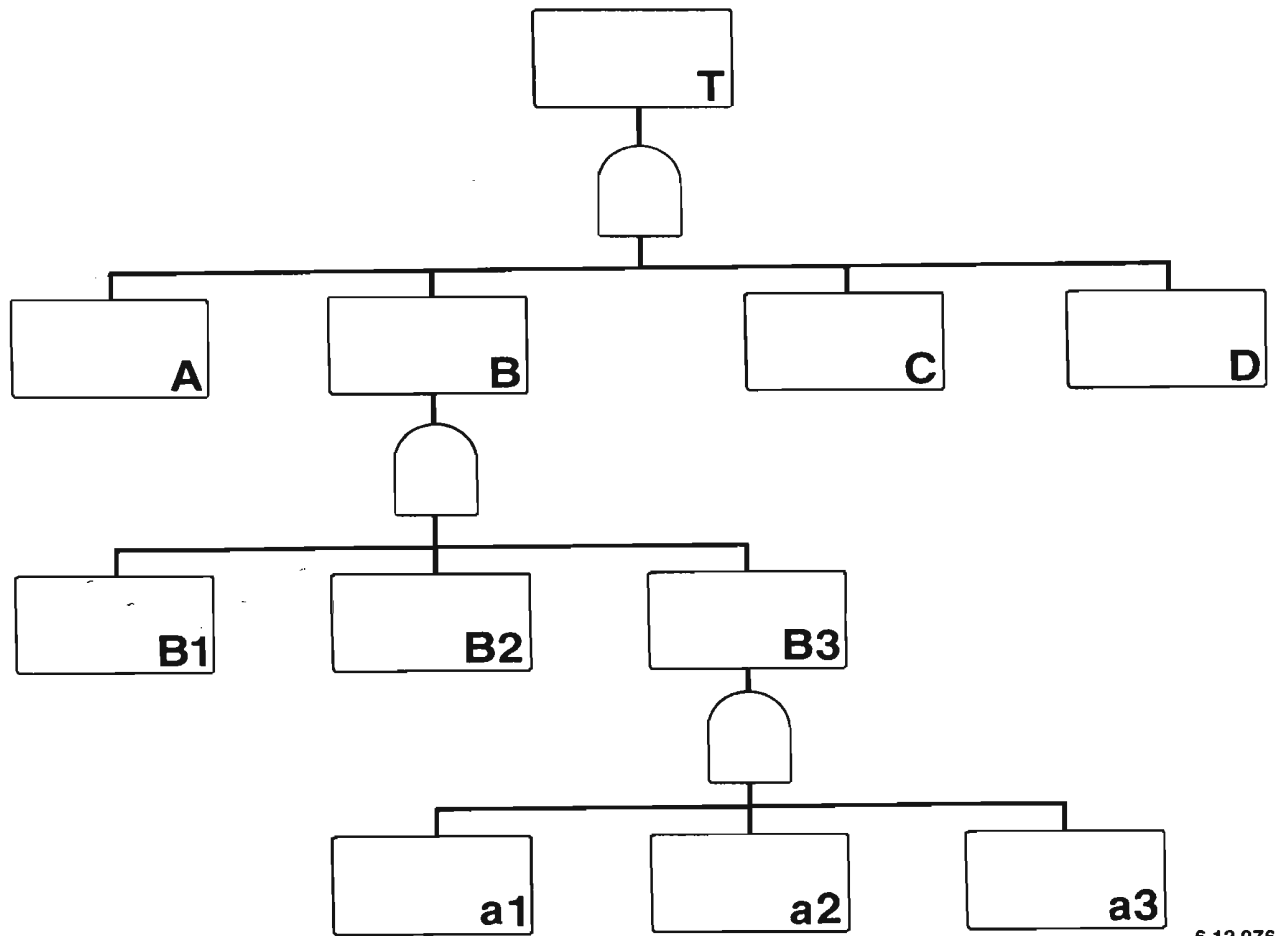
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# Example:



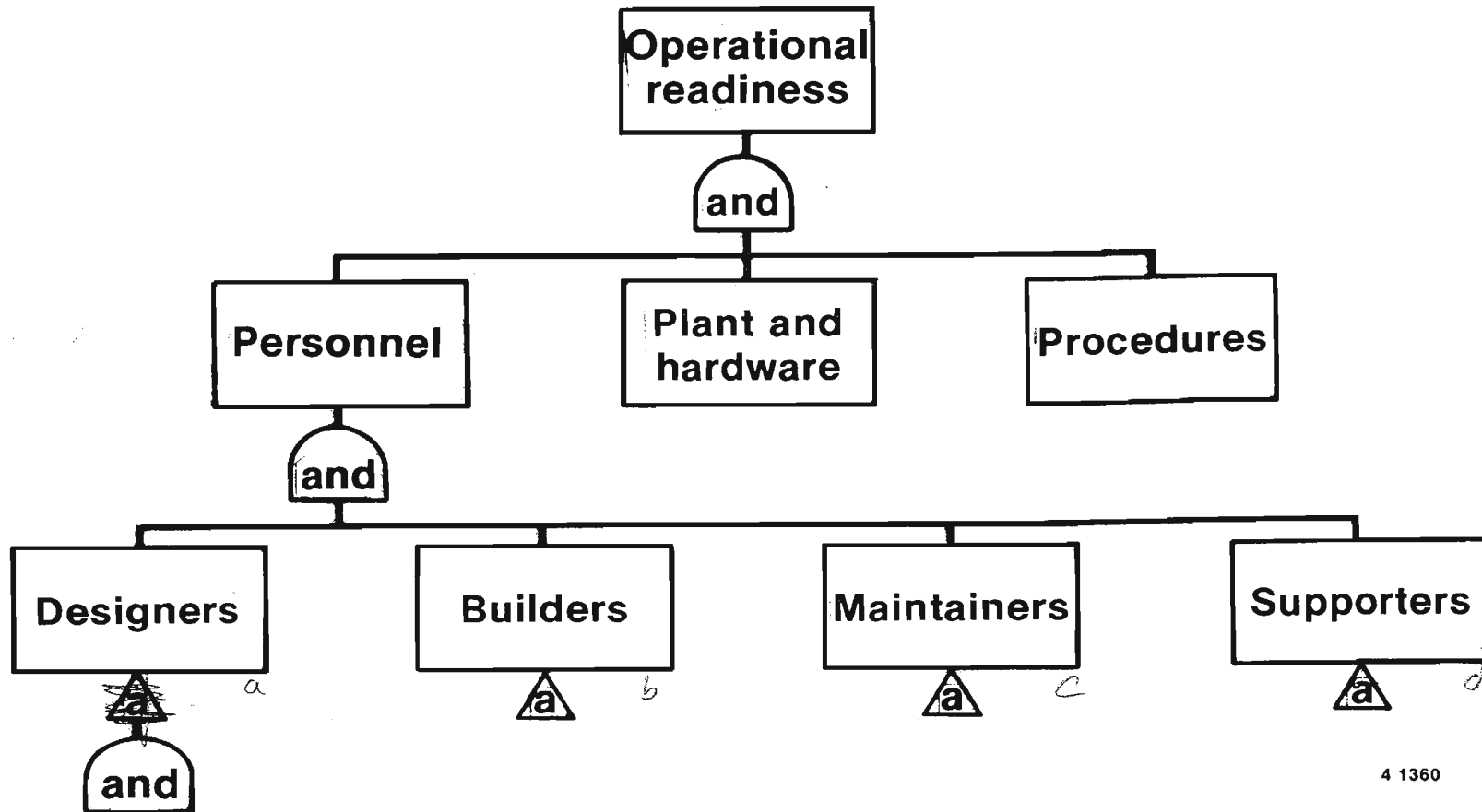
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# Example:



6 12 976

# Transfers



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# Operational Readiness Theory

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1.15

**Operational Readiness  
vs.  
Operational Readiness Review**

6 12 975

# What do we Mean by Operational Readiness?

- **Right people**
- **Right place**
- **Right time**
- **Right environment**
- **Working with right hardware according to right procedures and management controls**

6 12 972

# **What Determines What Is “Right?”**

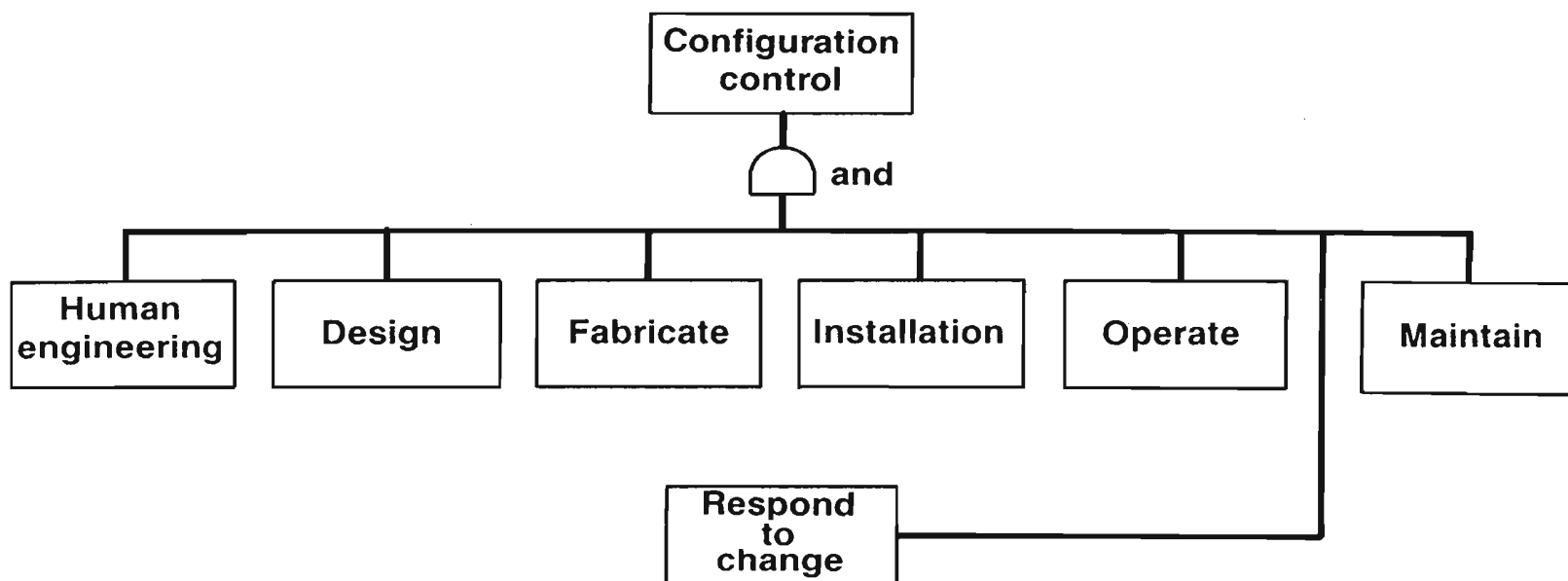
- **Will the program operation do as expected?**
- **Does it comply with applicable codes, standards, regulations?**

7-8993

# Operational Readiness

- **Preparing and following an Operational Readiness Plan**
- **Achieving a state of readiness**
- **Maintaining a state of Operational Readiness**
- **Preparing, monitoring, documenting, reviewing**  
*Do it. System, monitoring, documentation, review.*
- **Operated by competent people**
- **Providing evidence of readiness to operate to an Operational Readiness Board**

7-8992



7-8988

# Operational Readiness Review

- **A systematic methodology used to provide reasonable certainty that a project which has potential for significant safety risks is ready to proceed safely and effectively**
- **The residual risks of proceeding have been identified and accepted at the appropriate management level**

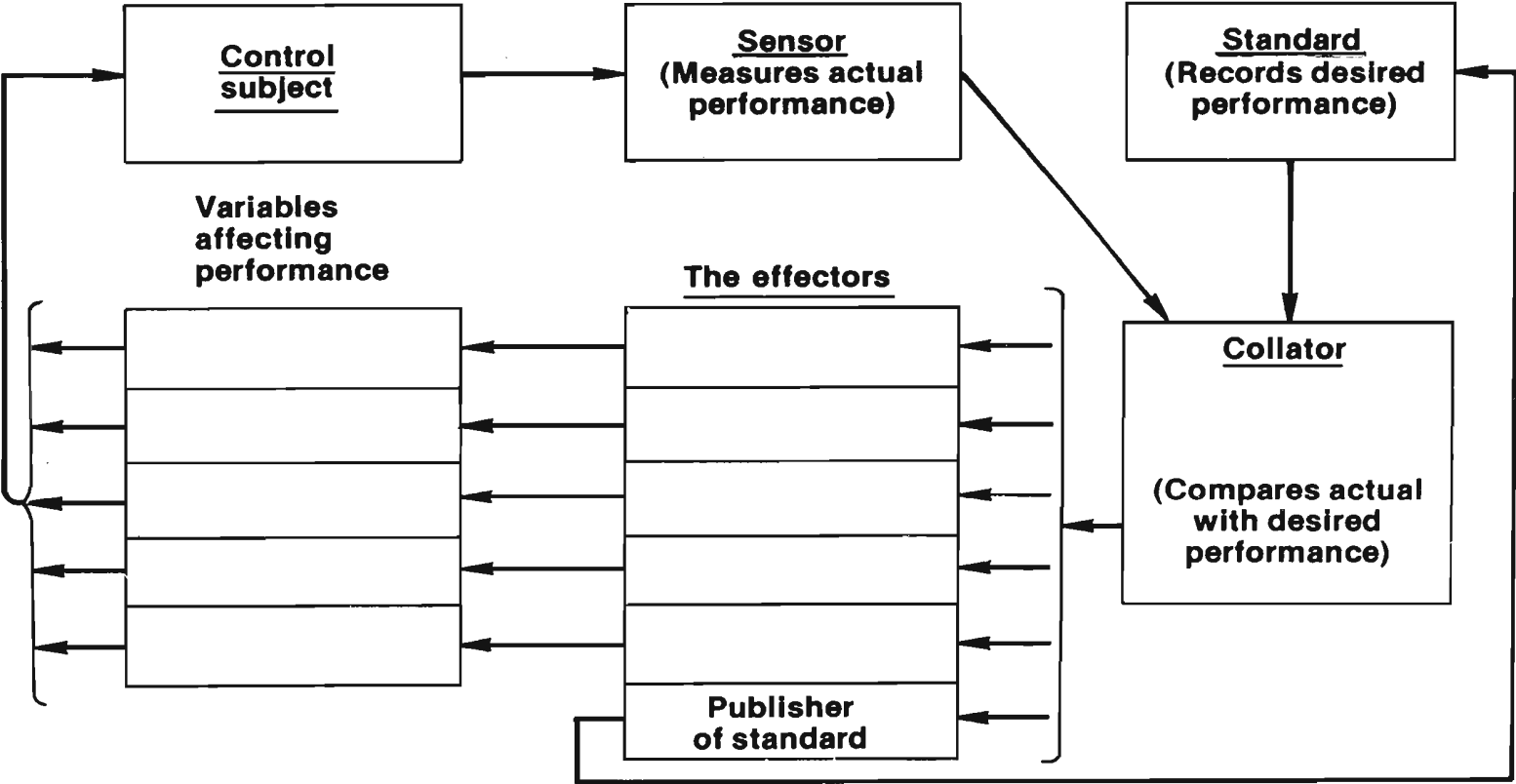
7-8991

## **Operational Readiness Review (cont'd)**

- **The Operational Readiness Review will provide verification and documentation to ensure:**
  - 1. Applicable criteria for design, construction and modification have been completed and safety requirements have been met**
  - 2. Required managerial controls have been implemented**
  - 3. The process or facility can be operated in accordance with established policy and procedures**
  - 4. Operated by competent people**

7-8990

# Feedback for Control of Anything



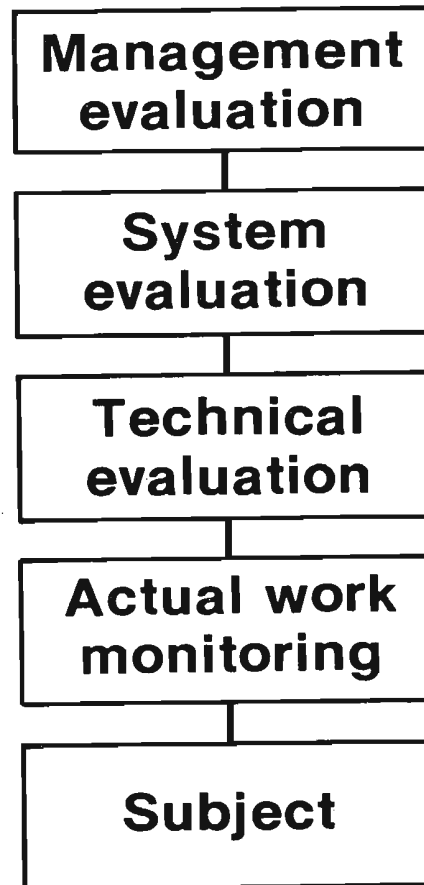
INEL-S-32 514  
1.19

(Juran)

# How do we Staff for Review?

*Wie sieht's gut System aus?*

*Techn. Hintergrund*



S2 2625  
1.21

# **What Kind of Monitoring is Necessary?**

- **Things that can be determined by inspection of the completed system**
- **Things that must be observed and recorded at an earlier time**

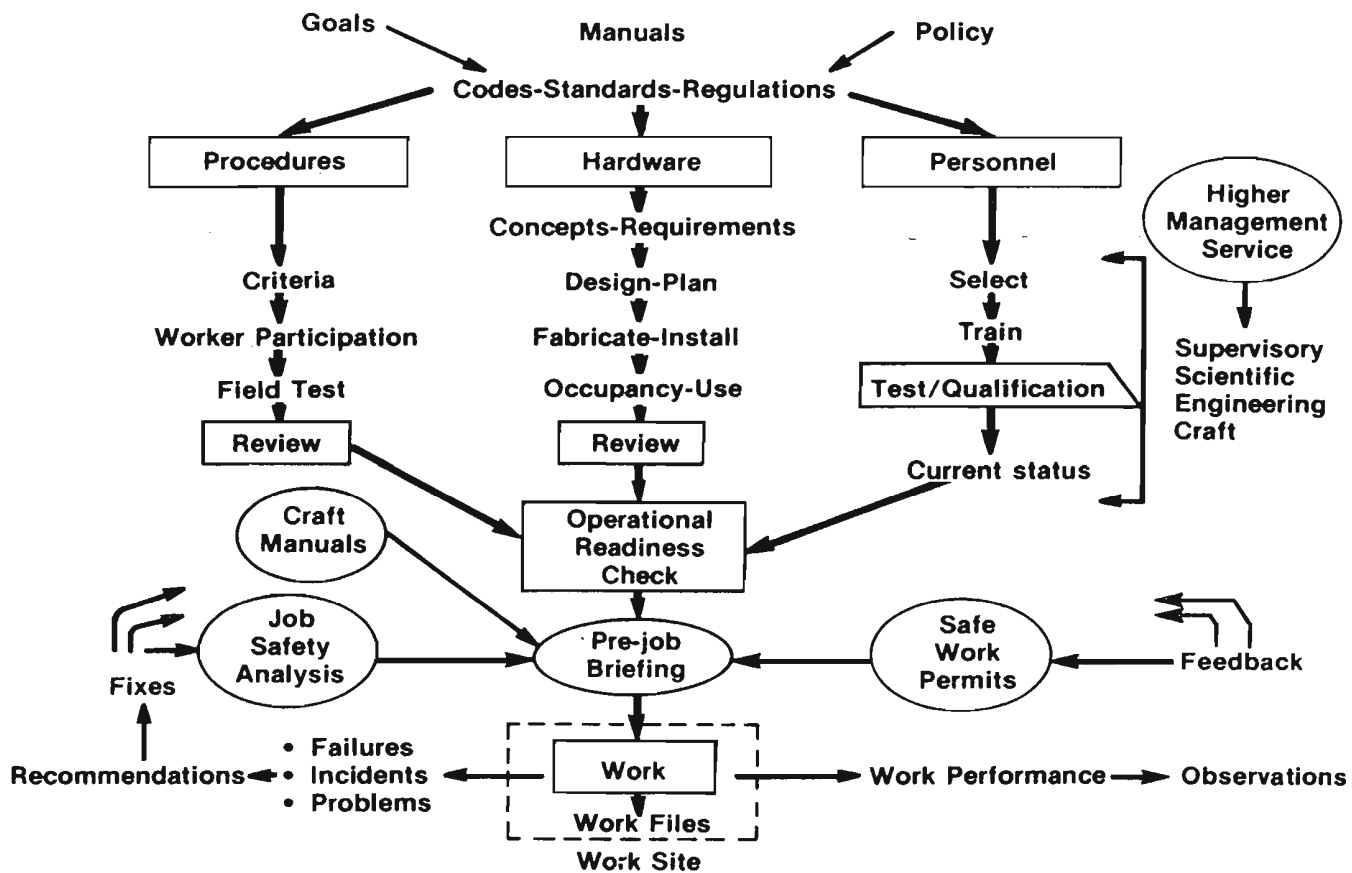
# How can We Accomplish a State of Readiness?

- **Through the use of logical methods of setting down what needs to be done to have:**
  - **Plant and hardware**
  - **People**
  - **Procedures and management controls in a state of readiness.**

# **What Does this Process Look Like in a Diagrammatic Sense?**

S2 2628  
1.25

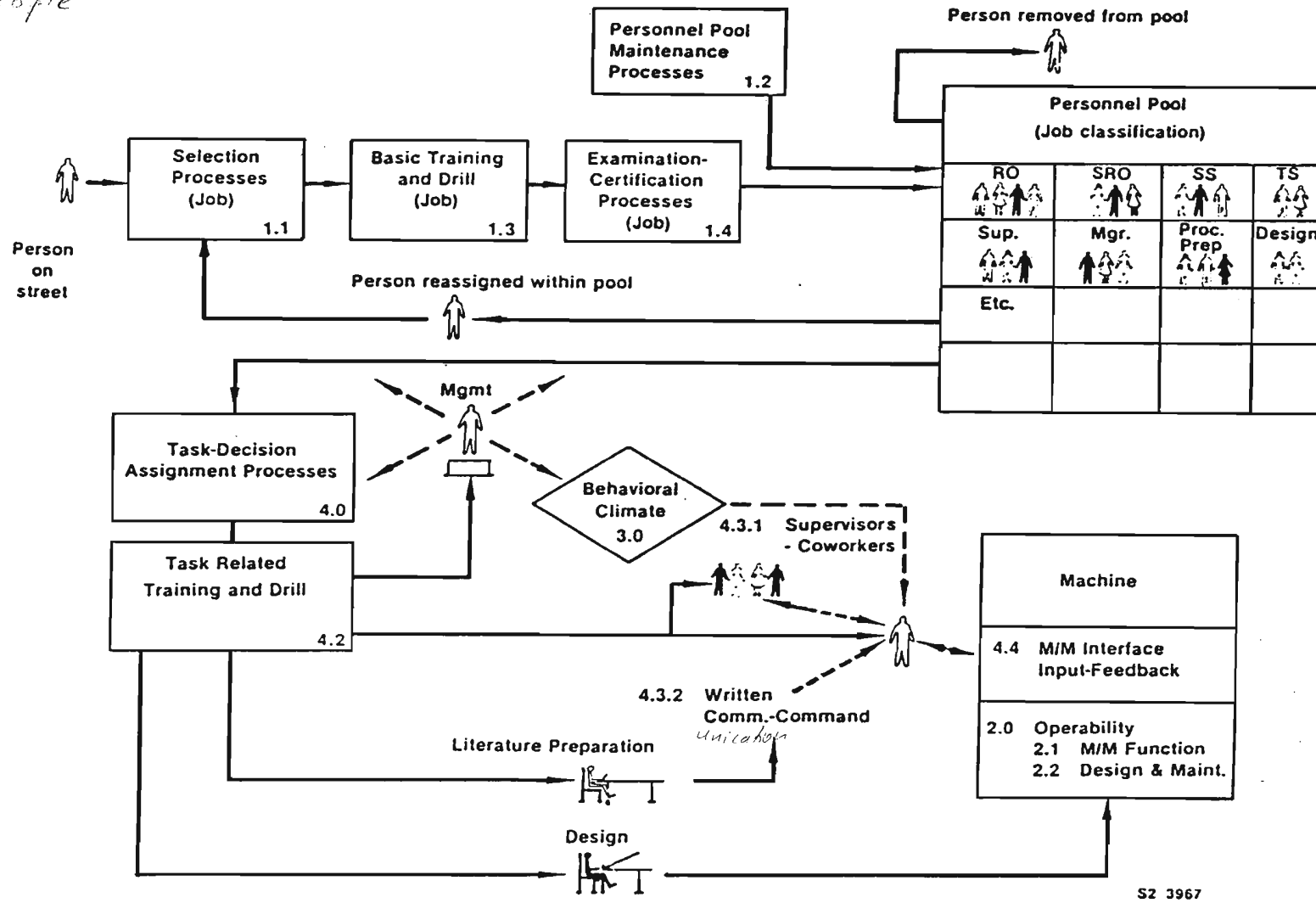
# Work Process Schematic



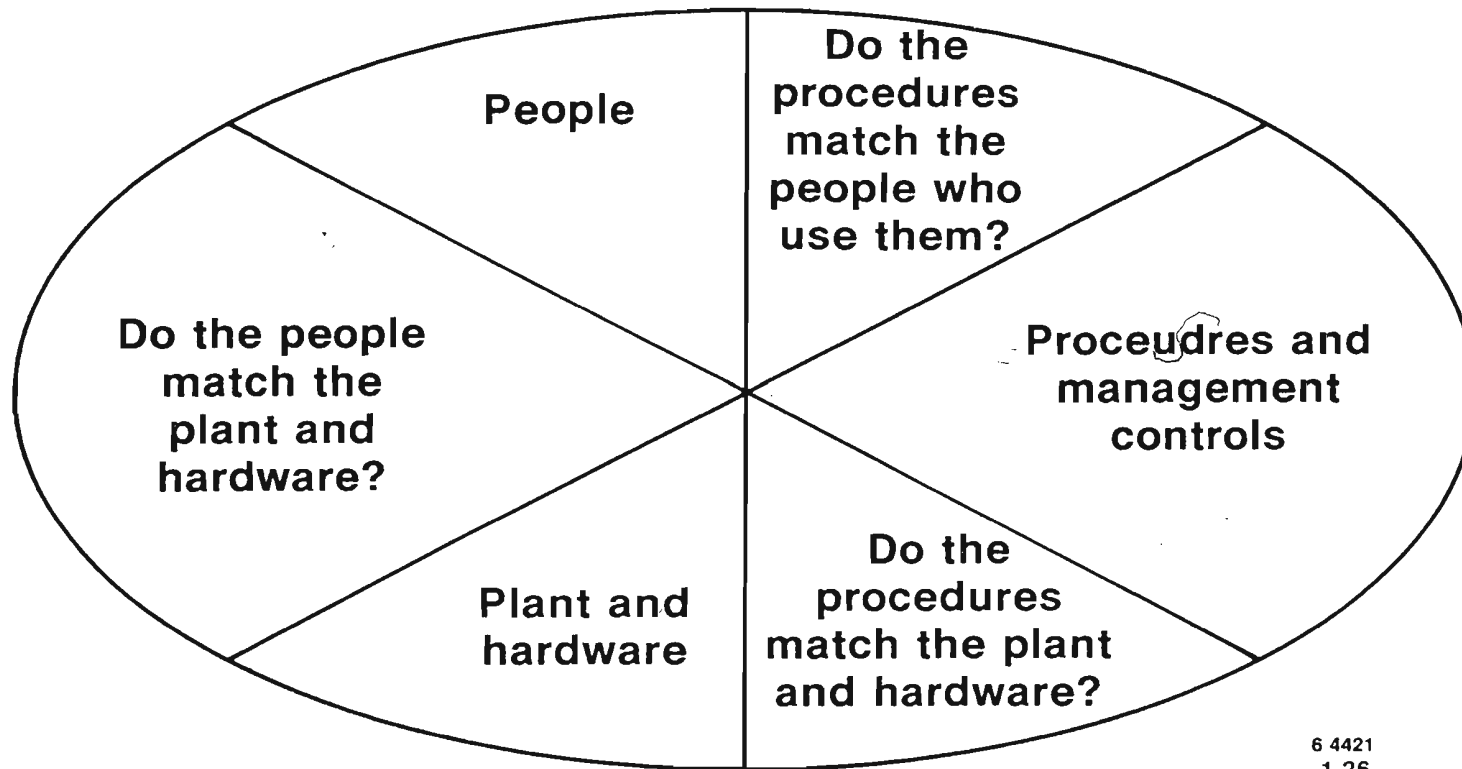
INEL-S-32 518  
1.24

Stickman - Model

Right People



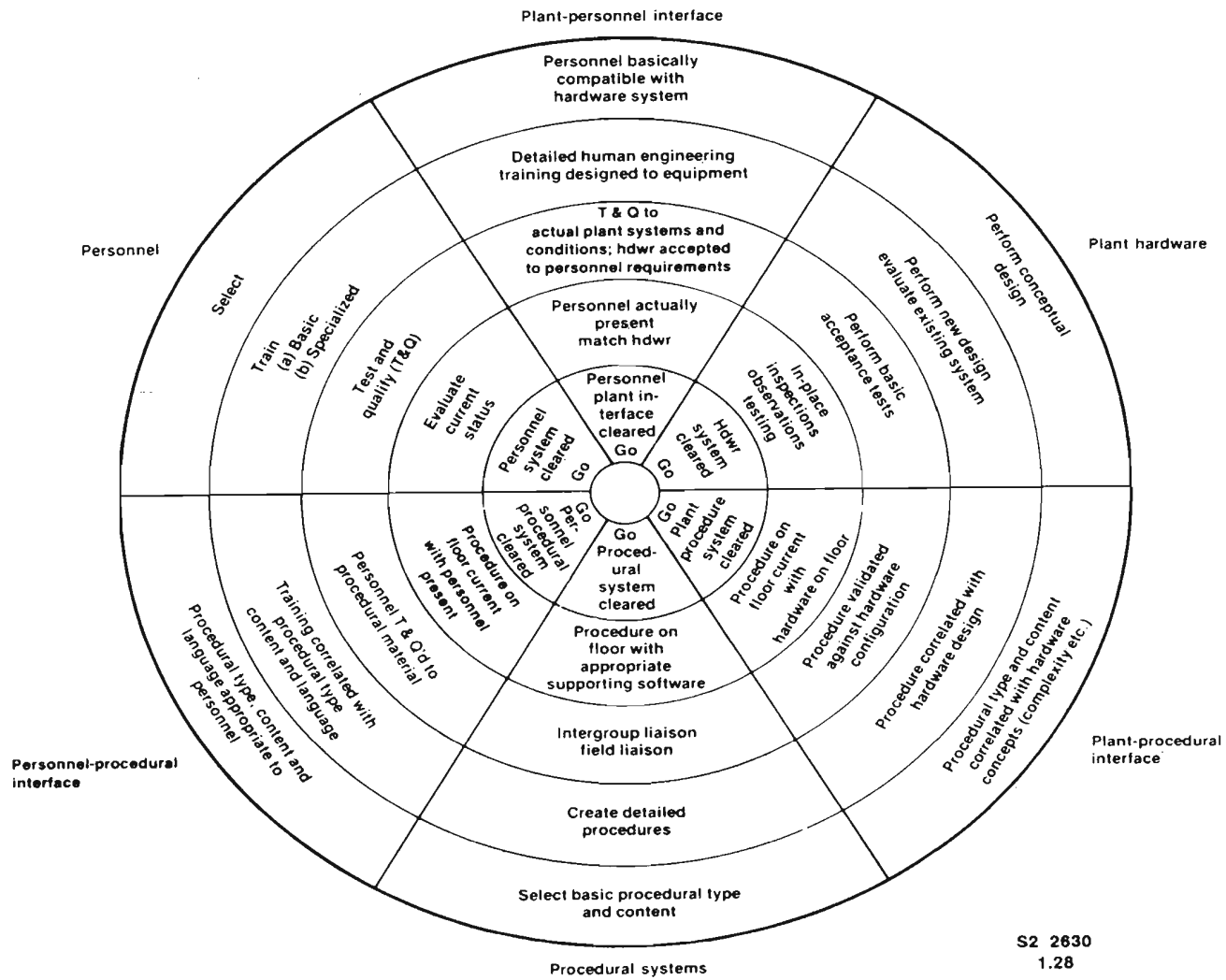
# Plant-People-Procedures Relationships



6 4421  
1.26

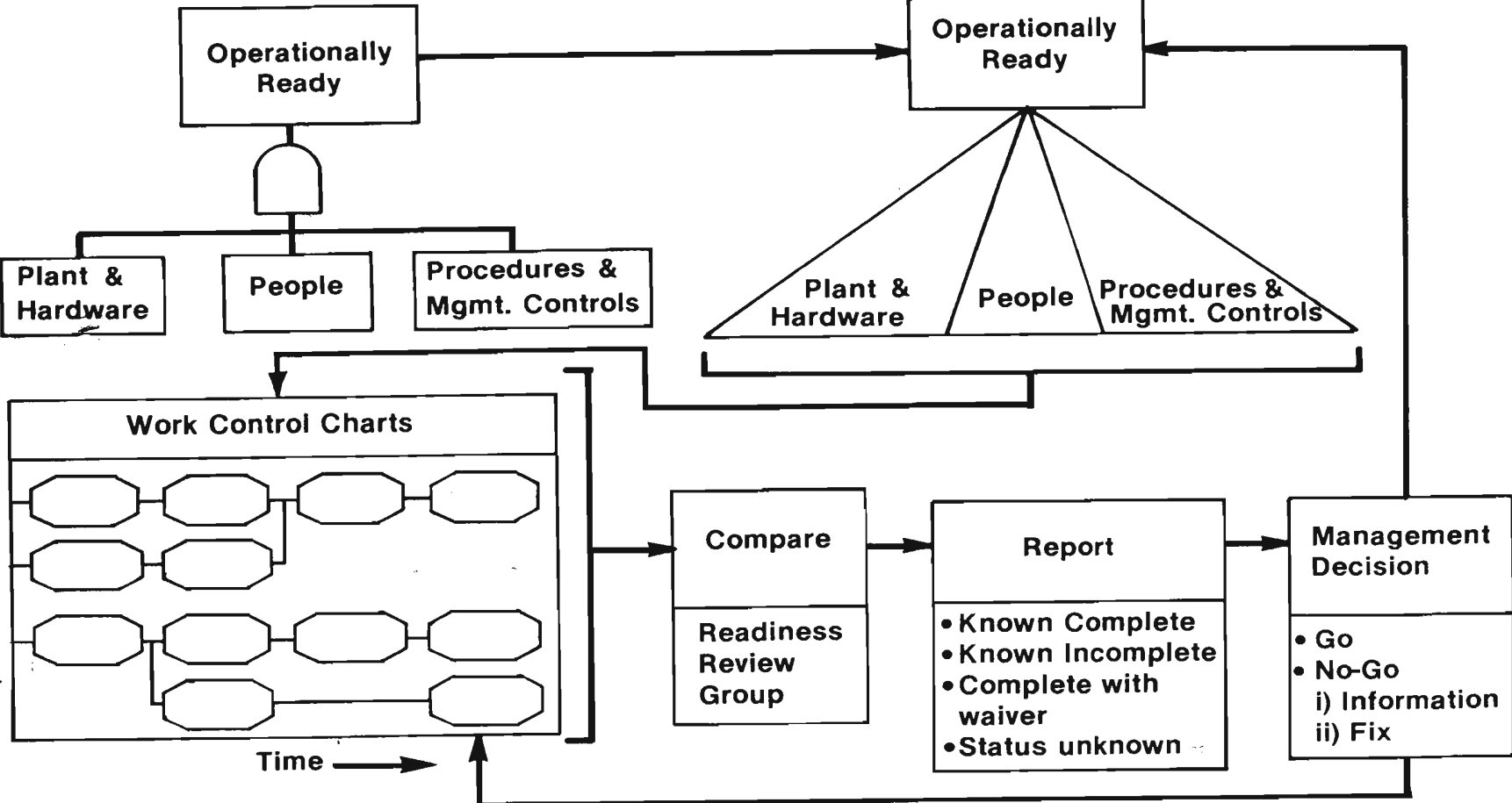
# Let's Add the Time Consideration

S2 2629  
1.27



S2 2630  
1.28

# How Does this Look in Operational Readiness Language?

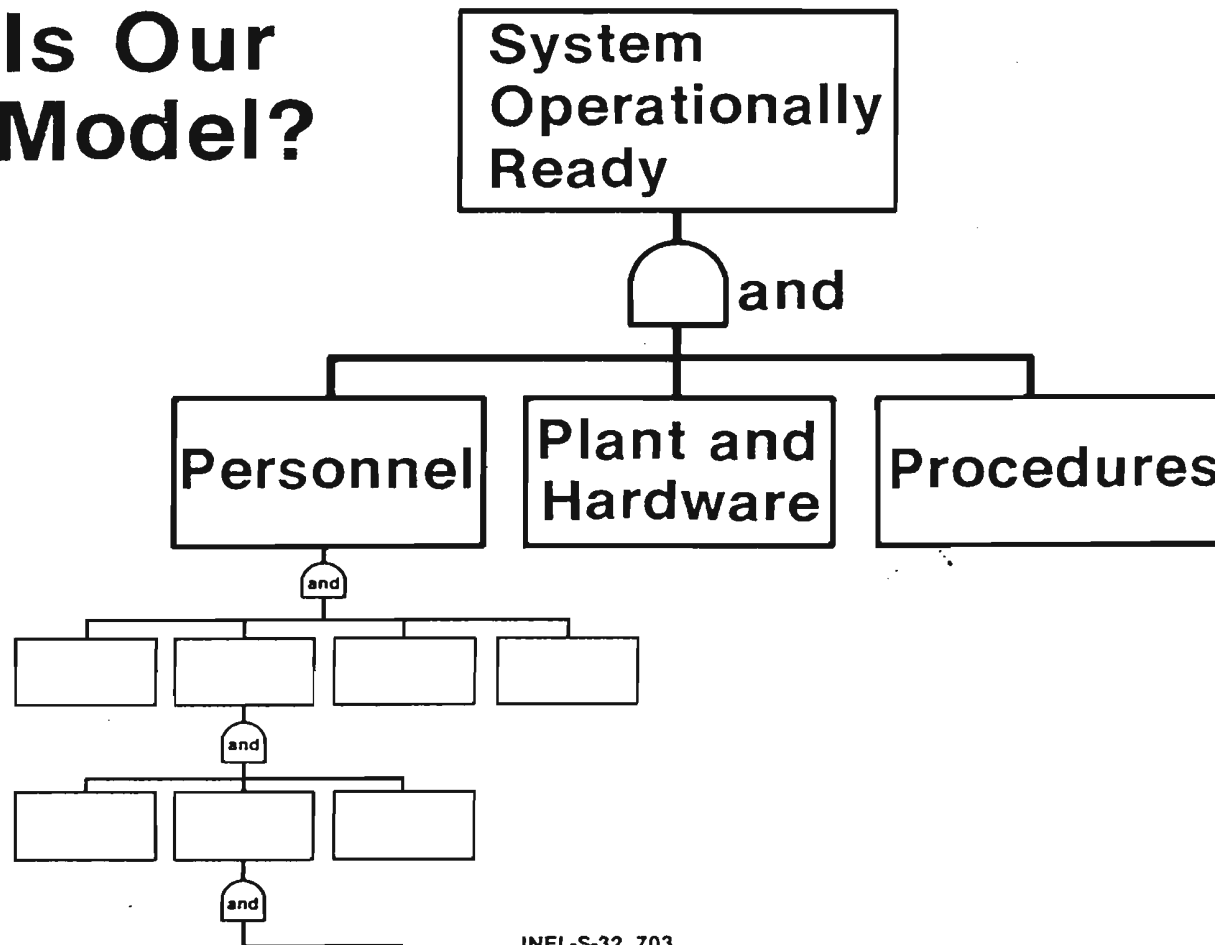


S2 2264  
1.20

# **This Process May Include Lots of Different People, Plant, Procedural Elements**

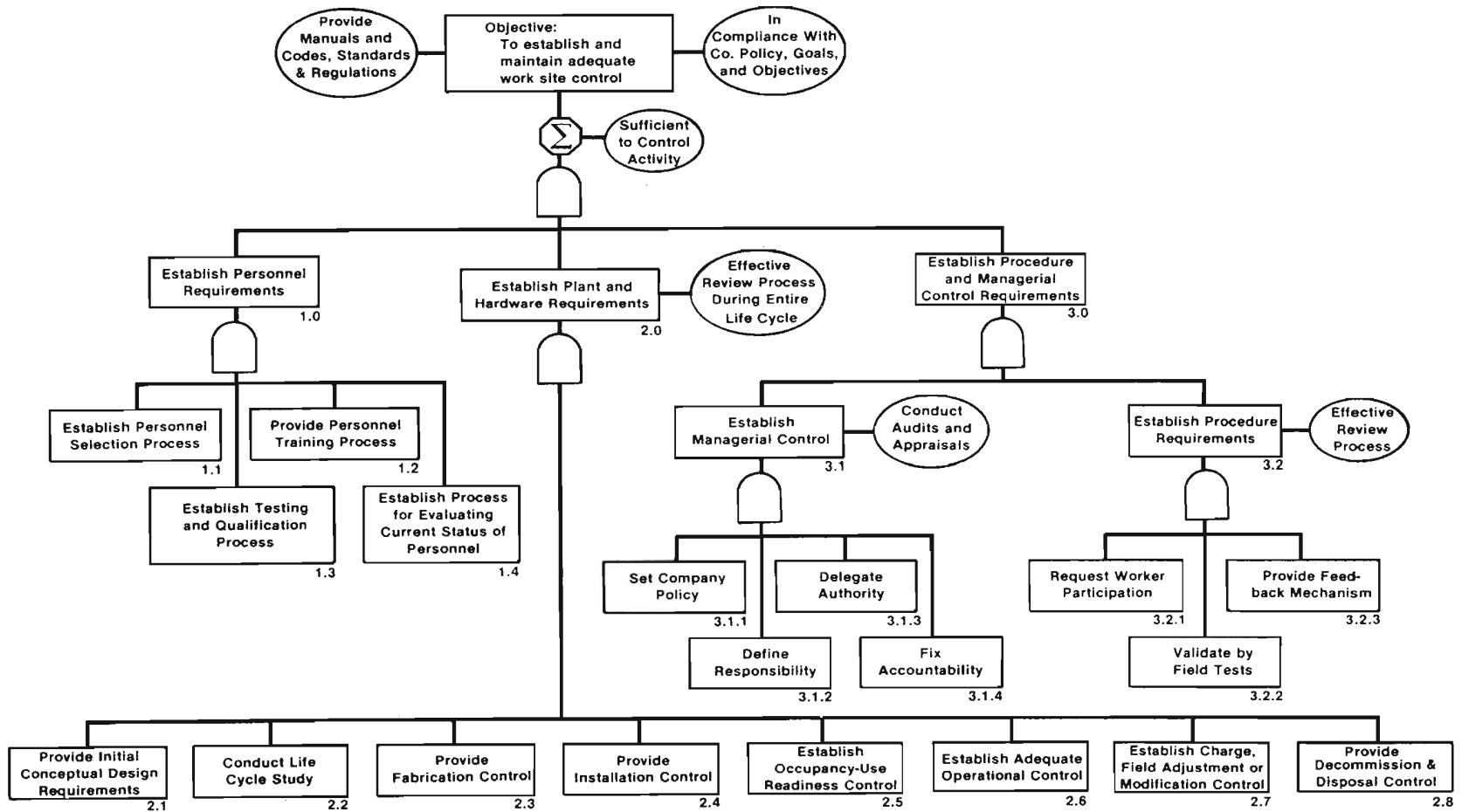
- **How can we prevent oversights?**

# What Is Our Basic Model?



INEL-S-32 703  
1.30

# The Work Process Control Tree



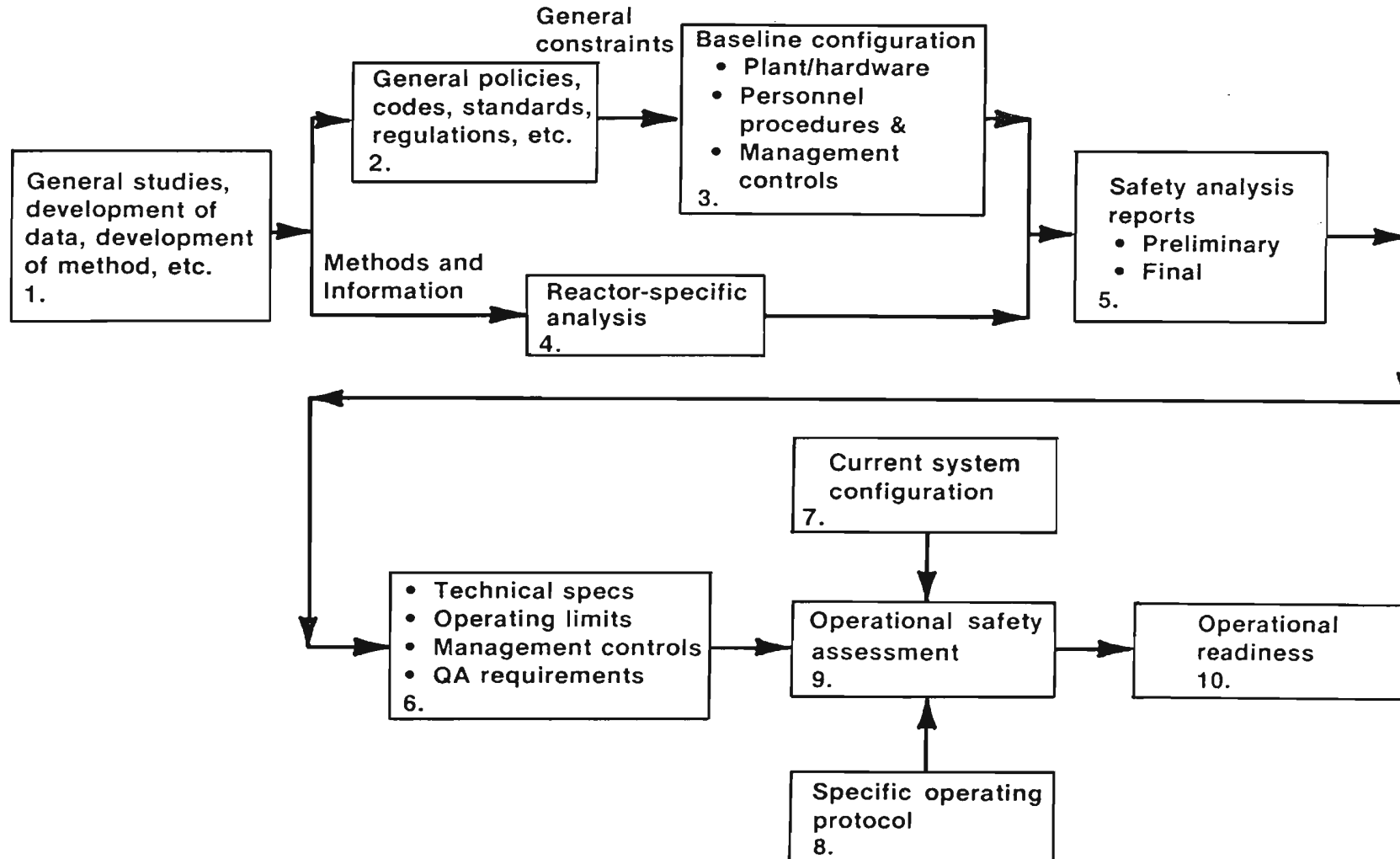
S2 2624  
1.18

# **This Takes Care of What Needs to be Done**

- **How can we track this in time?**

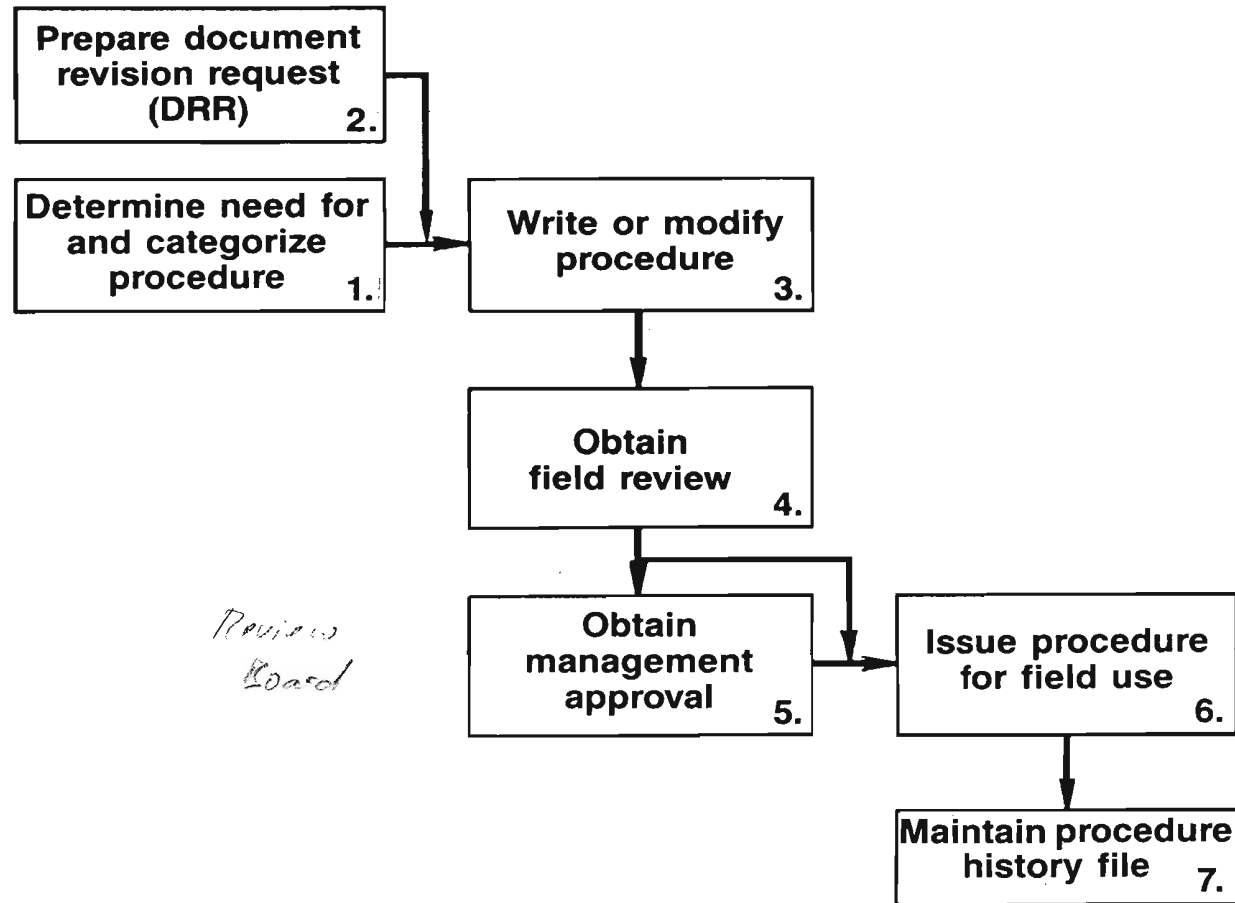
S2 2632  
1.31

# Process Development



6 4420  
1.32

# Preparation of Procedures



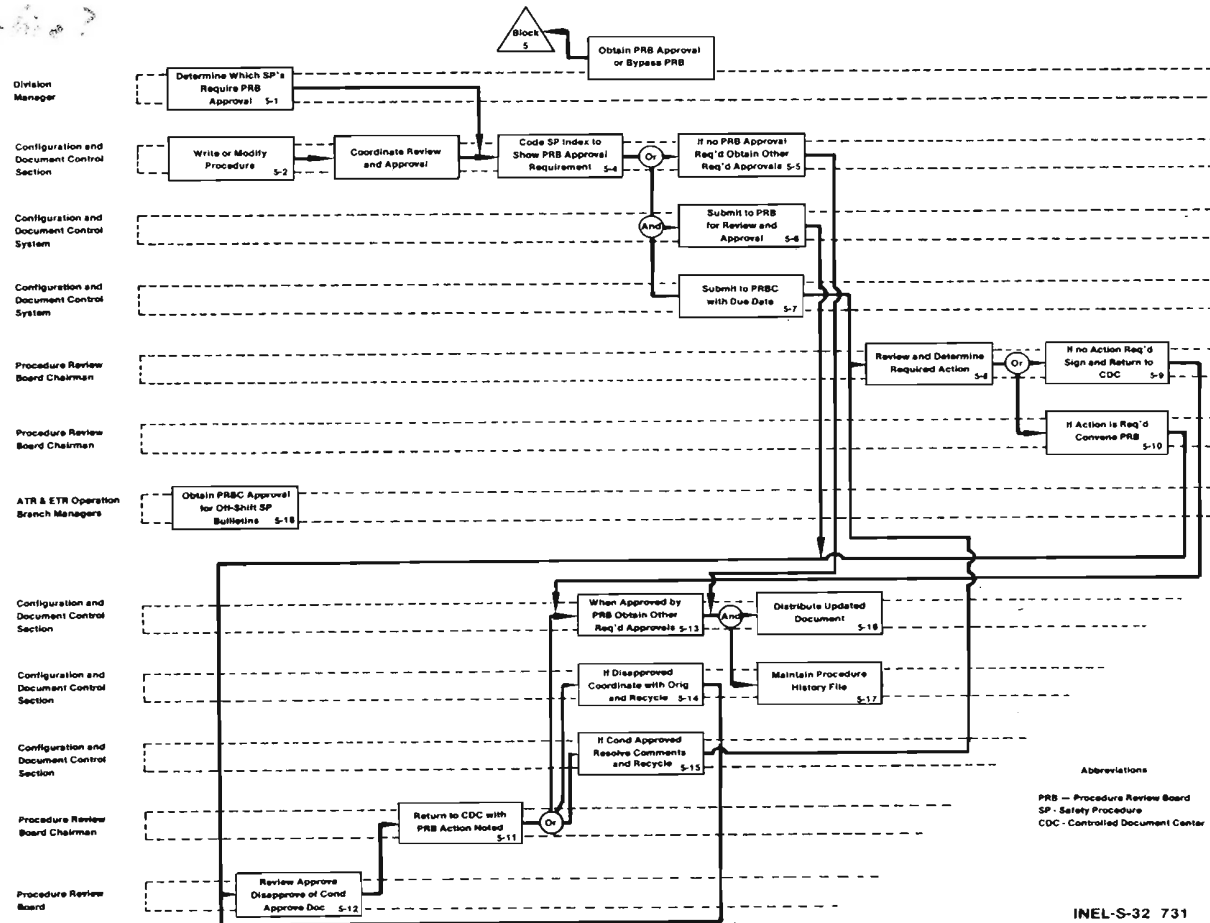
INEL-S-32 657  
1.33

Control Document Center

PRB Procedure Review Board

### What Do Tracking and Monitoring Systems Look Like

SP = Standard Practice?

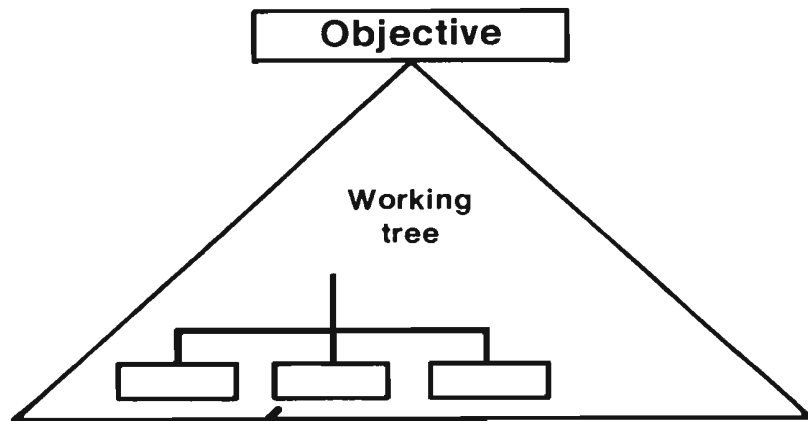


INEL-S-32 731  
1.34

# How can We Display Progress?

- The operational readiness matrix

S2 2633  
1.35



- △ Known not complete
- Known complete
- ◇ Status unknown

Work sequence charts

Who	When	
		What
		What
		What
		What

Operational readiness matrix

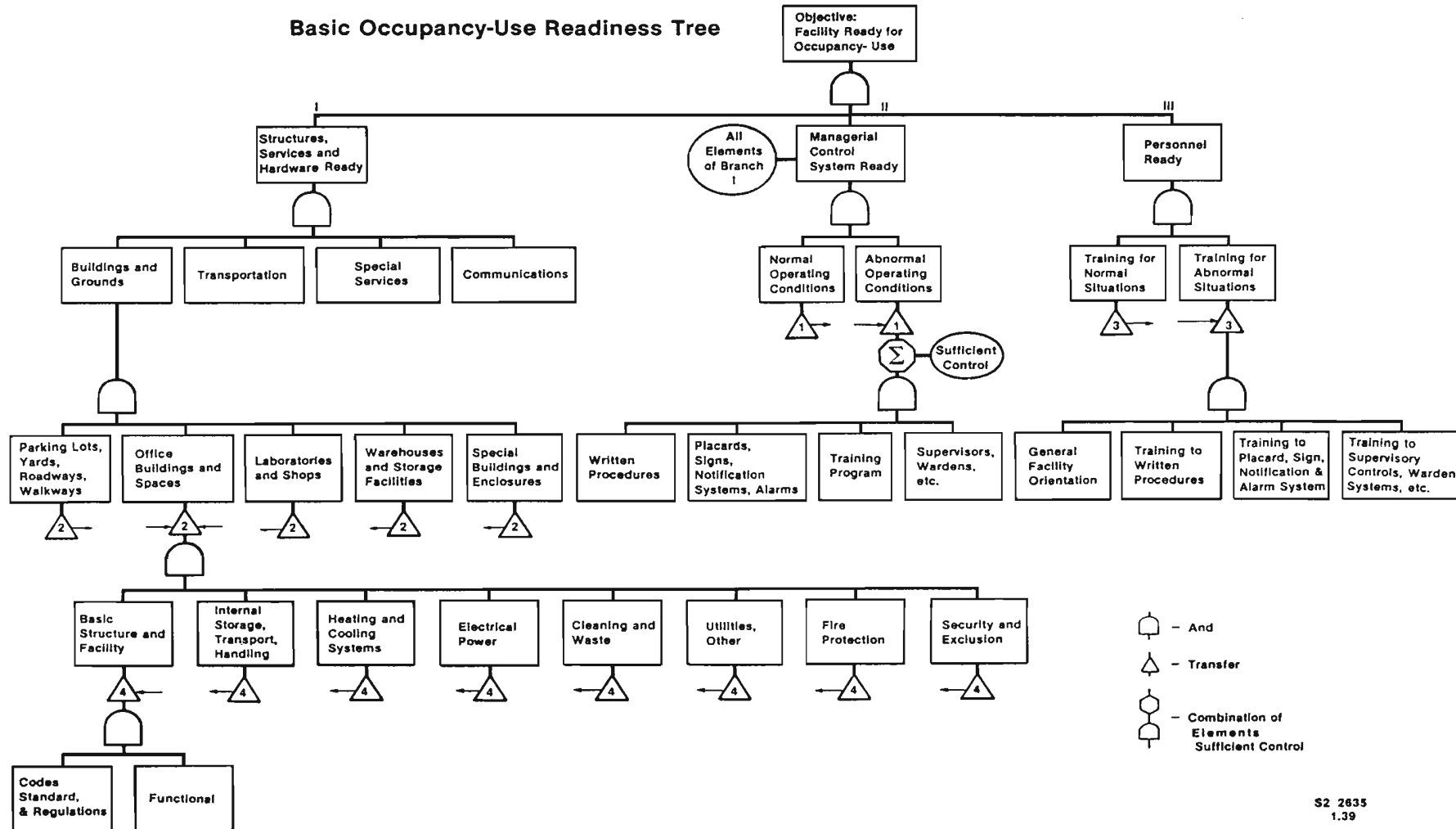
Who	What									
		○	○	○	△	×	◇	×	×	×
		◇	△	◇	○	△	×	×	×	×
		○	△	×	×	×	×	×	×	◇
		×	△	×	×	×	×	×	×	◇
		×	×	×	×	×	×	△	×	○
		×	×	×	×	×	×	△	△	△
		○	○	○	◇	×	×	×	×	×

INEL-S-32 609  
1.36

# **How Does This Look When We Put it all Together in One Organization?**

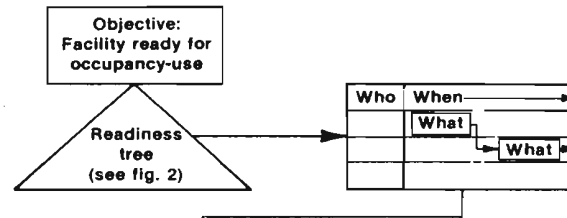
S2 2634  
1.37

# Basic Occupancy-Use Readiness Tree



S2 2635  
1.39

The Readiness Tree provides an overall picture of responsibilities (the "what") which are involved in the analytical process.



A relative timescale of progress (the "when") is obtained from the flow chart. (Fig. 3)

Specific areas of responsibility are listed on the Readiness Matrix, along with the involved groups (the "who"). The independent and overlapping responsibilities of the groups may then be indicated on the matrix.

Readiness Matrix (see fig. 4)

Who \ What	Structure, Services, and Hardware Ready for Occupancy	Procedures Ready	Occupant-User Personnel Ready
Construction Engring.			
Occupant-User			
Landlord			
Quality Assurance			
Safety Organization			

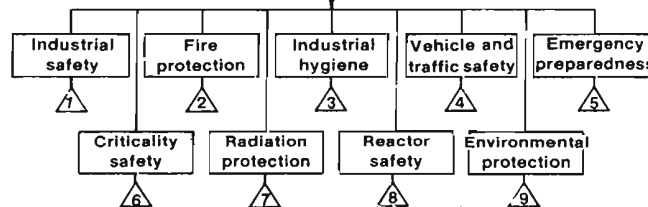
May develop own Disciplinary Chart to assist in the use of analytical trees.

The Safety Organization's disciplines are listed on the chart versus this group's criteria categories (energies involved in the Facility's operation). Other groups wishing to use a disciplinary chart would list their own group's disciplines and criteria categories.

Safety Organization Disciplinary Responsibilities (see fig. 5)

Disciplines (list →)	1	2	3	4	5	6	7	8	9
Energy (list energies)									

Each Safety discipline has its applicable criteria elaborately detailed in an analytical tree. The trees are used by the Safety Organization to see that all groups have fulfilled their safety responsibilities. Therefore, the other groups should refer to Appendix I to better understand the safety criteria against which they are evaluated.





# **Practical Considerations in Building the Operational Readiness Tree**

S2 2658  
1.63

# What do We Have to Be Careful Of?

- **No oversights in dealing with hazards.**
- **The right specialists look at the right areas in assuring readiness.**
  - (A) Do**
  - (B) Review**
- **Criteria**

S2 2656  
1.62

# **What Philosophy do We use in Setting up the Operational Readiness Analytical Trees?**

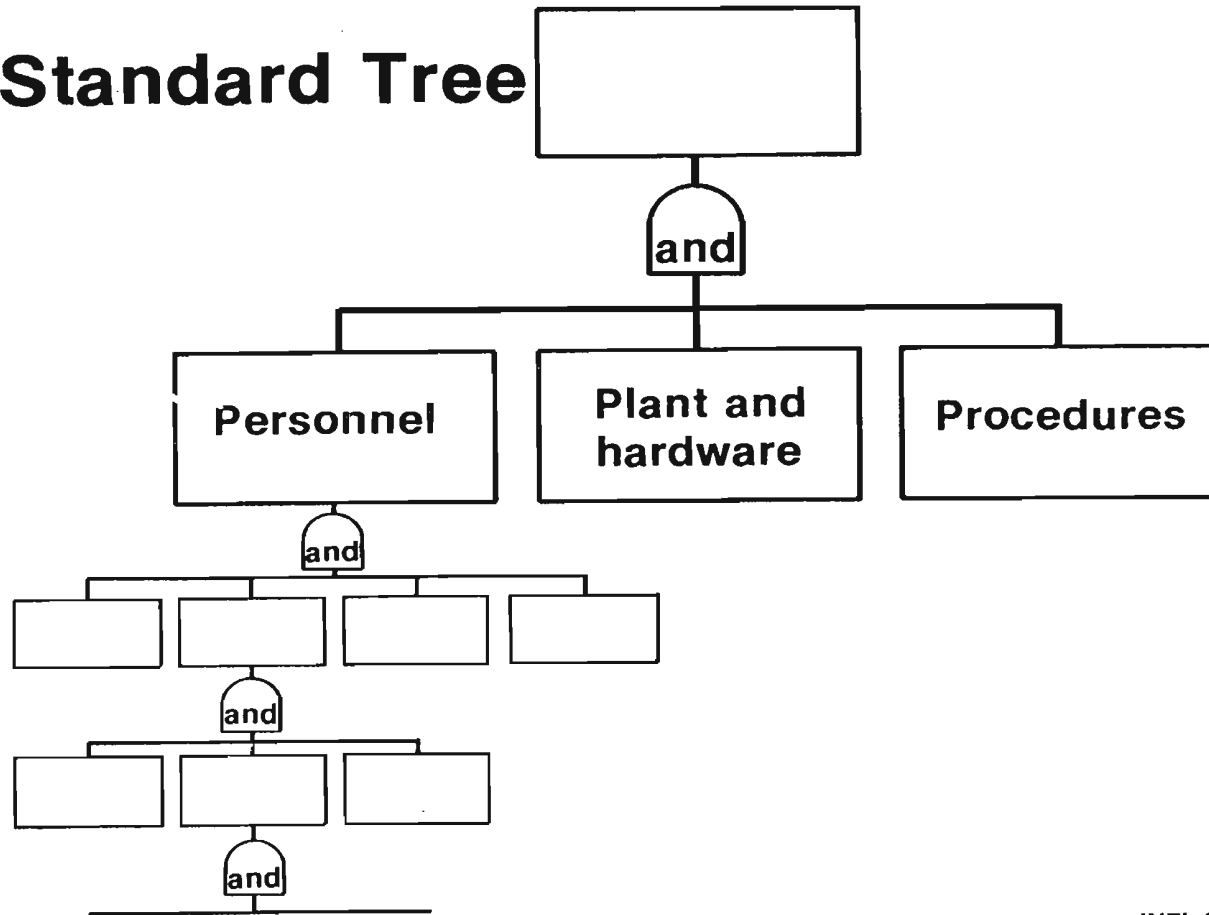
- **Use the standardized models directly for straightforward tasks.**
- **Develop special models for complex systems.**
- **Relate our models to the organization's management and work control systems.**

S2 2659  
1.64

# **How Would We Handle the Job of a Custodian Cleaning up This Room?**

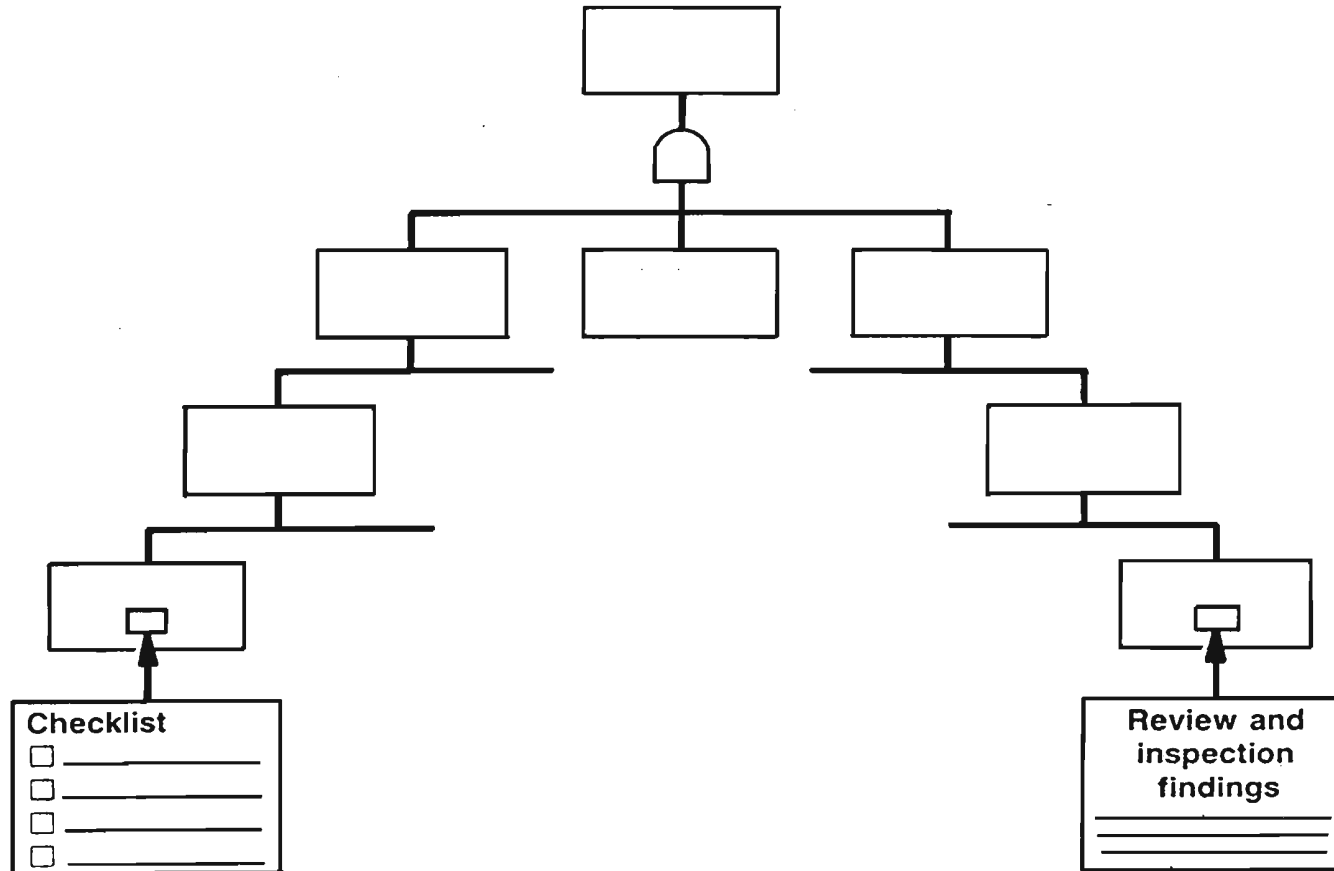
S2 2660  
1.65

# The Standard Tree



INEL-S-32 703  
1.66

# How do we use existing inspections, reviews, checklists, etc.?



6 9963

# How About Process Safety for a Big Highly Sensitive Job?

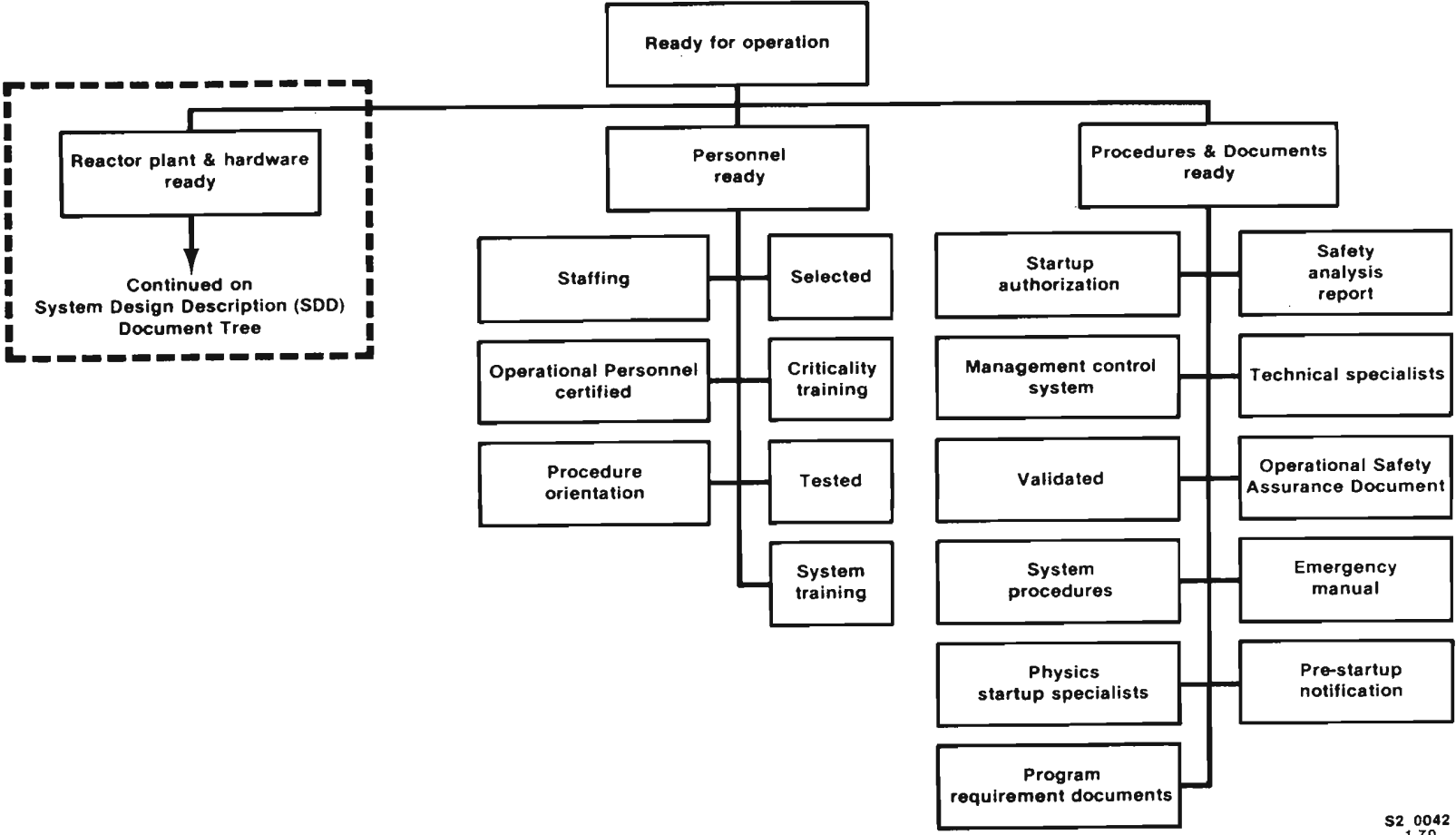
- Nuclear reactor
- Drilling

S2 2661  
1.67

# How Could We Handle a Nuclear Reactor?

S2 2662  
1.68

# Plant Equipment Readiness Review Matrix Work Tree



S2 0042  
1.70

# **Now Let's Move Down the Hardware Branch of the Tree**

S2 2663  
1.71

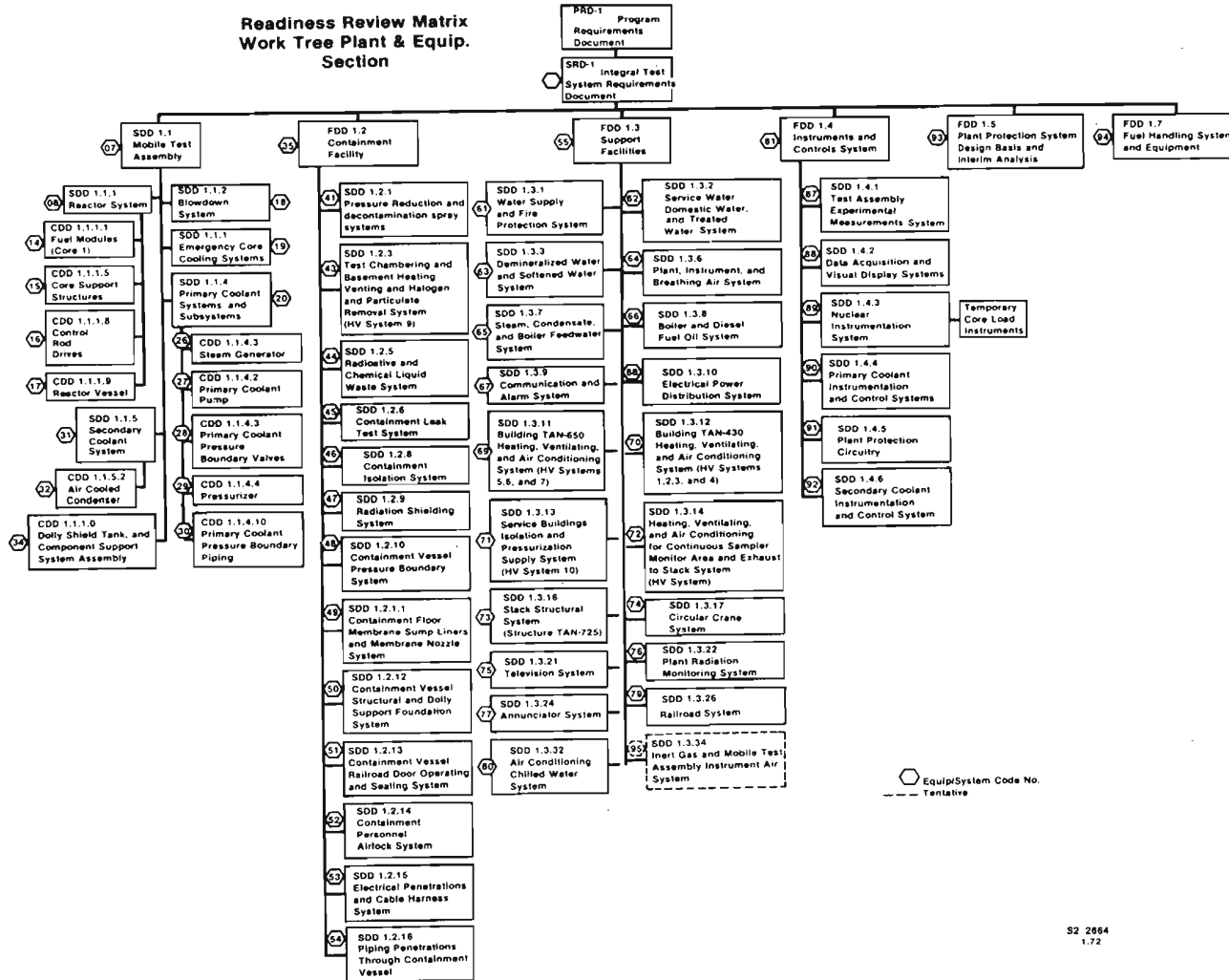
LOFT  
 Low of fluid and  
 Uoctic

SDD Facility Design  
 Description

SDD System Design Design

CDD

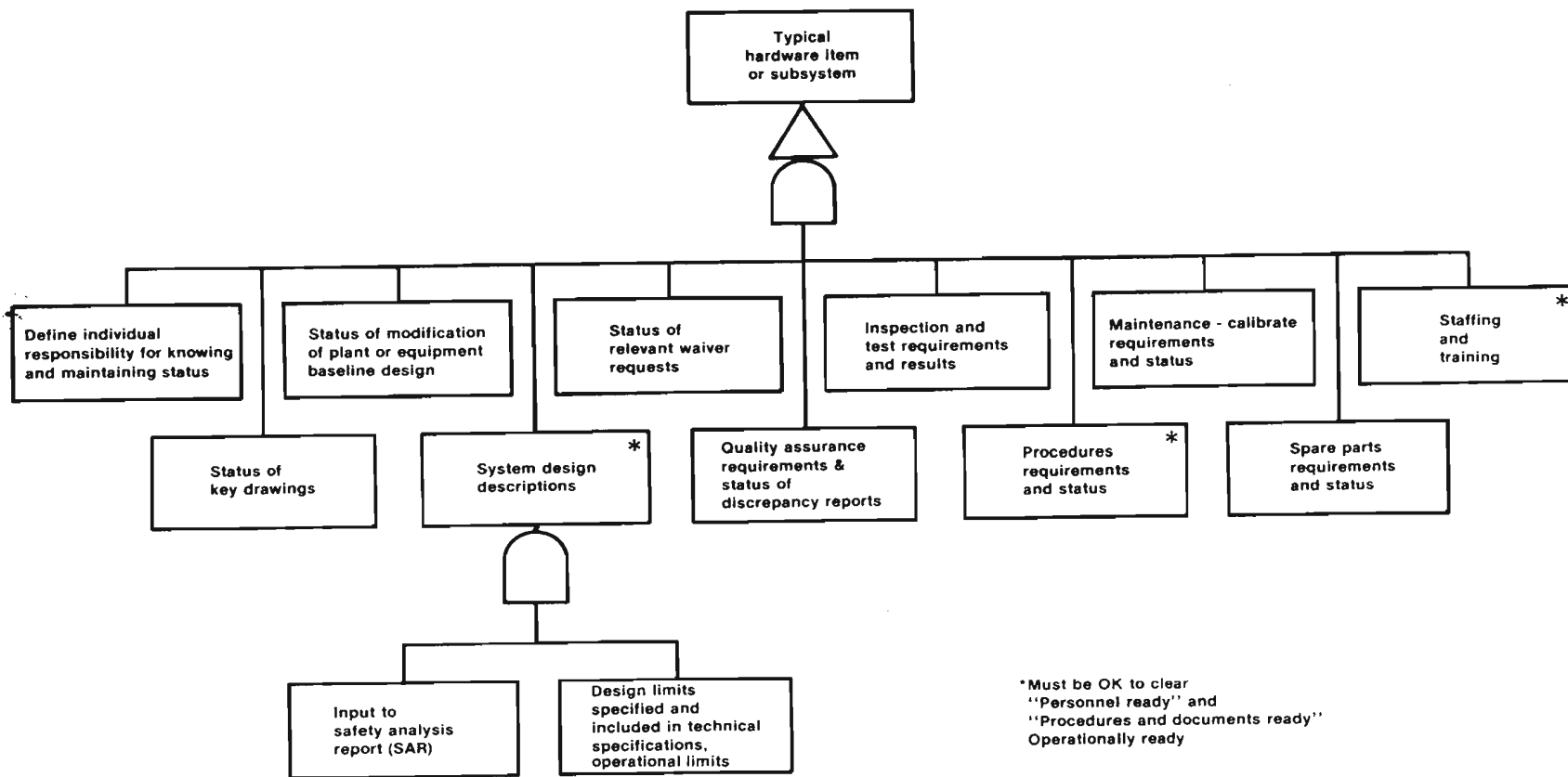
**Readiness Review Matrix  
 Work Tree Plant & Equip.  
 Section**



Equip/System Code No.  
 --- Tentative

# **Now What has to be Done for Every Piece of Hardware?**

S2 2665  
1.73



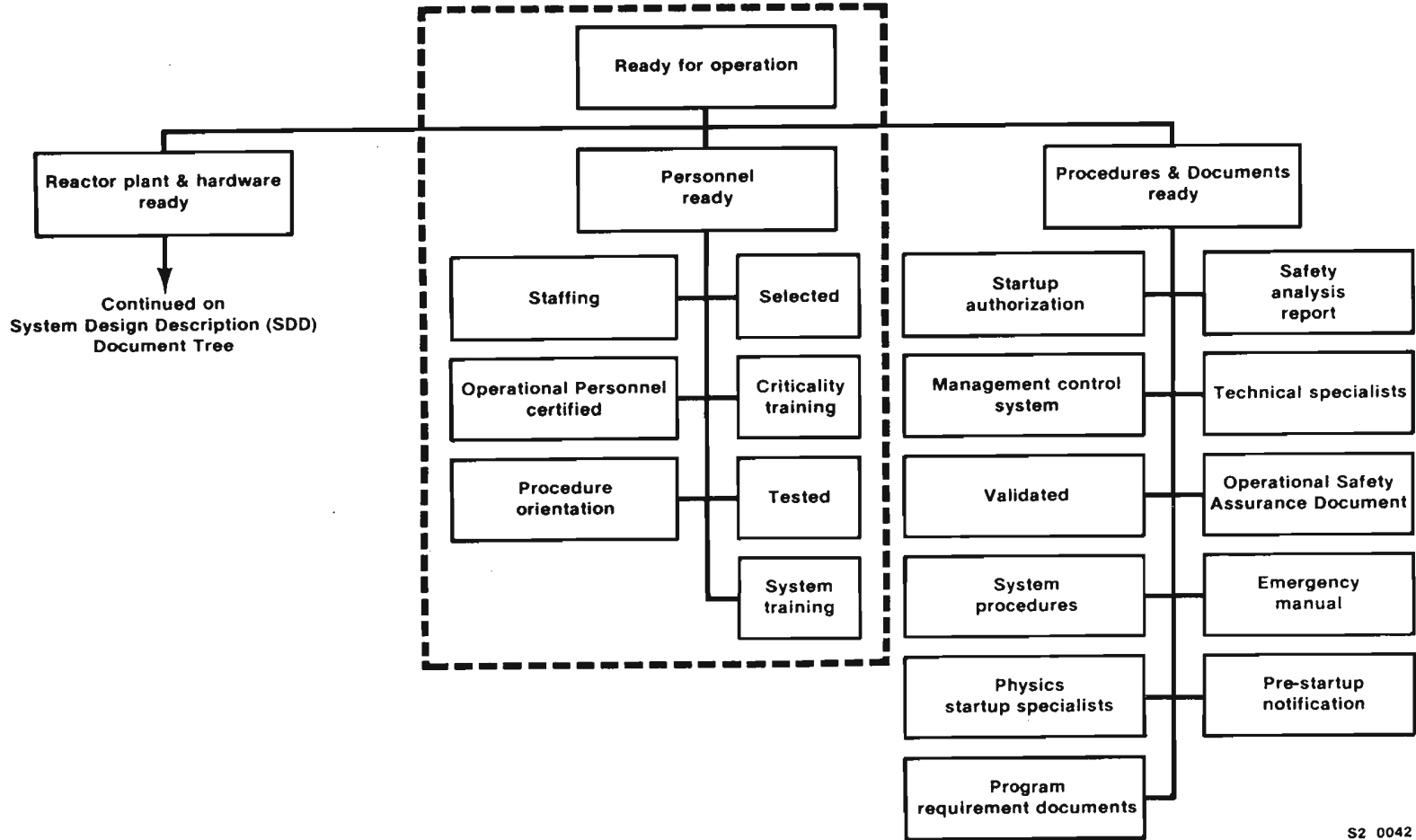
\*Must be OK to clear  
 "Personnel ready" and  
 "Procedures and documents ready"  
 Operationally ready

S2 0044  
 1.74

# **Now Let's Look at the Personnel Branch**

**S2 2669  
1.78**

# Plant Equipment Readiness Review Matrix Work Tree

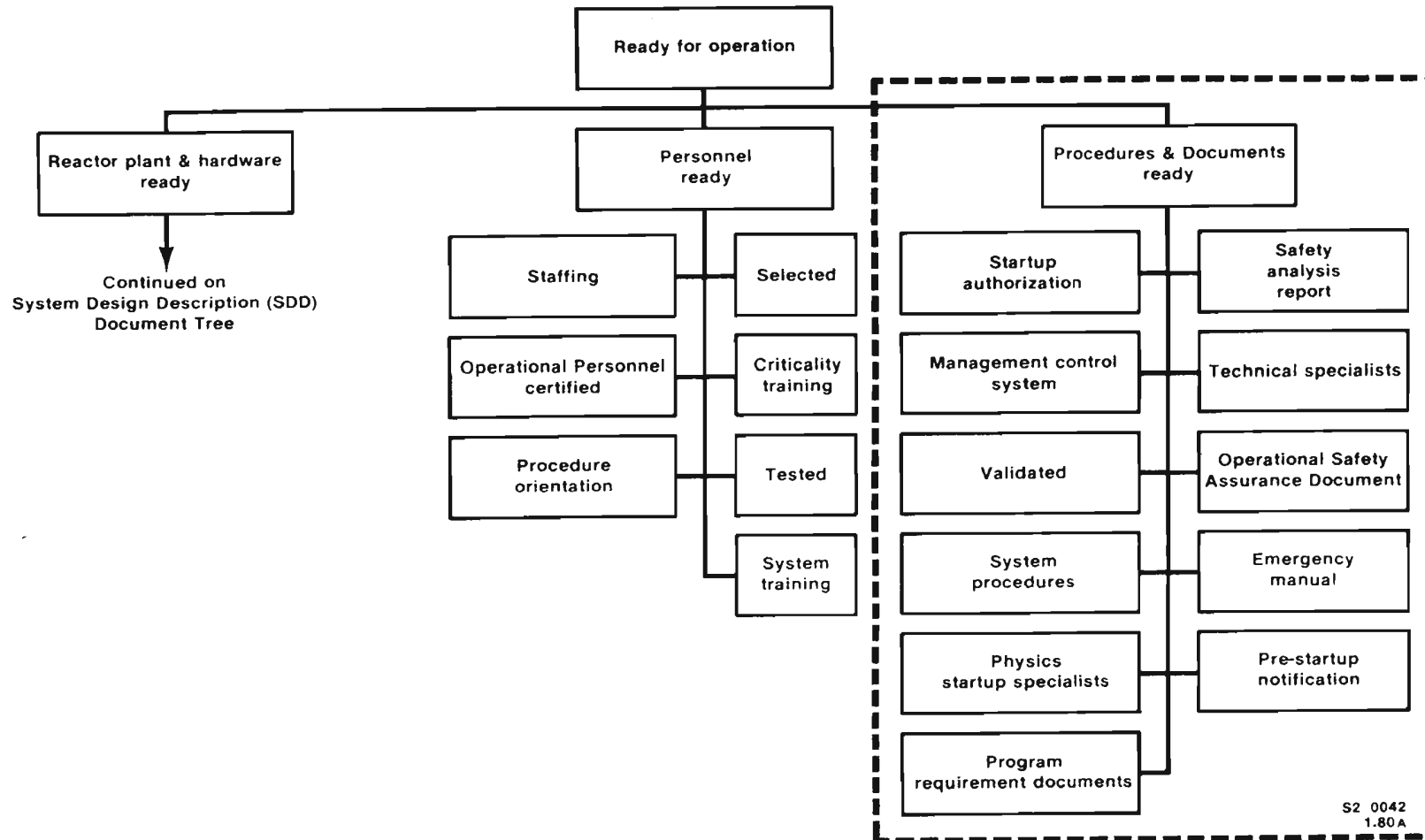


S2 0042  
1.79

# **Can we Handle the Procedural, Management Control Branch the Same Way?**

S2 2670  
1.80

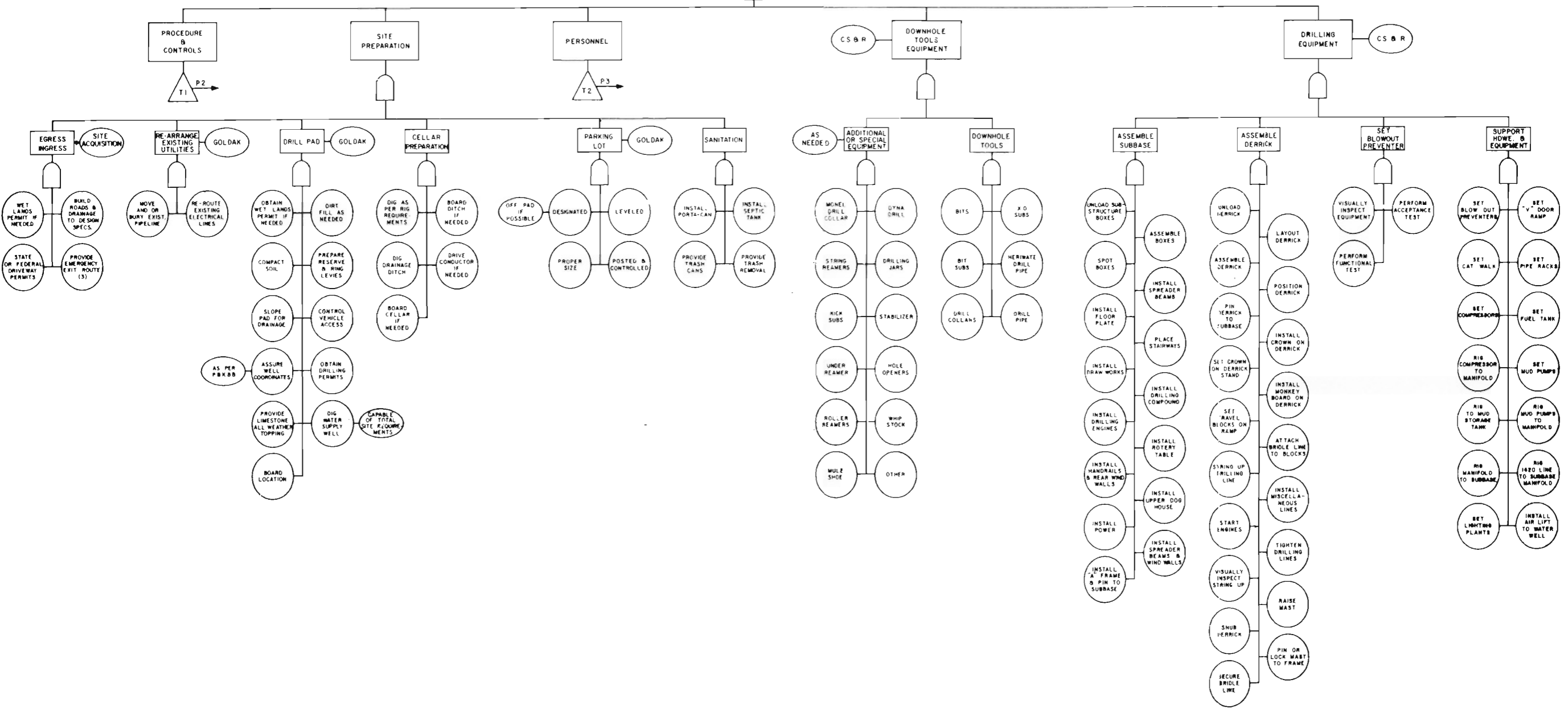
# Plant Equipment Readiness Review Matrix Work Tree



# How did the Drilling People Handle the Same Problem?

S2 2671  
1.81

READINESS FOR CAVERN ENTRY DRILLING



STRATEGIC PETROLEUM RESERVE DRILLING AND COMPLETION OPERATIONS	
MORT POSITIVE TREE	
AREA LOCATION	HOLE NAME
DEPT.	OR NUMBER
DATE	
REVISED	
PREPARED BY	FOR
APPROVED BY PROJECT MGR.	
REVIEWED BY INDUSTRIAL SAFETY	
DRAWING NO. 1-81 A	



# How do we build the total tree?

- **Upper echelon personnel specify the top policy, goals, objectives**
- **Lower echelons provide lower level information feed**

6 10 009

# The Big Problems

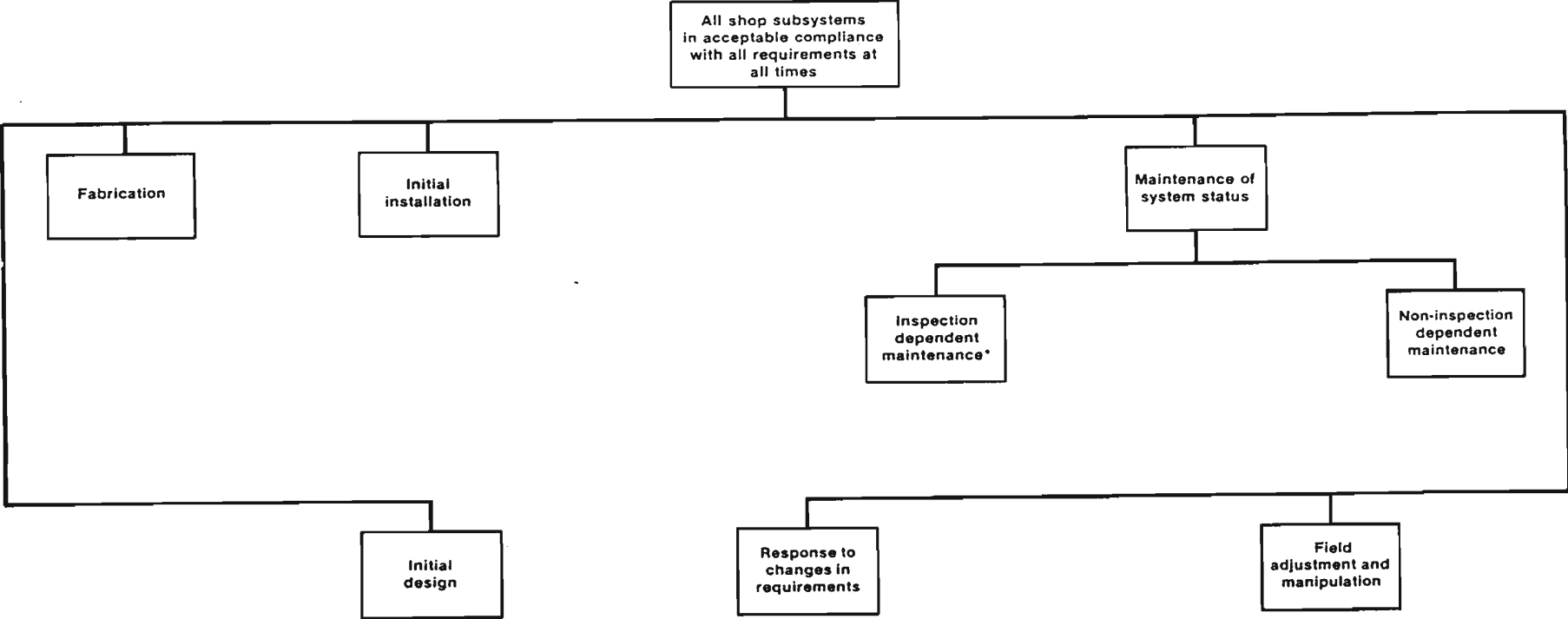
- **Identifying all elements of the system (in proper detail)**
- **Identifying deficiencies, deviations, unknowns**
- **Reducing the risk**
- **Communicating risks to upper level management (decision makers)**

6 10 008

# **What are the Administrative Considerations?**

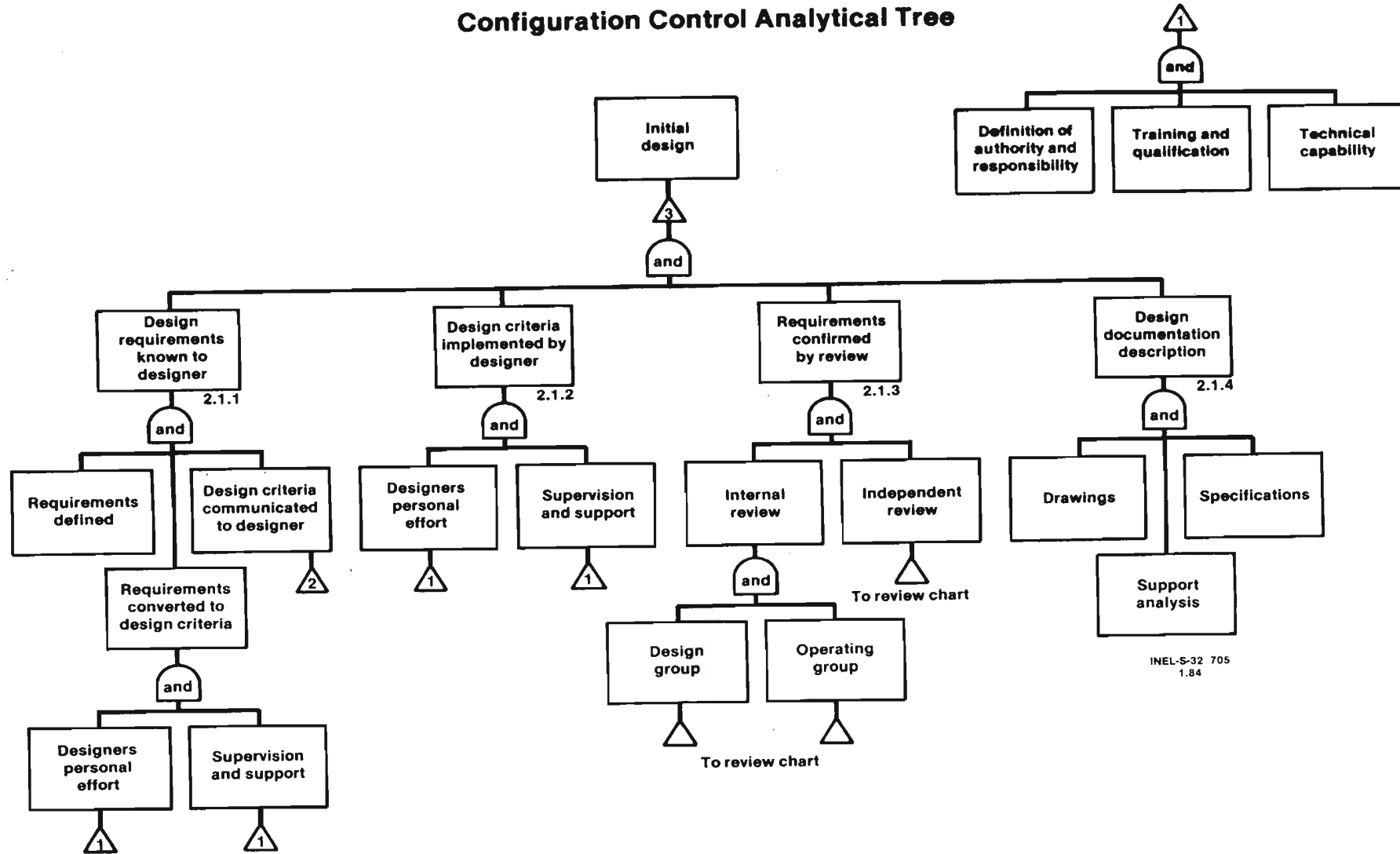
S2 2672  
1.82

### Configuration Control Analytical Tree

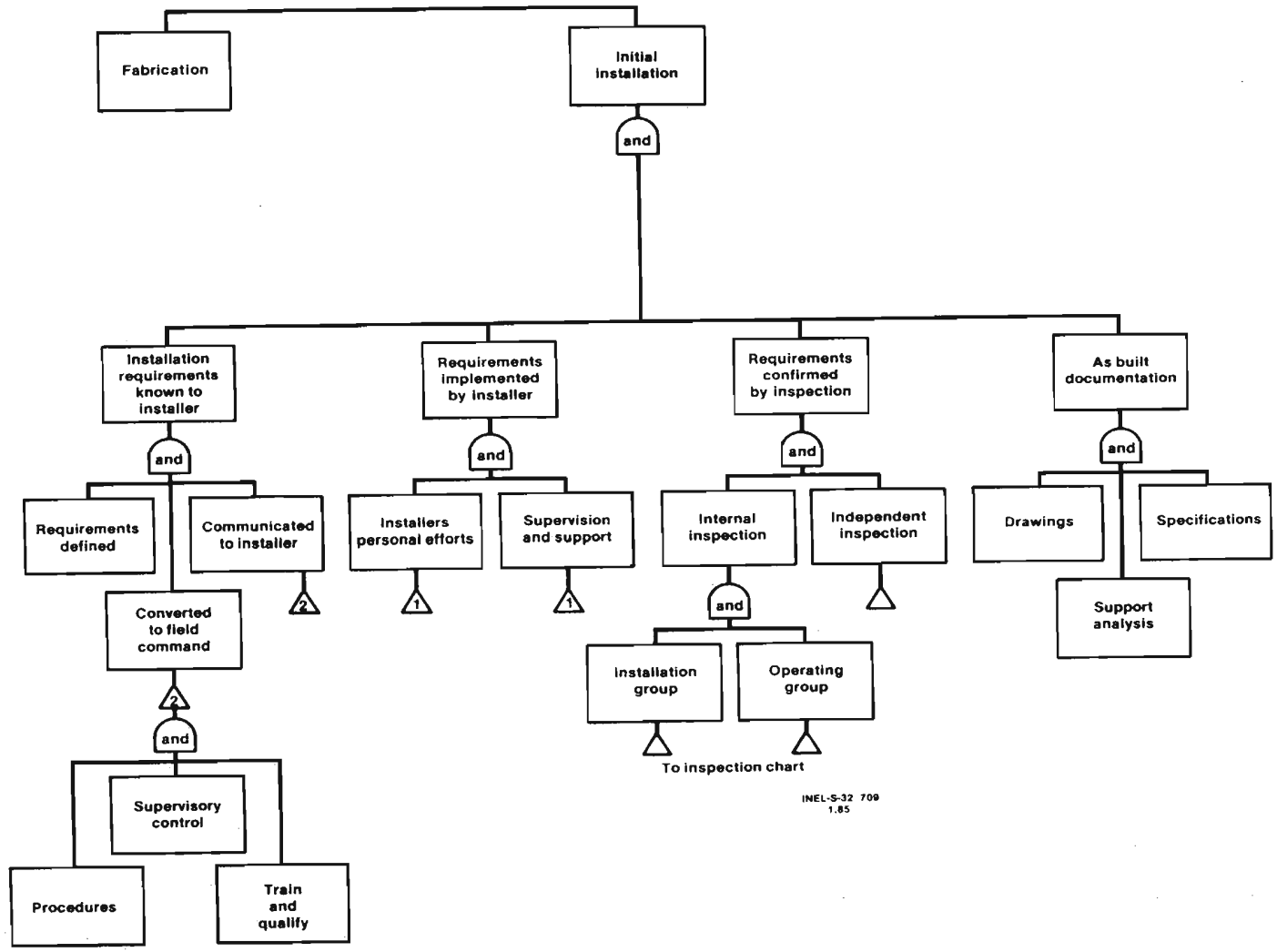


INEL-S-32 710  
1.83

# Configuration Control Analytical Tree

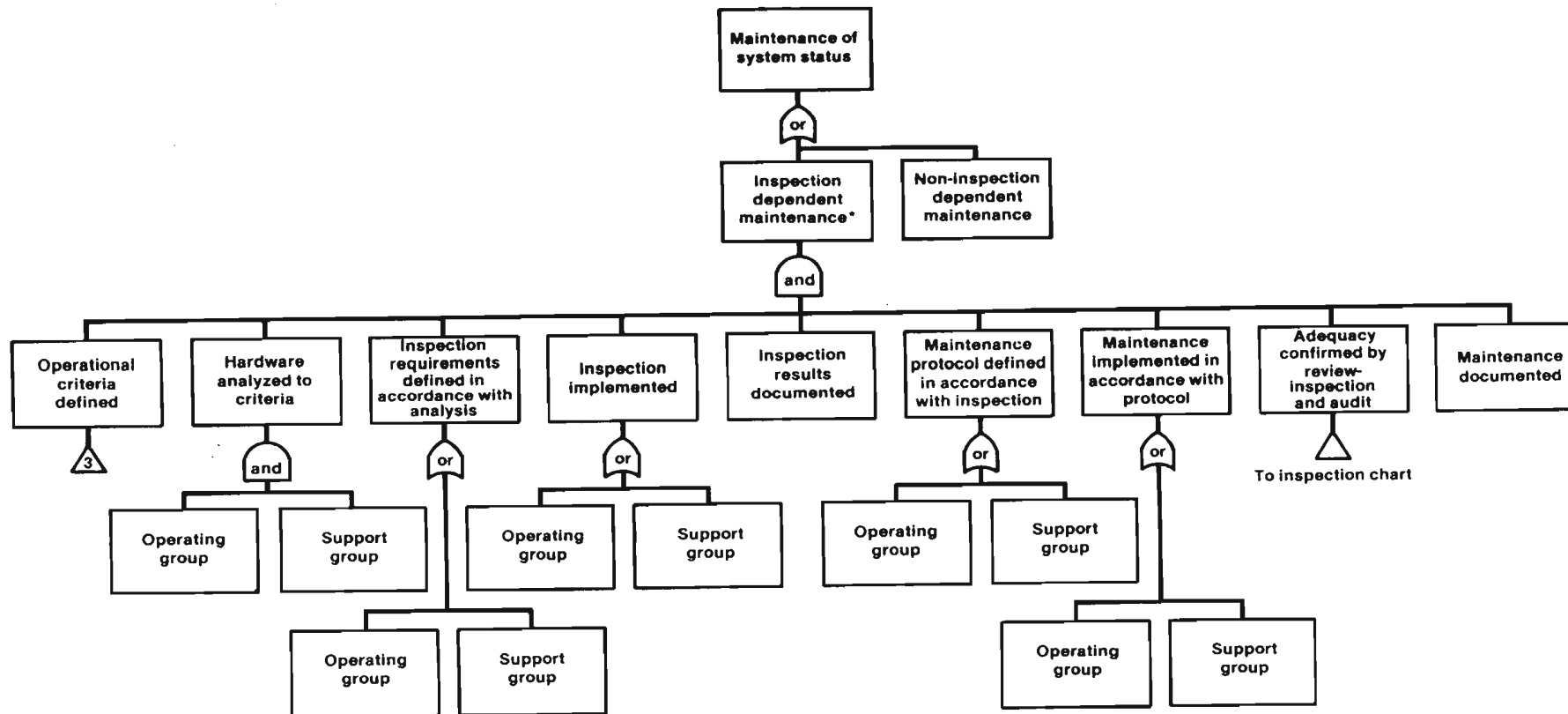


### Configuration Control Analytical Tree



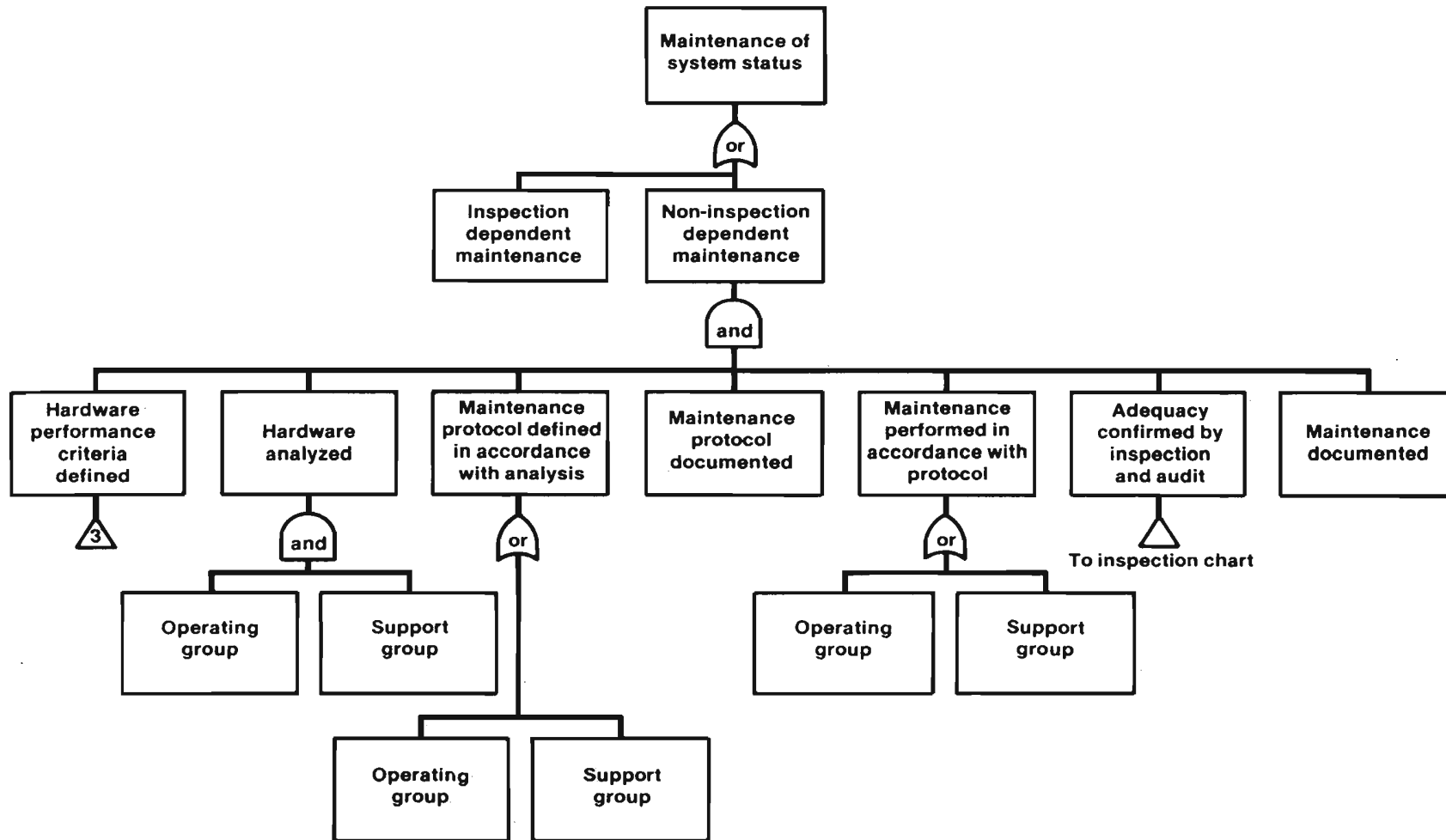
INEL-S-32 709  
1.85

### Configuration Control Analytical Tree



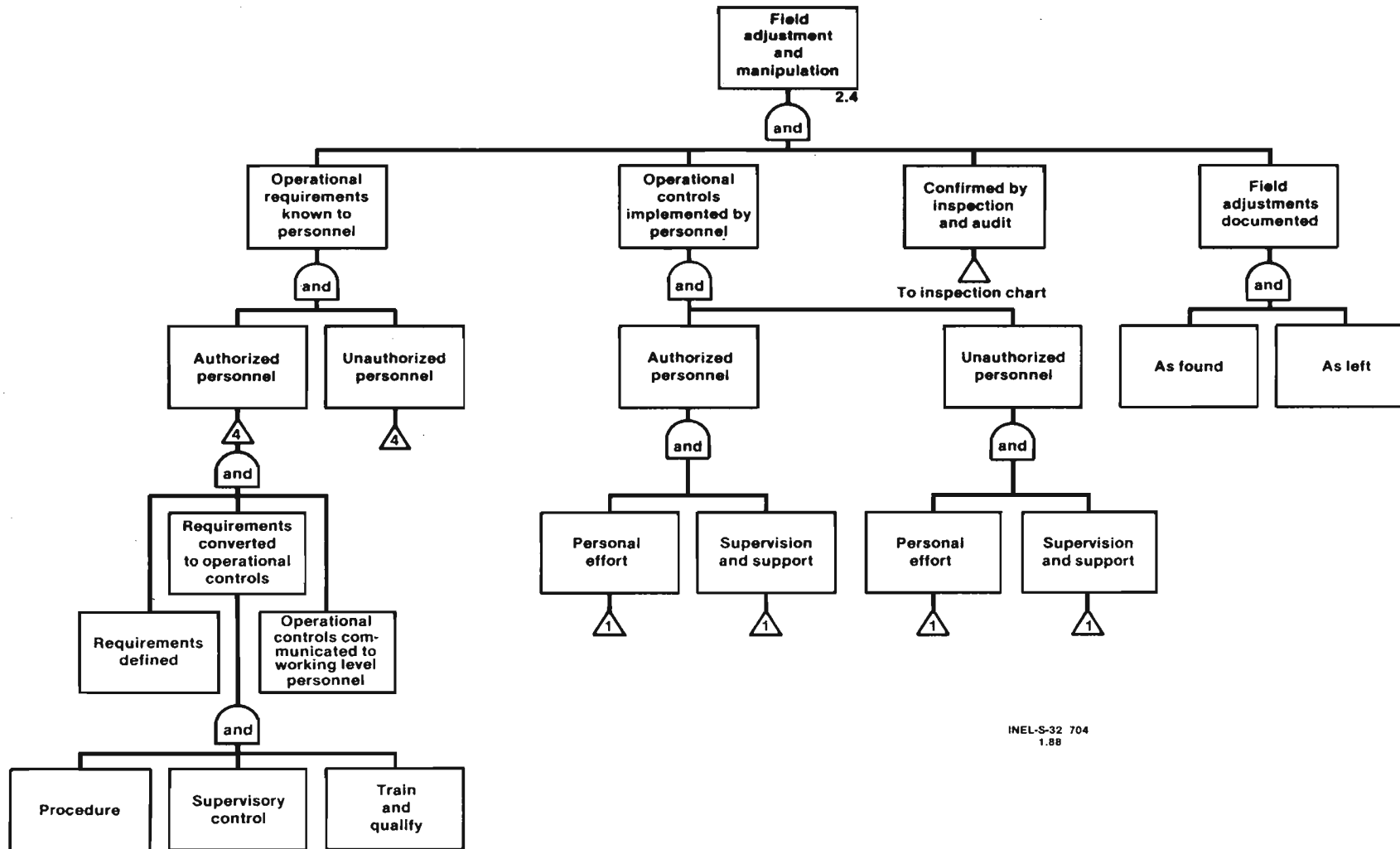
INEL-S-32 706  
1.86

## Configuration Control Analytical Tree



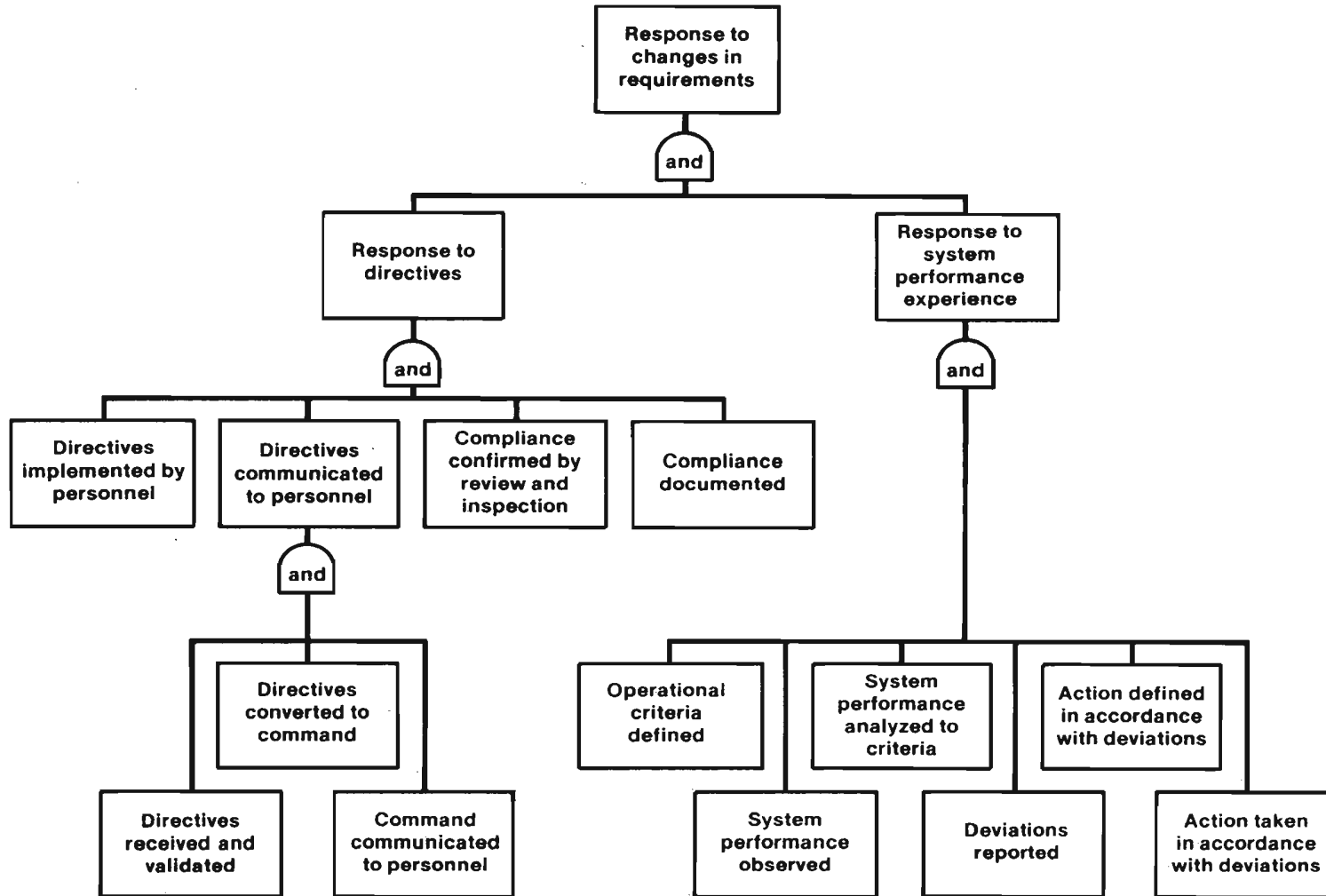
INEL-S-32 707  
1.87

## Configuration Control Analytical Tree



INEL-S-32 704  
1.88

## Configuration Control Analytical Tree



INEL-S-32 708  
1.89

# How can We use the Configuration Control Tree?

- To understand how we achieve initial readiness
- To describe how we maintain future readiness

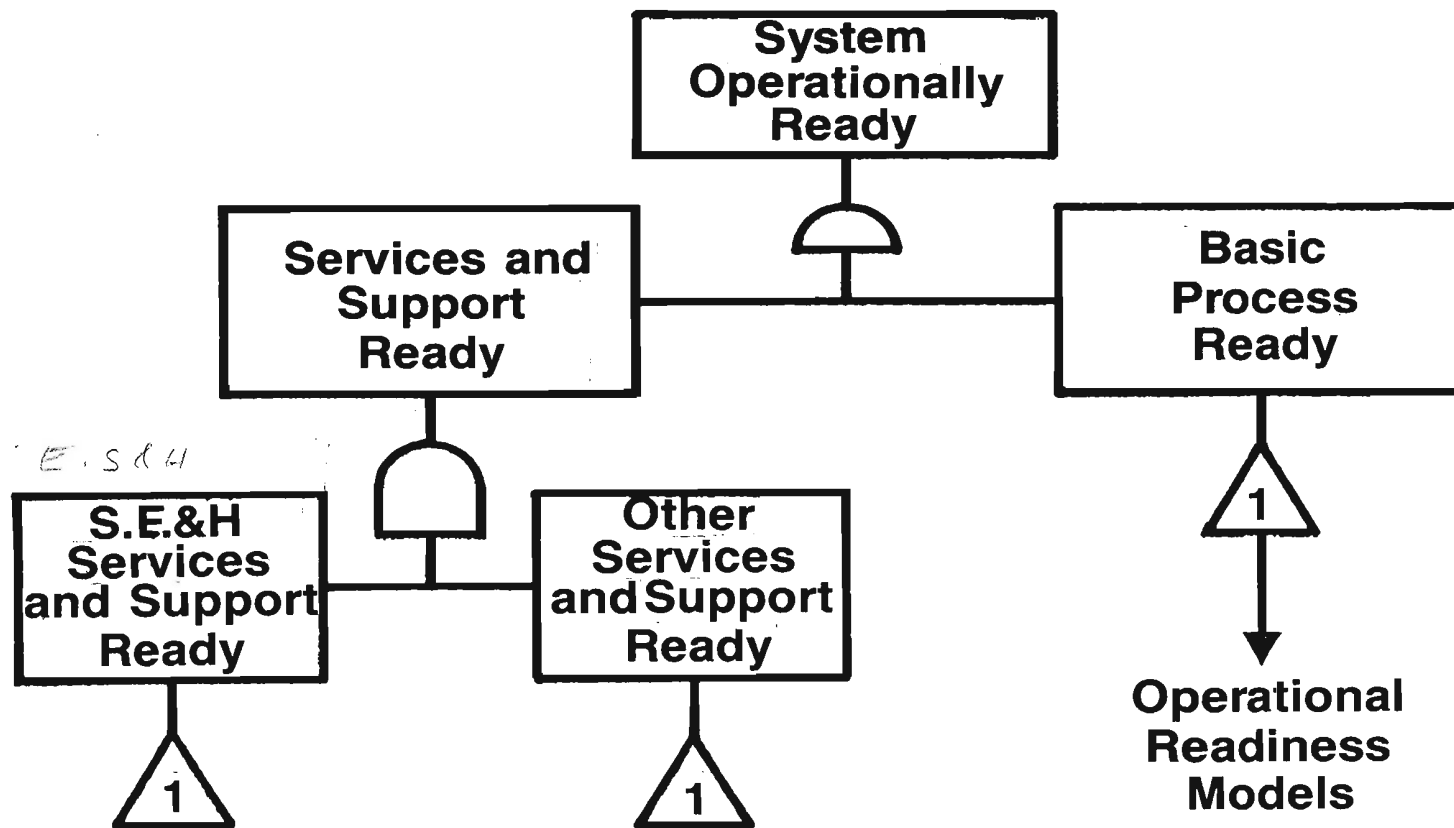
S2 2673  
1.90

# What are the Considerations in Scoping the Operational Readiness Evaluations?

- **Process function**
- **Process safety**
- **General safety** *(Spill, fire, etc. associated with process. Recovery, etc.)*
- **Disciplinary areas** *(Radiation, Etc.)*
- **Follow-on**

S2 2677  
1.94

# How Does This Look in an Analytical Format?



E.S.&H

S3 0050

# **Considerations in Design of Operational Readiness Programs**

S2 2694  
2.26

# What are Some of the Things to Watch for in Performing Operational Readiness Review?

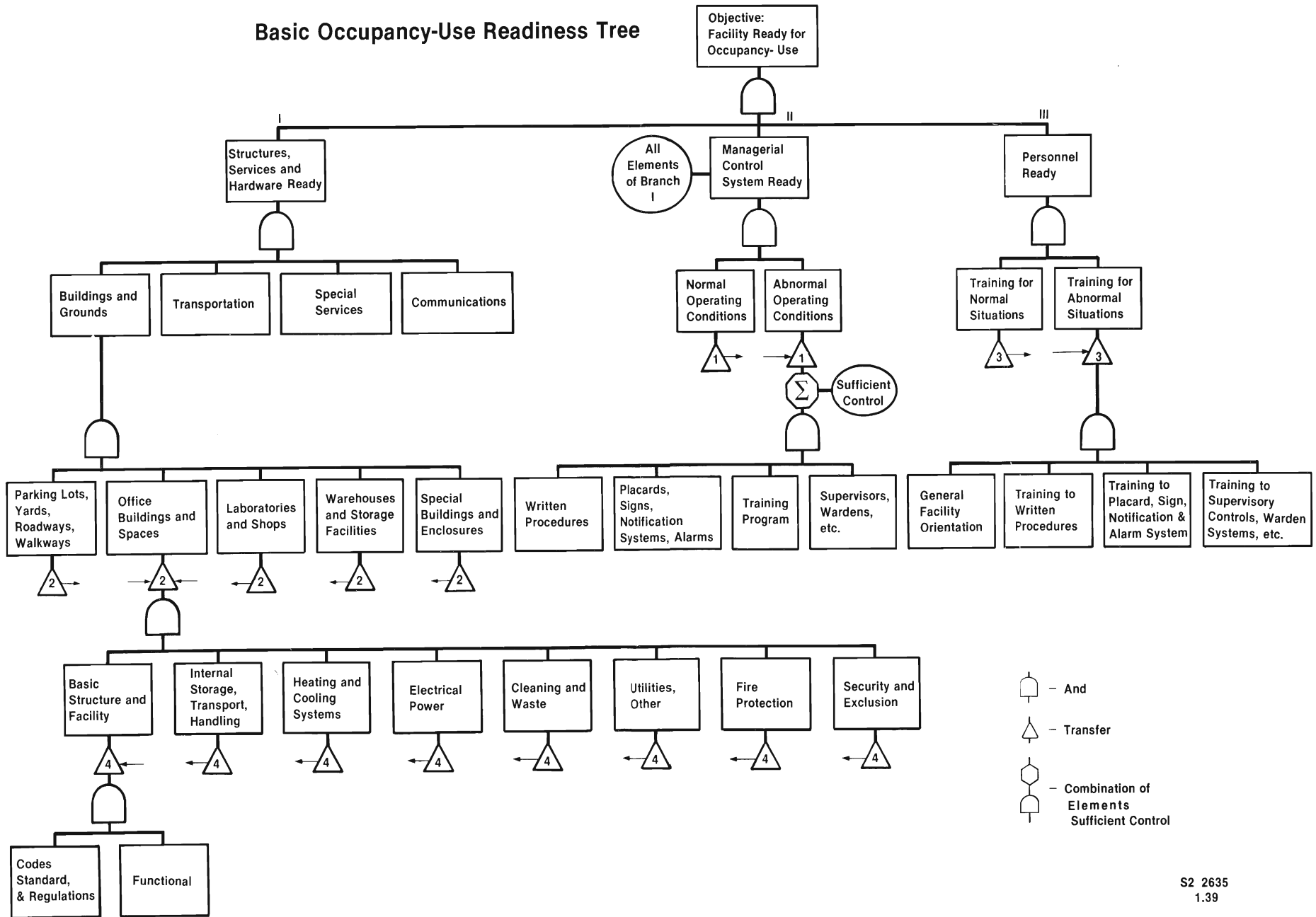
- Too much emphasis on dominant hazards and/or catastrophic consequence levels
- Overuse or underuse of formal techniques
- Overlooking peripheral hazard types
- Items which were “ready” and later “undone” (especially items performed early in the project)
- Failure to properly relate “unknown status” items to potential consequences if these items are not ready
- Failure to refer risk on unknown status items to proper management levels
- Effect of schedule pressures on quality of work
- Failure to clearly assign responsibilities for knowledge of work status

*Hint: check that way  
immer going field, are a zu finden!*

S2 2695  
2.27



# Basic Occupancy-Use Readiness Tree



S2 2635  
1.39



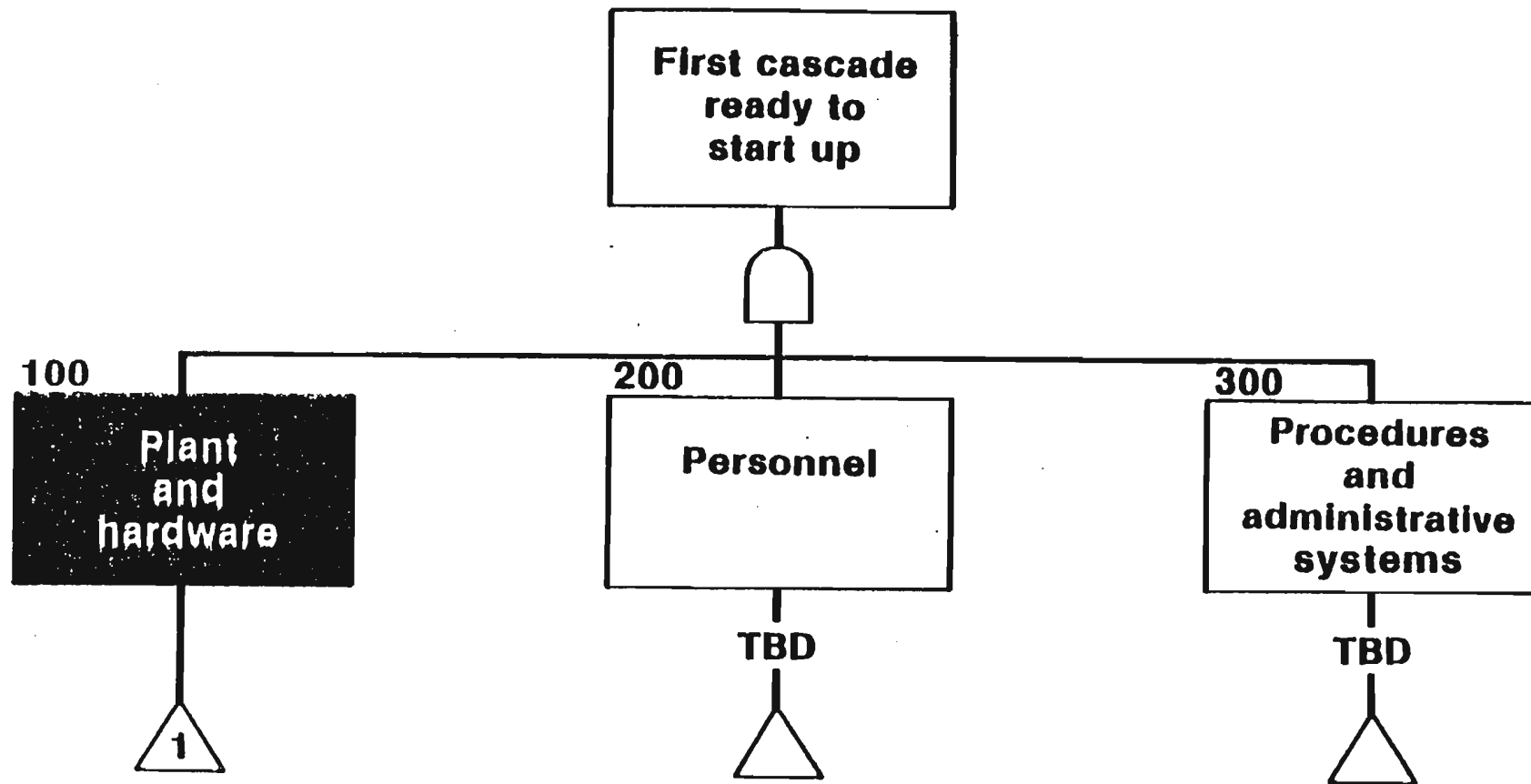
# First Day Laboratory

6 12 970

# Exercise

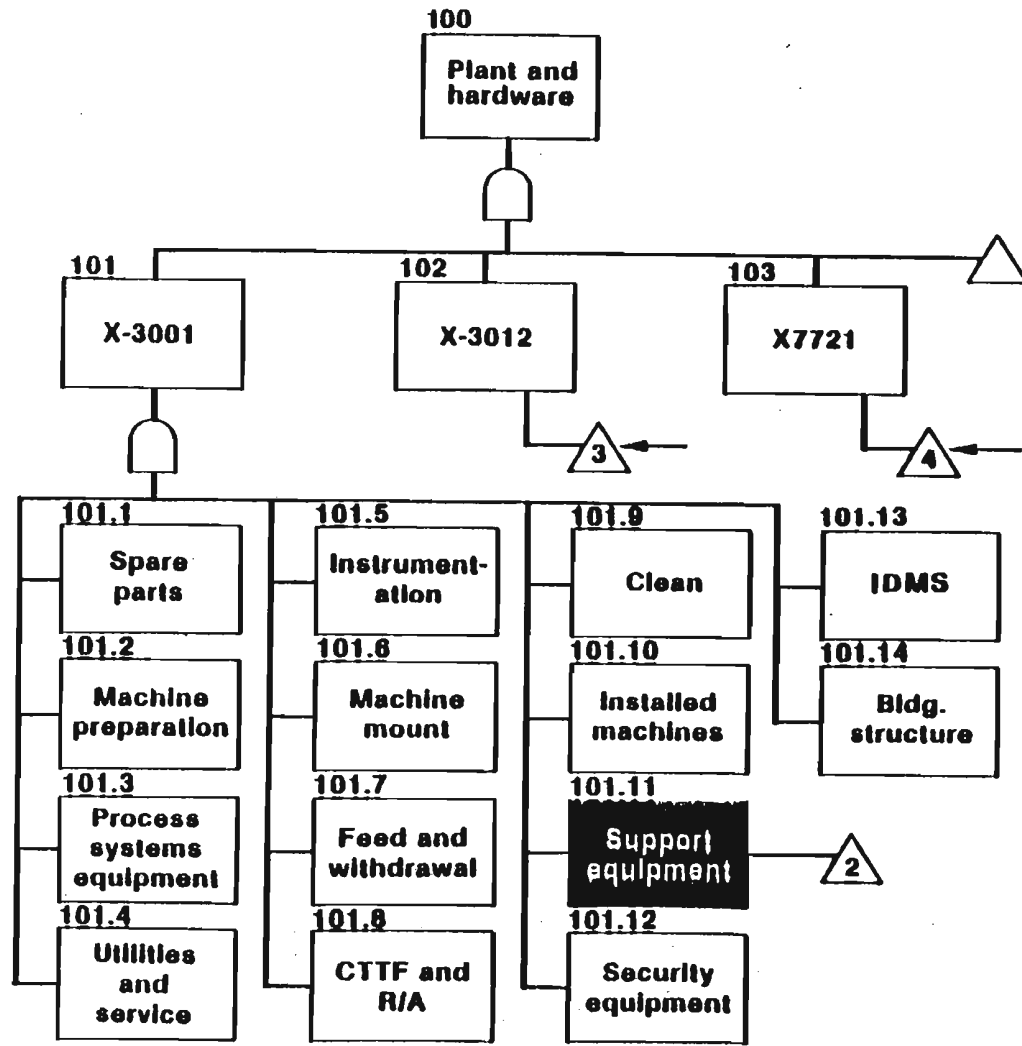
- **Select a project**
- **Design an operational readiness tree**
  - A. Process**
  - B. General safety**
  - C. Discipline area**
- **Instructor check trees at conclusion of laboratory**
- **Prepare to present your tree on second day**
- **Day one tree will be the basis for day two laboratory**

S2 2681  
1.98

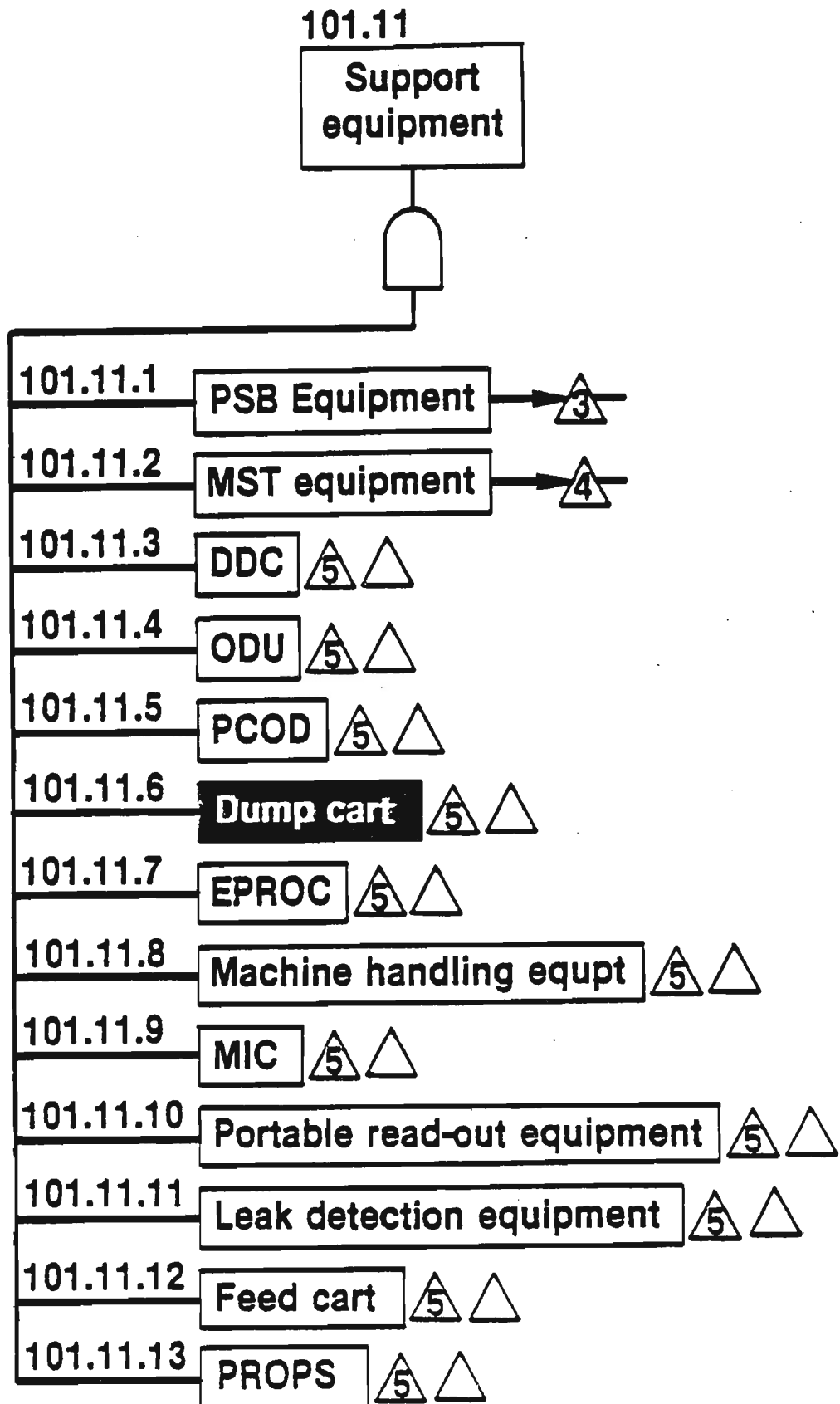


*TBD = To be determined*

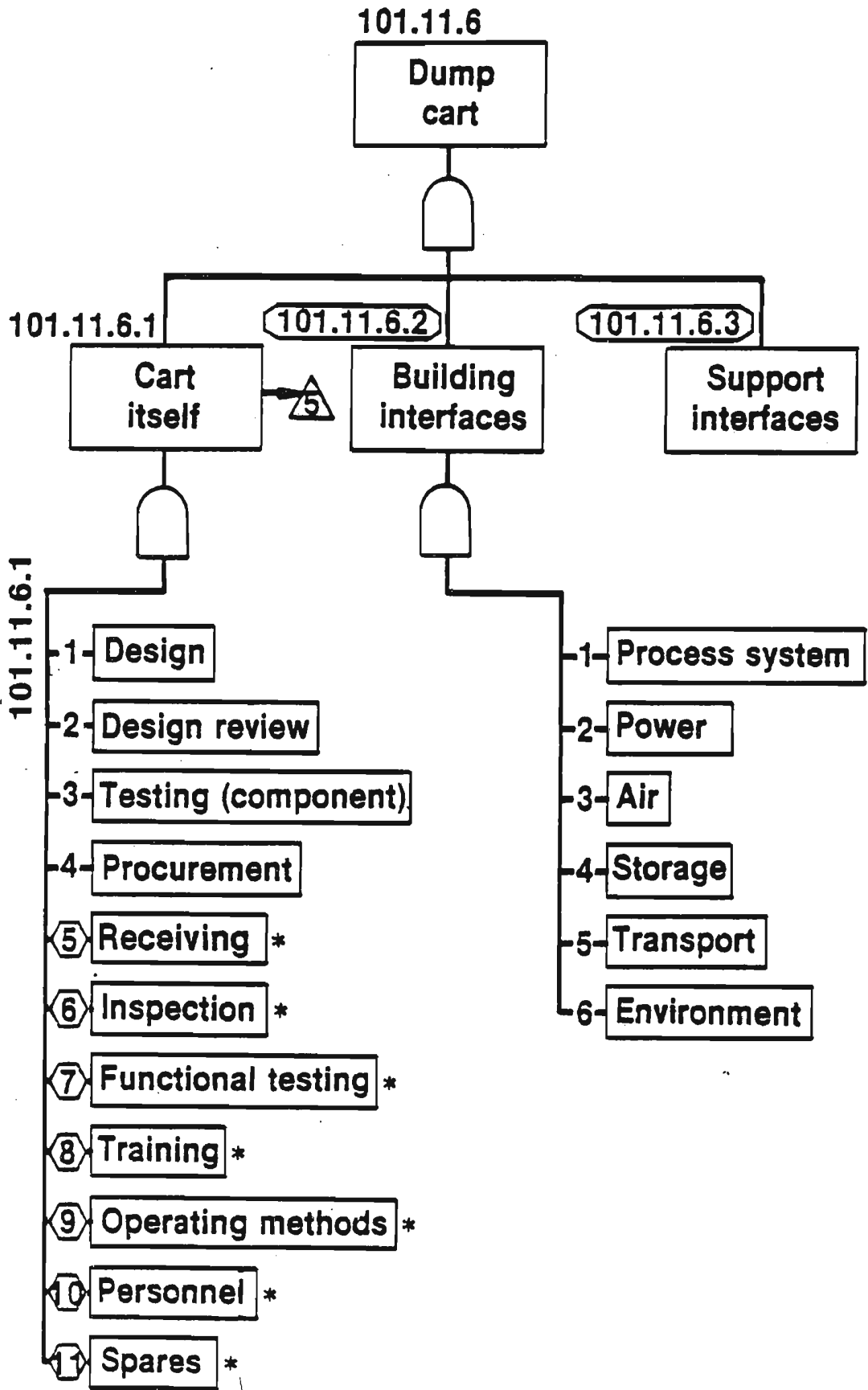
S2 10 913



52 10 014

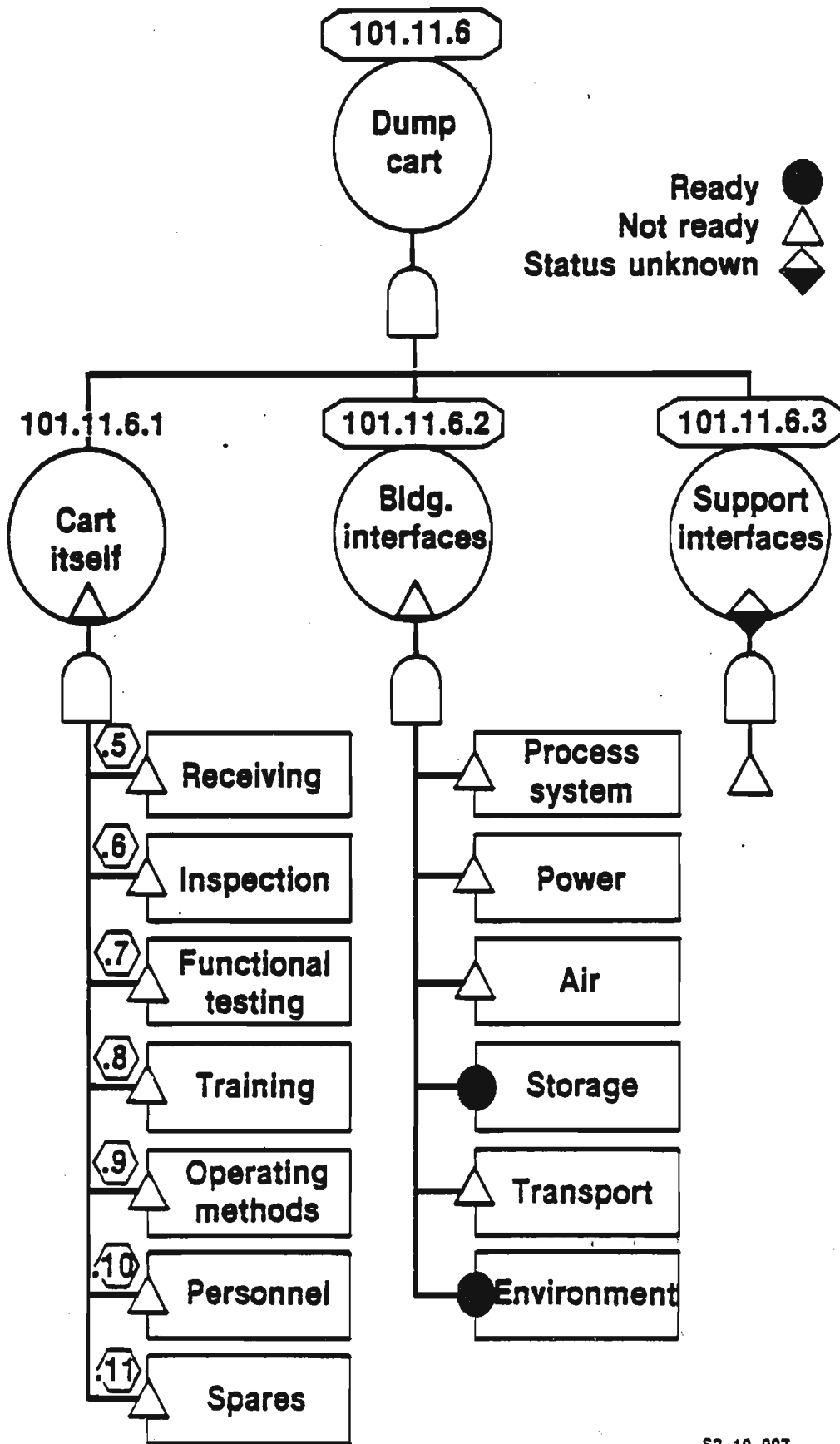


S2 10 912



*Status*

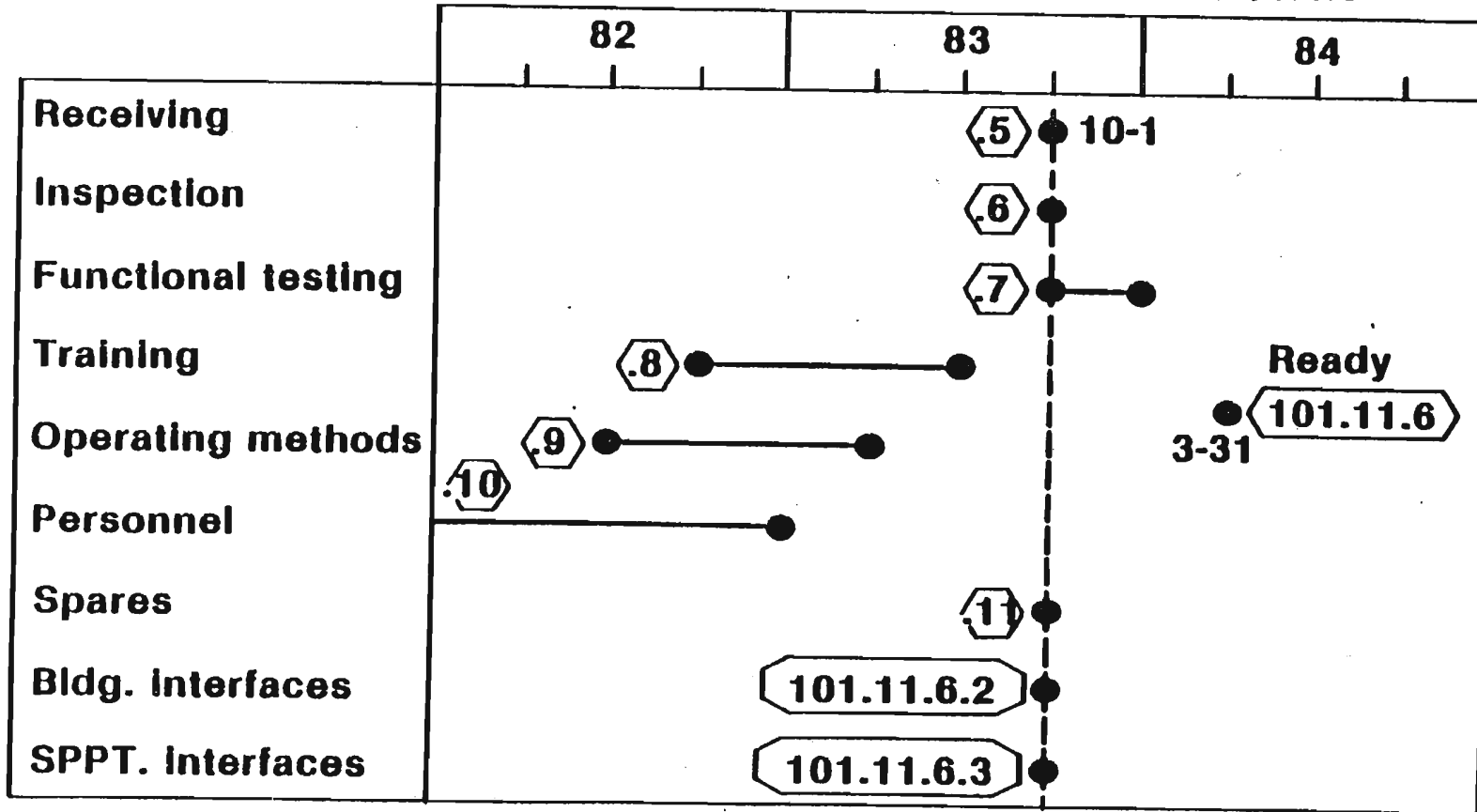
S2 10 911



S2 10 907

**Flowchart  
dump cart**

**Reference  
101.11.6.1 - 101.11.6.2  
101.11.6.3**



S2 10 908

### Dump Cart O.R. Tracking Matrix

Go     No go

Date

**101.11.6**

Description	Respon.	Start/finish date	Comp. criteria	Status*
Receiving	Materials div.	10-1-83	Notification	7.6.2.2%
Inspection	QC	10-1/10-4-83	Specification #XES-111-4	
Functional testing	Prod. div.	10-4/12-31-83	Test proc. #543-21	
Training	Prod. div.	10-1-82/7-1-83	Training validation test	
Operating methods	Prod. div.	7-1-82/3-31-83	Approval signatures	
Personnel	Employment	/1-1-83	All requisitions filled	
Spares	Maint. div.	10-1-83	Be in stock	
Bldg. interfaces		10-1-83	101.11.2 matrix	
SPPT. Interfaces		10-1-83	101.11.6.3 matrix	

Jordan  
Tay  
unib  
liber

\*Status code  
**C - Complete**  
**I - Incomplete**  
**U - Unknown**  
**n/a - Not applicable**  
**CW - Complete with waiver**

52 10 908



# **Flow Charting — Tracking — Analysis and Display of Operational Readiness Information**

S2 2682  
2.2

# Flow Charting

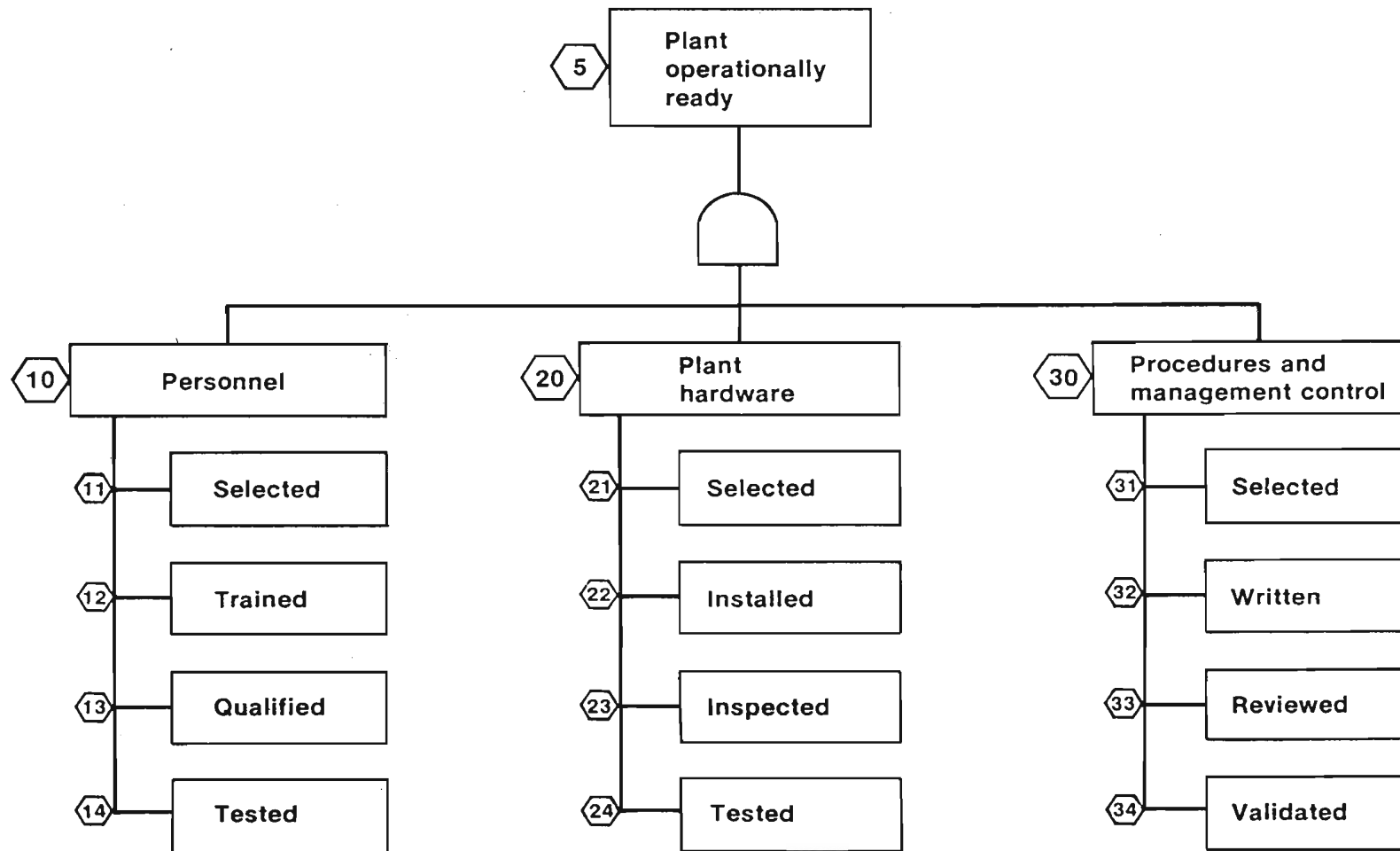
- **Flow charting is absolutely necessary to define points in time when personnel, procedures and plant hardware must be completed**
- **Use your program management system, Q.A. system, and configuration control system in developing a flow charting work control system**

7-8994

# **How do the Operational Readiness Trees Relate to Conventional Work Control Systems?**

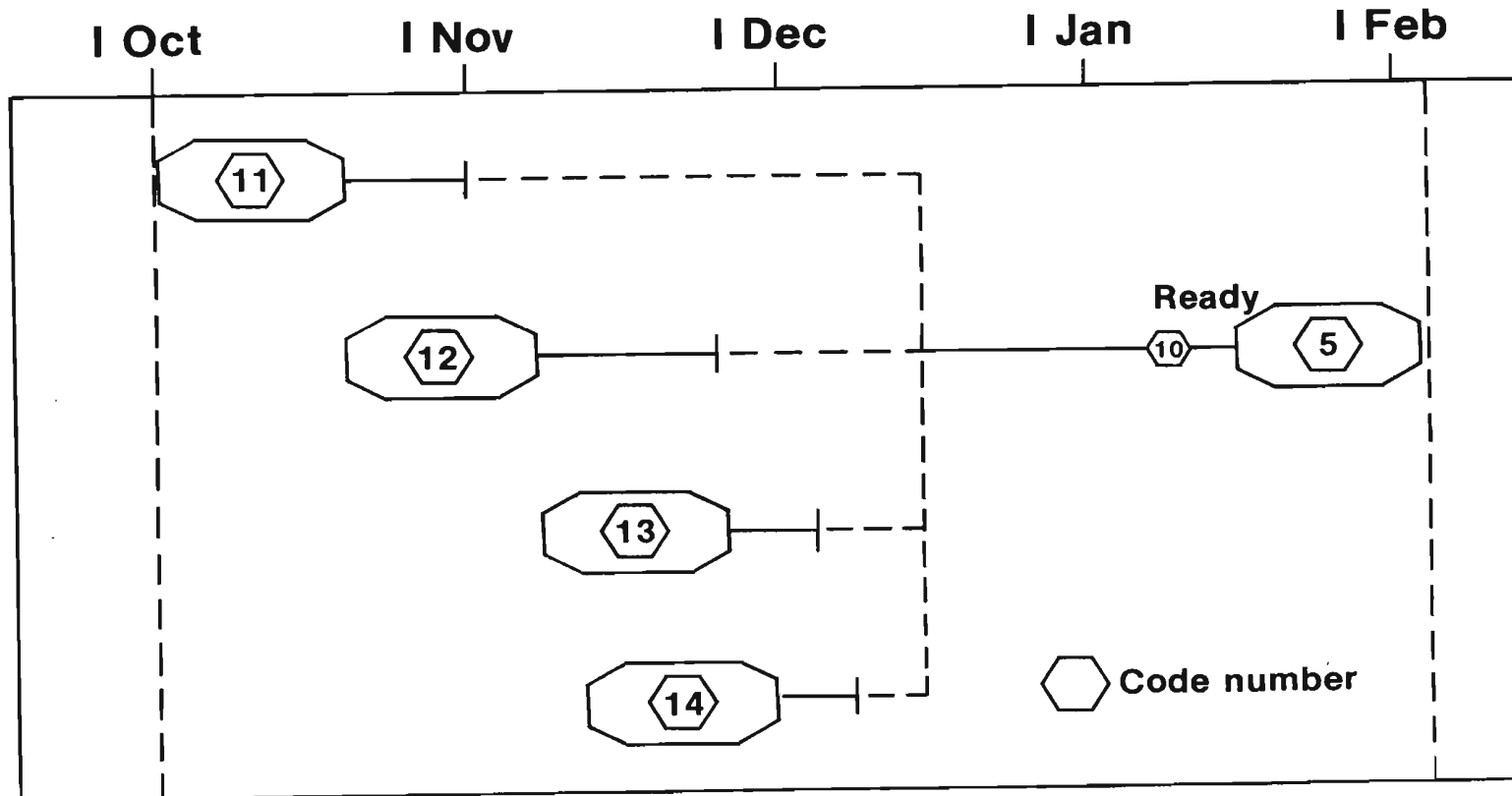
S2 2683  
2.3

## How Do We Relate Readiness Trees, Flow Charts and Matrices?



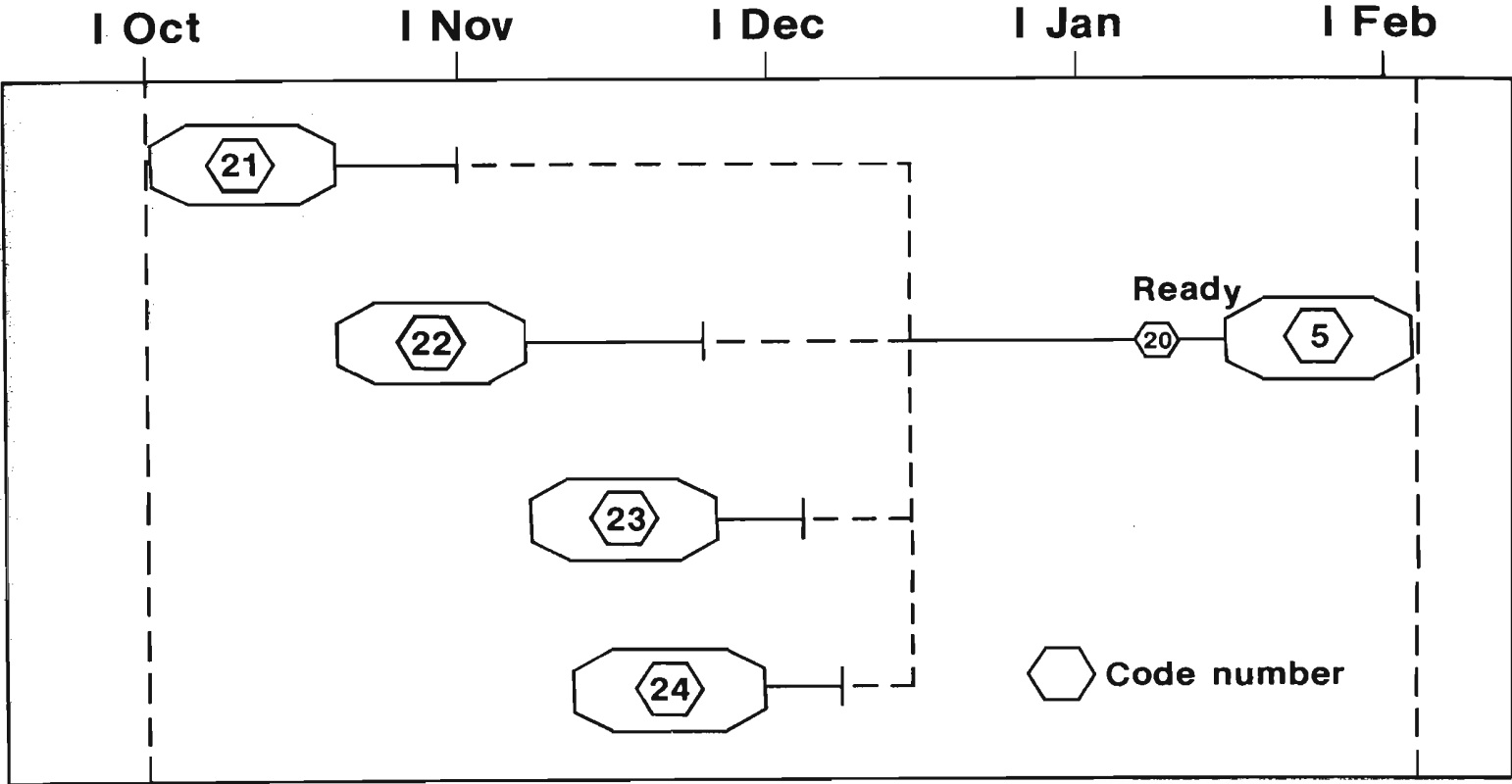
S2 0711  
2.4

# Personnel Flow Chart



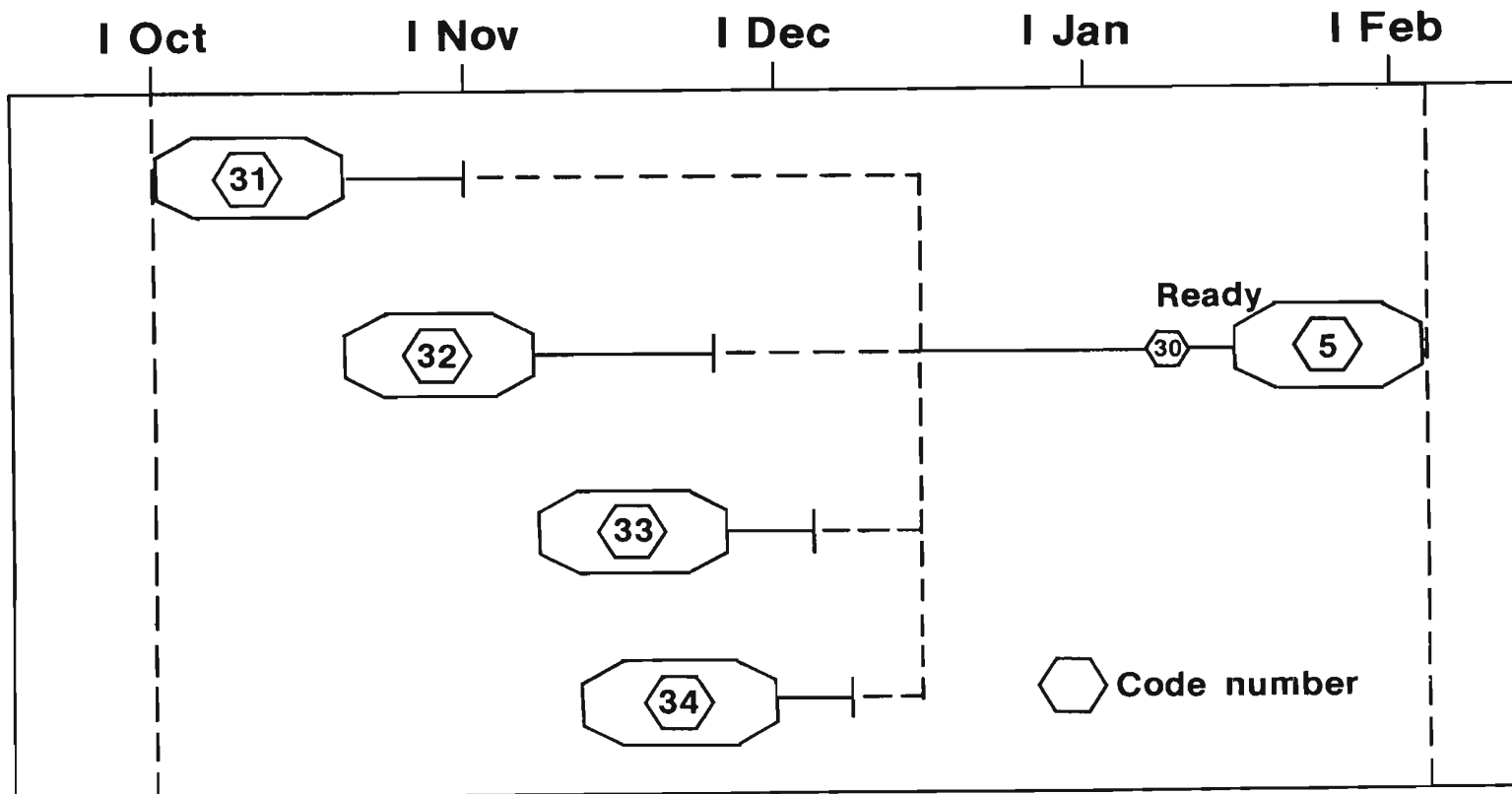
S2 0714  
2.5

# Hardware Flowchart



S2 0713  
2.6

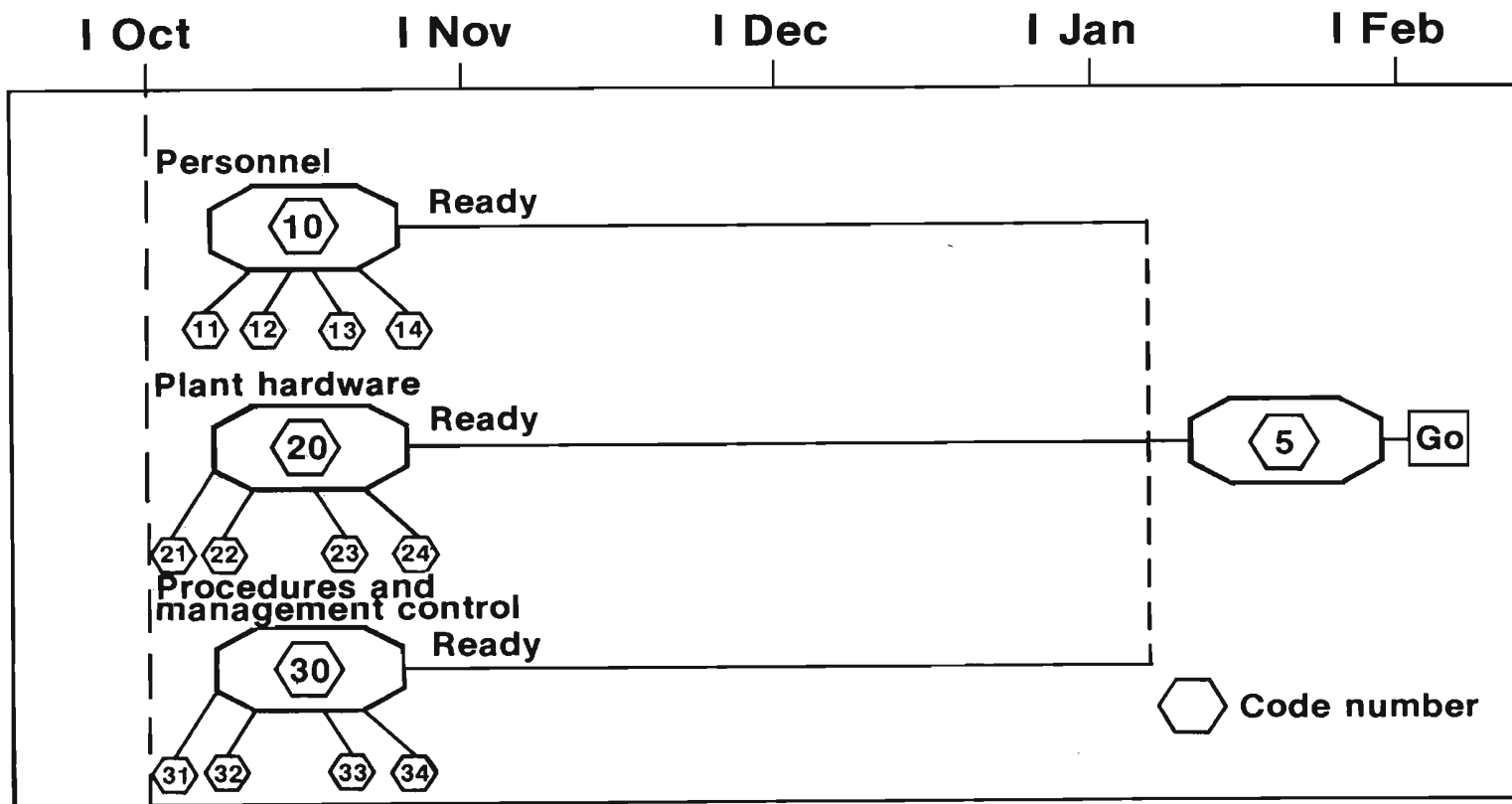
# Procedures and Management Control Flowchart



S2 0715  
2.7

# Master plan flowchart

## Personnel, Plant hardware, Procedures and Management



S2 0712  
2.8

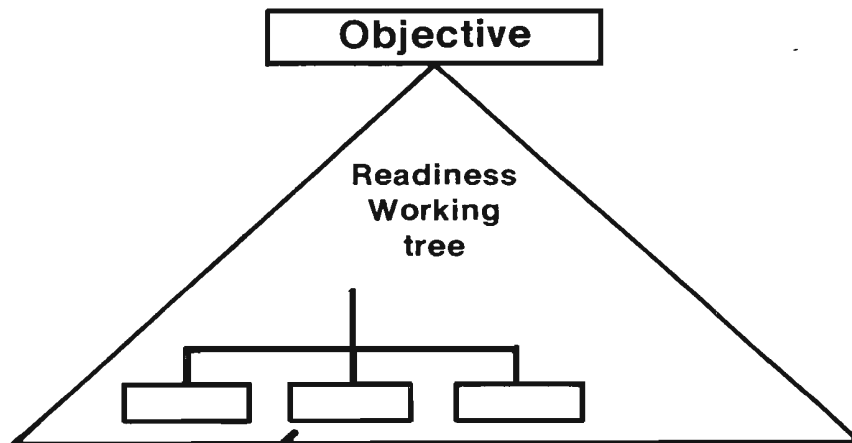
# Why use Both Trees and Flowcharts?

- **Flowcharts show time and sequential relationships**
- **Flowcharts are often available for work control purposes**
- **Trees show functional relationships between components and subsystems**



# How can We Track Completion?

- **One dimensional matrices**
- **Two dimensional matrices**
  - A. Criteria based**
  - B. Common completion criteria**



- △ Known not complete
- Known complete
- ◇ Status unknown

Work sequence charts

Who	When	What	What
		What	What
		What	
		What	

Operational readiness matrix

Who	What												
		○	○	○	△	×	◇	×	×	×	×	×	×
		◇	△	◇	○	△	×	×	×	×	×	×	×
		○	△	×	×	×	×	×	×	×	×	◇	×
		×	△	×	×	×	×	×	×	×	×	×	◇
		×	×	×	×	×	×	×	×	△	×	○	○
		×	×	×	×	×	×	×	×	△	△	△	△
		○	○	○	◇	×	×	×	×	×	×	×	×

INEL-S-32 716  
2.20

# What does the One Dimensional Matrix Look Like?

Item	Status

S2 2689  
2.21

## What do the Two Dimensional Matrices Look Like?

Who is involved in doing it?	What needs to be done?	Personnel properly selected	Personnel trained	Personnel qualified/certified	Personnel tested

S2 2690  
2.22

# Another Two Dimensional Matrix

Item \ Criteria	Q/A	Configuration control	Test inspection

S2 2691  
2.23

# How do We do the Whole Task?

WICHTIG:  
Was wollen wir  
erreichbar?

- **Scope our interest in operational readiness**
- **Construct appropriate analytical trees**
- **Select an appropriate display**, *um das vorzustellen  
(eine Übersetzung mit)*
  - A. Tree**
  - B. Flowchart**
  - C. Matrix**

S2 2692  
2.24

# What are the Considerations in Selecting the Method for Analytical Display?

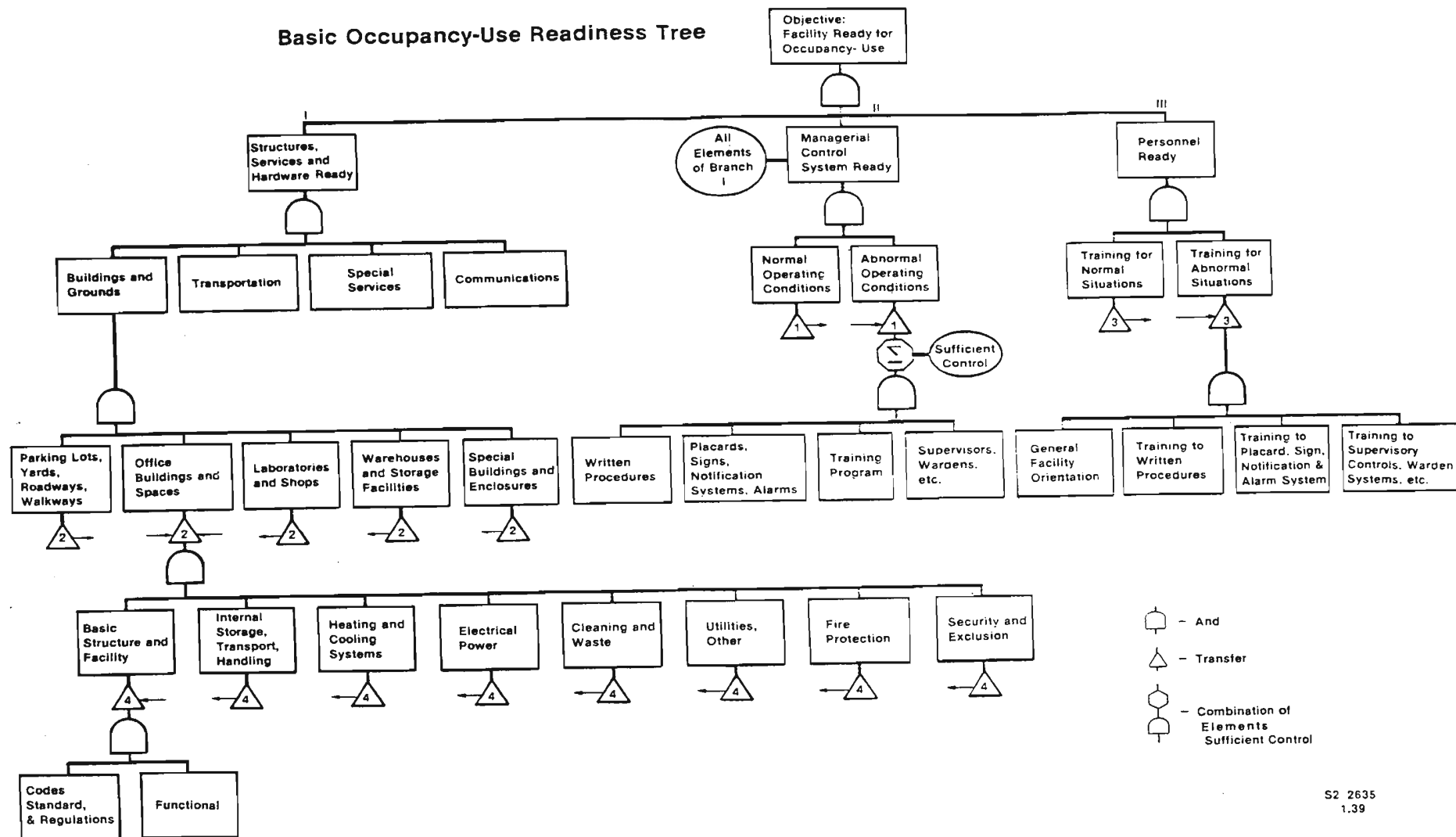
- **Clarity - communication**
- **Ability to relate deficiencies to:**
  - A. Fixes**
  - B. Consequences if not fixed**
- **Ability to track:**
  - A. Inputs** *-Wohler was in it, days 24-30, id (Reigen, was teh 3-2. Eastern model)*
  - B. Overall effects of changes in status of subsystems and components**

S2 2693  
2.25

# **What do the Work Sheets that Support a Real Life System Look Like?**

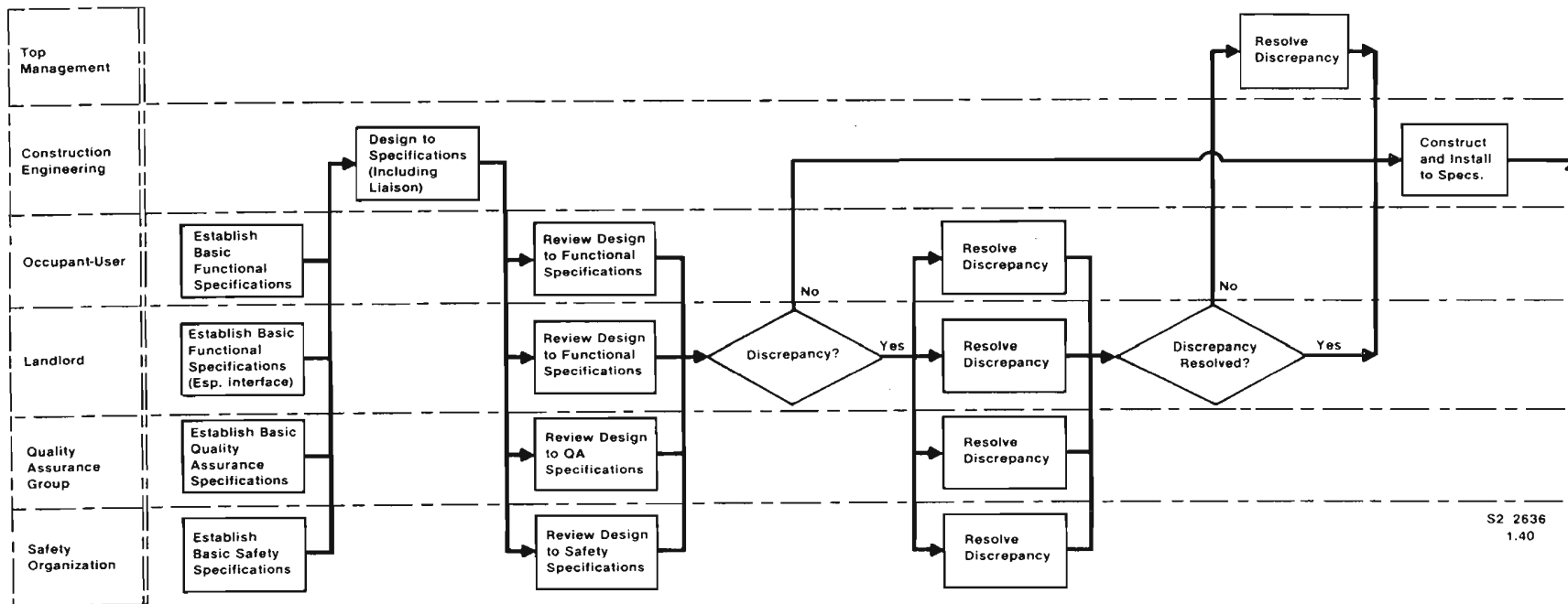
S2 2684  
2.9

# Basic Occupancy-Use Readiness Tree



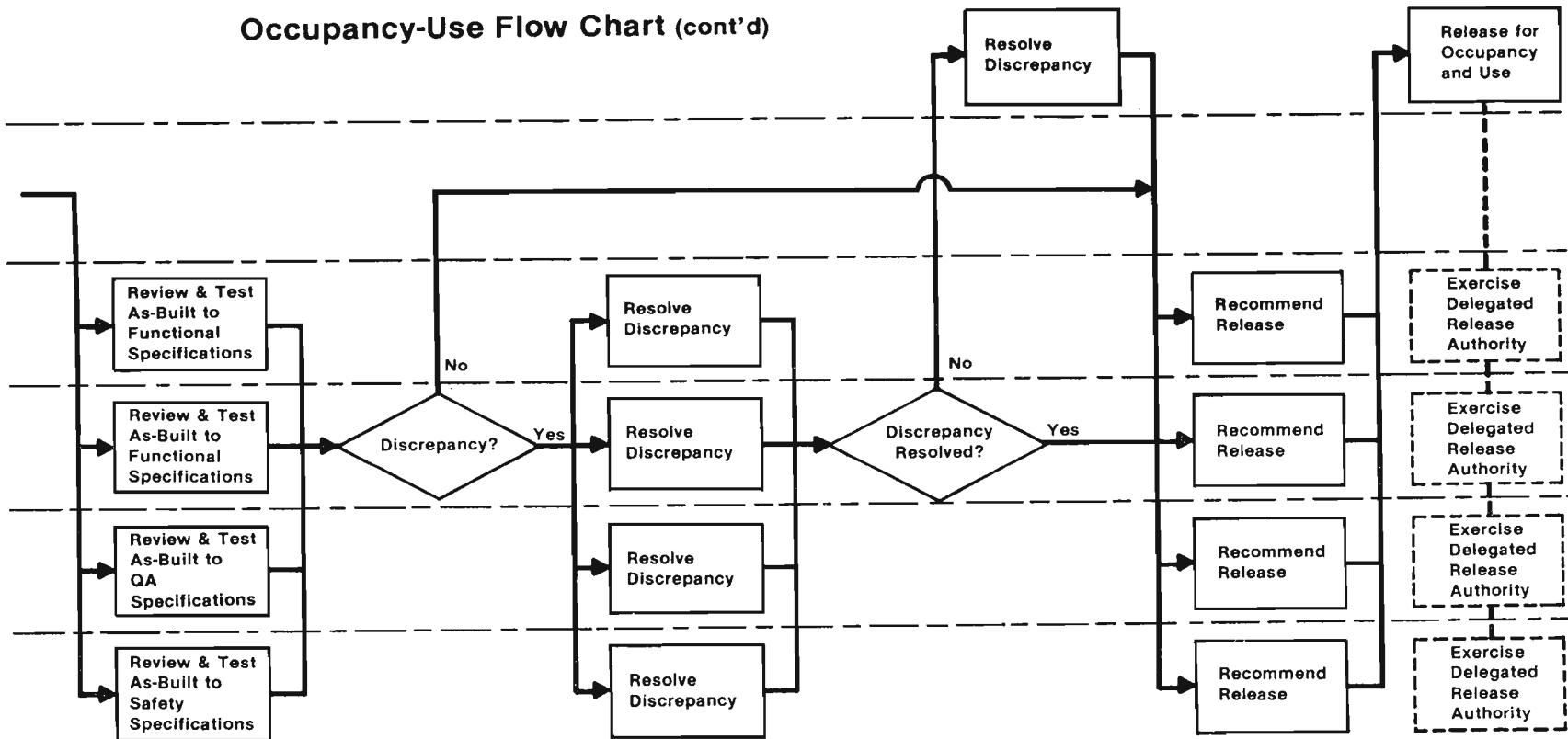
S2 2635  
1.39

### Occupancy-Use Flow Chart



S2 2636  
1.40

### Occupancy-Use Flow Chart (cont'd)



# Operational Readiness Matrix Work Sheet

(Use for General Items)

81

Date \_\_\_\_\_

Go  No go

Page \_\_\_\_\_

No.	Description	Responsible person	Completion criteria	Status
81 (2000)	Instruments and control systems	Connors Evans	87 Test Assembly Experimental Measurement System (3000)	I/90%
		Larson	88 Data Acquisition and Visual Display System (4000) <b>Ready</b>	C/100%
		Rose	89 Nuclear Instrumentation System (5000)	I/60%
		Taylor	90 Primary Coolant and Instrumentation and Control System (6000)	I/80%
		Polk	91 Plant Protection Circuitry (7000)	I/85%
		Banister	92 Secondary Coolant Instrumentation and Control System (8000)	CW

C - Complete  
I - Incomplete

U - Unknown status at this time  
NA - Not applicable  
CW - Complete with waiver

S2 1419  
2.14

*units, half year status*

## Operational Readiness Matrix

When-Date Who	What	Who	Core load nuclear instruments	NIS process SR channels (nuclear load)	Precriticality test	TIPS precriticality test	NIS physics test instruments	
Conners	Instruments and control systems <span style="float: right;">(81)</span>							
Evans	Test assembly experimental measurement system <span style="float: right;">(87)</span>							
J. Larson	Data acquisition and visual display systems <span style="float: right;">(88)</span>							
Rose	Nuclear instrumentation system <span style="float: right;">(89)</span>		C (89.1)	I (89.2)	U (89.3)	I (89.4)	I (89.5)	
Taylor	Primary coolant instrumentation & control system <span style="float: right;">(90)</span>							
Polk	Plant protection circuitry <span style="float: right;">(91)</span>							
Banister	Secondary coolant instrumentation & control system <span style="float: right;">(92)</span>							

C - Complete      U - Status unknown  
 I - Incomplete    CW - Complete with waiver  
                          N/A - Not applicable

S2 1422  
2.13

89

## Approval Sequence Chart

Go No  
Go

Date \_\_\_\_\_

System No.	Job description	SDD numerical code	Responsible person	Date released	Estimated hours	Required completion date	Configuration control system	Installation work request	Quality assurance	Current status	% Complete	Final approving authority Sig./Date
89	Nuclear instrumentation system	1.4.3	J.A. Rose	I	16.5		I	5000	I	I	70	
89.1	Core load nuclear instruments <u>Ready</u>	1.4.3.1	Rose		5.0		C	C 5001	C	C	100	L.P. Leach Date
89.2	NIS process SR channels (Nuclear load)	1.4.3.2	Rose		4.5		I	D 5002	I	I	40	
89.3	Pre-crit. test	1.4.3.3	Rose		4.0		I	E 5003	I	U	U	
89.4	TIPS Pre-crit. test	1.4.3.4	Rose		1.0		I	F 5004	I	I	60	
89.5	NIS physics test instruments	1.4.3.5	Rose		2.0		I	G 5005	I	I	50	

C - Complete  
I - Incomplete  
U - Unknown status at this time  
N/A - Not applicable  
C/W - Complete with waiver

S2 1415  
2.16

## Basic Occupancy - Use Readiness Matrix

Who \ What		I. Structure Services and Hardware Ready of Occupancy			II. Procedures Ready			III. Occupant-User Personnel Ready		
		Specification Established	Construct or Modify to Specifications	Inspect/Test to Specifications	Establish Procedure Requirements	Create Procedures to Requirements	Review Procedures	Establish Training Requirements	Train to Requirements	Review Training
Construction Engineering	CS&R*	•	•	•						
	Functional*	•	•	•						
Occupant-User Managers and Supervisors	CS&R	•	•	•	•	•	•	•	•	•
	Functional	•	•	•	•	•	•	•	•	•
Building Custodian	CS&R	•	•	•			•			
	Functional	•	•	•			•			
Quality Assurance	CS&R	•	• (1)	•	•		•		•(2)	•
	Functional	•	• (1)	•			•		•(2)	•
Safety Organization (3)	CS&R	•	• (4)	•	•		•	•	•(5)	•
	Functional	•	• (4)	•			•	•	•(5)	•

- (1) QA review during construction/installation.
- (2) QA auditing of ongoing training; may assist in simulated dry runs.
- (3) Safety related.
- (4) Field safety review during construction (as required).
- (5) Special safety training (as required).
- \* CS&R - Codes, Standards and Regulations (Required).
- \* Functional - Characteristics, design parameters, and other considerations unique to the construction and operation of this facility.

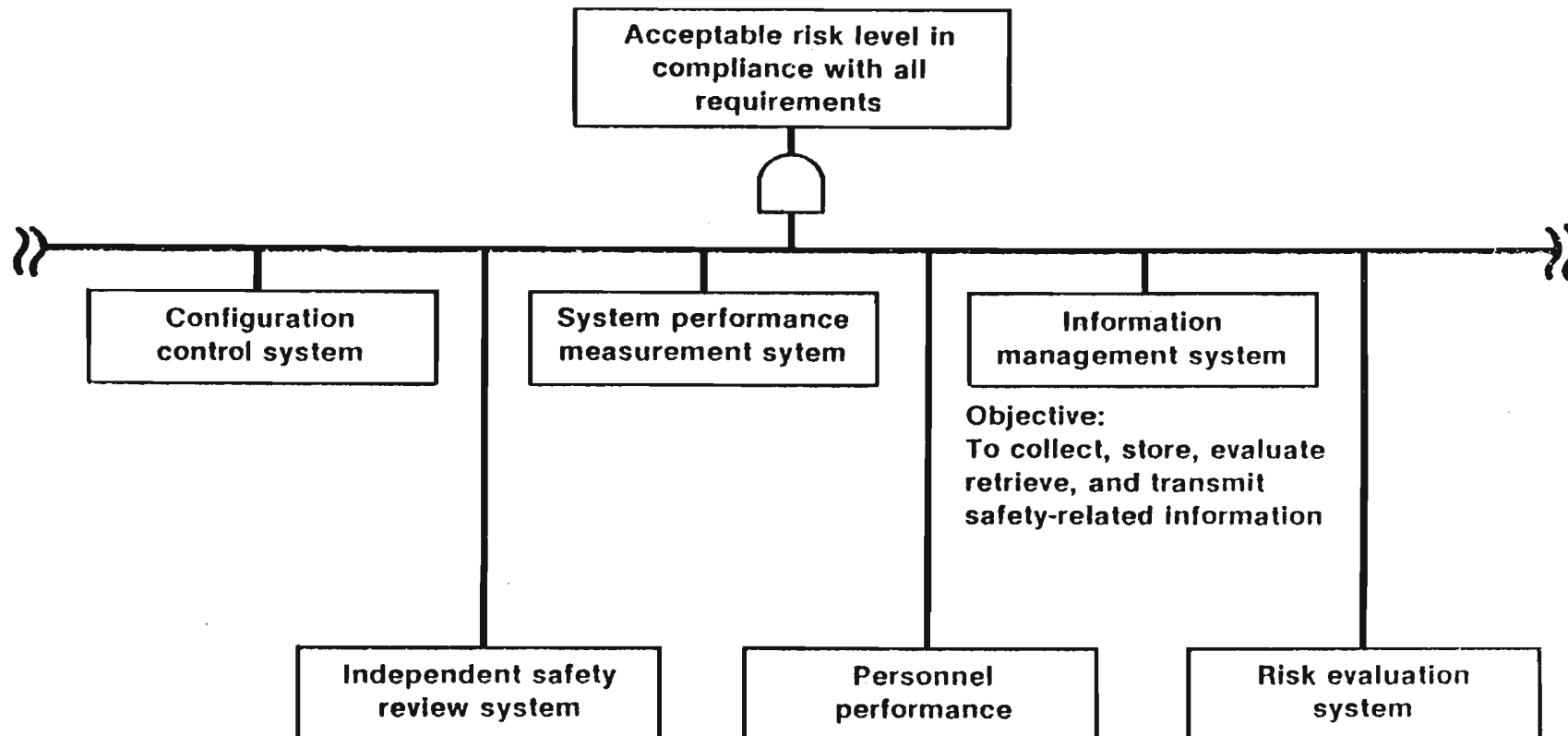
Key for status overlays:

- ◊ Status unknown (blue)
- △ Known to be "Not Ready" (red)
- Known to be "Ready" (green)

S2 2638  
1.42

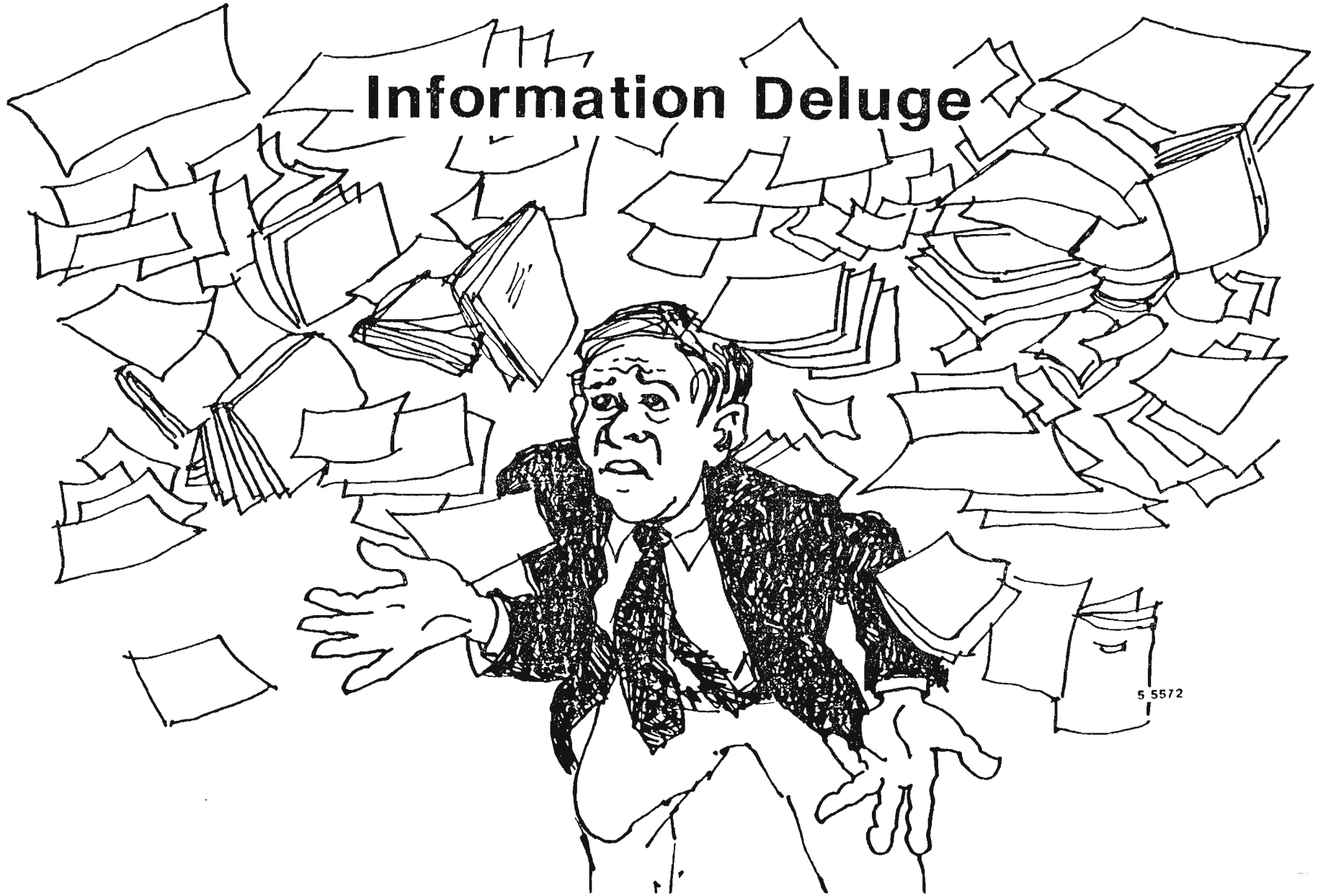


# The Contractor Safety Program



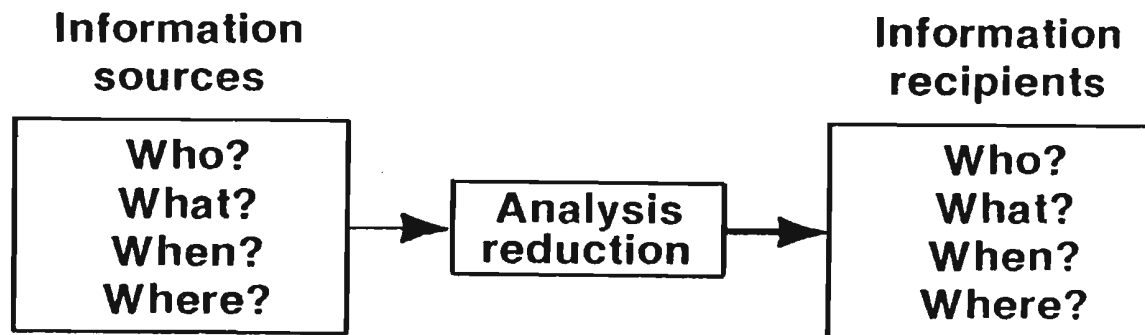
5 5574

# Information Deluge



5 5572

# Basic Problem

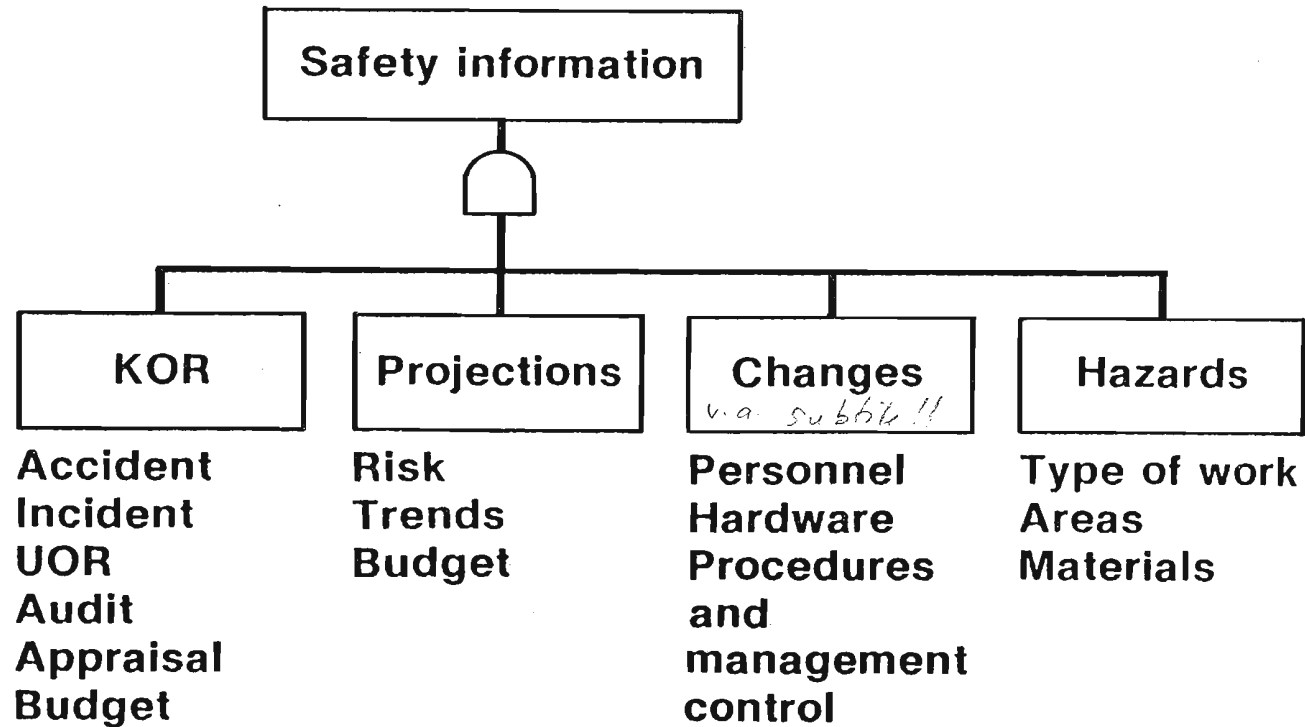


**How to get information to those who need it**  
**How to best use available information**

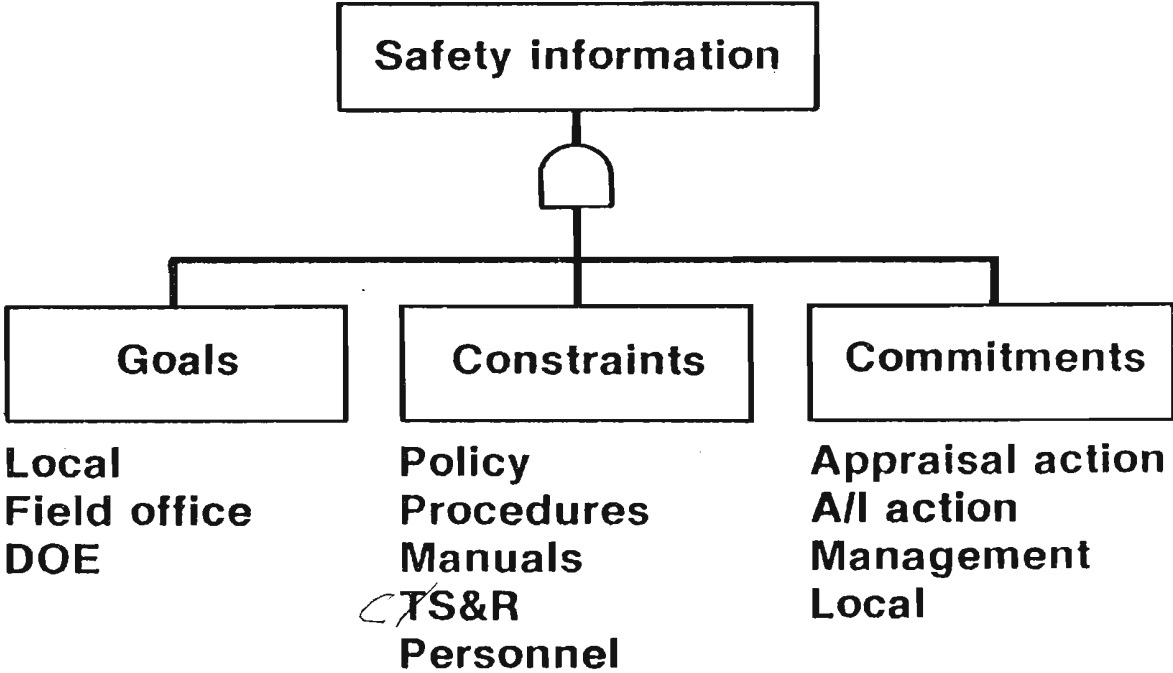
5 5570

*KOR = Knowledge of Results*  
*UOR = Unusual Occurrence Results*

# Organizational Safety Information

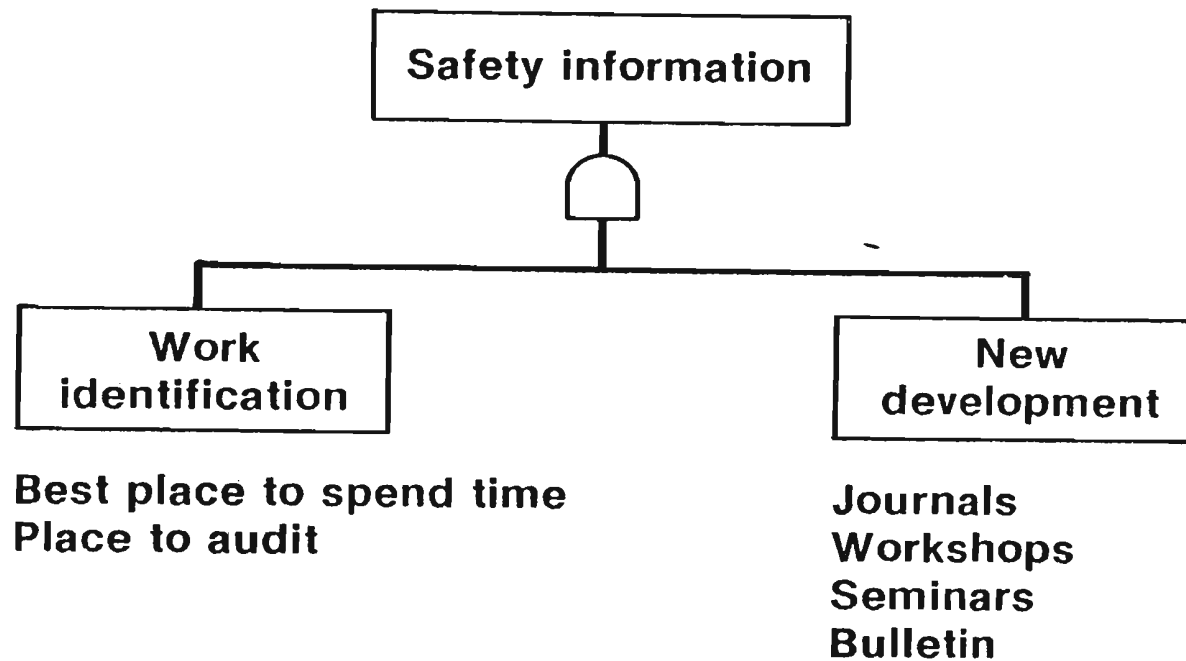


# Organizational Safety Information (cont'd)



5 5577

# Organizational Safety Information (cont'd)



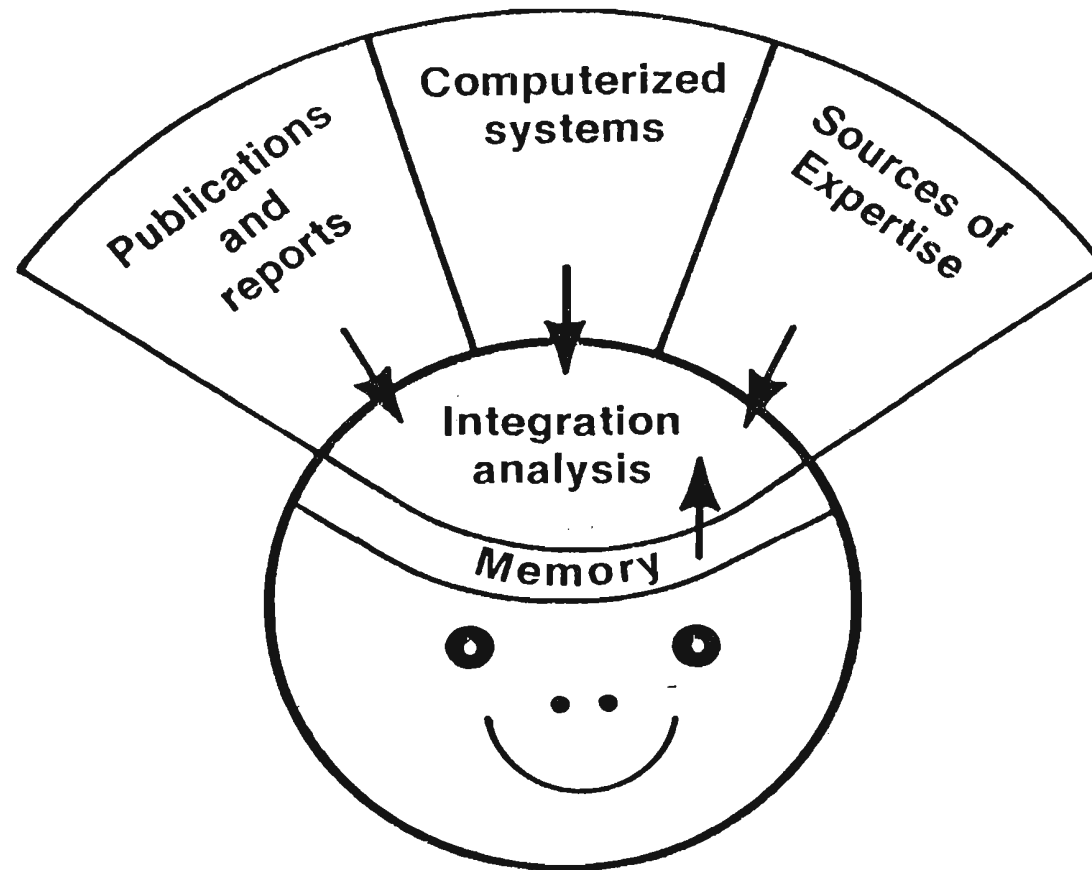
5 5576

# **Information Storage and Access**

- 1. Manual**
- 2. Computer**
- 3. Combination**

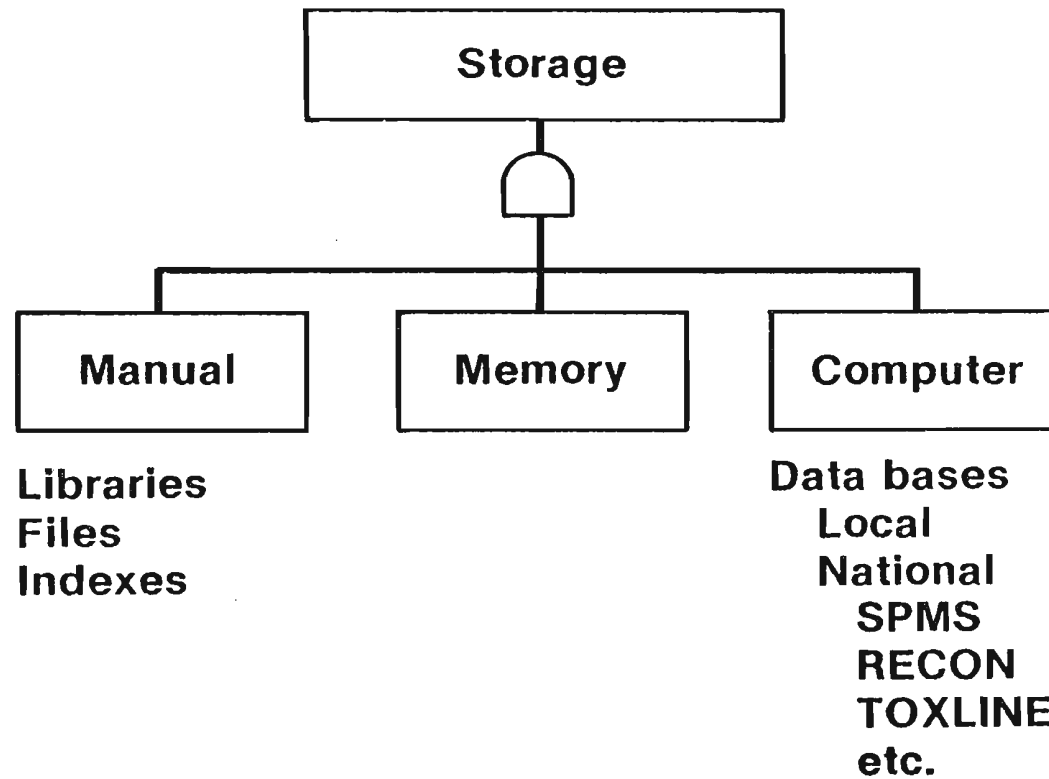
**Or you may chose to ignore the information**

# Information Storage



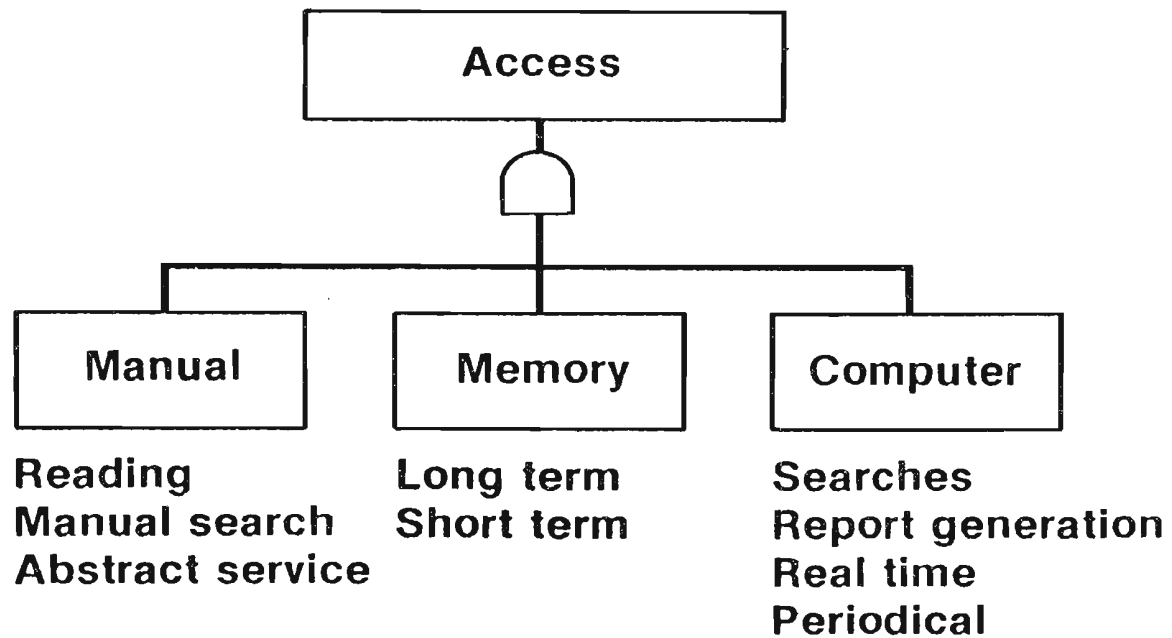
5 5591

# Information Storage



5 5579

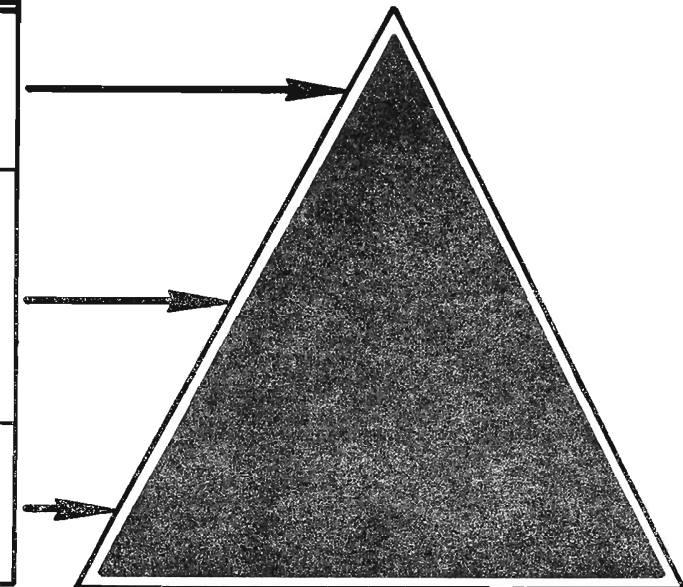
# Information Access



5 5578

# Requirements vs. Organizational Level

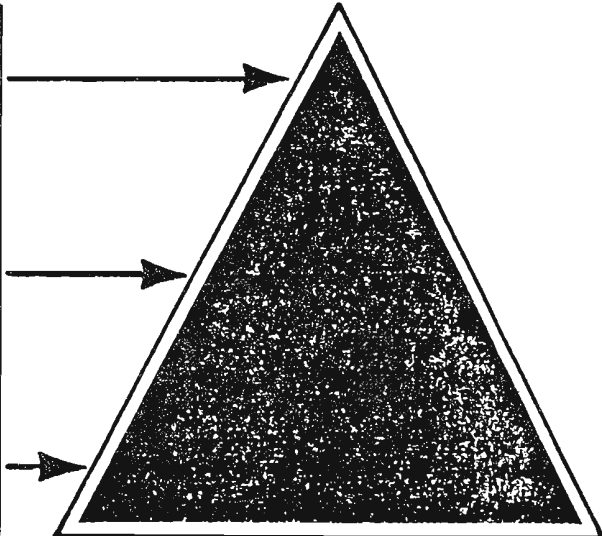
Constraints	Goals and objectives	KOR
What constraints are imposed on the company?	Specific company goals and objectives	What is the company doing?
What constraints are imposed on my unit?	What are company goals and objectives? What is my part in fulfilling these goals and objectives?	How is my unit doing?
What constraints exist on this job for me?	What does the company expect from me?	How am I doing?



# Aim For the Proper Level

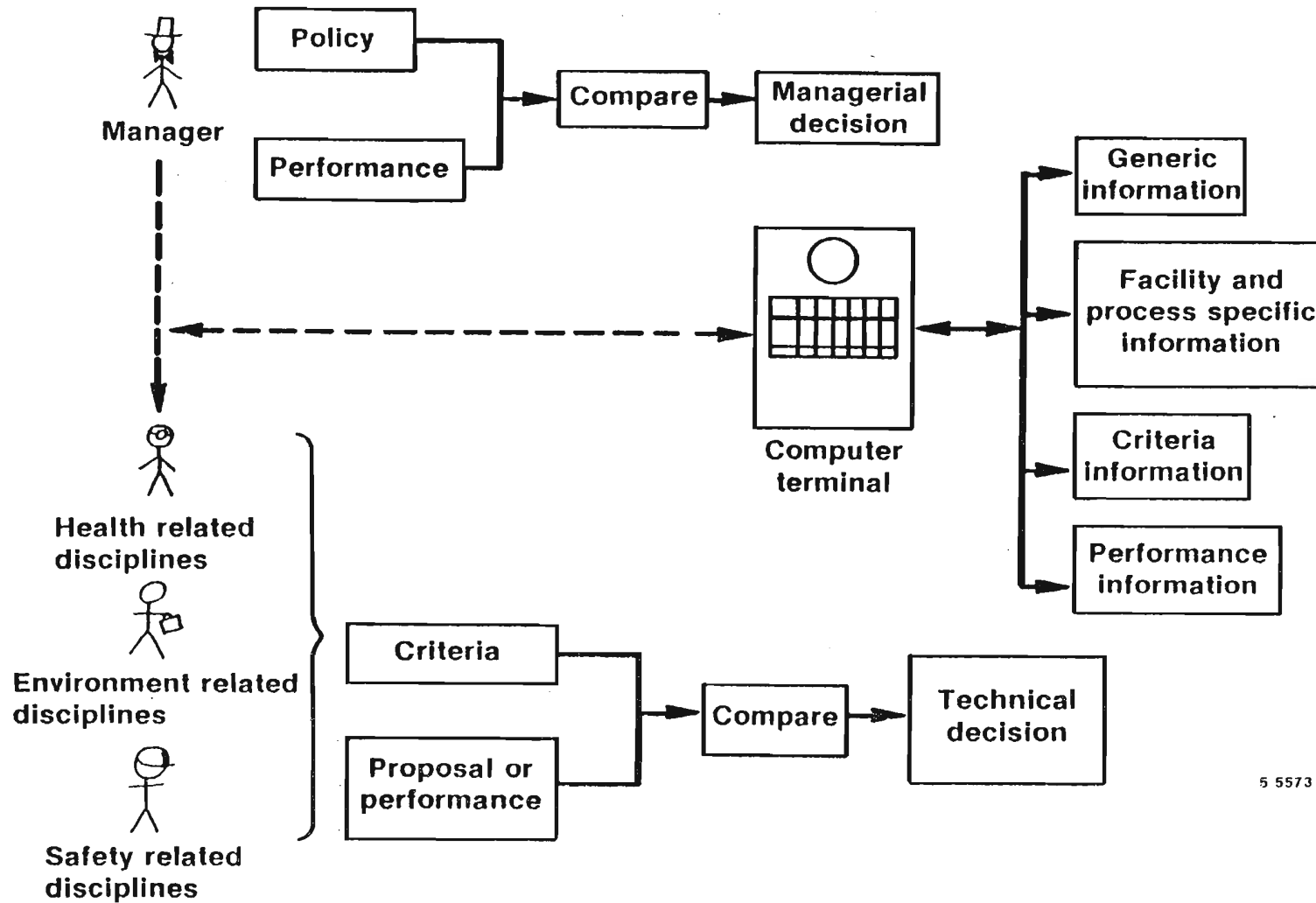
## Requirements vs. Organizational Level

Constraints	Goals and Objectives	KOR
Constraints on company?	Company goals	What is the company doing?
Constraints on my unit?	Unit goals	How is my unit doing?
Constraints on me?	Individual goals	How am I doing?



5 5589

# Aim for Proper Use



5 5573

# At the Work Place

## The Work Process

*Probability*



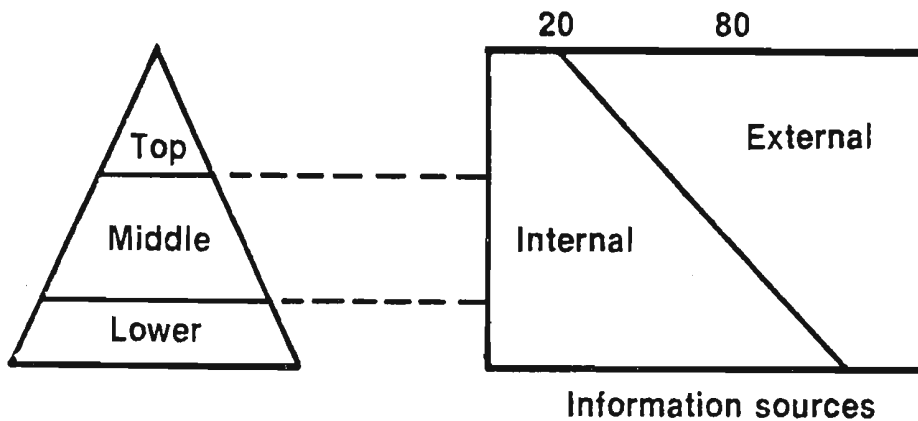
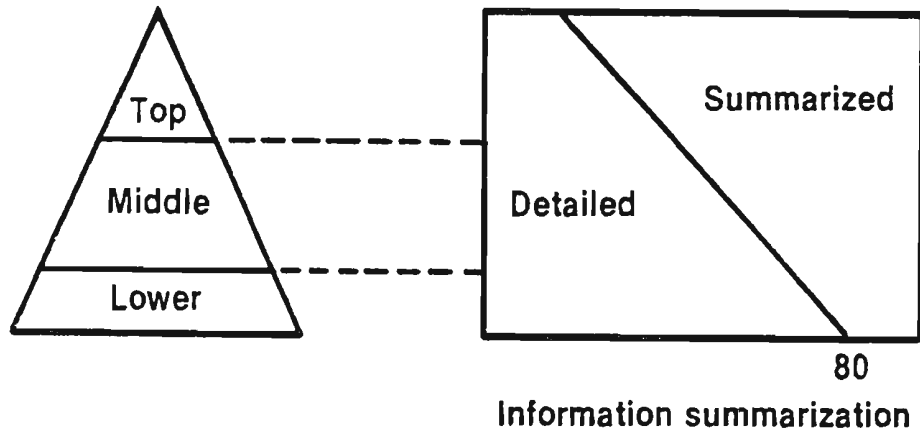
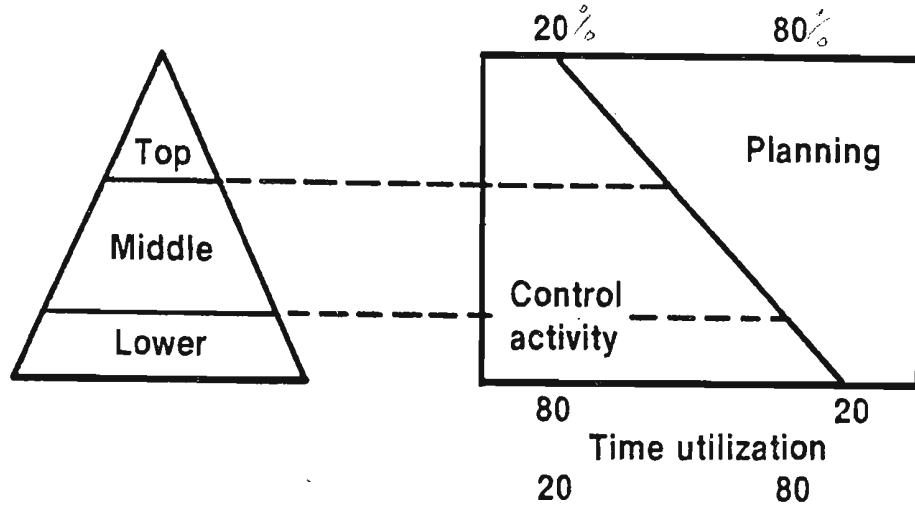
Energy sources	Source locations	Targets	Barriers and controls	Failure modes	Operating history	Changes	Potential consequences	Residual risk
Source Kind Amount	Organizations  Places  Processes	People Things						

Information stores

## **For the Manager**

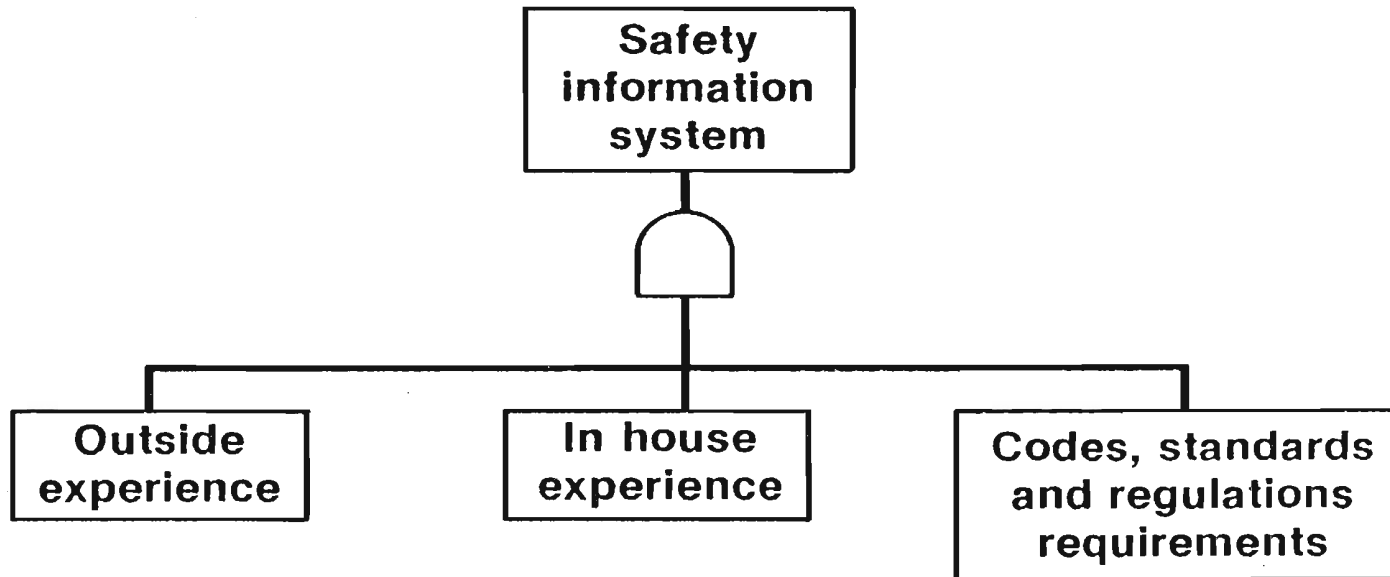
- **Knowledge of results**
- **Hazard identification**
- **Hazardous material inventory**
- **Risk projection**
- **Risk acceptance**
- **Constraints**
- **New development**
- **Commitments**
- **Budget information**

# Information Needs at Managerial Levels



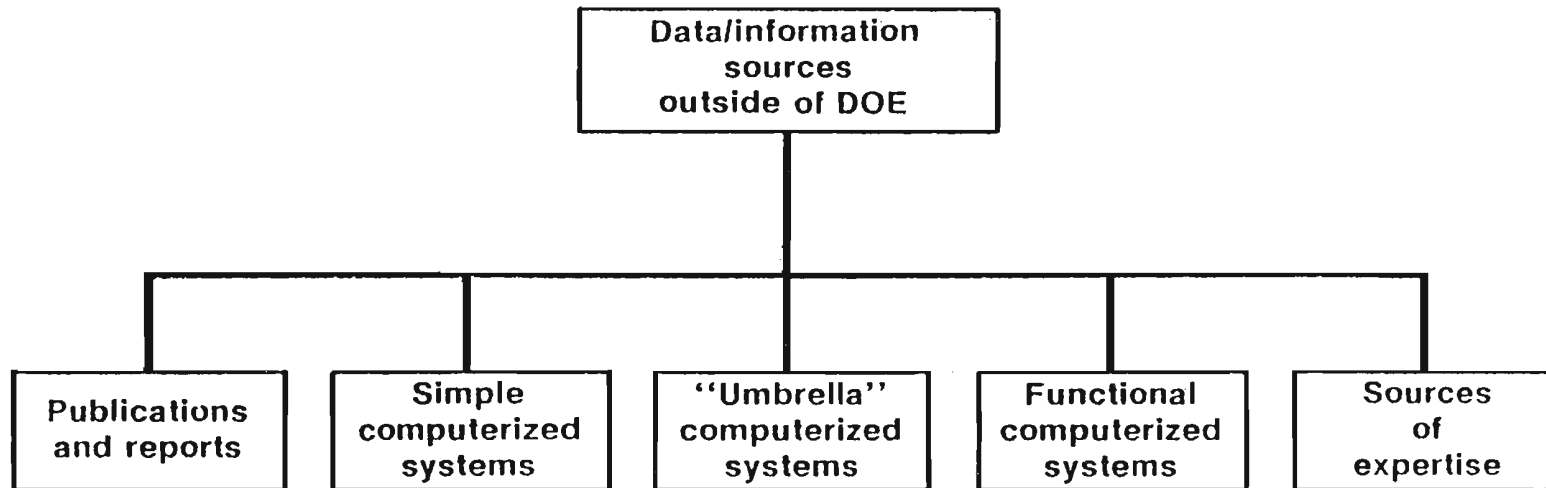
5 5590

# Design of Safety Information System



5 5585

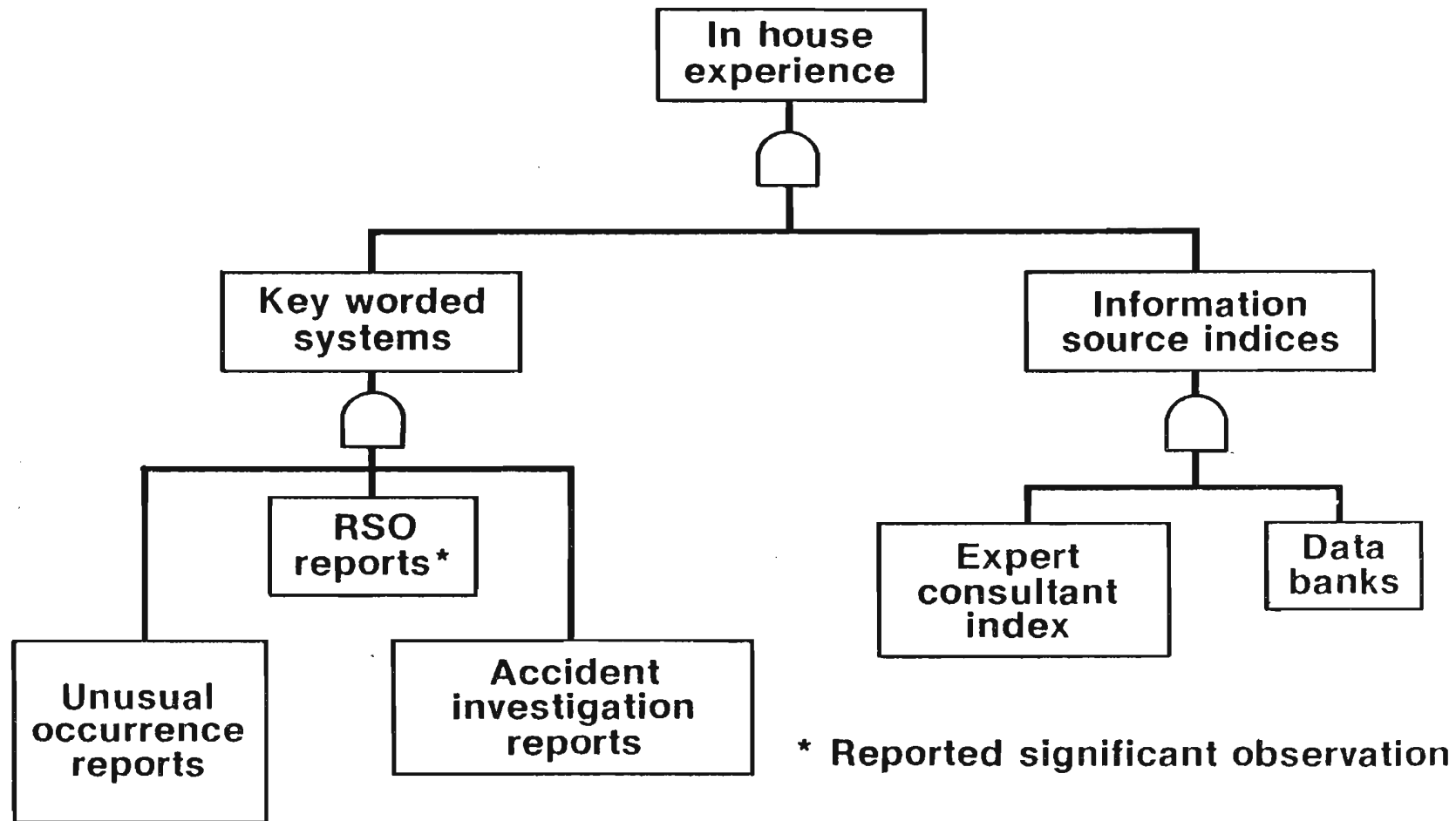
# Data Sources Outside DOE



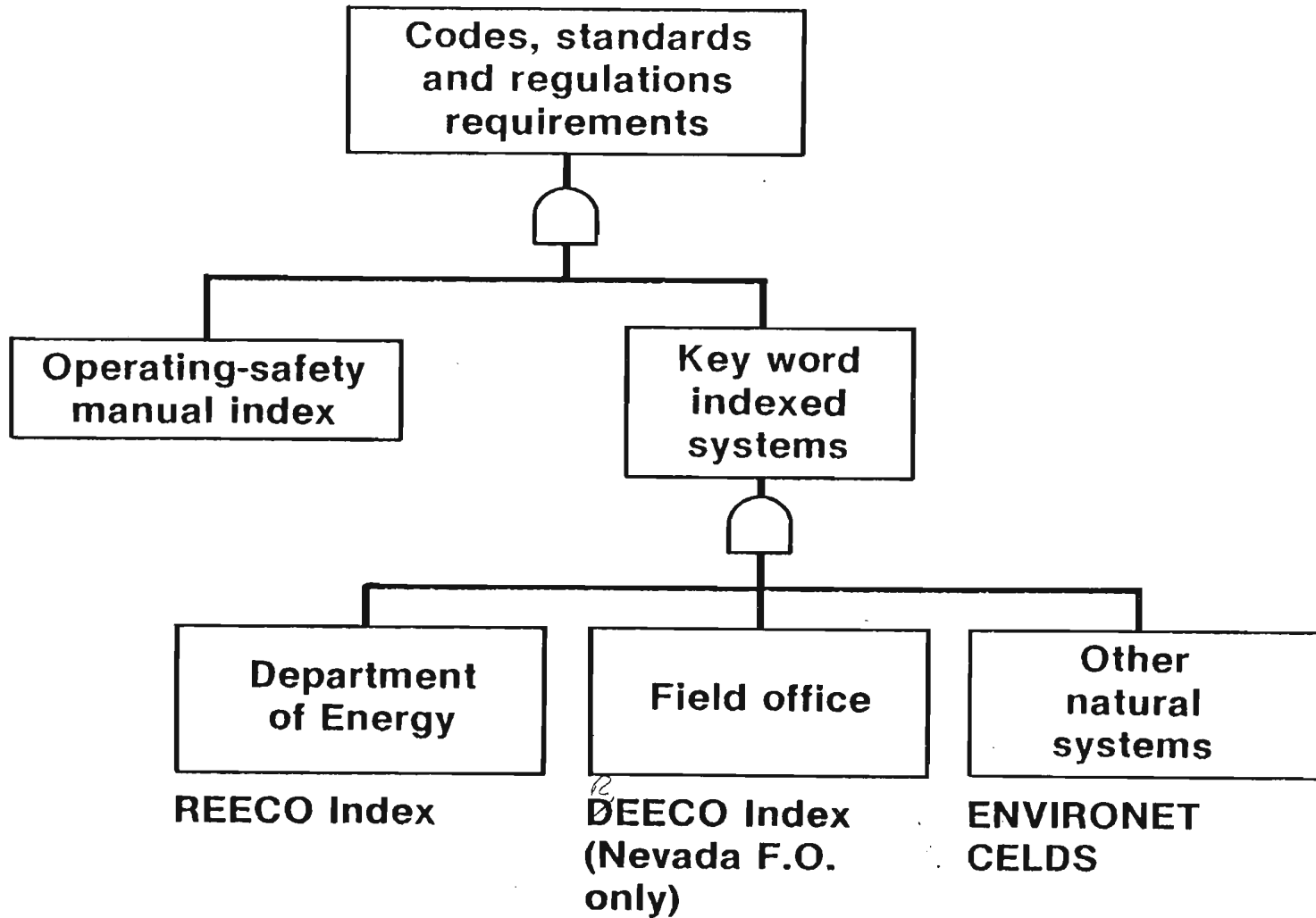
*2-B (CAD/CAM)  
PERT*

5 5571

## Design of Safety Information System (cont'd)



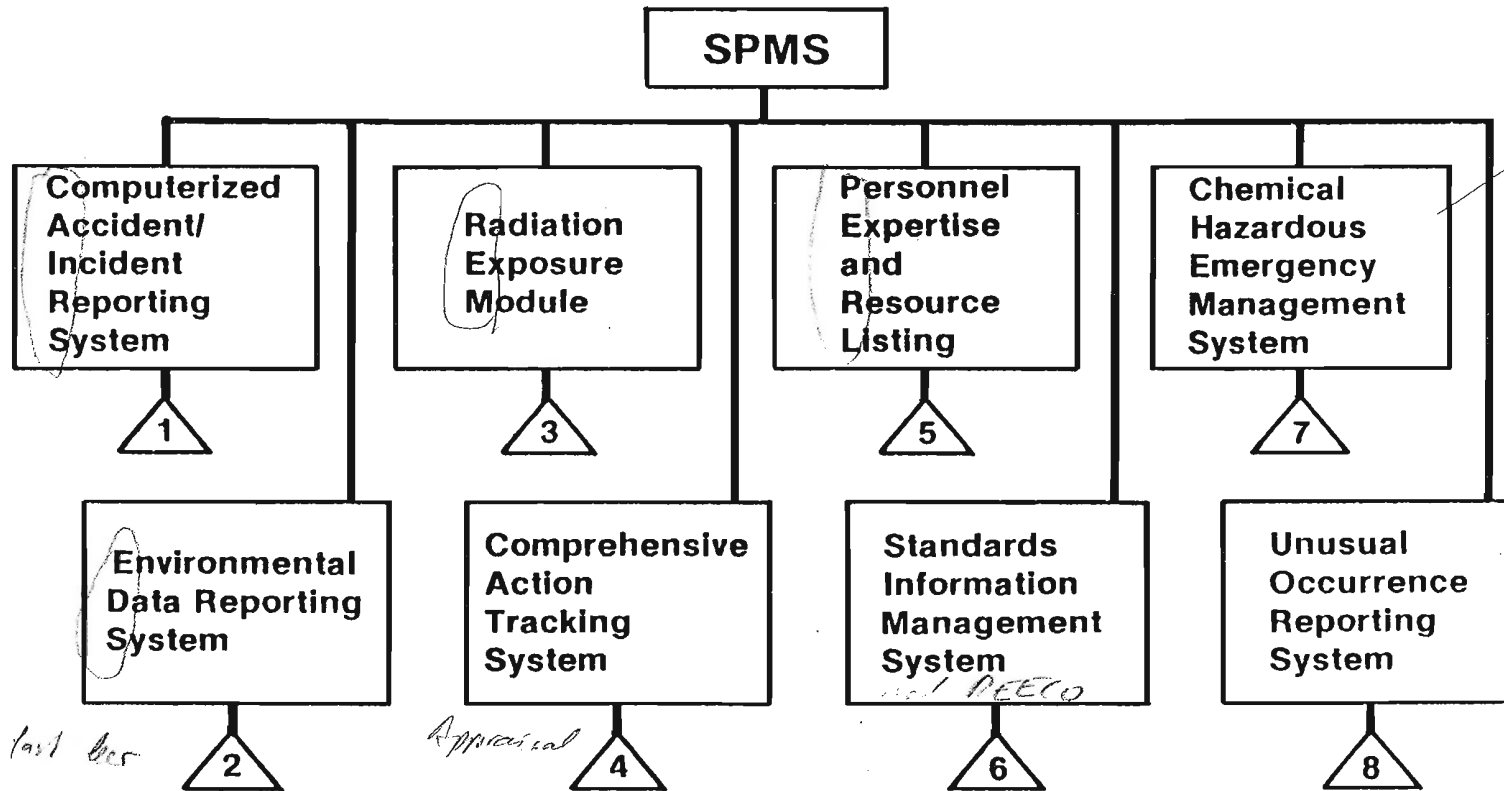
## Design of Safety Information System (cont'd)



5 5583

# The DOE System

## The SPMS Information Stores



*Brookhaven, NY*

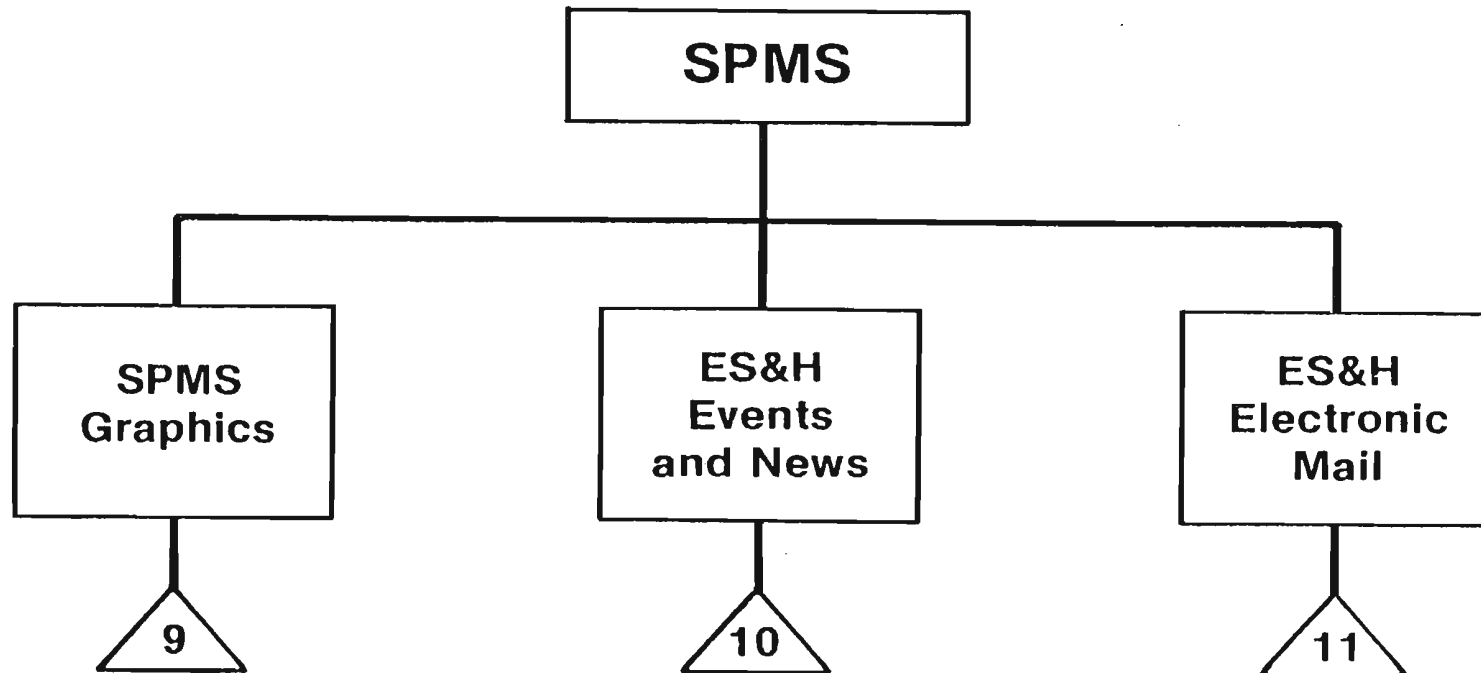
*last des*

*Appraisal*

*not DECO*

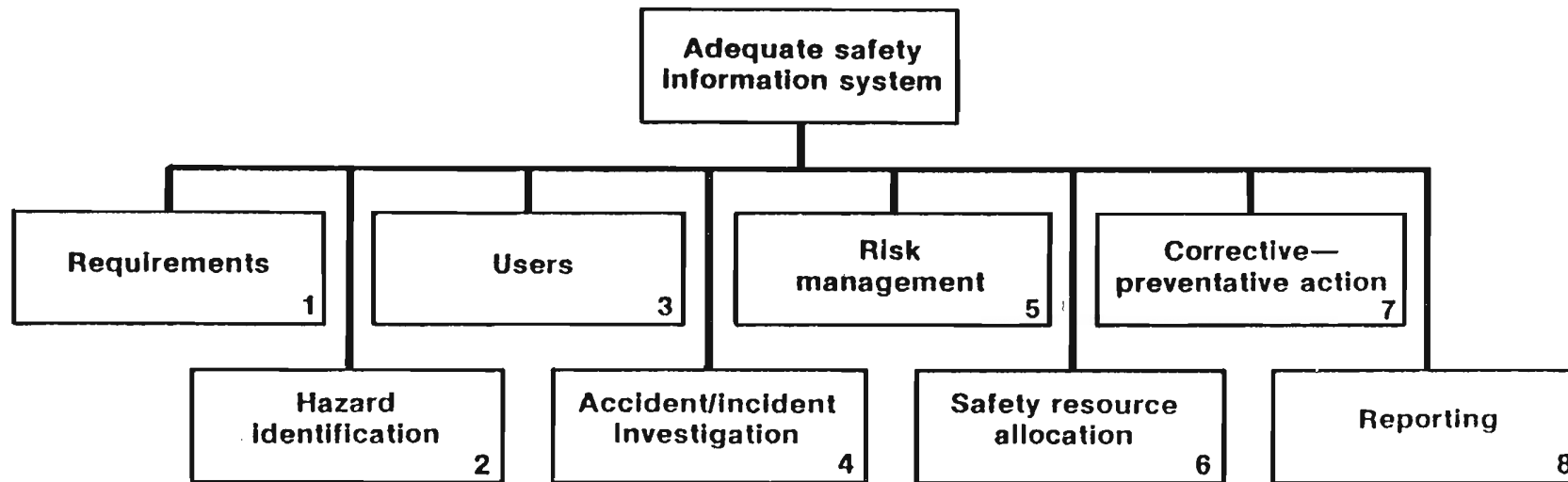
5 5587

# SPMS Display and Communication Elements



5 5588

# First Tier Events Safety Management Information Tree (Guideline Document SSSDC-9)



5 5586



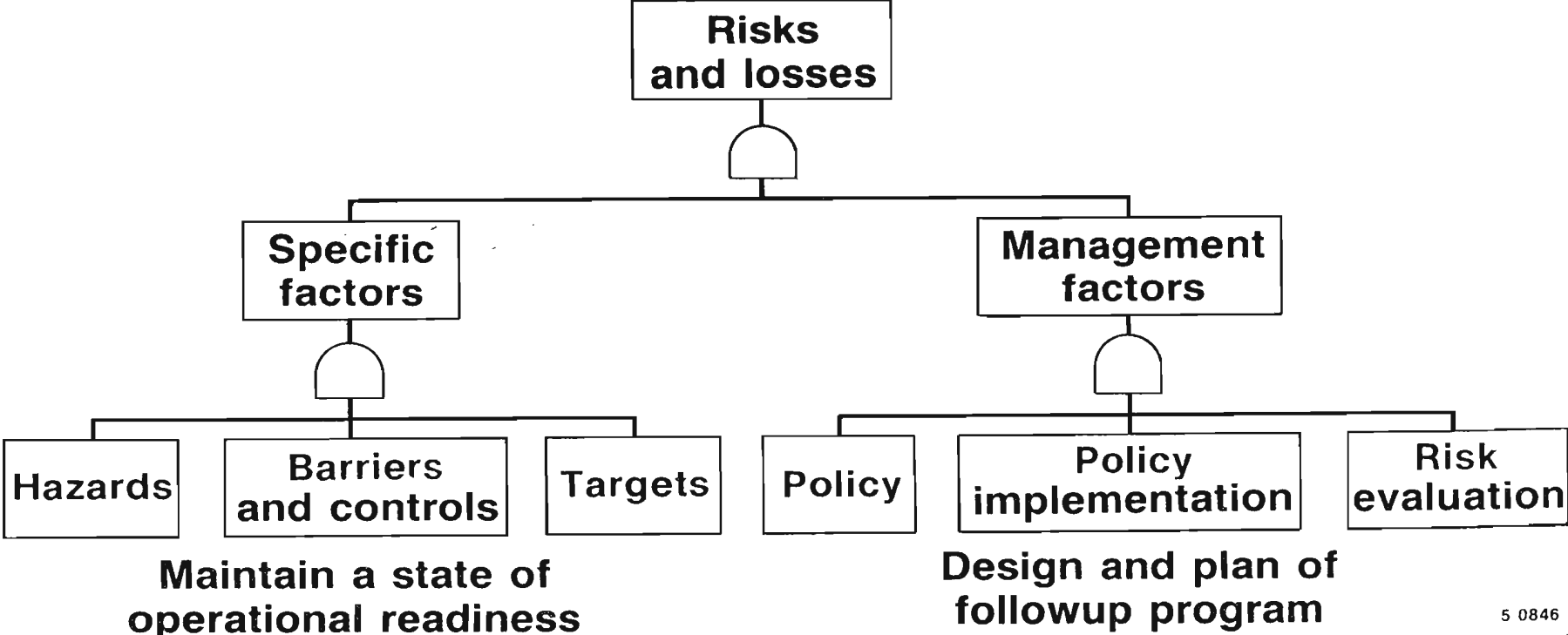
# **Keeping the System Operationally Ready — Follow-on Activities**

6 10 001

# The Nature of the Problem

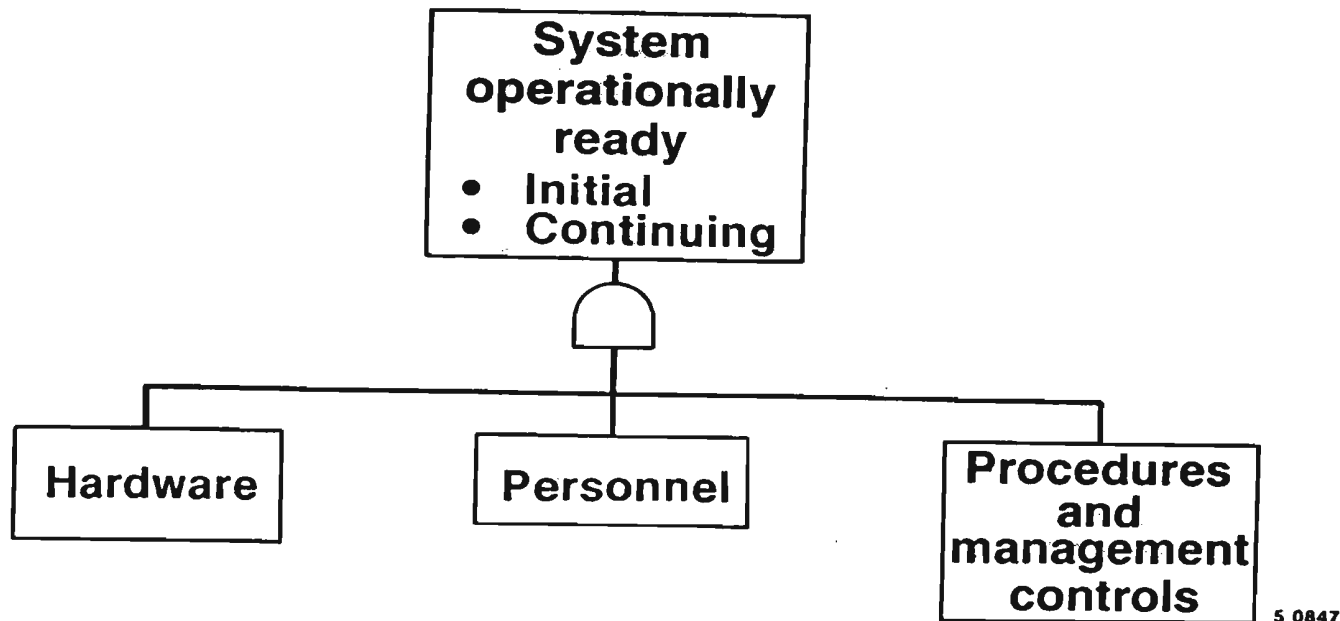
- Plan
- Execution

# MORT

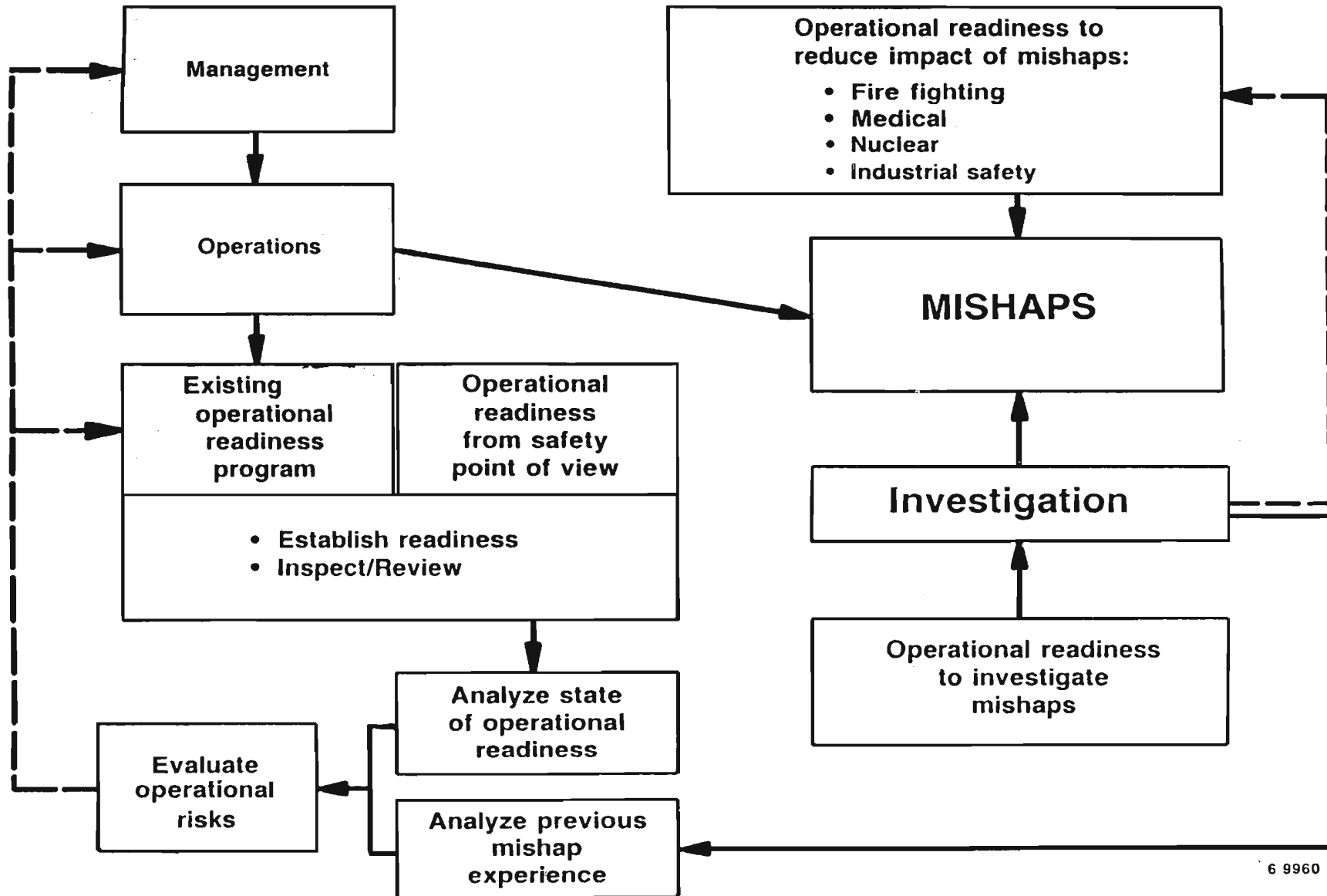


# What is operational readiness?

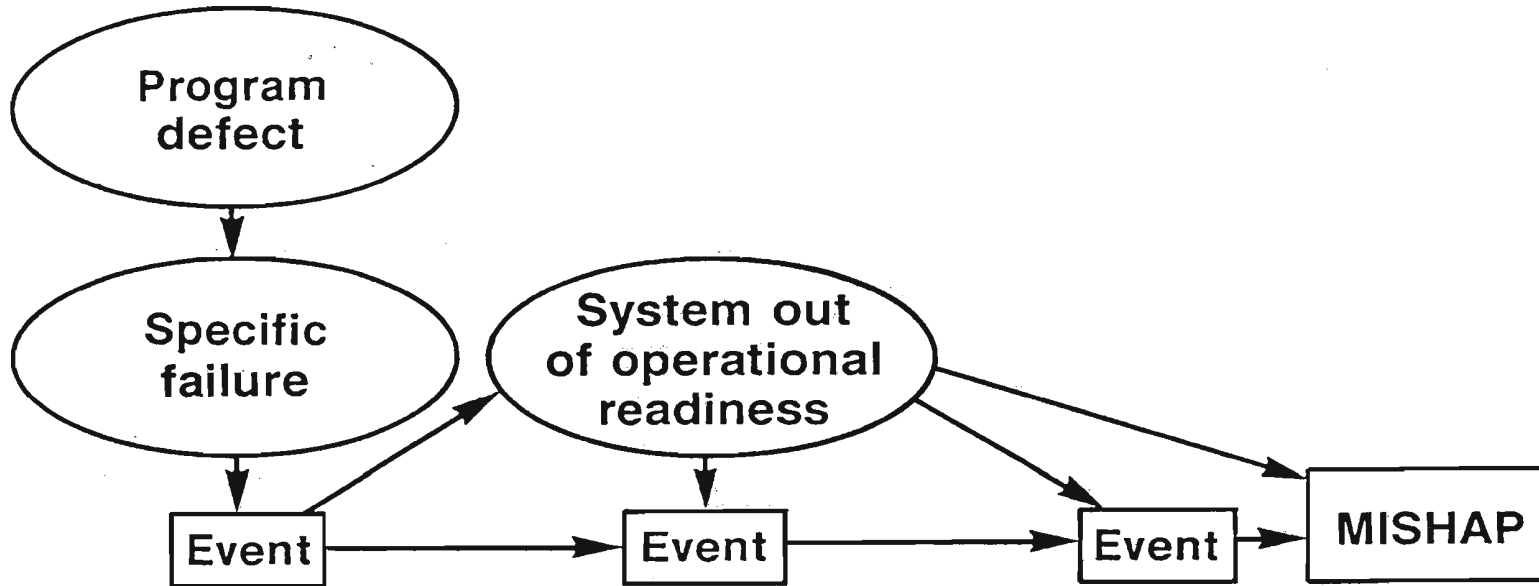
- Right people
- Right time
- Right place
- Right hardware
- Right procedures and management controls



# What are some types of readiness?



# How do these Elements Fit Together in Operational Mishaps



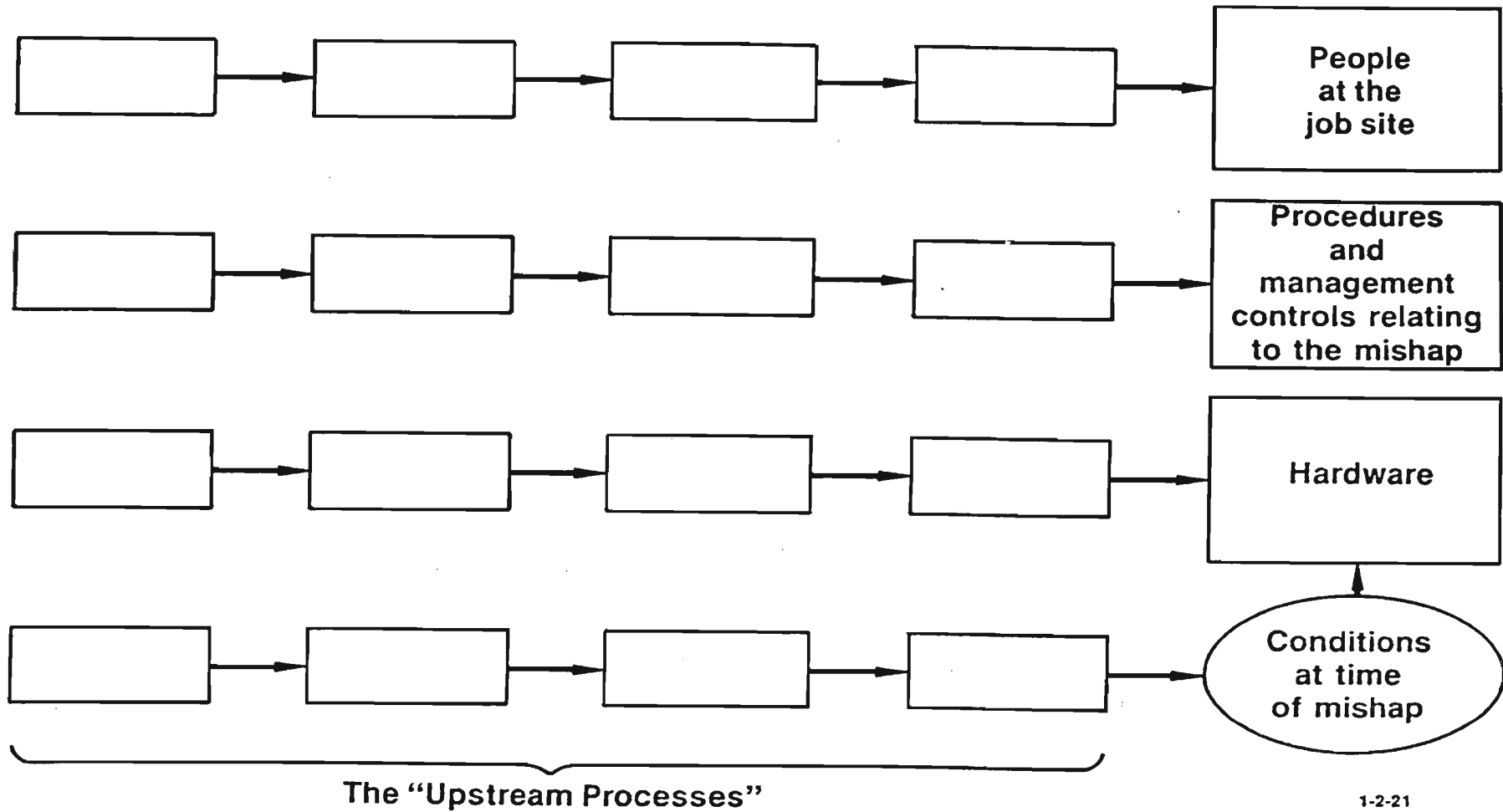
Failure to:

- Complete mission
- Within budget
- On schedule
- With acceptable side effects

Case study # 1

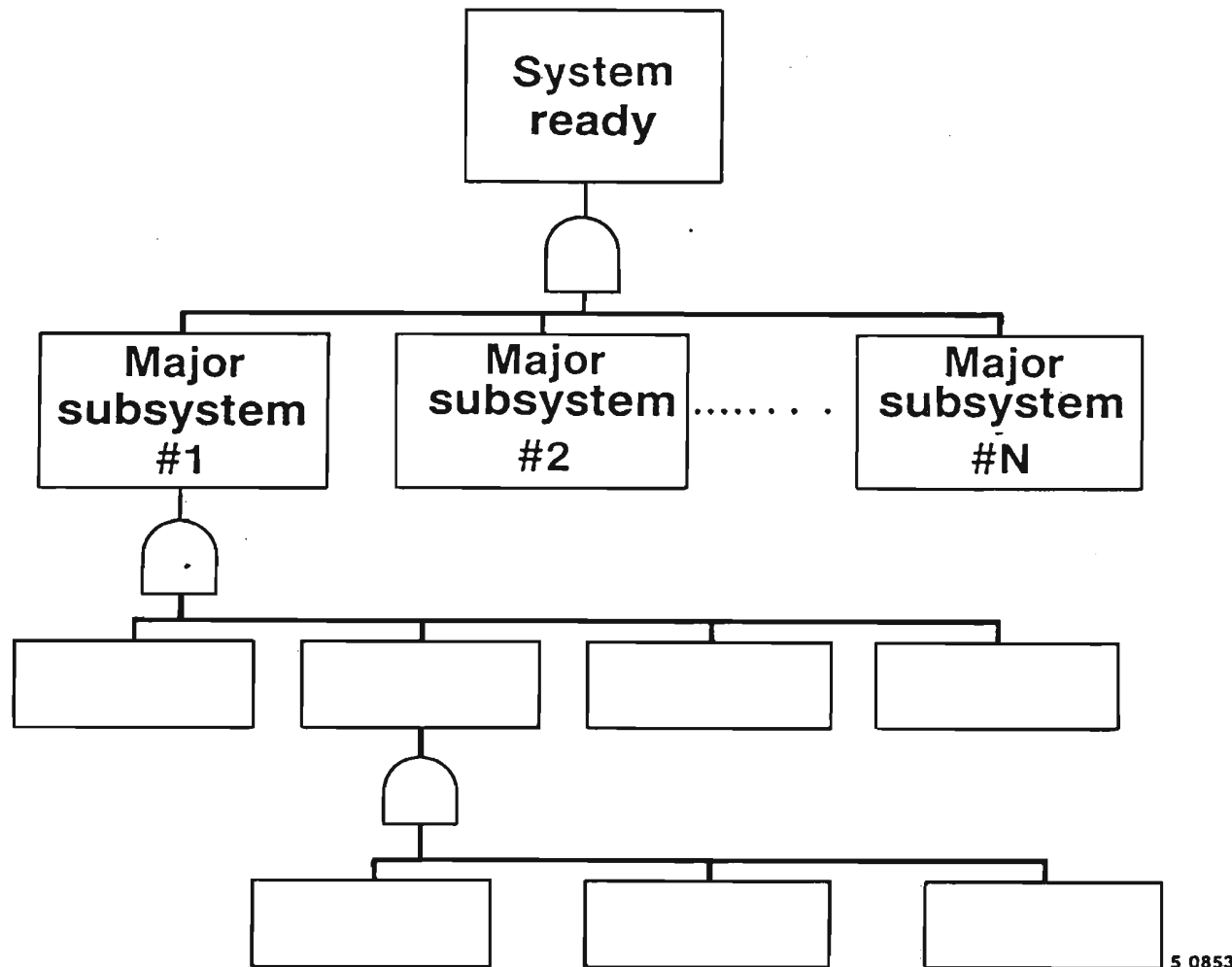
# Upstream Processes

The mishap is the result of “upstream processes”:



1-2-21  
S4 9235

# Keeping the System in a State of Readiness



# How About the Maintenance of Hardware

- The basic program
- Prioritization

6 10 018



→ WP-25

# Operational Readiness from the Viewpoint of the Operator

6 12 958

# **Can the System Be Operated and Maintained by the Personnel?**

6 12 959

SPIP's (WP...)

# How Do You Determine the Problems of the Operators?

- **Reported Significant Observation (RSO) study**

6 12 960

# What Are RSO Studies?

- **Obtaining feedback from operators on problems which they have identified at the worker level**

6 12 961

# Why Do RSO Studies?

- **Get feedback from workers on problems PRIOR to start up**

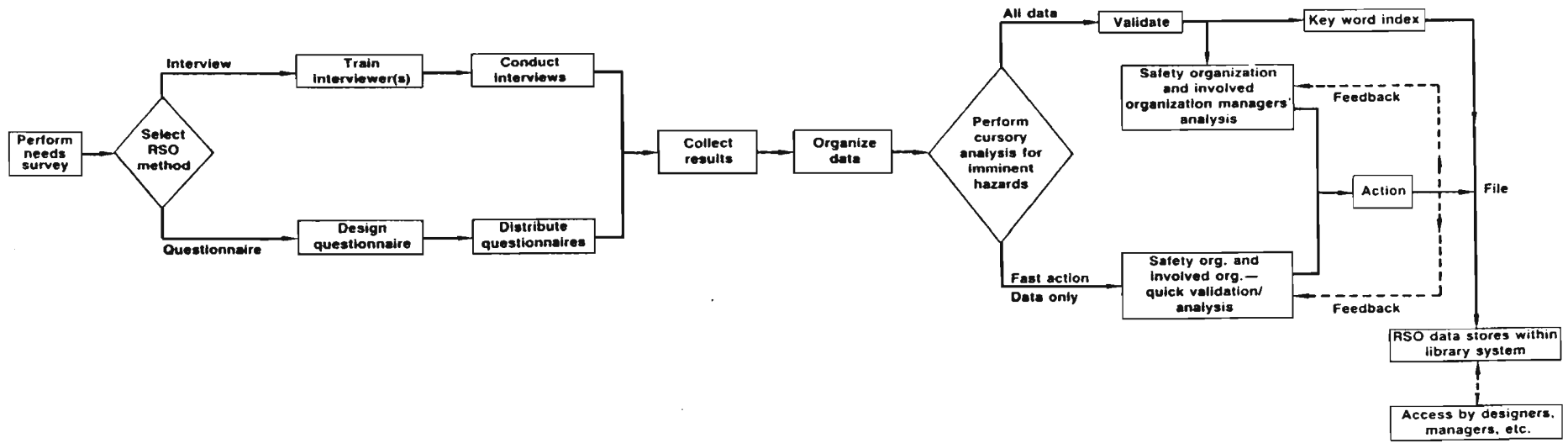
6 12 962

# **How to Perform an RSO Study (See. SSDC-5)**

- 1. Use interviews or questionnaires**
- 2. Get response from representative number of people**
- 3. Ask each to identify items which they have personally observed which are either good or bad and why**
- 4. Analyze results for problem areas**

6 12 963

## Reported Significant Observations



From your experience, think of the *most recent situation* in which you observed a job or operating situation for which it was *not* easy to operate or maintain plant equipment in an effective, error-free manner.

1. When and where did this happen (approximate date and place)?
  
2. What equipment and/or what type of job was involved?
  
3. Briefly describe the situation at the time (process or machine running, process or machine shut down, abnormal operating conditions, etc.).
  
4. Exactly what occurred? (Use other side if necessary.)
  
5. Why do you classify this as being an *especially* difficult operational or maintenance job?
  
6. What might have been expected from more effective plant design or procedures in this situation (e.g., easier to perform, less chance of error, less chance of equipment damage, etc.)?

# **Typical Problems Detected by this Method**

- **Mechanical operability**
- **Communications system**
- **Visual access**
- **Personnel access**
- **Mechanical maintainability**

6 12 964

# **Actual Case Study Indicates That:**

- **Operations people are very good at pointing out problems which will eventually cause an accident**
- **If the problems were fixed the accidents could have been prevented**
- **Review agents, designers, management, etc. Should be aware of RSO material if we ~~prevent~~ prevent problems**

6 12 965

# Example Case

## ***Accident***

**An individual removed a radioactive wand from a test. Assuming it to be non-radioactive. The hand-held radiation monitor failed to alarm. The health physicist directed the individual to put it back, the individual froze and the HP had to take it away and throw it back.**

*↳ estimate*

## **RSO reports prior to accident :**

- 1. Difficulties in identifying hot or cold wand (1 time)**
- 2. Hand-held monitor failed (5 times)**
- 3. Personnel fail to respect to HP directives (3 times)**

6 12 966

## **Resume:**

**Sponsor-irradiated fuel pins were taken to one of our hot cells for examination. This was a rush job under combined direction of our people and sponsor representatives.**

**The pins were taken from the transfer cask and were placed in a wire mesh basket which was resting on a ‘‘slotted’’ working base (like a boardwalk with large cracks between the boards).**

**The mesh size on the basket was larger than the fuel pin diameter. A pin fell partially through the basket and into one of the slots on the working base. When the basket was moved (using remote manipulations), the pin was bent.**

6 12 967

## Relevant Problems Revealed by RSO Prior to the Event:

1. Conducting work with impaired visual access - windows or periscope (reported 3 times).
2. Conducting work with impaired cell equipment, inadequate equipment for the job to be done, or jury rigging *(Wollister)*  
*(Walmart)* (reported 5 times).
3. Job supplied on short notice (reported twice).
4. Too many companies trying to direct work without organized coordination (reported once).
5. Lack of information on hardware to be worked with (reported 3 times).
6. Too much pressure to work fast and get job out (reported twice).
7. "Handling techniques had to be developed when specimens arrived" (reported once).
8. ". . .lack of patience in following established procedures due in part but not entirely, to the pressure of jobs waiting to be done with partially impaired facilities (cell windows)" (reported once).

# Moral

**When you think you are ready to operate  
ask those who will be required to perform  
the work.**

6 12 969

# Laboratory Instructions Second Day

S2 2700  
2.52

- 1. Utilize the readiness tree prepared during the first day.**
- 2. Lay out sample flowcharts to describe the steps required to achieve a state of readiness.**
  - A. Utilize your organization's flow charting - work control methodology or**
  - B. Select an appropriate flow charting technique.**
- 3. Select appropriate work sheets to track readiness.**
  - A. Utilize your organization's media and methods or**
  - B. Select new media.**
- 4. Select an appropriate method for displaying the state of readiness. This should report status as follows:**
  - A. Known complete as designed and planned.**
  - B. Known complete with waivers.**
  - C. Known incomplete.**
  - D. Status unknown.**

S2 2701  
2.53

- 5. Be prepared to present your example to the group with specific examples of its use tomorrow morning.**
- 6. Diagram a monitoring and review process which can be used in your organization for actually sampling the necessary information. Conducting operational readiness review and in establishing management controls over system startup.**



# The Readiness Review Process

6 10 025

# Operational Readiness Review

## Purpose:

- **To determine**
  - **That a system or facility is constructed as designed**
  - **That it can be operated safely**
  - **That it will perform as designed**
  - **That it is functional**
  - **That it will be operated by competent people**
  - **That everything is documented**

6 12 973

# **Some Considerations in Operational Readiness**

- **Roles of field office and contractor**
- **Integral design**
- **How much operational readiness review**
- **Costs**
- **Reporting to management**

S2 10 145

# The Roles of Field Office and Contractor

- No specific DOE order
- “Do” vs “Review”
- “Review”
  - Understand and evaluate system
  - Validate by sampling (*QA people send you lines*)
- Contractor
  - Do
  - Review
- Field office
  - Do
  - Review

# Integral Design

- **Types of review**
  - **Hardware turnover**
  - **Total system readiness**
- **Scheduling and timing** (*Si-Halt*)
- **Existing control - information systems**  
(*unter anderem Namen*)
- **Retrofit problems**

*Teilsystem*

*Wahl stellen!*

# **An Orderly Logical Review Process vs. a “High Tech Easter Egg Hunt”**

*(vested/De no blarne)*

6 9977

# How Much Operational Readiness Review?

- Use of program management and quality assurance systems
- Redundancy
- Proper talents-skills-experience *(Reviews unique Fachwissen haben)*
- Depth and detail
  - Analytical models
  - Working models
  - Reporting models

S2 10 136

# Safety Review Redundancy and Independence Scale

**Minimal Redundancy  
and Independence**

**Complete Redundancy  
and Independence**

Role of Safety Review Agent		
Performs primary safety analysis to operational proposals		Not involved in performance of primary safety analysis
Specifies proper codes, standards and regulations		Validated codes, standards and regulations selected by others
High degree of personal interest in operational impact of review decisions		No personal interest in operational impact of review decisions
Dependent on operating group for funding	<i>One or more criteria compromised to some degree</i>	Financially independent of operating group
Common management or supervision with operating groups or groups performing primary safety analyses		Organizationally independent of operating group and groups performing primary safety analyses
Rewrites proposals to meet review criteria or participates directly in rewrite		Rejects proposals with cause. Does not participate in rewrite
Automatically utilizes same analytical methodology as group performing primary safety analysis		Utilizes different analytical methodology and/or challenges analytical methodology used by group performing primary safety analysis

S2 10 135

# Routing Matrix

Potential Consequences Energy Involved	Death or Injury	Property Loss	Program Impact	Adverse Publicity *
Electrical	IS FE	IS FE	IS FE	IS FE
Nuclear	HP RS NS	HP RS NS	HP RS NS	HP RS NS
mgh	IS	IS	IS	IS
pv-kd	IS	IS	IS	IS
KE-linear	IS (TS)	IS (TS)	IS (TS)	IS (TS)
KE-rotational	IS	IS	IS	IS
Corrosive	IH	IS	IH IS	IH IS
Explosive-pyrophoric	IS	IS	IS	IS
Toxic-pathogenic	IS IH	IS IH	IS IH	IS IH
Flammable	FE IS	FE IS	FE IS	FE IS
Thermal	IS	IS FE	IS FE	IS FE
$\alpha, \beta, \gamma$ Radiation	HP RS	HP RS	HP RS	HP RS
Acoustical Radiation	IH IS	IH NS IS	IH NS IS	IH NS IS
Thermal Radiation	IH IS	IH FE IS	IH FE IS	IH FE IS

- IS = Industrial Safety
- HP = Health Physics
- IH = Industrial Hygiene
- FE = Fire Engineering
- RS = Radiological Safety
- NS = Nuclear Safety
- TS = Traffic Safety

○ = Primary Responsibility

\*Type A or B incident

S2 10 134

# Costs

- **Program management and Q/A Systems already exist**
- **New costs**
  - **Review staff costs**
  - **Information collection, processing and presentation**
- **Reasonable costs**
- **Exorbitant costs**

S2 10 147

# **Reporting to Management**

- **What does management want?**
- **Analytical models vs reporting models**
- **Relationship to commitments**
- **Relationship to risk**

S2 10 148

# What are Some of the Things to Watch for in Performing Operational Readiness Review?

- Too much emphasis on dominant hazards and/or catastrophic consequence levels
- Overuse or underuse of formal techniques
- Overlooking peripheral hazard types
- Items which were “ready” and later “undone” (especially items performed early in the project)
- Failure to properly relate “unknown status” items to potential consequences if these items are not ready
- Failure to refer risk on unknown status items to proper management levels
- Effect of schedule pressures on quality of work
- Failure to clearly assign responsibilities for knowledge of work status

- **Compromise of “here and now” readiness of personnel to operate the system due to overtime, overwork and other pressures**

- **Effectiveness of change and configuration controls**

**A. As-built information** *(Verfall mit 7 Tagen, Lo-6 bohren, Hochspannung)*

**B. Time lags in system**

**C. Long term systemic changes and system handoffs (e.g., “construction” to “operations”, “old” vs “new” quality assurance programs, etc.)**

*Info-übergabe!*

S2 2696  
2.28

## **How can We Avoid These Problems?**

- **Assignments of responsibility and use of media to assure that systems designed to achieve both basic process safety and safety considerations in the various disciplinary areas are in a state of readiness.**
- **Use both formal methods and personal experience and skills to avoid oversights.**
- **Use appropriate general laundry lists, checklist, etc. to cross check for oversights.**

# Recommendations on the Review Process

The review group summarized their review by making the following recommendations regarding ORR's in general and our plan in particular.

*Operational Readiness Review*

- **Set up systems of administrative controls to handle**
  - (1) Component requalifications**
  - (2) In-service inspections**
  - (3) Instrument recalibrations.**
- **Specify the authority of the ORR review team (see Sections 5.5 and 5.6 of our Plan). Team's role should be advisory only.**

S2 3520

# **Recommendations on the Review Process (cont'd)**

- **A person with operations skills should be added to the Review Team.**
- **In management procedures, build in a communications system to disseminate public relations information.**
- **Consider presenting a package to the ORR Review Team in advance of the review.**
- **In the ORR, do not resolve anything on the spot; just write down the problem and (later) write up the resolution.**

S2 3521

# **Recommendations on the Review Process (cont'd)**

- **Prior to the ORR, someone outside the Review Team should have reviewed documentation for adequacy (Review Team will be unable to do this in the time available).**
- **Review Team should meet for the ORR at least two months prior to operation.**
- **Consider convening the Review Team for incremental reviews. (Use reviewers only from within their organization.)**

S2 3522

## **Recommendations on the Review Process (cont'd)**

- **One to two days is not adequate for an ORR of a complex system.**
- **Set up rigorous system for control of changes (to software.)**
- **Establish operator qualifications. Two to four year training period for “shift supervisors” in critical areas; in some cases psychological exams are given; the plant facility manager has the last word in accepting an operator.**

S2 3523

## **Recommendations on the Review Process (cont'd)**

- **Obtain management commitment to support ORR. We have a great amount of ORR work to do - perhaps five to six full time people for the next three months.**
- **Set up operational controls at a point in the testing program prior to first plasma, and control the work thereafter.**
- **Make a dry run of the ORR presentation.**
- **Establish methods to control the work and changes after the ORR.**

S2 3525

## **Recommendations on the Review Process (cont'd)**

- **Establish software assessment criteria, set up an independent review of critical software programs, including dry run test.**
- **For safety readiness, conduct emergency preparedness planning, establish safety limits and periodic monitoring requirements.**
- **Establish procedures for handling trouble reports.**

# **Some Checklists and Considerations Relating to Operational Readiness**

- A. Check system for all hazards by energy type**
- B. Check system for functions which might affect performance**
- C. Check system for consequences of things which are not or might not be ready**

S2 2698  
2.30



# **A. Check System for all Hazards by Energy Type**

S2 2704  
2.31

## Typical Examples of Energy Sources

### Electrical

Battery banks  
Diesel units  
High lines  
Transformers  
Wiring  
Switchgear  
Underground wiring  
Cable runs  
Service outlets and fittings  
Pumps  
Motors  
Heaters  
Power tools  
Small equipment

### Nuclear

Vaults  
Temporary storage areas  
Receiving areas  
Shipping areas  
Casks  
Burial ground  
Storage racks  
Canals and basins  
Reactor in-tank storage areas  
Dollies  
Trucks  
Hand carry  
Cranes  
Lifts  
Commercial  
Shops

Hot cells  
Assembly Areas  
Inspection areas  
Test rigs  
Reactors  
Critical facilities  
Subcritical facilities  
Laboratories  
Pilot plants

### Thermal Radiation

Furnaces  
Boilers  
Steam lines  
Lab and pilot plant equipment  
Solar

### Mass, Gravity, Height

Human effort  
Stairs  
Lifts  
Cranes  
Bucket and ladder  
Trucks  
Slings  
Hoists  
Elevators  
Jacks  
Scaffolds and ladders  
Crane cabs  
Pits  
Excavations  
Elevated doors

Canals  
Vessels

### Pressure-Volume/K-Constant-Distance

Boilers  
Heated surge tanks  
Autoclaves  
Test loops and facilities  
Gas bottles  
Pressure vessels  
Coiled springs  
Stressed members  
Gas receivers

### Kinetic-linear

Cars  
Trucks  
Buses  
Fork lifts  
Carts  
Dollies  
Railroad  
Surfaces  
Obstructions  
Shears  
Presses  
Crane loads in motion  
Pv blowdown  
Powder assisted driving tools

S2 2705  
2.32

## Typical Examples of Energy Sources (cont'd)

### Kinetic-Rotational

Centrifuges  
Motors  
Pumps  
Cooling tower fans  
Cafeteria equipment  
Laundry equipment  
Gears  
Shop equipment (grinders,  
saws, brushes, etc.)  
Floor polishers

### Corrosive

Acids  
Caustics  
"Natural" chemicals (soil,  
air, water)  
Decon solutions

### Explosive Pyrophoric

Caps  
Primer cord  
Dynamite  
Powder metallurgy  
Dusts  
Hydrogen (incl. battery banks  
and water decomp.)  
Gases-other  
Nitrates  
Electric squibbs  
Peroxides-Superoxides

### Toxic Pathogenic

Acetone  
Fluorides  
Carbon monoxide  
Lead  
Ammonia and compounds  
Asbestos  
Trichlorethylene  
Dusts and particulates  
Pesticides-herbicides-insecticides  
Bacteria  
Beryllium and compounds  
Chlorine and compounds  
Decon solutions  
Sandblast  
Metal plating  
Asphyxiation-drowning

### Flammable Materials

Packing materials  
Rags  
Gasoline (storage and in vehicles)  
Lube oil  
Coolant oil  
Paint solvent  
Diesel fuel  
Buildings and contents  
Trailers and contents  
Grease  
Hydrogen (incl. battery banks)  
Gases - other  
Spray paint  
Solvent vats

### Thermal (except radiant)

Convection  
Heavy metal weld preheat  
Exposed steam pipes  
Electric heaters  
Fire boxes  
Lead melting pot  
Electrical wiring and equipment  
Furnaces

### Electromagnetic and Particulate Radiation

Canals  
Plug storage  
Storage areas  
Storage buildings  
Radioactive sources  
Waste and scrap  
Contamination  
Irradiated experimental and  
reactor equipment  
Electric furnace  
Blacklight (e.g., magniflux)  
Laser  
Medical X-ray  
Radiography equipment and sources  
Welding  
Electric arc - other (high  
current circuits)  
Electron beam

### Acoustical Radiation

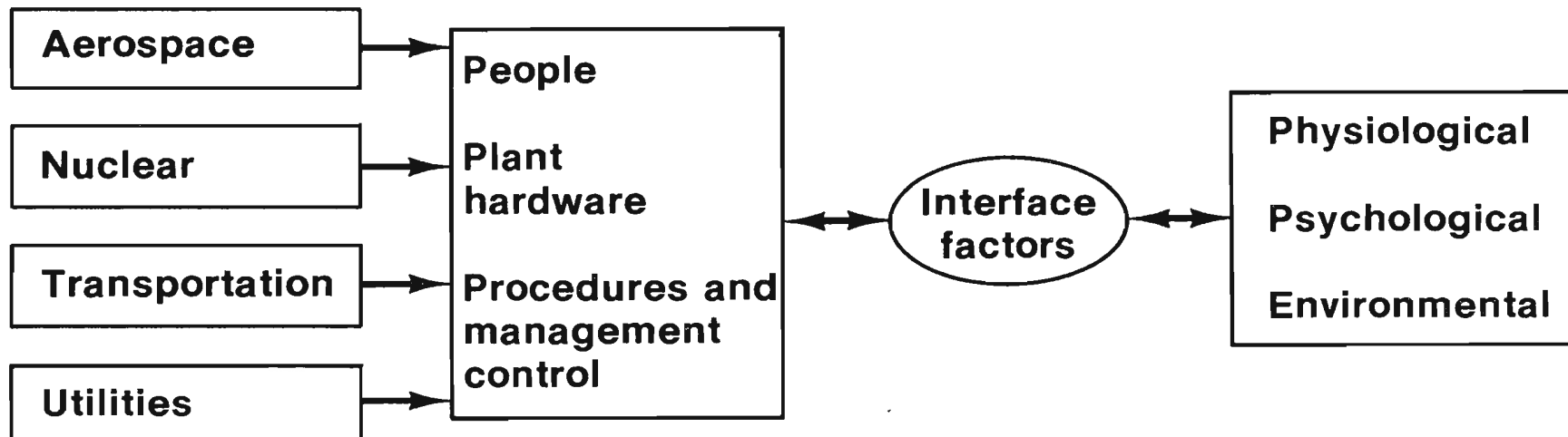
Equipment noise  
Ultrasonic cleaners

S2 2706  
2.33

## **B. Check System for Functions Which Might Affect Human Performance**

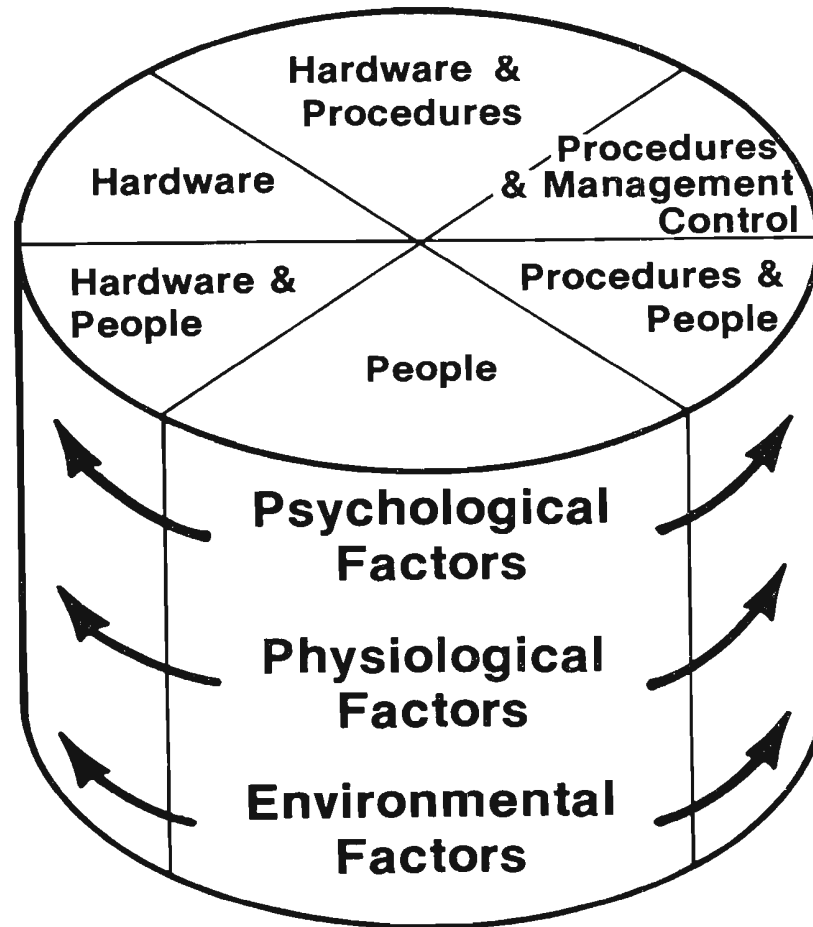
S2 2707  
2.34

## Task Performance Factors in Industry



S2 2708  
2.35

# Task Performance Factors



S2 0043  
2.36

# Task Performance Factors

## Psychological (mental-emotional stress)

- Family pressure
- Economical pressure
- Management pressure
- Supervisory pressure
- Peer pressure
- Work load

# Task Performance Factors

## Physiological (biological stress)

- Fatigue
- Hypoglycemia (diet)
- Drugs
- Alcohol
- Health factors
- Physical stress
- Circadian rhythm

S2 2710  
2.38

# Task Performance Factors

## Environmental (physical and mental stress)

- Hypothermia
- Hyperthermia
- Radiation
- Pollution
- Acoustical
- Illumination
- Hypobarics
- Pressure changes
- Hyperbarics
- Work space

S2 2711  
2.39

# **Aerospace Industry Personnel Factors**

**S2 2712  
2.40**

# **Aerospace Industry Personnel Factors**

## **Supervisory Factors**

**Acceptance of Responsibility**

**Qualifications/Intelligence/Experience**

**Training (Including Emergencies)**

**Team Coordination/Crew Discipline**

**Morale**

**Illness/Physical Disabilities**

**Alertness**

**Vertigo/Disorientation/Visual Illusions**

**Responsiveness**

**Perceptions/Human Factors**

**Reactions**

**Sight/Color Blindness**

**Hearing**

**Strength/Fatigue**

**Stress (Physical, Psychological, Physiological)**

**Buddy System Reliance**

**Emotional Stability**

**Communication/Language Difficulty**

**Clothing/Protective Wear**

**Boredom/Complacency/Fixation/Hypnosis**

**Efficiency**

**Capability (Task Loading)**

**Overconfidence**

# **Aerospace Industry Hardware and Environmental Factors**

S2 2714  
2.42

# **Aerospace Industry Hardware and Environmental Factors**

**Fire/corker potential**  
**Explosion/implosion/overpressure**  
**Electrocution/electrical burns**  
**Electrical failure/backup power**  
**Inadvertent electrical activation**  
**Radiation (ionizing/nonionizing)**  
**Structural failure**  
**Engine failure/emergency power**  
**Mechanical/hydraulic failure**  
**Humidity**  
**Leakage**  
**Impact**  
**Corrosion/toxicity**  
**Acceleration**  
**Air/fluid contamination**  
**Excessive noise/vibration**  
**Extreme cold/heat**  
**Flooding/loss of buoyancy**  
**Instrument readability/control accessibility**

S2 2715  
2.43

# **Nuclear Industry Personnel, Procedural and Hardware Factors**

S2 2716  
2.44

## **Nuclear Industry Personnel, Procedural and Hardware Factors**

- **Operator factors in human error incidences**

- Fatigue
- Disorientation
- Distraction
- Motivation
- Forgetting
- Confusion
- Expectancy or set
- Psychological stress
- Inadequate reasoning/problem solving capability
- Inadequate skill levels
- Inadequate knowledge

- **Operational factors in human error incidence**

- Time constraints
- Interfering activities
- Poor communications
- Excessive workloads
- Environmental stress (noise levels, lighting, levels, temperature, etc.)

- **Design factors in human error incidence**

- Control/display location
- Control/display arrangement
- Control/display identification or coding
- Control/display operation or response
- Information availability
- Information readability
- Availability of feedback information

- **Procedural factors in human error incidence**

- Erroneous instructions or directives
- Incomplete or inconsistent instructions
- Confusing directives

- **Training factors in human error incidence**

- Inadequate knowledge training
- Inadequate skill training

S2 2717  
2.45

# **Transportation Industry Personnel, Hardware, Procedural Factors**

S2 2718  
2.46

# **Transportation Industry Personnel, Hardware, Procedural Factors**

**Job assignment  
Responsibilities  
Project pressure  
Reliability of the employee  
Health  
Toxic exposures, historical  
Radiation exposure  
Driving experience  
Driving record  
Normal modes of transportation  
Fatigue, immediate, and chronic  
Food  
Location of incidents  
Toxic exposures in the vehicle - vehicle condition  
Driving boredom  
Worries, on the job  
Home life  
Recreation  
Habits, personal  
Vehicle control  
Group exposure (highway miles)  
Hours of work control - contention  
Availability of food  
Availability of beds**

S2 2719  
2.47

# **Coal-Fired Power Plants Personnel, Hardware and Procedural Factors**

S2 2720  
2.48

## Coal-Fired Power Plants Personnel, Hardware and Procedural Factors

Most important	Second most important	Third most important	Overall
Training <sup>1</sup> 18	Training 13	Equipment design 6	Training 32
Turnover <sup>2</sup> 5	Turnover 5	Turnover 5	Turnover 16
Equipment design <sup>3</sup> 3	Human factors 3	Supervision 3	Equipment design 9
Personnel selection 3	Discipline 2		Human factors 3
Root cause analysis 2			Supervision 4
			Personnel selection 3
			Root Cause analysis 3
			Employee attitudes 3
			Discipline 3
			Scheduling 2
			Vendor instructions 2

<sup>1</sup>Increased training

<sup>2</sup>Reduced turnover

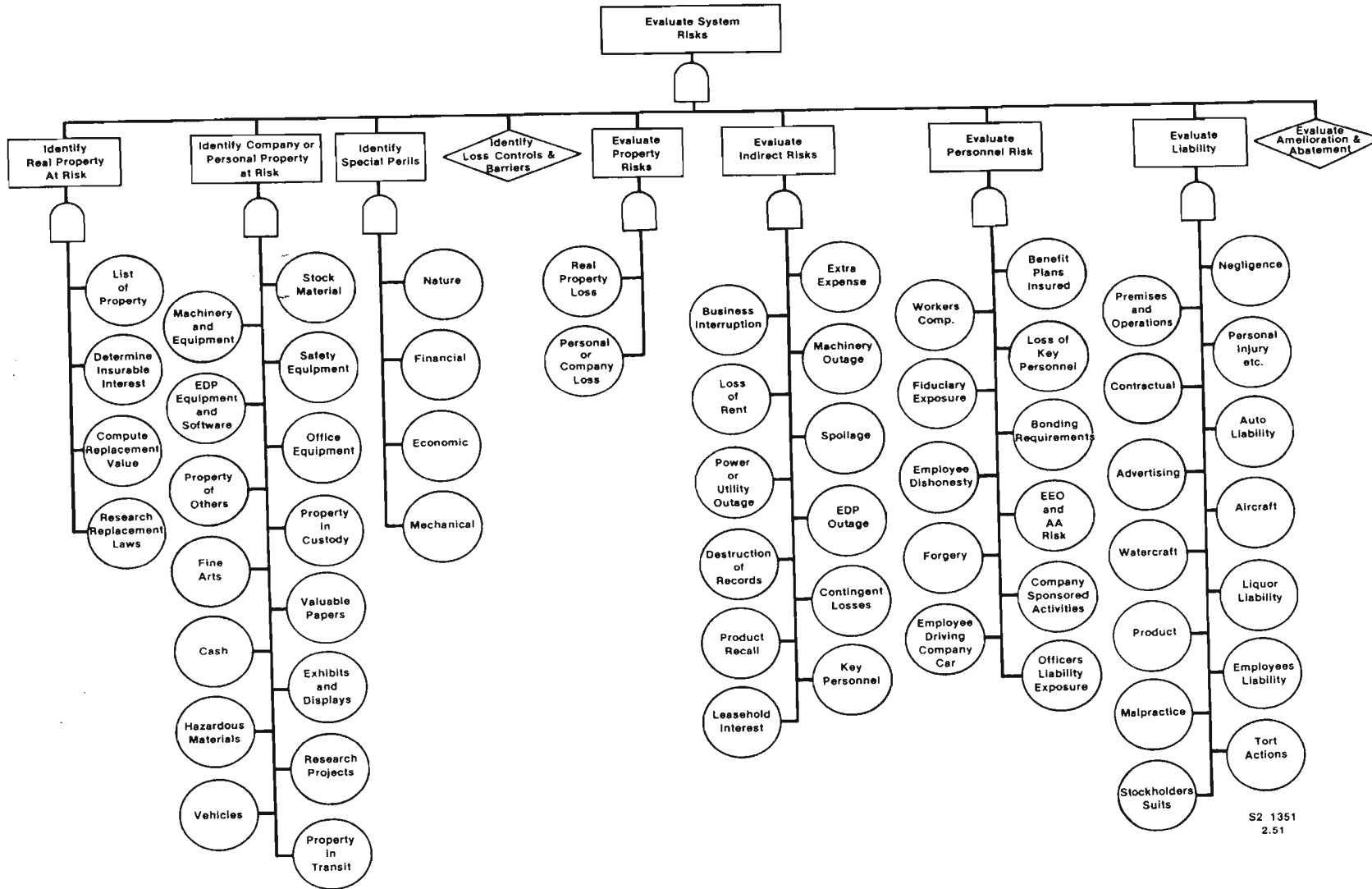
<sup>3</sup>Improved equipment design to reduce error

S2 2721  
2.49

**C. What are the Potential  
Consequences for Things  
That are not or Might not  
be Ready?**

S2 2699  
2.50

# Practical Risk Management



S2 1351  
2.51



# **Practical Considerations for Readiness Reviews (Hanford Experience)**

S2 10 149

- **Several prime contractors (UNC, Rockwell, etc.)**
- **Multiplicity of facilities**
  - **N Reactor**
  - **Z Plant (Pu processing)**
  - **Nuclear waste vitrification**
  - **Nuclear waste storage tanks**

S2 10 150

# **In My View:**

**DOE-HQ requirements assign responsibility for controlling:**

- **Cost**
- **Schedule**
- **Quality (fitness for intended use)**

S2 10 138

# **No Formal Requirement to Conduct Documented Readiness Reviews**

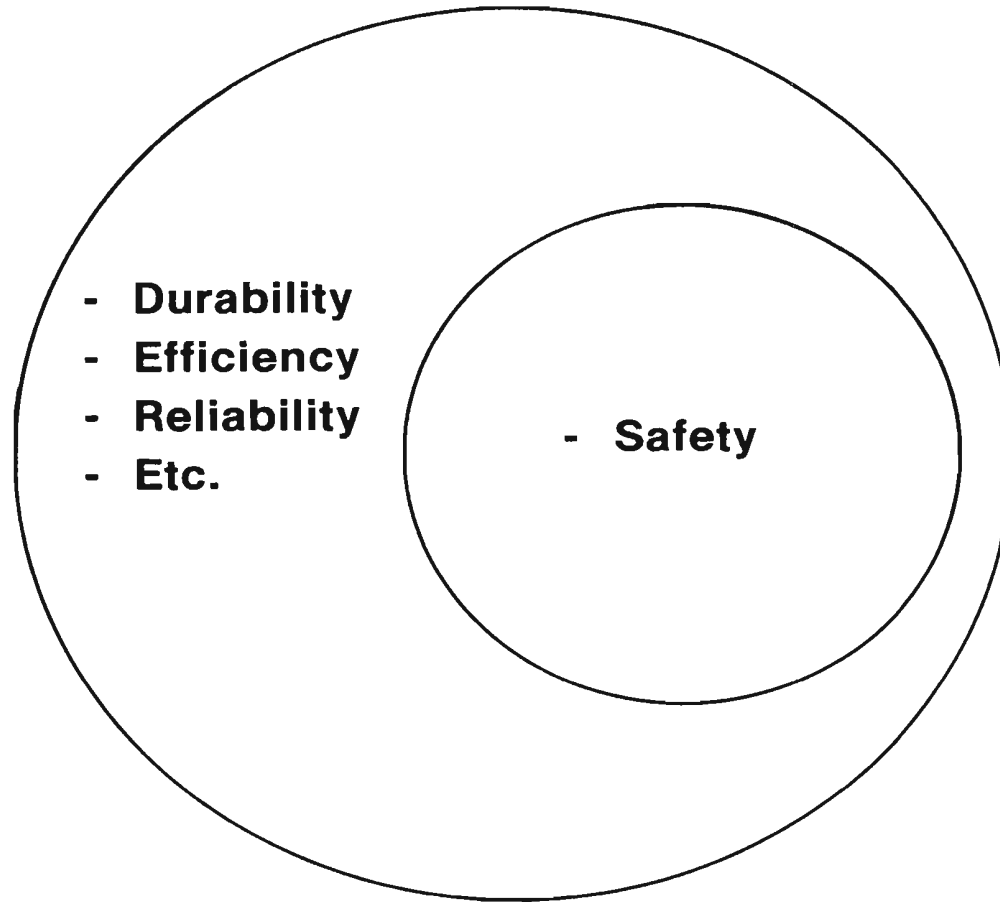
S2 10 152

**In God We Trust  
All Others Pay Cash**

S2 10 141

**Formal Readiness Reviews  
Provide Management with  
Visible Objective Evidence  
(Cash) of Readiness**

S2 10 164



**Quality (fitness for intended use)**

S2 10 137

**Readiness Reviews Help  
Achieve the Mission as Well as  
Guard Against the Hazard**

S2 10 140

**A Field Office and Contractor  
Procedure should be Issued  
Detailing Readiness  
Mechanisms and or  
Requirements**

S2 10 165

# **Selection of Startups for Formal Review**

- **Selection should be performed in advance via a formal projection list submitted to senior official for approval**
- **Normally data for projections should be accumulated by program entity and compiled by safety-type division**

S2.10 153

- **Some selection criteria for requiring a formal readiness review could be:**
  - **Startup of new nuclear facilities, operations, or processes**
  - **Restart of facilities, operations, or processes that were ordered shutdown for safety reasons or following effluent release to the environment in excess of DOE standards**
  - **Restart of nuclear facilities, operations or processes following modification involving safety questions previously unreviewed by RL**

*Richard*

S2 10 154

*Demolition &  
Decommission*

- **Criteria (continued)**
  - **Restart of nuclear facilities, operations, or processes that have been shutdown or in standby for an extended period.**
  - **Initiation of D&D projects involving safety questions previously unreviewed**
  - **Initiation of non-routine transport of hazardous materials**
  - **Initiation of new type activities which present an identifiable hazard to employees, the public, or the environment**
  - **Any startup specifically designated by the government**

S2 10 155

- **A readiness review should be tailored for particular facilities, contractors or processes**
- **DOE-RL has generally asked for certain basic elements in a contractor startup review**

S2 10 156

## **Basic Elements Are:**

- **Compilation of a review checklist based upon an analytical method such as MORT or SSDC-1:**

**“Do the sum of the pieces add up to the whole”?**

S2 10 157

- **State of readiness should be recommended by independent review body to authorizing official, e.g., contractor readiness board recommends to contractor senior official, RL review team recommends to field office manager**

S2 10 158

- **What signatures mean must be documented, e.g., 100% complete, complete with waiver, etc.**
- **Meaningful documentation must exist behind each signature, e.g., audit report, surveillance report, training, test result, etc., “Belief without evidence is called faith”.**
- **Portions of the tree or checklist considered N/A or waived should be technically justified, e.g., no consequence, consequence is acceptable risk as judged by qualified individual.**

S2 10 144

- **Signoffs required by system expert with management approval**
  - **Management should be alert for interface problems, e.g., have individual hardware and/or management systems been tested together as well as separately,**
    - **System Operational Test Procedures (OTP's)**
    - **Match of procedures with the plant**

S2 10 151

- **Incomplete items should be designated pre or post-startup, e.g.,**
  - **Some items will be complete after authorization but prior to startup (PRE)**
  - **Some after actual startup (POST)**
  - **If it is ever needed, it is not needed for startup? If not, why not?**

S2 10 143

# Helpful Hints

- **Time for conduct of a readiness review should be incorporated in the startup schedule**

S2 10 159

- **QA certification that background documentation is in place**
- **Master checklist or tree is maintained by one designated individual**

S2 10 160

- **General problems identified for one readiness review should be fixed for overall site or contractors system and not just facility specific “Band-Aid”.**

S2 10 161

- **Approval in stages is often necessary and appropriate.**
- **The conduct of the readiness review can be hazardous too!**

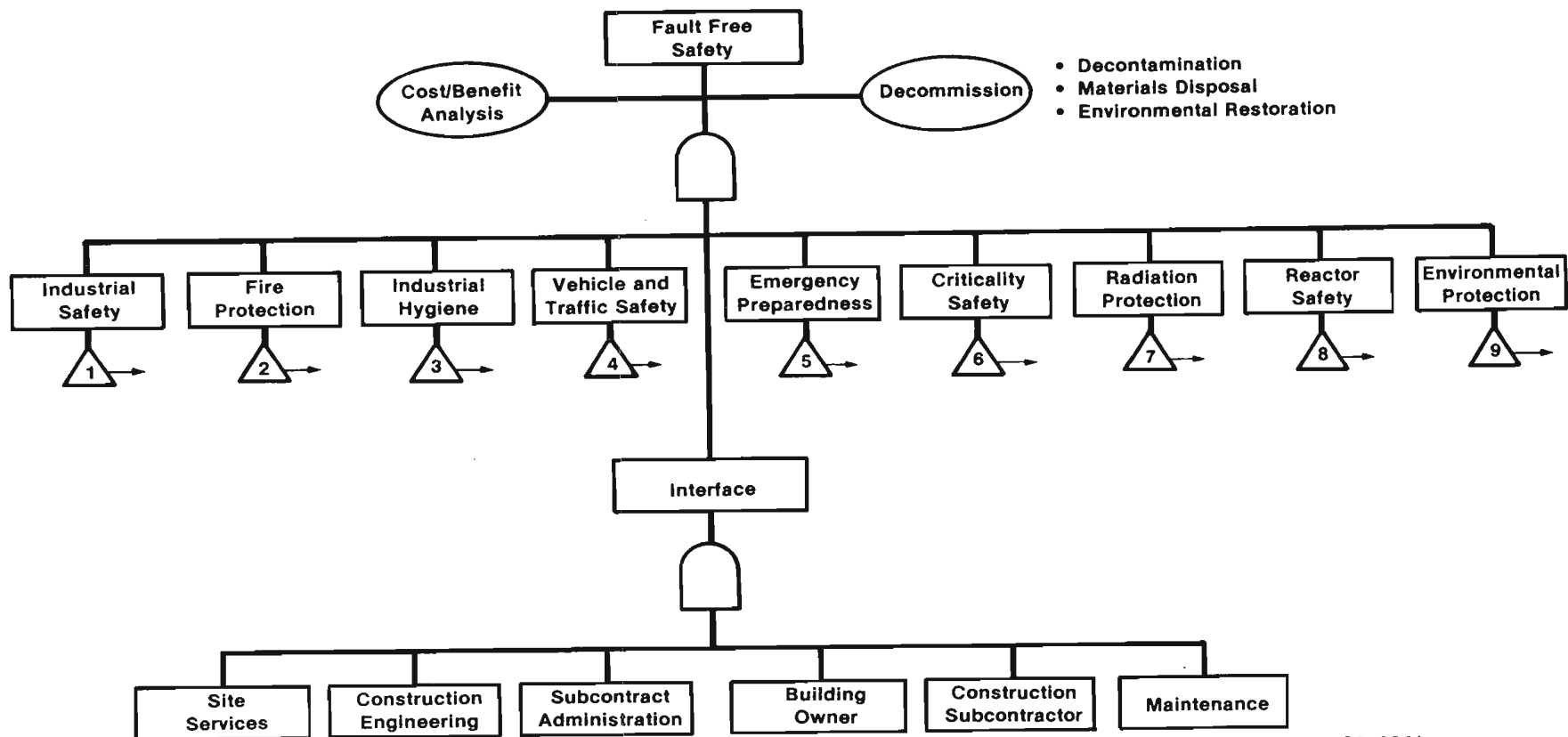
S2 10 162

- **Readiness review is not a guarantee. So, don't turn your brain off!**

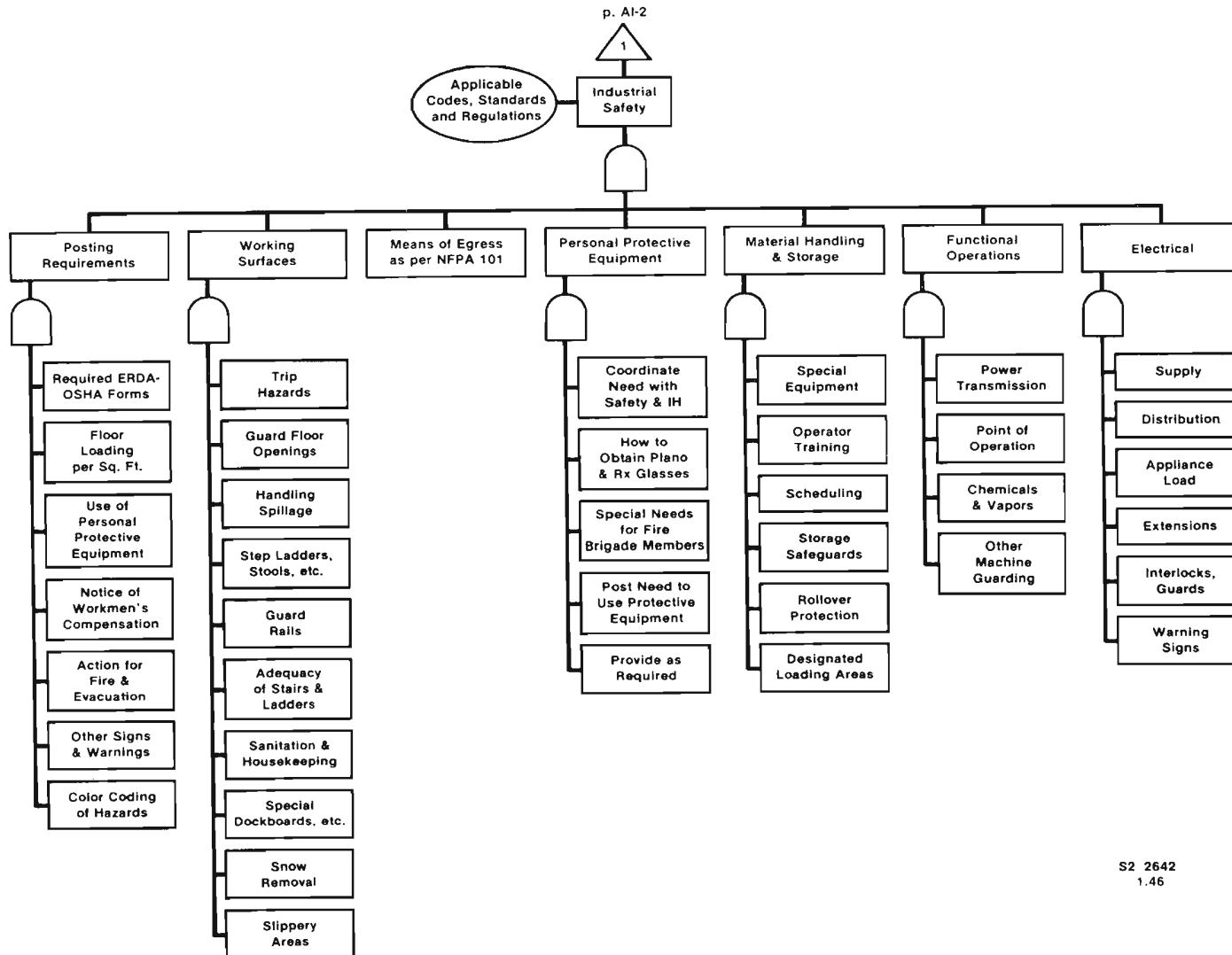
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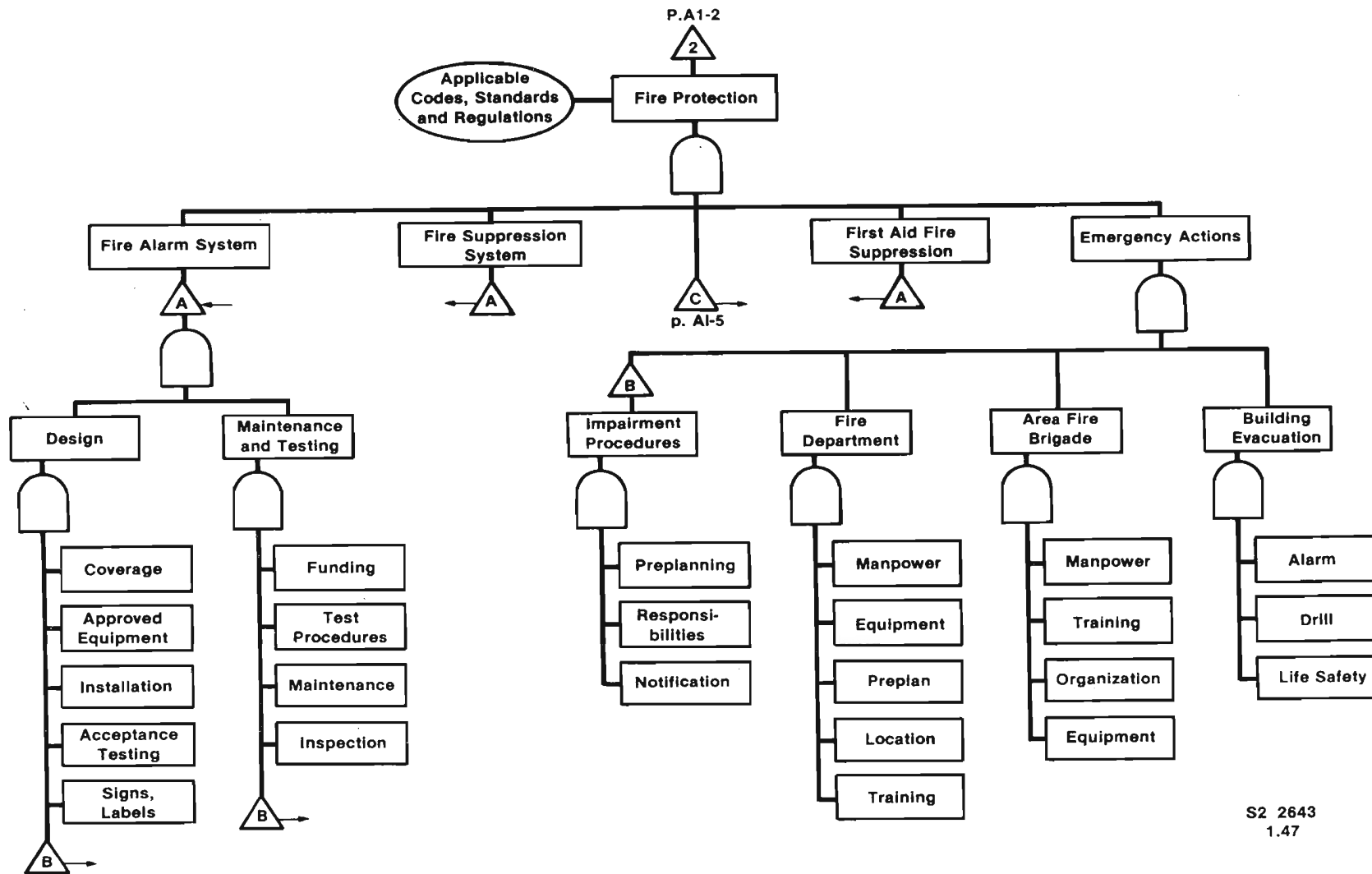


## Facility Occupancy - Use Management Oversight Risk Tree

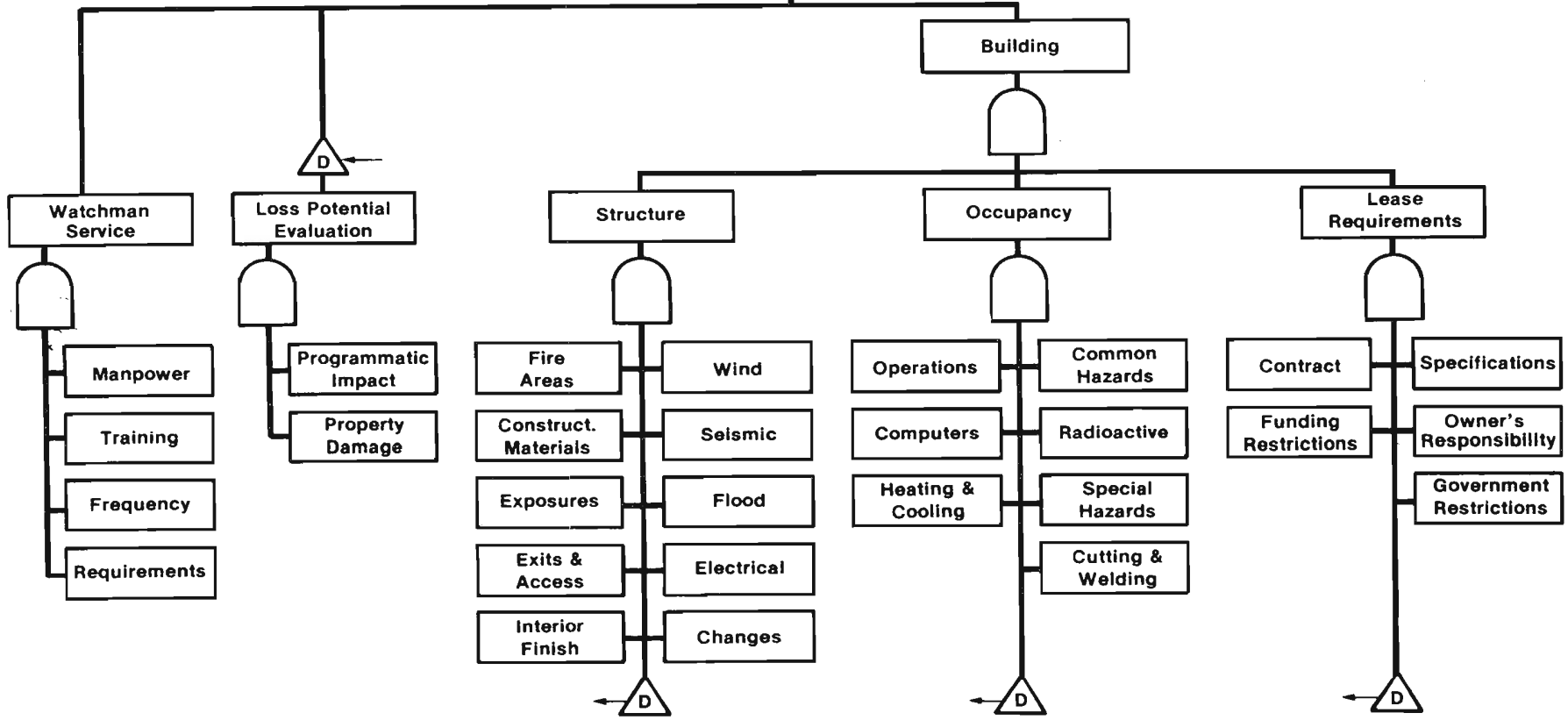


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1.45

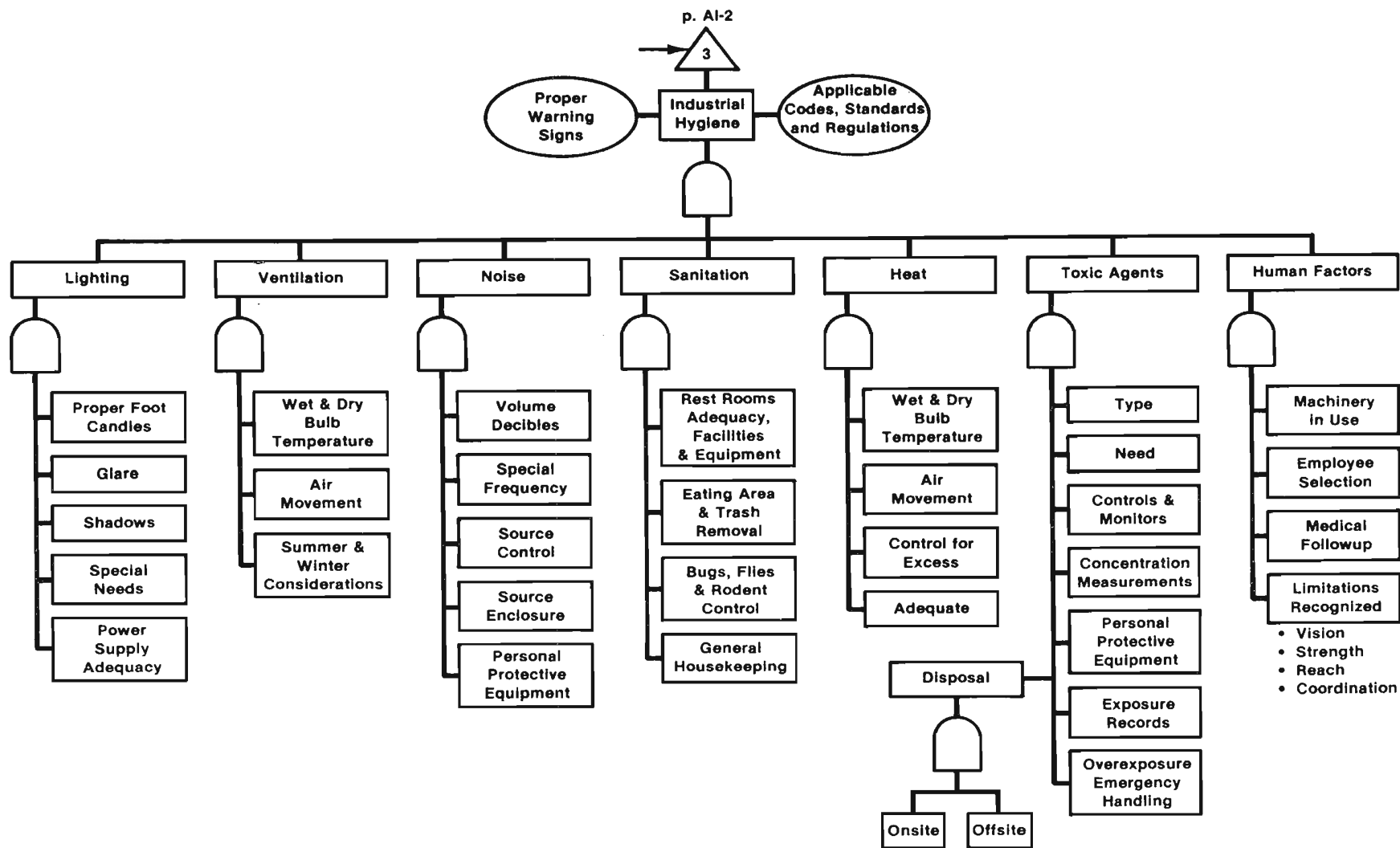




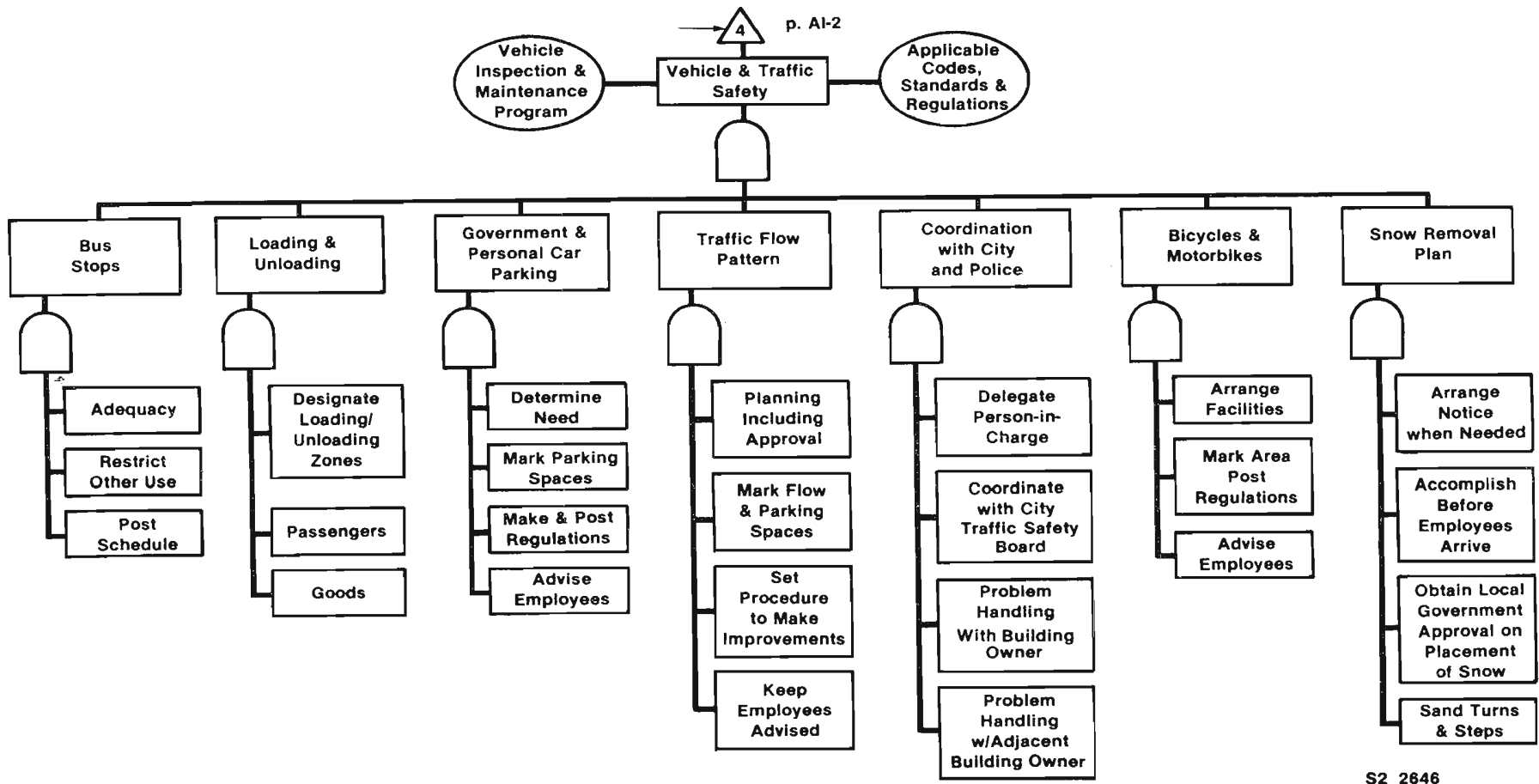
S2 2643  
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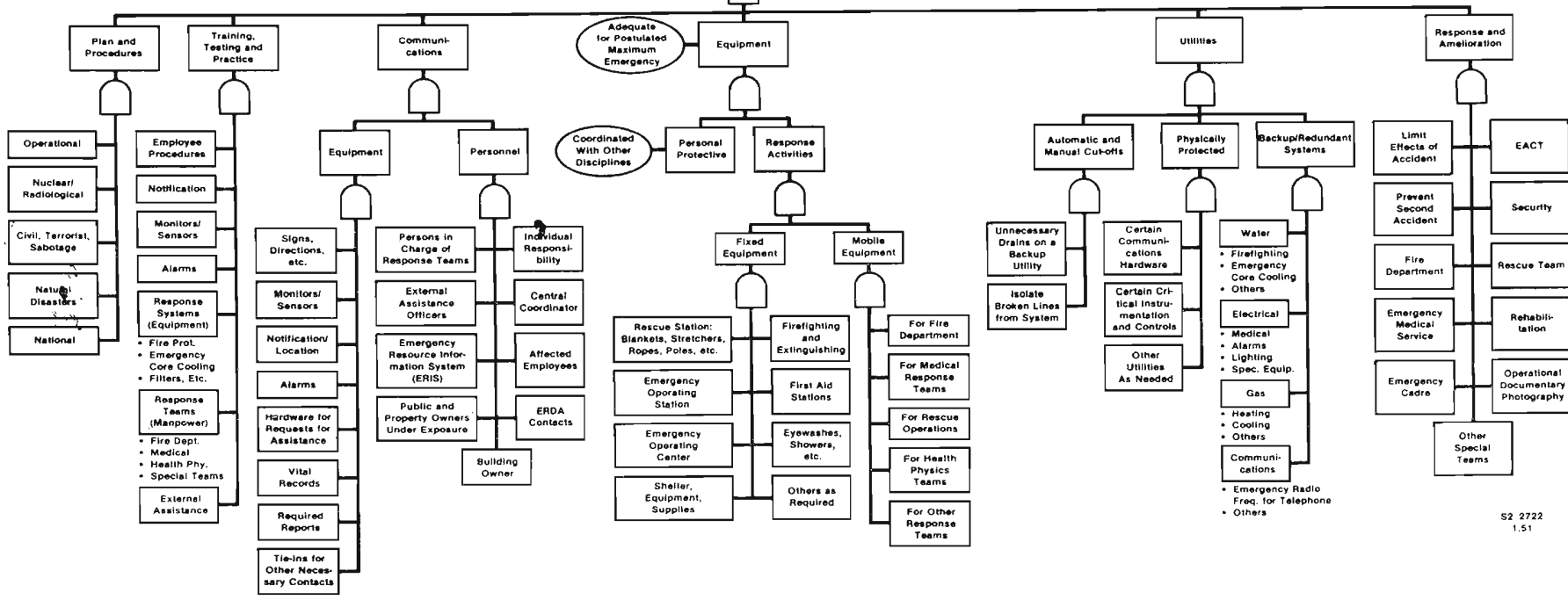
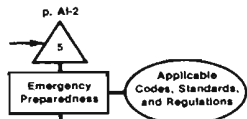
S2 2644  
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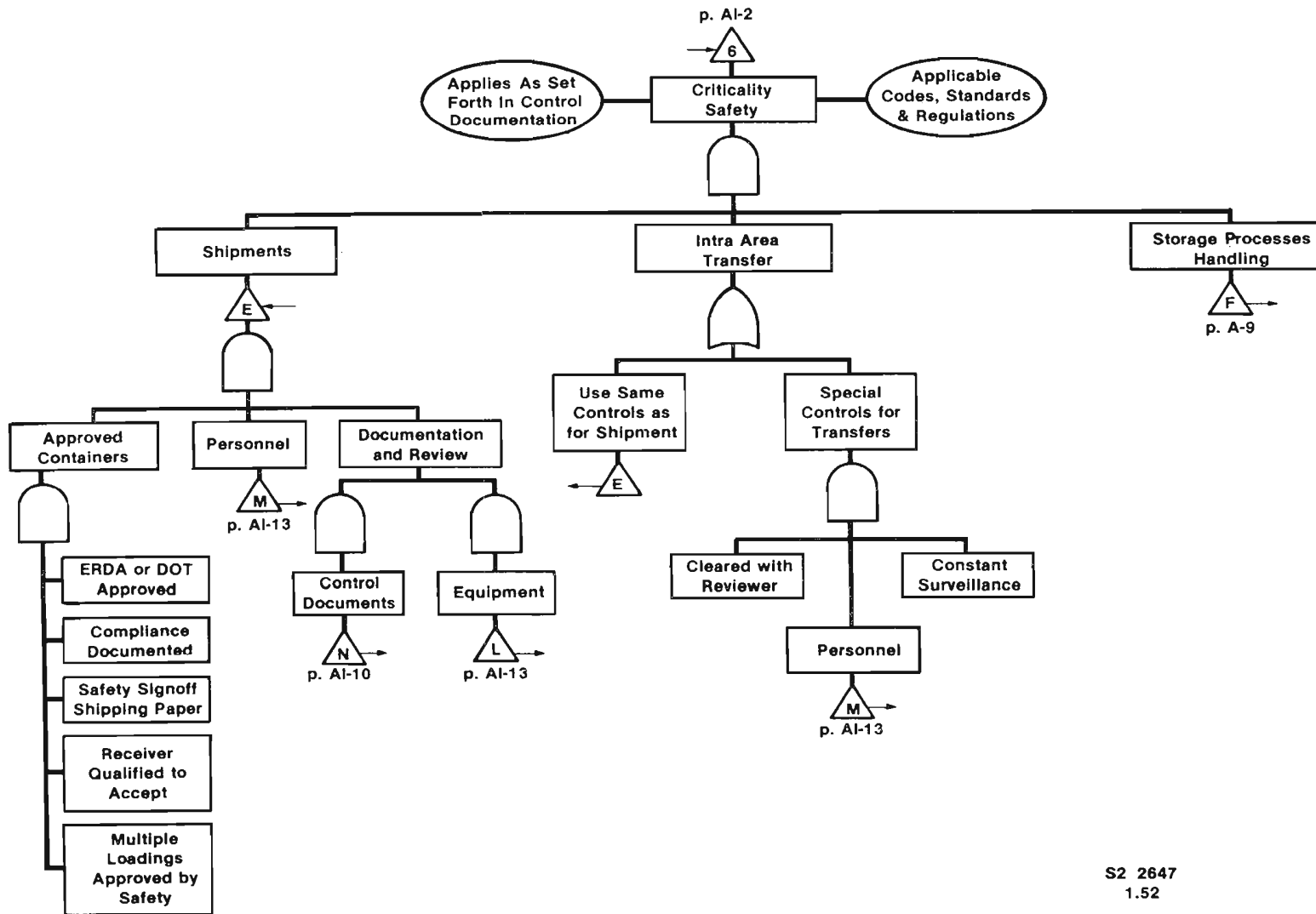
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S2 2646  
1.50

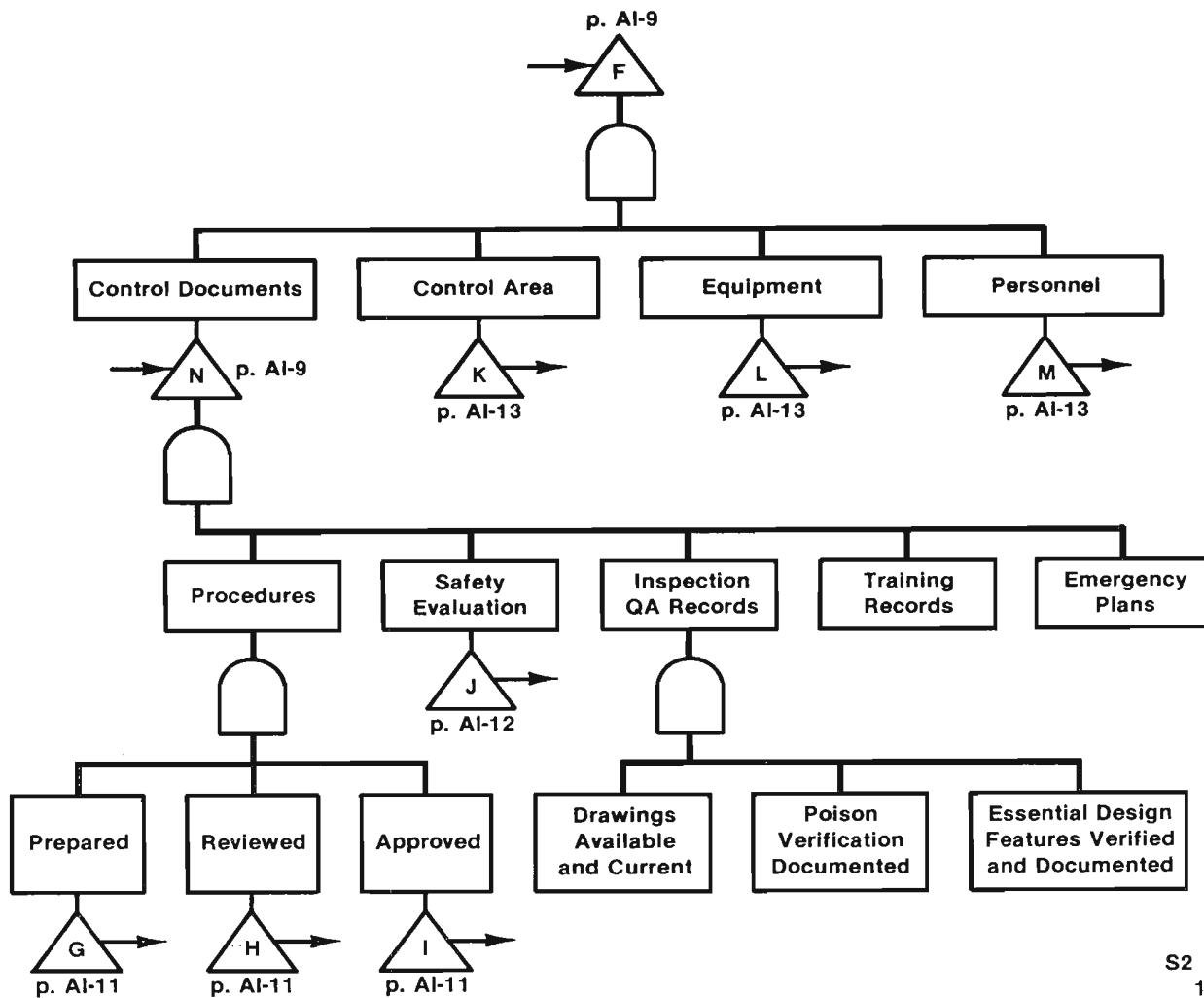


S2 2722  
1.51



S2 2647  
1.52

## Storage Process Handling



S2 2648  
1.53

p. AI-10  
Prepared



Standard  
Format

Clear Who  
Applies To

Ambiguities  
Eliminated

Auditable

Control Area  
Identified

Storage and  
Handling Limits  
(General Terms)

p. AI-10  
Reviewed



Safety Review

Management  
Review

Safety  
Analysis Must be  
Approved

p. AI-10  
Approved



Safety Signoff  
Required

Management  
Approval

If Applicable

Control Equip.  
Identified

Special Transfer  
or Shipping

Receiving

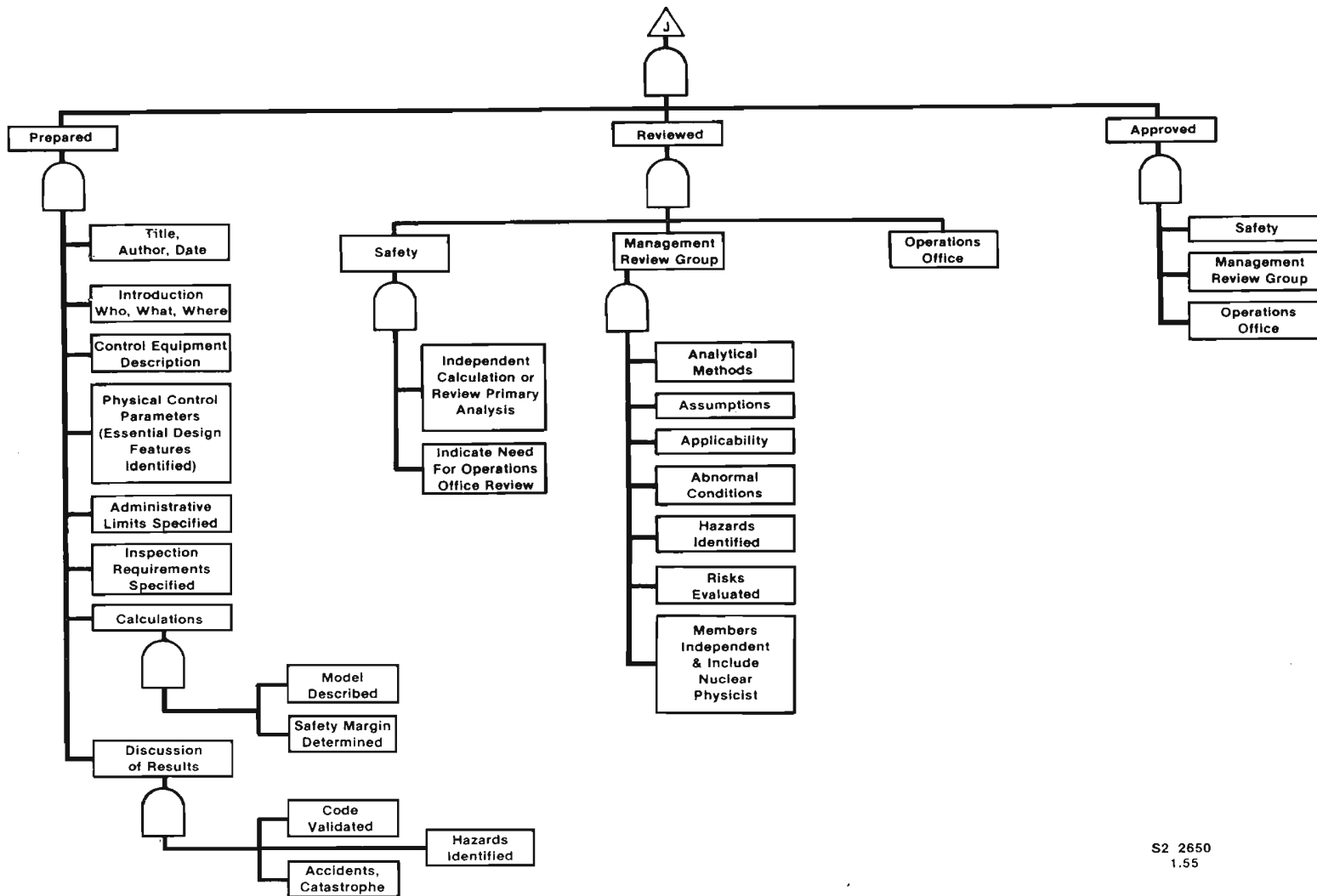
Recordkeeping

Perpetual  
Inventory

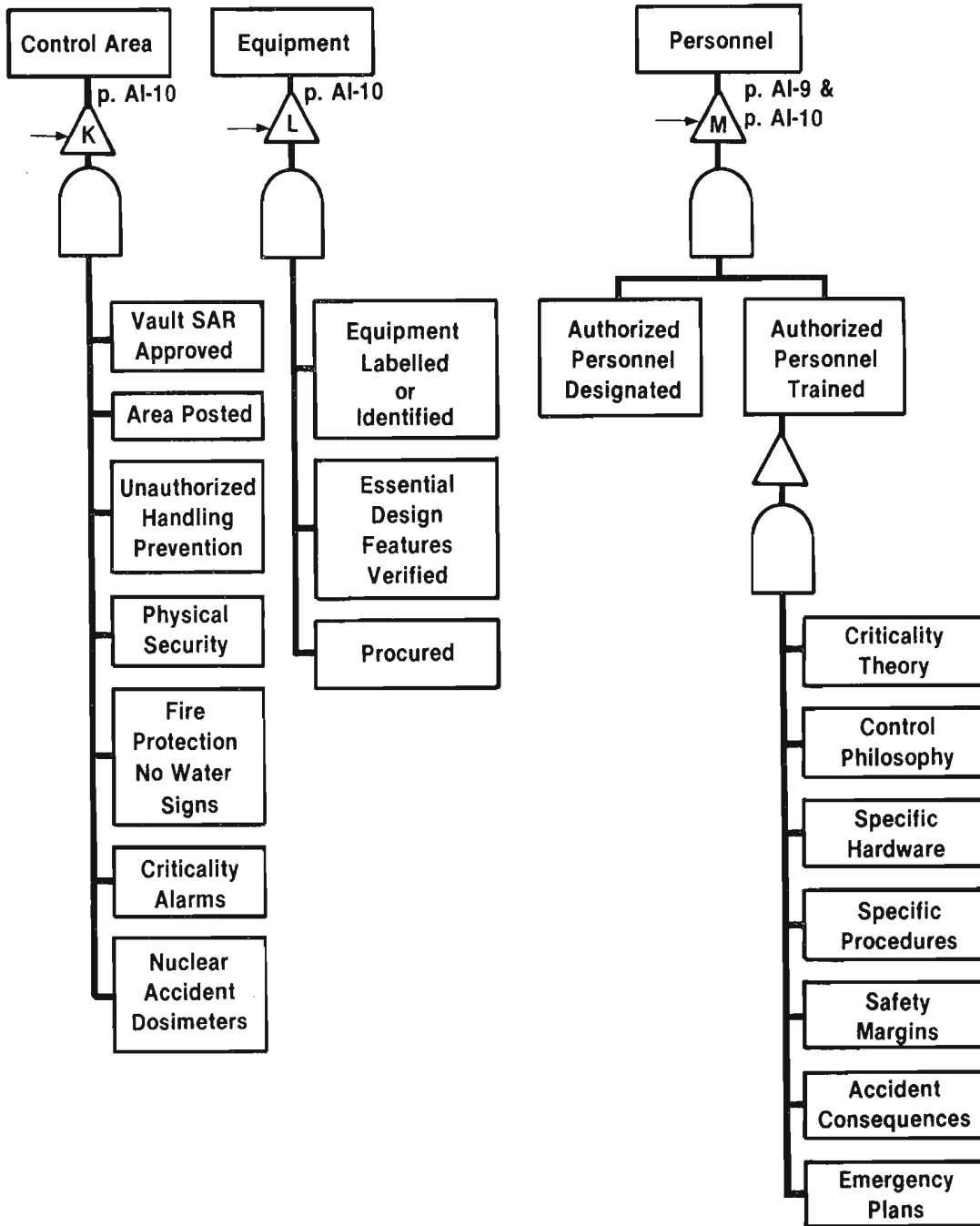
Inspections  
Equipment

Cautions  
Warnings

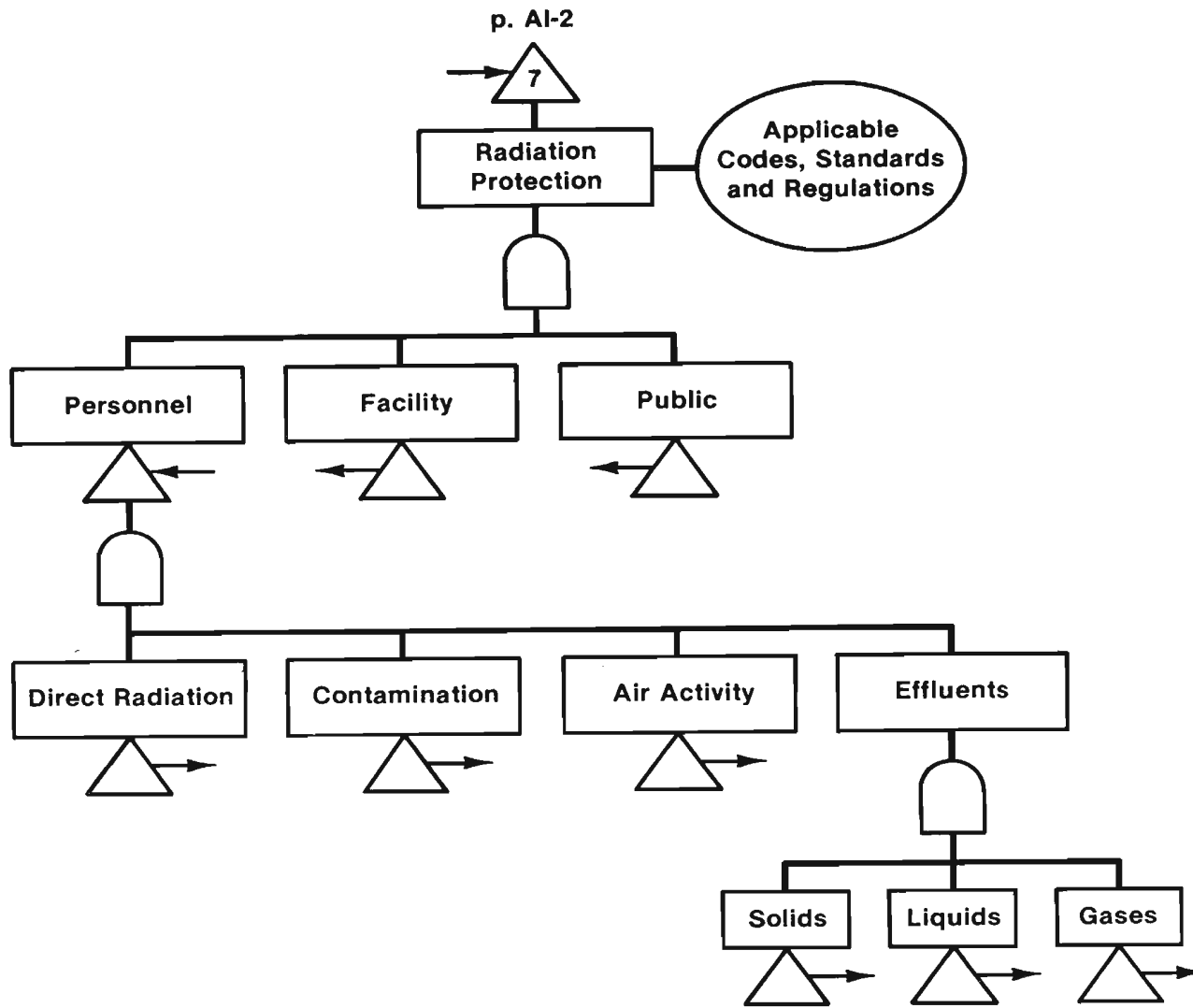
S2 2649  
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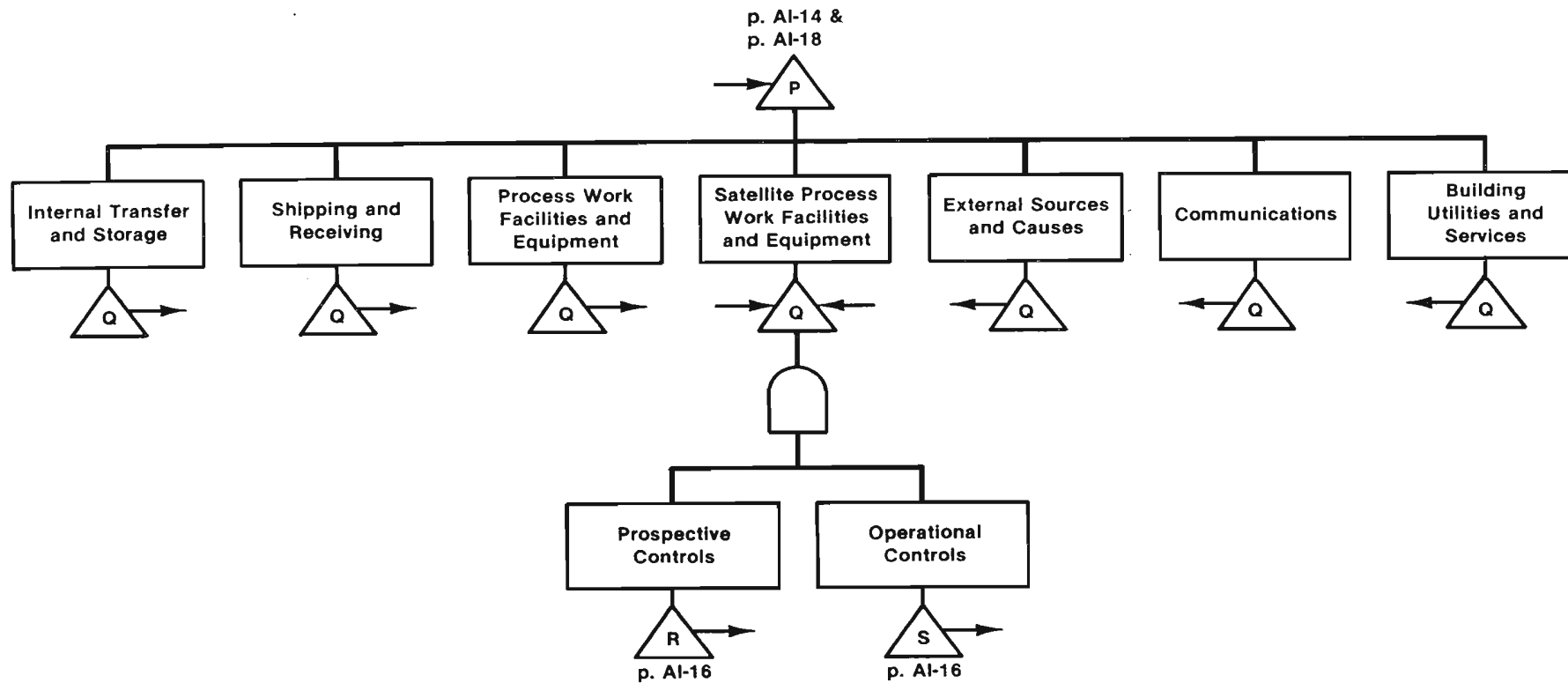
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1.55



S2 2651  
1.56



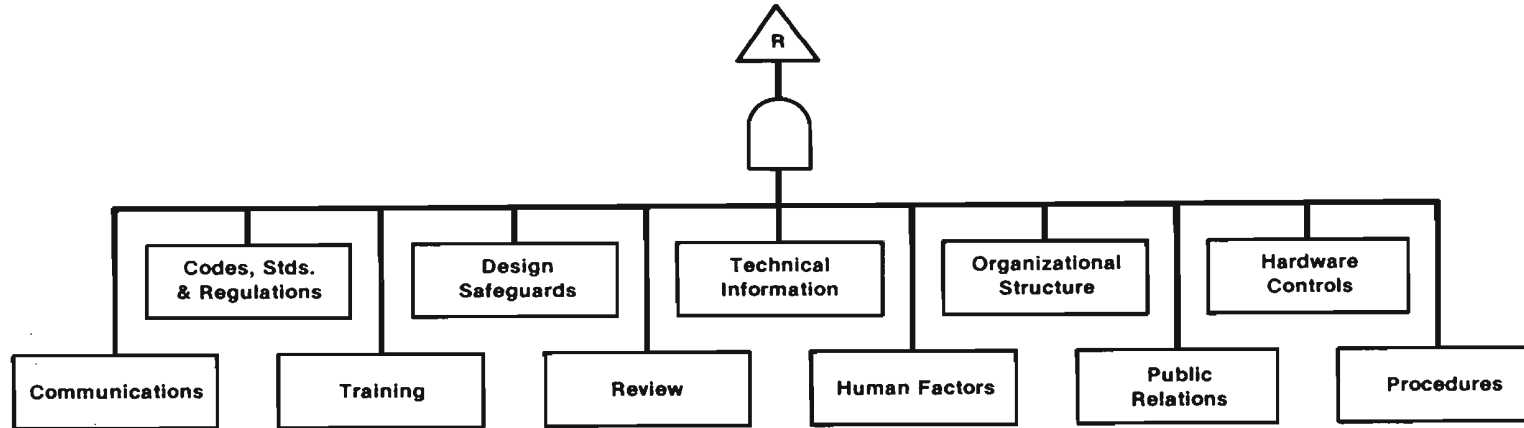
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S2 2653  
1.58

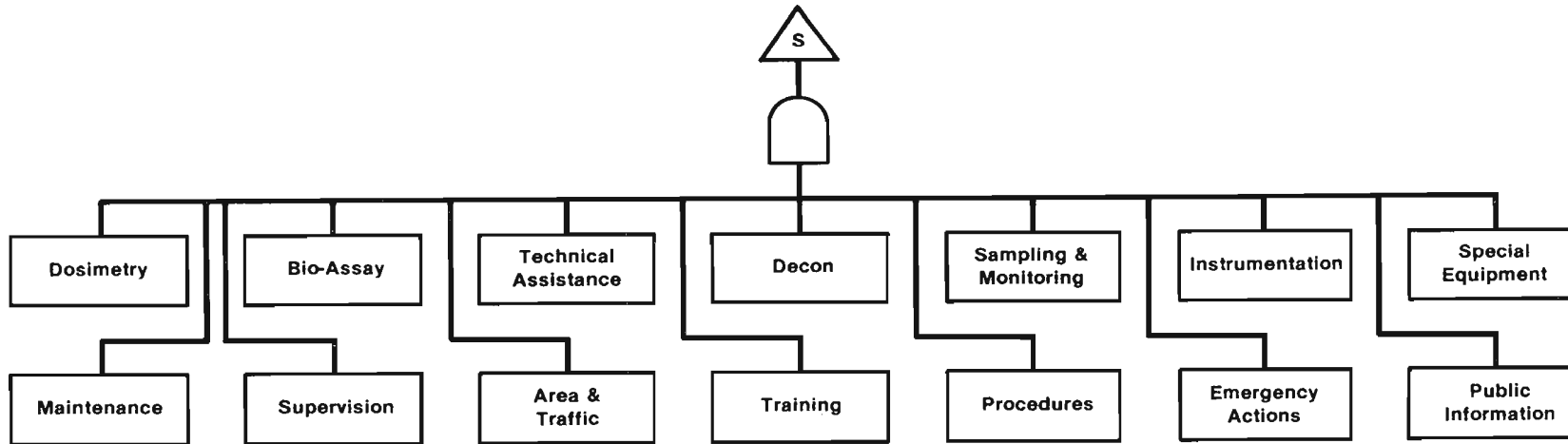
### Prospective Controls

p. AI-15

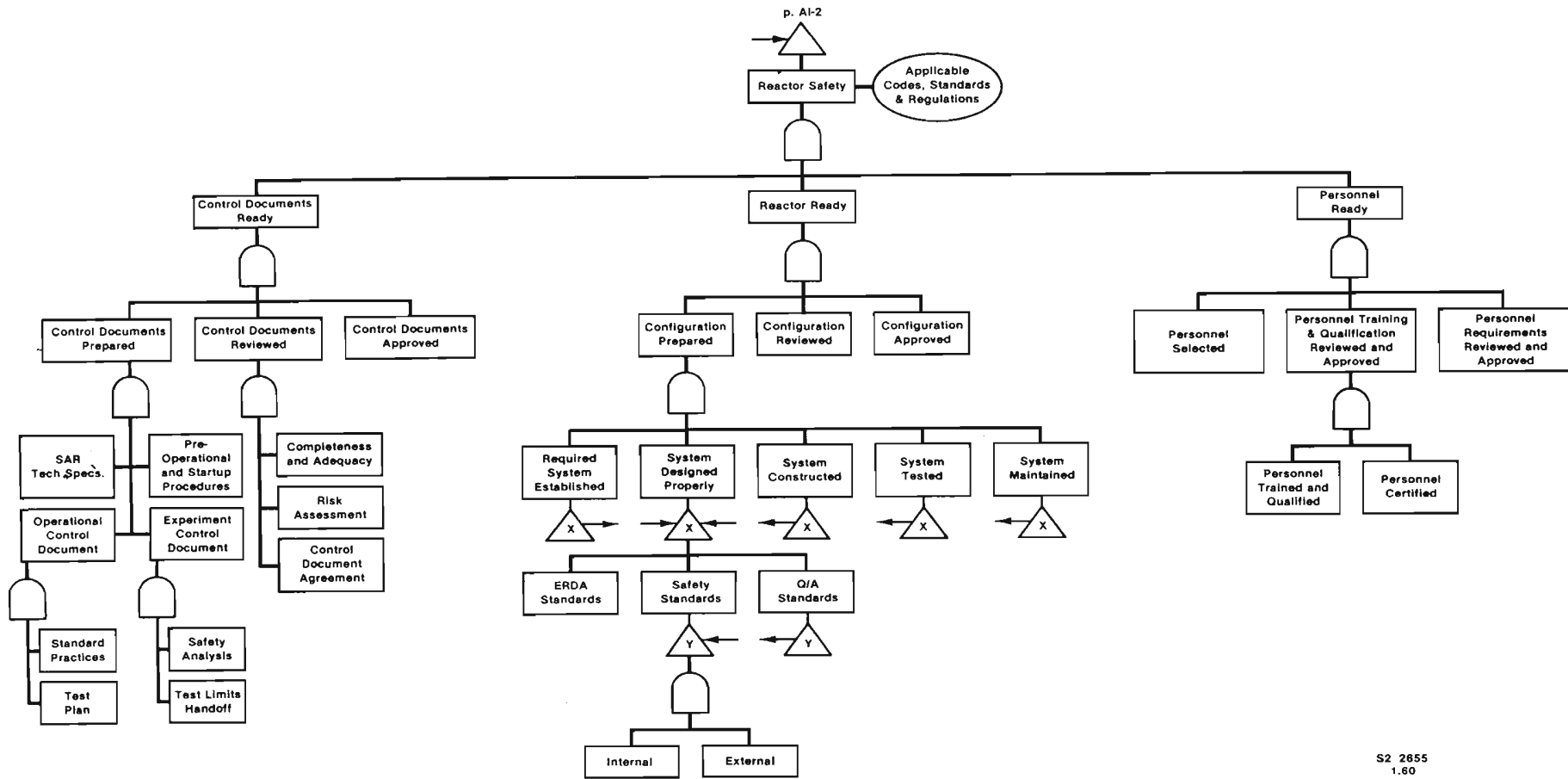


### Operational Controls

p. AI-15



S2 2654  
1.59



S2 2855  
1.60

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

ORDER

DOE 5480.1B

9-23-86

SUBJECT: ENVIRONMENT, SAFETY, AND HEALTH PROGRAM  
FOR DEPARTMENT OF ENERGY OPERATIONS

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1. PURPOSE. To establish the Environment, Safety, and Health (ES&H) Program for Department of Energy (DOE) operations.
2. CANCELLATION. DOE 5480.1A, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION PROGRAM FOR DOE OPERATIONS, of 8-13-81.
3. SCOPE. The provisions of this Order apply to all Departmental Elements and contractors performing work for the Department as provided by law and/or contract and as implemented by the appropriate contracting officer.
4. REFERENCES.
  - a. DOE 0000.1A, STANDARD SUBJECT CLASSIFICATION SYSTEM, of 8-14-79, which contains the categories for filing records and documents.
  - b. DOE 1324.2, RECORDS DISPOSITION, of 5-28-80, which describes the procedures for retention of records and documents.
  - c. DOE 3790.1A, FEDERAL EMPLOYEE OCCUPATIONAL SAFETY AND HEALTH PROGRAM, of 10-22-84, which establishes the policy for the implementation and administration of the occupational safety and health program for Federal employees.
  - d. DOE 5000.3, UNUSUAL OCCURRENCE REPORTING SYSTEM, of 11-7-84, which establishes a system for reporting unusual occurrences having programmatic significance.
  - e. DOE 5440.1C, IMPLEMENTATION OF THE NATIONAL ENVIRONMENTAL POLICY ACT, of 4-9-85, which establishes procedures for implementing the National Environmental Policy Act of 1969.
  - f. DOE 5480.5, SAFETY OF NUCLEAR FACILITIES, of 9-23-86, which establishes DOE's nonreactor nuclear facility safety program.
  - g. DOE 5480.6, SAFETY OF DEPARTMENT OF ENERGY-OWNED NUCLEAR REACTORS, of 9-23-86, which establishes DOE's reactor safety program.
  - h. DOE 5480.14, COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT PROGRAM, of 4-26-85, which establishes a program to identify and remediate inactive hazardous waste disposal sites, and to control hazardous substance mitigation.

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- i. DOE 5481.1B, SAFETY ANALYSIS AND REVIEW SYSTEM, of 9-23-86, which establishes uniform requirements for the preparation and review of safety analyses.
- j. DOE 5482.1B, ENVIRONMENT, SAFETY, AND HEALTH APPRAISAL PROGRAM, of 9-23-86, which presents the Department's policy and requirements for appraisal of environment, safety, and health programs.
- k. DOE 5483.1A, OCCUPATIONAL SAFETY AND HEALTH PROGRAM FOR GOVERNMENT-OWNED CONTRACTOR-OPERATED FACILITIES, of 6-22-83, which provides guidance and establishes procedures for the government-owned contractor-operated safety and health program.
- l. DOE 5484.1, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION INFORMATION REPORTING REQUIREMENTS, of 2-24-81, which establishes the requirements and procedures for reporting and investigating matters of environmental protection, safety, and health protection significance to DOE operations.
- m. DOE 5610.3, PROGRAM TO PREVENT ACCIDENTAL OR UNAUTHORIZED NUCLEAR EXPLOSIVE DETONATIONS, of 12-18-80, which establishes safety policies and procedures applicable to activities involving nuclear explosives.
- n. DOE 5700.1C, MAJOR SYSTEMS ACQUISITIONS, of 9-6-83, which establishes requirements and objectives and assigns responsibilities and authorities necessary for the acquisition of major systems.
- o. DOE 5700.4A, PROJECT MANAGEMENT SYSTEM, of 11-7-83, which provides the principles and requirements which govern the development, approval, and execution of DOE's major system acquisitions and major projects.
- p. DOE 5700.6B, QUALITY ASSURANCE, of 9-23-86, which establishes DOE's quality assurance program.
- q. Title 29 CFR 1960, Safety and Health Provisions for Federal Employees, which provides the regulations and guidelines for the implementation of Executive Order 12196.
- r. Department of Energy Acquisition Regulation, 48 CFR 970.23, and 48 CFR 923.70, which together provide the clauses to be used in contracts where DOE is either required to, or elects to, enforce ES&H requirements.
- s. Executive Order 12088, "Federal Compliance with Pollution Control Standards", which establishes requirements and procedures for Federal agencies to comply with environmental legislation and regulations.

9-23-86

- t. Executive Order 12196, "Occupational Safety and Health Programs for Federal Employees," which establishes the requirement for Federal agencies to provide occupational safety and health programs for their employees.

## 5. DEFINITIONS.

- a. DOE Contractor includes any prime contractor or subcontractor subject to the contractual provisions of 48 CFR 923.70, 48 CFR 970.23, or other contractual provisions where DOE has elected to enforce ES&H requirements by specific negotiated contract provisions.
- b. DOE Operations are those DOE-funded activities for which DOE has assumed responsibility for the environment, safety, and health programs.
- c. Environment, Safety, and Health Overview is an organized set of activities performed as independent functions. Its purpose is to assure that all aspects of environment, safety and health-related activities at the program, project, and contractor level are adequately addressed. Such activities include:
  - (1) Establishing Department-wide environment, safety, and health policies, requirements and standards;
  - (2) Periodic and timely reviews of program and project documents, activities, actions, and plans;
  - (3) Appraising the implementation of environment, safety and health programs at the Headquarters, field, and contractor level as appropriate; and
  - (4) Providing support, assistance, and guidance to Headquarters program offices and field organizations.
- d. Environment, Safety, and Health (ES&H) Program encompasses those DOE requirements, activities, and functions in the conduct of all DOE and DOE-controlled operations that are concerned with: controlling air, water, and soil pollution; limiting the risks to the well being of both operating personnel and the general public to acceptably low levels; and protecting property adequately against accidental loss and damage. Typical activities and functions related to this program include, but are not limited to, the following: environmental protection, occupational safety, fire protection, industrial hygiene, health physics, occupational medicine, process and facilities safety, nuclear safety, emergency preparedness, quality assurance, and radioactive and hazardous waste management.

- e. Environmental Survey is a documented, multidiscipline assessment (with sampling and analysis) of a facility to determine environmental conditions and to identify environmental problem areas of environmental risk requiring corrective action.
- f. Environmental Audit is a documented assessment of a facility to monitor the progress of necessary corrective actions, to assure compliance with environmental laws and regulations, and to evaluate field organization practices and procedures.
- g. Exception is an interim release from a standard of the type specified under the Occupational Safety and Health Act. An exception is processed in accordance with DOE 5483.1A.
- h. Federal Employee Occupational Safety and Health Program is that program mandated by Executive Order 12196 and implemented by 29 CFR 1960, DOE 3790.1A, and HQ 3790.2.
- i. Generic Exemption is a temporary or permanent release from the requirements of this Order or other Orders in the DOE 5480 series, which extends beyond specific facilities and projects or applies to a category of facilities or activities (see also paragraph 8d(6)).
- j. Implementation Plan is a concise description of the approach, resources, and time period planned for implementing Orders that require such plans on a site-wide basis. The plan includes a description of the execution of environmental protection, safety, and health responsibilities and authorities by the field organization, and any proposed generic exemptions to parts of such DOE Orders.
- k. Line Organization is that unbroken chain of command which extends from the Secretary through the Under Secretary, to the Program Senior Officials (PSO) who set program policy and plans and develop assigned programs, to the field organization managers who are responsible to the PSO for execution of these programs, to the contractors who conduct the programs. Environment, safety, and health are integral parts of each program. Accordingly, line management responsibility for ES&H functions flows from the Secretary through the Under Secretary, to the PSO, to the field organization managers, to the contractors.
- l. Program Senior Official (PSO) is a senior outlay program manager and includes the Assistant Secretaries for Conservation and Renewable Energy, Defense Programs, Fossil Energy, and Nuclear Energy, the Director of Energy Research, and the Director of Civilian Radioactive Waste Management. For purposes of this Order, this definition also includes the Administrators of the Bonneville and Western Area Power Administrations.

9-23-86

- m. Standard means a specified set of rules or conditions concerned with the classification of components; delineation of procedures; definition of terms; specifications of materials, performance, design, or operations; or measurements of quality in describing materials, products, systems, services or practices. Standards may be specified by DOE as mandatory (i.e., required) or recommended.
- n. Technical Safety Appraisal is a documented, multidiscipline appraisal of selected Department reactors and nuclear facilities conducted by a team selected by the Deputy Assistant Secretary for Safety, Health, and Quality Assurance (EH-30). They assure proper Department-wide application of particular safety elements of the ES&H program, nuclear industry lessons learned, and appropriate licensed facility requirements as described in DOE 5482.1B, paragraph 9b.
- o. Unreviewed Safety Question. A proposed change, test, or experiment shall be deemed to involve an unreviewed safety question if:
  - (1) The probability of occurrence or the consequences of an accident or malfunction of equipment important to safety evaluated previously by safety analyses will be significantly increased, or
  - (2) A possibility for an accident or malfunction of a different type than any evaluated previously by safety analyses will be created which could result in significant safety consequences.
- p. Variance is a release from a standard of the type specified under the Occupational Safety and Health Act which is processed in accordance with DOE 5483.1A.

## 6. APPLICATION.

- a. This Order applies to the ES&H programs at all Government-owned contractor-operated (GOCO) facilities including the occupational safety and health programs for DOE contractor employees at GOCO facilities where the contracts include the occupational safety and health contract clause specified in DOE Acquisition Regulations 48 CFR 923.70 and 48 CFR 970.23. This Order also applies to environmental protection programs and programs for the protection against accidental loss or damage to property as provided by law and/or contract and as implemented by the appropriate contracting officer. This Order does not apply to the occupational safety and health programs for non-GOCO contractor employees doing work for the Department or Federal employees as described in DOE 3790.1A (see paragraph 8e of this Order).
- b. A partial or complete variance from this Order may be granted when compliance with the Order may be inconsistent with external regulatory, legislative, or judicial requirements imposed on a DOE program. Such

variances shall be recorded by means of a memorandum of understanding (MOU) to be signed by the Assistant Secretary for Environment, Safety, and Health (EH-1) and by the requesting Program Senior Official (PSO). The MOU will contain the basis for the granting of the variance, the identification of the specific portion(s) of the Order to which the variance applies, and, when applicable, the alternative measures that will be implemented to accomplish the intent and purpose of the Order's requirements.

7. POLICY. It is Department policy to:

- a. Assure the protection of the environment and the health and safety of the public.
- b. Assure safe and healthful workplaces and conditions of employment for all employees of DOE and DOE contractors as described in paragraph 6, above.
- c. Protect Government property against accidental loss and damage.
- d. Assure compliance with applicable statutory requirements affecting Federal facilities and operations and where possible, consistent with the Department's mission and supported by appropriate cost/benefit analysis, reduce identified environment, safety, and health risks, even though not mandated by specific requirements.
- e. Assure that quality assurance is pursued (i.e. that research, development, demonstration, and production activities are performed in a controlled manner; that components, systems, and processes are designed, developed, constructed, tested, operated, and maintained according to industry accepted engineering standards, quality practices, and Technical Specifications/Operational Safety Requirements; and that resulting technology data are valid and retrievable).
- f. Require line management to be responsible for effective Environment, Safety, and Health (ES&H) performance in their programs. Through overview, the Assistant Secretary for Environment, Safety, and Health (EH-1) is responsible to assure acceptable ES&H performance for the Secretary and for Program Senior Officials.

8. RESPONSIBILITIES AND AUTHORITIES.

- a. Under Secretary (S-3) has overall responsibility and authority for DOE programs and may take necessary management actions to ensure safety, including directing the curtailment and suspension of operations, when in his or her opinion, such operation would result in an undue risk.
- b. Program Senior Officials (PSO) are assigned primary responsibility for implementation of the DOE ES&H program. This responsibility includes confirming that DOE and Federal ES&H policies and directives are

adhered to vigorously in all DOE operations. Including responsibilities described in other DOE 5480 series Orders, PSOs shall:

- (1) Provide clear and explicit delegations of authority and responsibilities.
- (2) Ensure that appropriate ES&H requirements, as identified in the DOE Orders, are included in program plans and proposals for design, construction, operation, modification, and decommissioning of DOE operations.
- (3) Take necessary management actions, including the requirement that budget proposals for their assigned functions provide adequate ES&H resources.
- (4) Confirm that applicable ES&H requirements are identified and provided to the contracting officers for inclusion in contracts.
- (5) Perform program reviews to confirm effective implementation of DOE ES&H requirements by program and field organizations. In the execution of this responsibility, maximum use should be made of the appraisals and other reviews performed by EH, including assuring that recommendations made by EH are addressed in a responsive and timely manner.
- (6) Provide program and project direction to the field organizations consistent with the ES&H Orders and ES&H policy guidance requirements relating to ES&H. Program or project direction that is related to ES&H and affects more than one field organization must be concurred in by EH-1.
- (7) Provide EH-1 with copies of field organization implementation plans for DOE 5480 series Orders.
- (8) Review and, subsequent to EH-1 concurrence, approve implementation plans for DOE 5480 series Orders submitted by field organizations.
- (9) Assume the responsibilities assigned to Heads of Field Organizations in paragraph 8d below for DOE program activities not assigned to a field organization for implementation.
- (10) Take such action as may be appropriate to ensure safety, including directing the field organization head to curtail and suspend operations when, in their opinion, such operation would result in an undue ES&H risk.
- (11) Ensure that documents generated under this Order and other DOE 5480 series Orders are reviewed for classification where appropriate.

- (12) Request EH-1 concurrence in generic exemptions (post implementation plan) from ES&H requirements and responsibilities as contained in the DOE 5480 series Orders.
  - (13) Participate in selected field organization appraisals, as appropriate, in accordance with DOE 5482.1B.
  - (14) Ensure that EH-1 recommendations on ES&H upgrades are considered in their formulation of budget requests to the Office of Management and Budget and Congress.
  - (15) Approve the construction and initial operation of reactors and high and selected moderate hazard facilities or modifications thereto involving an unreviewed safety question in accordance with DOE 5481.1B.
  - (16) Assure that EH-1 is provided all information and documentation requested to enable efficient discharge of their overall ES&H responsibilities.
- c. Assistant Secretary for Environment, Safety and Health (EH-1) shall:
- (1) Develop and establish ES&H policies, standards, guidance, requirements, and procedures for DOE projects and program operations, including but not limited to those on notification, investigation, and reporting of occurrences having ES&H significance.
  - (2) Review and concur in ES&H program and project direction issued by a PSO to the field that is directly related to ES&H matters which affect more than one field organization.
  - (3) Provide advice and assistance concerning ES&H programs to line organizations.
  - (4) Seek the advice of appropriate field organizations and program offices in determining ES&H research and technical assistance activities to be undertaken.
  - (5) Provide a central point for coordination within DOE and liaison with other agencies and groups in the development of ES&H related regulations, standards, and requirements; and resolution of environmental, safety, or health issues applicable to DOE operations, including review of proposed statutes (where appropriate), regulations, standards, and requirements for their application to and potential impact on DOE activities; and participation in the development and review of general design criteria.
  - (6) Develop guidelines on the content of field organization Implementation Plans which will be used by all field organizations to ensure a consistent approach to the implementation of the DOE 5480 series Orders where required.

- (7) Review and concur in all field organization Implementation Plans for DOE 5480 series Orders.
- (8) Conduct appraisals of the line organization's ES&H programs in accordance with DOE 5482.1B and other DOE 5480 series Orders.
- (9) Identify needs for research and development to support ES&H programs and recommend appropriate actions.
- (10) Provide a central point for the collection, retention, evaluation and dissemination of information having ES&H significance.
- (11) Render interpretations of this Order and other DOE 5480 series Orders.
- (12) Provide independent assurance that safety analyses are prepared and reviewed in accordance with DOE 5481.1B.
- (13) Concur in generic exemptions from ES&H requirements and responsibilities contained in DOE 5480 series Orders.
- (14) Process requests for variances from occupational safety and health standards in accordance with the procedures of DOE 5483.1.
- (15) Conduct reviews of facilities and operations including, technical safety appraisals of Department reactors and nuclear facilities, environmental surveys, and environmental audits. The planning and conduct of these reviews will be coordinated with the appropriate field organizations and Headquarters program offices to minimize overlap or duplication of effort. Appropriate field organizations and Headquarters program offices will be requested to participate.
- (16) Participate in selected field organization ES&H appraisals of contractor facilities/operations in accordance with DOE 5482.1B. All participation shall be as a full active member and scheduled for the year at the time of the annual submittal by the field of its proposed appraisal schedule.
- (17) Provide an independent prioritization of ES&H corrective actions and upgrade projects to the PSO and the Assistant Secretary for Management and Administration (MA-1), for use in initiating and, ultimately, by the Under Secretary, in establishing the Departmental budget requested. This input would be based on a number of information sources including ES&H appraisals, environmental surveys, environmental audits, and Field Office Manager's and PSO's recommended budget requests.

- (18) For reactors and high and selected moderate hazard facilities, concurs in accordance with DOE 5481.1B, with the safety related aspects of the construction and initial operating authorizations or modifications involving an unreviewed safety question.
- (19) Prepare and coordinate Departmental comments on emerging regulations, and policies of other agencies related to ES&H that could impact DOE projects and program operations.
- (20) Curtail or suspend operations at DOE facilities, under the conditions described below, when a clear and present danger exists to workers or members of the public. (Clear and present danger is a condition or hazard which could reasonably be expected to cause death or serious harm to plant workers or the public immediately or before such condition or hazard can be eliminated through normal procedures.)
- (a) Whenever EH-1, in carrying out his or her responsibilities, determines that the environmental, safety, or health conditions at any DOE facility present a clear and present danger, EH-1 shall notify the Under Secretary that such a determination has been made. In addition, notification shall be provided to the Program Senior Official and the Head of the appropriate Field Element. Upon receiving such notification, the Head of the Field Element shall take immediate action to curtail or suspend the operation and to mitigate the danger.
- (b) If appropriate action is not taken to curtail or suspend the operation and mitigate the identified danger, EH-1 shall advise the Secretary. In the event that the Secretary is unavailable, EH-1 is authorized to direct the PSO or field element to suspend or curtail an operation which EH-1 has determined is posing a clear and present danger until the danger has been mitigated.
- (c) The authority reflected in subparagraph (20) may not be redelegated or assumed by acting officials and will terminate on 1-31-88, unless specifically renewed.

- d. Heads of Field Organizations are responsible for assuring that all operations under their jurisdiction are carried out consistent with sound ES&H practices and in accordance with the ES&H Orders. In carrying out this responsibility the Heads of Field Organizations shall:
- (1) Execute programs and assure that contractors and their subcontractors execute programs and policies which utilize appropriate ES&H program elements, as identified in this and other Orders for siting, design, construction, operation, maintenance, modification, deactivation, decontamination, and decommissioning of DOE facilities and activities.
  - (2) Take such action as may be appropriate to assure acceptable environment, safety, and health, including curtailment and suspension of operations when, in their opinion, such operation would result in an undue ES&H risk.
  - (3) In the selection of contractors, ensure the ability of offerors to meet ES&H requirements. Assure that applicable environment, safety, health, and quality assurance requirements are included in contracts.
  - (4) Execute programs and assure that contractors and their subcontractors execute programs and policies in a manner that complies with mandatory requirements relating to ES&H.
  - (5) Appraise the programs, projects, and facilities of subordinate field activities in accordance with DOE 5482.1B, and other DOE 5480 series Orders.

- (6) Prepare implementation plans for this Order and other DOE 5480 series Orders.
- (a) These plans shall include:
- 1 The designation of ES&H responsibilities and authorities by the field organization and their contractors; and
  - 2 A concise description of the approach, resources, and time period planned for implementing Orders that require such plans on a site wide basis, including a description of the execution of ES&H responsibilities and authorities by the field organization, and any proposed generic exemptions to parts of such Orders.
- (b) The field organization implementation plans will be reviewed and approved by the cognizant PSO before implementation. This requirement in no way prohibits Heads of Field Organizations from initiating actions of necessity in exercising responsibility for environment, safety, and health activities. Specific exemptions to the requirements of this Order or other ES&H Orders which are dependent on specific facility designs would not be a part of the implementation plans but shall be identified in the facility design documentation and safety analysis which will be reviewed and approved in the normal process of facility design and operation and assessed as part of the ES&H appraisal programs.
- Note: These procedures for specific exemptions do not apply to Federal regulations (such as the National Environmental Policy Act), Environmental Impact Statements, or Environmental Assessment documents.
- (7) Establish and maintain liaison with regional, State, or local officials as appropriate, and advise the responsible PSO of any ES&H requirements issued by these officials that will significantly affect their operations. Concurrently advise EH-1 of all requirements issued that will significantly affect any DOE operation.
- (8) Grant exceptions to, and process requests for variances from occupational safety and health standards in accordance with DOE 5483.1.
- (9) Request Program Senior Official approval of generic exemptions from ES&H requirements and responsibilities as contained in the DOE 5480 series Orders.

DOE 5480.1B  
9-23-86

- (10) Authorize the construction and initial operation of reactors and high and moderate hazard facilities or modifications thereto involving an unreviewed safety question in accordance with DOE 5481.1B.
- (11) Assure that documents generated under this Order are reviewed for classification where appropriate.
- (12) Provide EH-1 with copies of their prioritized recommendations for major ES&H upgrades and corrective actions included in their budget requests to the PSO.
- (13) Provide EH-1 all information and documentation requested to enable efficient discharge of EH-1 overall responsibilities.
- (14) Assure the establishment, implementation, and maintenance of a Quality Assurance Program, by DOE contractors to whom this Order is made applicable, in accordance with this Order and DOE 5700.6B.
- (15) Provide for an overview of environment, safety, and health in their organization independent of line management responsibility.

NOTE: The Manager, Pittsburgh Naval Reactors Office, and the Manager, Schenectady Naval Reactors Office, together with their branch field offices located at DOE Naval Reactor prototype sites, report to the Deputy Assistant Secretary for Naval Reactors because of their unique responsibility solely involved with the Naval Reactors Program. In this regard, the Deputy Assistant Secretary for Naval Reactors will continue to carry out responsibilities for approving implementation of DOE requirements in such areas as reactor safety, criticality control, radiation protection, and radiological environmental monitoring and protection defined herein and in other DOE Orders for field organization managers.

- e. The Director of Administration (MA-2) is responsible for the administration and overview of the Federal Employee Occupational Safety and Health Program. In carrying out this function, MA-2 responsibilities and authorities are detailed in DOE 3790.1A. Questions regarding impact on Federal employees shall be addressed to this organization.
- f. Deputy Assistant Secretary for Naval Reactors shall:
  - (1) Be responsible for conducting management appraisals, implementing DOE ES&H requirements, and establishing overviews in such areas as reactor safety, criticality control, radiation protection, and radiological environmental monitoring and protection in the Naval Reactors Program. These appraisals, implementation actions, and overviews are excluded from EH-1 responsibility, notification, requirements, and authority.

- (2) Carry out responsibilities assigned herein and in other DOE ES&H Orders to field organization managers for approving and implementing DOE requirements in such areas as reactor safety, criticality control, radiation protection, and radiological environmental monitoring and protection.
- (3) Carry out the responsibilities and authorities of a Program Secretarial Officer for activities under his cognizance.



JOHN S. HERRINGTON  
Secretary

REDESIGNATION OF THE CHAPTERS OF DOE 5480.1A\*

<u>DOE 5480.1A Chapter No.</u>	<u>Title</u>	<u>New Order No.</u>
I	ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION STANDARDS	5480.4
None	HAZARDOUS AND RADIOACTIVE MIXED WASTE MANAGEMENT	5480.2
III	SAFETY REQUIREMENTS FOR THE PACKAGING OF FISSILE AND OTHER RADIOACTIVE MATERIALS	5480.3
V	SAFETY OF NUCLEAR FACILITIES	5480.5
VI	SAFETY OF DEPARTMENT OF ENERGY OWNED REACTORS	5480.6
VII	FIRE PROTECTION	5480.7
VIII	CONTRACTOR OCCUPATIONAL MEDICAL PROGRAM	5480.8
IX	CONSTRUCTION SAFETY AND HEALTH PROGRAM	5480.9
X	INDUSTRIAL HYGIENE PROGRAM	5480.10
XI	REQUIREMENTS FOR RADIATION PROTECTION	5480.11
XII	PREVENTION, CONTROL, AND ABATEMENT OF ENVIRONMENTAL POLLUTION	5480.12
XIII	AVIATION SAFETY	5480.13

\* Individual chapters will remain in effect until replaced by a new Order.



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

**ORDER**

DOE 5483.1A

6-22-83

**SUBJECT: OCCUPATIONAL SAFETY AND HEALTH PROGRAM FOR DOE CONTRACTOR EMPLOYEES  
AT GOVERNMENT-OWNED CONTRACTOR-OPERATED FACILITIES**

1. PURPOSE. To establish requirements and procedures to assure that occupational safety and health standards prescribed pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, and the Department of Energy Organization Act of 1977, provide occupational safety and health protection for Department of Energy (DOE) contractor employees in Government-owned contractor-operated (GOCO) facilities which is consistent with the protection afforded private industry employees by the occupational safety and health standards promulgated under the Occupational Safety and Health Act of 1970 (OSHA), Public Law 91-596.
2. CANCELLATION. DOE 5483.1, OCCUPATIONAL SAFETY AND HEALTH PROGRAM FOR GOVERNMENT-OWNED CONTRACTOR-OPERATED FACILITIES, OF 4-13-79.
3. SCOPE. The provisions of this Order apply to all elements of DOE and to DOE contractors whose contracts include the occupational safety and health contract clause specified in DOE Procurement Regulation (PR) 9-50.704-2(a). The provisions of this Order apply only with respect to radiation hazards in the workplace to DOE contractors whose contracts include the radiation protection contract clause specified in DOE PR 9-50.704-2(b).
4. BACKGROUND. Based upon section 4(b)(1) of the Occupational Safety and Health Act of 1970, the provisions of that Act do not apply to the working conditions of DOE contractor employees working in GOCO facilities since DOE exercises statutory authority to prescribe and enforce safety and health standards at these facilities.
5. REFERENCES.
  - a. "Occupational Safety and Health Act of 1970," Public Law 91-596, which establishes Federal requirements for assuring occupational safety and health protection for employees.
  - b. "Occupational Safety and Health Standards," Title 29 CFR Part 1910, which provide general industry safety and health standards pursuant to Public Law 91-596.
  - c. "Occupational Safety and Health Standards for Shipyard Employees," Title 29 CFR Part 1915, which provide shipyard safety and health standards pursuant to Public Law 91-596.
  - d. "Occupational Safety and Health Standards for Agriculture," Title 29 CFR Part 1918, which provide agricultural safety and health standards pursuant to Public Law 91-596.

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307

6-22-83

- e. "Safety and Health Regulations for Construction," Title 29 CFR Part 1926, which provide construction safety and health standards pursuant to Public Law 91-596.
- f. "Safety and Health Regulations for Longshoring," Title 29 CFR Part 1928, which provide longshoring safety and health standards pursuant to Public Law 91-596.
- g. OSHA Form 200-S, a U.S. Department of Labor form, used to report annual occupational injury and illness survey information on an as requested basis.
- h. DOE 1324.2, RECORDS DISPOSITION, of 5-28-80, which provides retention periods for DOE and contractor records.
- i. DOE 5480.1A, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION PROGRAM FOR DOE OPERATIONS, of 8-13-81, which establishes the environmental protection, safety, and health protection program for DOE operations.
- j. DOE 5484.1, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION INFORMATION REPORTING REQUIREMENTS, of 2-24-81, which establishes the requirements and procedures for the reporting of information having environmental protection, safety, or health protection significance for DOE operations.
- k. DOE F 5480.2, "Occupational Safety and Health Protection," a poster which outlines contractor responsibilities to provide occupational safety and health protection. The Spanish language version is DOE F 5480.3.
- l. DOE F 5480.4, "Occupational Safety or Health Complaint," which may be used to report information regarding safety and health hazards and/or situations believed to be in nonconformance with the DOE-prescribed OSHA standards.
- m. DOE Form EV-102A, "Summary of DOE and DOE Contractor Occupational Injuries and Illnesses," which is posted in the workplace to notify employees of occupational injury and illness statistics for the previous calendar year.
- n. DOE Form EV-632, "Radiation Protection and Nuclear Criticality Safety," a poster which outlines contractor responsibilities to provide radiation and nuclear criticality safety protection. The Spanish language version is DOE Form EV-632S.
- o. DOE PR 9-50.704-2(a), which specifies the standard clause used in contracts where DOE elects to enforce occupational safety and health requirements.
- p. DOE PR 9-50.704-2(b), which specifies the standard clause used in contracts where DOE elects to enforce radiation protection and nuclear criticality safety requirements.

6-22-83

6. DEFINITIONS.

- a. Compliance Inspection. A documented visit to and evaluation of a GOCO Facility, to include an examination of the equipment, physical plant, methods, operations, procedures, and processes, to assess and assure the contractor's conformance with the DOE-prescribed OSHA standards.
- b. Complaint. An oral or written communication by an employee or representative thereof, alleging that there are conditions in the work environment which are in violation of the DOE-prescribed OSHA standards or which pose safety or health hazards to employees.
- c. Contracting Officer (CO). A DOE official designated by Headquarters to enter into or administer contracts between DOE and contractors, and make contract-related determinations and findings.
- d. Contracting Officer's Representative. A DOE employee designated in writing by the contracting officer to represent the contracting officer for administrative and technical functions regarding the contract between DOE and the contractor.
- e. Contractor. For purposes of this Order, any DOE prime contractor or subcontractor thereto subject to the contractual provisions of DOE PR 9-50.704-2(a) or (b).
- f. Contractor Employee. A person who is employed by a contractor.
- g. Discrimination. Discharge, demotion, reduction in pay, coercion, restraint, threats, or other negative actions taken against a contractor employee by a contractor, as a result of the employee's exercise of occupational safety and health rights set forth in this Order.
- h. DOE-Prescribed OSHA Standards. Occupational safety and health requirements promulgated under Public Law 91-596 and listed on page I-1, paragraph 1.
- i. Exception. An interim release from a DOE-prescribed OSHA standard, granted after a request for a temporary or permanent variance. Exceptions shall not exceed 180 days and are not renewable.
- j. Field Organization. A DOE field-based office which is responsible for the management, coordination, and administration of operations under its purview, and reports to the cognizant program Secretarial Officer(s) or equivalent, through the appropriate program office(s).
- k. Government-Owned Contractor-Operated Facility. For the purposes of this Order, a facility owned or leased by DOE or a contractor for the account of DOE in connection with which DOE prescribes and enforces through contractual provisions, occupational safety and health standards pursuant

6-22-83

to the authority in the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, and the Department of Energy Organization Act of 1977, for contractor employees working therein. A listing of these GOCO facilities is maintained by the Office of Operational Safety (EP-32).

- l. Imminent Danger. Any condition or practice which is such that a hazard exists that could reasonably be expected to cause death or serious physical harm to employees (permanent or prolonged impairment of the body or temporary disablement requiring hospitalization), unless immediate actions are taken to mitigate the effects of the hazard and/or remove employees from the hazard.
- m. National Institute for Occupational Safety and Health. An Agency of the U.S. Department of Health and Human Services, established under Public Law 91-596 with major responsibility to undertake National occupational safety and health research and development activities.
- n. Occupational Safety and Health Administration. An Agency of the U.S. Department of Labor, established under Public Law 91-596 with major responsibilities to promulgate, prescribe, and enforce occupational safety and health standards.
- o. Permanent Variance. A release from a DOE-prescribed OSHA standard. Such variances are not time-specified.
- p. Program Office. A Headquarters organization which is responsible for assisting and supporting field organizations in safety and health, administrative, management, and technical areas, and reports to the cognizant program Secretarial Officer.
- q. Program Secretarial Officer. An outlay program manager, which includes the Assistant Secretaries for Conservation and Renewable Energy, Fossil Energy, Defense Programs, and Nuclear Energy, and the Director of Energy Research.
- r. Representative of Employees. A person chosen by contractor employees to represent their occupational safety and health related views, interests, and concerns. For purposes of access to an employee's bioassay, monitoring, or radiation exposure records, if the representative is not the recognized/certified collective bargaining agent, then he or she must have the employee's written authorization for such access.
- s. Safety and Health Director. The primary field organization staff manager responsible for the overview and coordination of the occupational safety and health program administered by a field organization for its contractor operations.

- t. Temporary Variance. A short-term release from a DOE-prescribed OSHA standard. Such variances shall not exceed 1 year, except that in unusual cases a renewal may be granted, not to exceed an additional year.

7. RESPONSIBILITIES AND AUTHORITIES.

- a. Under Secretary. Line management responsibility for occupational safety and health at GUCO facilities flows from the Under Secretary to the program Secretarial Officers to the Heads of the Field Organizations.

- b. Assistant Secretary, Environmental Protection, Safety, and Emergency Preparedness (EP-1).

(1) Promulgates, amends, or revokes, as appropriate, DOE-prescribed OSHA standards for GUCO facilities, and responds to requests for such actions.

(2) Determines the disposition of and responds to requests for permanent variances from the DOE-prescribed OSHA standards.

- c. Director of Operational Safety (EP-32).

(1) Provides reviews for and makes appropriate recommendations to the Assistant Secretary, Environmental Protection, Safety, and Emergency Preparedness, in the following areas:

(a) Requests for promulgation, amendment, or revocation of DOE-prescribed OSHA standards.

(b) Requests for permanent variances from the DOE-prescribed OSHA standards.

(2) Determines the disposition of and responds to requests for temporary variances from the DOE-prescribed OSHA standards.

(3) Determines appropriateness of and responds to requests concerning abatement of violations of DOE-prescribed OSHA standards.

(4) Investigates and responds to requests for resolution of problems associated with field organization investigation of and/or response to complaints.

(5) Maintains a listing of Departmental GUCO facilities.

(6) Coordinates matters regarding paragraphs 7c(1)-(5), above, with the appropriate safety and health officials of the cognizant program office(s).

- d. Directors of Naval Reactors and Administrative Services, Heads of Field Organizations, and Officials Designated as Contracting Officers or Contracting Officer's Representatives.
- (1) Determine those contractors that are subject to this Order and advise them accordingly.
  - (2) Review design, engineering, construction, and related planning documents and activities to assure compliance with the DOE-prescribed OSHA standards in the construction, modification, operation, or decommissioning of GOCO facilities.
  - (3) Provide for and participate in the development of new occupational safety and health standards or modification to existing standards as required by Chapter I.
  - (4) Process requests for promulgation, amendment, or revocation of standards, and requests for temporary or permanent variances from the DOE-prescribed OSHA standards in accordance with the procedures in Chapter I.
  - (5) Grant or deny requests for exceptions to DOE-prescribed OSHA standards in accordance with the procedures for exceptions in Chapter I.
  - (6) Assure that compliance inspections of GOCO facilities are conducted in accordance with the inspection procedures in Chapter I.
  - (7) Assure that contractor employee complaints are investigated and handled in accordance with the complaint procedures outlined in Chapter II.
  - (8) Investigate and take appropriate actions regarding accidents and allegations of discrimination as set forth in Chapter III.
  - (9) Consider, in contract renewal or in other reviews of contractor performance, violations of the DOE-prescribed OSHA standards and the timing and manner of correction. Willful violation of the standards or refusal or failure to abate violations of the standards may be justification for contract termination.
  - (10) Establish procedures to admit (as a matter of comity, for safety and health orientation or consultation) officials of the National Institute for Occupational Safety and Health, the Occupational Safety and Health Administration, and the various State safety and health agencies, provided they meet field organization requirements. Such visits are to be coordinated with the Office of Operational Safety (EP-32) and the cognizant program office(s).

(11) Require contractors to:

- (a) Furnish to contractor employees, employment and a place of employment which are as free from occupational safety and health hazards as possible.
- (b) Establish and implement programs and procedures in support of this Order which assure that:
  - 1 There is meaningful contractor employee participation in all aspects of the occupational safety and health program.
  - 2 All existing equipment, materials, facilities, and operations are in compliance with DOE-prescribed OSHA standards.
  - 3 All equipment and materials which are to be procured and all new facilities, modifications, or additions to existing facilities comply with DOE-prescribed OSHA standards.
  - 4 The workplace is monitored for, and records maintained of, known toxic substances and harmful physical agents which are used or produced at the GOCU facility.
  - 5 Availability and maintenance of, requests for changes to, and requests for variances or exceptions from, the DOE-prescribed OSHA standards are in accordance with Chapter I.
  - 6 Contractor employees are fully informed of their rights, protections, obligations, and responsibilities as required by Chapter I.
  - 7 Compliance inspections are conducted in GOCU facilities, using the inspection procedures of Chapter I as general guidelines.
  - 8 Contractor employee safety and health complaints are investigated promptly and resolved equitably according to the requirements of Chapter II.
  - 9 Contractor employees who exercise their rights under this Order are not discriminated against, as required by Chapter III.

- 10 Occupational safety and health records and information are maintained and posted as prescribed by Chapter III.
- 11 Accident investigations are conducted as required by Chapter III.



WILLIAM S. HEFFELFINGER  
Director of Administration

TABLE OF CONTENTS

	<u>Page</u>
<u>CHAPTER I - STANDARDS, INSTRUCTIONS, AND INSPECTIONS</u>	
1. DOE-prescribed OSHA Standards.....	I-1
2. Standards File .....	I-1
3. DOE-prescribed OSHA Standards Promulgation, Amendment, or Revocation .....	I-1
4. Variance and Exception Request, Evaluation, and Response Procedures .....	I-2
5. Instructions to and Information for Employees .....	I-4
6. Compliance Inspections .....	I-5
 <u>CHAPTER II - OCCUPATIONAL SAFETY AND HEALTH COMPLAINTS</u>	
1. Submission .....	II-1
2. Inspection .....	II-1
3. Imminent Danger Complaints - Submission and Inspection .....	II-2
4. Response to Complainants .....	II-2
5. Complaint Resolution .....	II-2
 Attachment II-1 - DOE F 5480.4, "Occupational Safety or Health Complaint".....	 II-5
 <u>CHAPTER III - NONDISCRIMINATION, INJURY AND ILLNESS INFORMATION, AND ACCIDENT INVESTIGATIONS</u>	
1. Nondiscrimination .....	III-1
2. Recordkeeping .....	III-1
3. Posting .....	III-2
4. Accident Investigation .....	III-2



6-22-83

CHAPTER 1STANDARDS, INSTRUCTIONS, AND INSPECTIONS

1. DOE-PRESCRIBED OSHA STANDARDS. As applicable to their work in GOCO facilities, contractors shall comply with the following DOE-prescribed OSHA standards:
  - a. "Occupational Safety and Health Standards," Title 29 CFR Part 1910.
  - b. "Safety and Health Regulations for Construction," Title 29 CFR Part 1926.
  - c. "Occupational Safety and Health Standards for Shipyard Employees," Title 29 CFR Part 1915,
  - d. "Safety and Health Regulation for Longshoring," Title 29 CFR Part 1918.
  - e. "Occupational Safety and Health Standards for Agriculture," Title 29 CFR Part 1928.
2. STANDARDS FILE. Each contractor shall assure that current copies of DOE-prescribed OSHA standards cited in paragraph 1, above, along with the contractor's own safety and health procedures applicable to the workplace, are available in a place and form reasonably accessible to all employees and their authorized representatives.
3. DOE-PRESCRIBED OSHA STANDARDS PROMULGATION, AMENDMENT, OR REVOCATION. Contractors and contractor employees (or representatives thereof), may submit written requests to the cognizant CO or CO representative that new standards be promulgated to cover occupational safety and health hazards not addressed by the existing DOE-prescribed OSHA standards, or that the existing standards be amended or revoked to assure effective coverage of hazards. The CO or CO representative, the safety and health director, and other appropriate elements of the field organization shall provide a comprehensive review and evaluation of the request and forward it (along with their recommendation) to the Office of Operational Safety (EP-32) within 60 days of receipt of the request. EP-32 shall review and coordinate the request and recommendation of the field organization with the appropriate program office(s). Based on an analysis of the request and supporting information, EP-32 shall recommend to the Assistant Secretary, Environmental Protection, Safety, and Emergency Preparedness (EP-1), that Headquarters promulgate, amend, or revoke the standard(s) in question. EP-1 shall provide a decision in writing through the field organization and contractor to the requestor, within 60 days of receipt of the request by EP-32. If the decision is that a new, amended, or revoked standard is not needed, the requestor shall be so informed and no further action shall be necessary. However, if the decision is that a new, amended, or revoked standard is needed, a proposed or temporary standard shall be issued by EP-1 within 60 days after such a decision has been made. Field organizations, contractors, contractor

6-22-83

employees, and representative thereof, whose working conditions would be affected by the standard, shall have the opportunity to review and comment on proposed or temporary standards before their promulgation or amendment as final standards. The field organization shall develop and implement procedures for such review and comment so that the results thereof are provided to EP-32 within 90 days of receipt (in the field) of the proposed or temporary standard. EP-32 shall review and coordinate the comments with the appropriate program office(s) and provide a recommendation to EP-1. After consideration of the comments, analyses thereof, and recommendation(s), EP-1 shall promulgate a new, amended, or revoked standard within 180 days of receipt of the comments by EP-32. EP-32 shall effect DOE-wide notification of the final standard by formal correspondence to appropriate Departmental Elements, contractors, and the requestor of the standard.

#### 4. VARIANCE AND EXCEPTION REQUEST, EVALUATION, AND RESPONSE PROCEDURES.

##### a. Temporary Variances.

- (1) A contractor may apply to the appropriate CO or CO representative for a temporary variance from the DOE-prescribed OSHA standards. A request for a temporary variance shall contain:
  - (a) A specification of the standard from which the contractor seeks a variance.
  - (b) A representation that the contractor is unable to comply with the standard and a detailed statement of the reasons therefor.
  - (c) A statement of the steps the contractor has taken and will take to protect employees from the hazard covered by the standard, to include the conditions the contractor must maintain and the practices, means, methods, operations, and processes which must be adopted and utilized to the extent they provide protection equivalent to that of the standard for which the variance is requested.
  - (d) A certification that the contractor has informed employees of the application by giving a copy thereof to their authorized representative (where applicable), posting a statement, giving a summary of the request, and specifying where a copy may be examined (e.g., at the place or places where notices to employees are normally posted), and by other appropriate means. A description of how employees have been informed shall be contained in the certification. The information to employees also shall inform them that they may comment on the request to the appropriate CO or CO representative.
  - (e) A statement of when the contractor will be able to comply with the standard and what steps have been taken and will be taken by the contractor to come into compliance with the standard.

- (2) The CO or CO representative, the safety and health manager, and other appropriate elements of the field organization shall review the contractor's request and the employees' comments and submit the field organization's recommendation, together with the contractor's request and contractor employee comments, to the Director of Operational Safety (EP-32) within 30 days of receipt of the request. After review and evaluation of the request, comments, and recommendation, and after coordination with the appropriate program office(s), EP-32 shall approve a temporary variance if the request establishes that (a) the contractor is unable to comply with the standard because of unavailability of professional or technical personnel, materials or equipment, funding needed to come into compliance with the standard, or because necessary construction or alteration of facilities must be completed in order to comply; (b) the contractor is taking all available steps to safeguard employees against the hazards covered by the standard; and (c) the contractor has an effective program for coming into compliance with the standard as quickly as practicable.
- (3) A temporary variance may be in effect for no longer than the period needed by the contractor to achieve compliance with the standard or 1 year, whichever is shorter, except that in unusual circumstances (e.g., lack of programmatic funding) such a temporary variance may be renewed not more than once. Such a renewal also shall be in effect for no longer than 1 year. An application for renewal must be filed and processed in the manner specified in paragraph 4a(2), above at least 90 days prior to expiration of the temporary variance. Employees also shall be given an opportunity to review and comment on a request for a renewal, as outlined on page I-2, paragraph 4a(1)(d).
- (4) The Director of Operational Safety shall inform the field organization of the results of the evaluation of the request for a temporary variance or the extension thereof, within 180 days of receipt of the request.

b. Permanent Variances.

- (1) DOE contractors may apply to the appropriate CO or CO representative for a permanent variance from the prescribed OSHA standards. The request for variance shall contain the same information specified on page I-2, paragraphs 4a(1)(a)-(d). The CO or CO representative, the local safety and health office, and other appropriate elements of the field organization shall review the contractor's request and the employees' comments and submit their recommendation, together with the contractor's request and contractor employee comments, to the Director of Operational Safety (EP-32) within 30 days of receipt of the request. After review and evaluation of the request, comments, and recommendation, and after coordination with the appropriate program office, EP-32 shall submit a recommendation to the Assistant Secretary, Environmental Protection, Safety, and Emergency Preparedness (EP-1), for consideration.

- (2) If EP-1 determines that the contractor has demonstrated that the conditions, practices, means, methods, operations, or processes to be used will provide employment and a place of employment which is as safe and healthful as those which would prevail if the contractor complied with the standard, a permanent variance shall be approved and the requesting organization shall be notified accordingly, within 180 days of receipt of the request by EP-32.
- (3) However, if the permanent variance request is not approved by EP-1, the requesting organization shall be notified of the rationale for the determination, within 180 days of receipt of the request by EP-32.

c. Exceptions. The CO or CO representative may grant exceptions from the DOE-prescribed OSHA standards after evaluation of a contractor's request for a temporary or permanent variance. To provide such an evaluation, the CO or CO representative shall consult with the safety and health director and other appropriate elements of the field organization. An exception shall be granted only where the contractor has demonstrated that contractor employees will be provided protection equivalent to that provided by the standard(s) for which the temporary or permanent variance is being requested. The exception is to be effective only until a decision on the issuance of a variance is made by Headquarters, but in no case is an exception to be effective for longer than 180 days, beginning with the date of Headquarters' receipt of the request. The exception shall not be renewable.

#### 5. INSTRUCTIONS TO AND INFORMATION FOR EMPLOYEES.

- a. All contractor employees shall be instructed by the contractor to:
  - (1) Observe the DOE-prescribed OSHA standards applicable to their work and report promptly to the contractor any condition which may lead to a violation of these standards.
  - (2) Report emergencies and respond to warning signals which may be activated in the event of fire, radiation, or other possible emergencies.
- b. All contractor employees shall be instructed by the contractor initially and periodically (at least annually) regarding the requirements outlined by the DOE safety and health poster, DOE Forms 5480.2 and 5480.3, or DOE Forms EV-632 and EV-632S, as appropriate. Questions concerning the DOE poster may be brought to the attention of the contractor or to the field organization.
- c. All contractor employees shall be fully informed (at least annually) by the contractor of their rights, protections, and obligations, which include nondiscrimination; the filing of complaints; availability of the

DOE-prescribed OSHA standards and of complaint form DOE F 5480.4 (Attachment II-1); and accompaniment of the DOE inspector during the conduct of compliance inspections or during the conduct of inspections based on the filing of complaints.

- d. All contractor employees shall be informed that the contractor is required to monitor the employee's workplace for radiation exposure and known toxic materials or harmful physical agents which are used or produced at the GOCO facility, and to maintain records of the data as required by Title 29 CFR Part 1910.20, "Access to Employee Exposure and Medical Records." Employees or their authorized representatives are to be provided with an opportunity to observe monitoring or measuring for toxic materials and harmful physical agents and to have access to the results thereof. Each employee or former employee or representative thereof, within 15 days of a written request, shall be provided access to or copies of any records of cumulative recorded occupational radiation dose or any monitoring or bioassay records relevant to potential exposure to toxic materials or harmful physical agents during employment. Employees will be notified of any information indicating that a radiation dose or an exposure to toxic materials or harmful physical agents may have exceeded the limits specified by the DOE-prescribed OSHA standards.
- e. All contractor employees or former employees shall have access to their personal safety, health, and medical records consistent with the provisions of the Freedom of Information Act and the Privacy Act.

#### 6. COMPLIANCE INSPECTIONS.

- a. Occupational safety and health professionals of field organizations shall conduct unannounced compliance inspections of GOCO facilities, using the DOE-prescribed OSHA standards as requirements. These inspections are in addition to occupational safety and health appraisals or audits required by any other DOE Order, and shall be conducted on a priority basis with respect to the safety and health hazards involved and the number of employees affected. The compliance inspection may be a separate visit or it may be a part of a visit scheduled for other safety and health-related purposes. The inspection shall be conducted so that a representative sample (i.e., some large buildings, some small, and a variety of operations, including construction) of each GOCO facility is inspected every year. Where violations of the DOE-prescribed OSHA standards are noted, appropriate follow-up actions shall be taken to assure the effectiveness of corrective actions taken on deficiencies noted during initial compliance inspections.
- b. The contractor shall not be notified in advance of compliance inspections, except for situations involving contractor employee complaint allegations of imminent danger where DOE may elect to notify the contractor immediately to assure elimination of the danger and/or removal of employees from the danger (page II-2, paragraph 3b) before the inspection is conducted. DOE personnel may be assisted by third party specialists when needed. The contractor shall provide such assistance and information as may be required by the inspector to aid in the inspection.

- c. The DOE inspector shall meet with the contractor management of the specific operation, building, location, and activity to be inspected to explain the purposes of the visit. The contractor management representative and the representative authorized by the employees shall be given an opportunity to accompany the DOE inspector during the inspection. DOE shall be responsible for determining that the employee representative is in fact the person designated by the employees. Employees may be represented by a third party of their choice who is not an employee (such as an industrial hygienist or a safety engineer). Where it is impossible for the DOE inspector to determine the authorized employee representative, he or she shall consult with the CO or CO representative, and appropriate elements of the field organization to make a determination. Where there is no representative authorized by employees, the DOE inspector shall consult with a reasonable number of employees concerning safety and health conditions in the workplace.
- d. When the inspection party moves from one section of the facility to another, or where the security restrictions would prevent access, a different representative authorized by the employees may accompany the inspector.
- e. In the event the inspector discovers a situation which presents an imminent danger to contractor employees' safety and health, he or she shall take immediate and effective remedial action to assure that employees are removed from the danger area and/or that the danger is eliminated. This should be accomplished by working closely with the contractor, contractor employees, and representatives thereof, as appropriate. As soon as possible, the DOE inspector also shall notify the CO or CO representative, the safety and health director, and any other appropriate elements of the field organization of the facts and circumstance of the imminent danger situation. The field organization and the contractor shall assure that the matter is investigated and that prompt actions are taken to preclude recurrence of a similar imminent danger situation.
- f. Upon completion of the inspection, the DOE inspector shall hold a closeout meeting with the contractor management and, if requested, with the employees or authorized employee representatives to inform them of the inspection findings. A combined meeting may be held if the participants agree. When the inspection discloses a violation of the DOE-prescribed OSHA standards, a copy of the notice of violation with abatement dates will be transmitted formally from the CO or CO representative within 30 days after the completion of the inspection. The contractor shall notify the CO or CO representative in writing as soon as practicable, but not later than 30 days after receipt of the written findings, of the planned or completed abatement actions taken in response to the notice of the violation(s). Copies of the notice of violation(s) shall be posted conspicuously by the contractor in the general area of the violation for a period of 5 working days or until the violation is corrected, whichever is longer. Contractor employees or authorized representatives of employees may file written notices with the CO or CO representative in situations where they believe that the time fixed for abatement is unreasonable. The CO or CO representative, the safety and health director, and other

appropriate elements of the field organization shall review the written notice and provide a written response thereto within 15 days of receipt. If not satisfied with the field organization's response, the employee or representative thereof may refer, in writing, unresolved differences to the Director of Operational Safety (EP-32) for resolution. EP-32 shall review and evaluate such referrals in consultation with the appropriate program office(s). Based on their evaluation, a recommended course of action to resolve the problem shall be provided to the field organization. Within 30 days of the request, EP-32 shall provide a written response to the employee or representative thereof which details the actions taken and the rationale therefor.

- g. In a situation where a contractor is unable to correct a violation or comply with the standards in a reasonable length of time due to funding limitations or other DOE-imposed restrictions, the contractor shall provide the CO or CO representative with full details and an alternate plan to provide safety and health protection equivalent to that provided by the standard(s) during the period of noncompliance. In such cases, the CO or CO representative shall consult with the safety and health director and other appropriate elements of the field organization. Based upon this consultation, the CO or CO representative shall determine an appropriate course of action to be followed and also shall advise the contractor to notify employees of this course of action through the posting procedure noted on page I-6, paragraph 6f.



CHAPTER II

OCCUPATIONAL SAFETY AND HEALTH COMPLAINTS

1. SUBMISSION.

- a. Initially, contractor employees or representatives thereof should attempt resolution of their complaints by submitting to their contractor management, either directly or through their authorized employee representative, reports of any conditions or practices which they consider hazardous to their safety or health, or which they believe are in violation of the DOE-prescribed OSHA standards.
- b. Contractor employees or their representatives may submit complaints directly to the DOE field organization safety and health manager or the CO or CO representative, particularly in situations where the complainant wishes to remain anonymous (to the contractor), or where the complainant believes that unsafe/unhealthful conditions still exist or violations of standards still remain after being brought to the attention of and addressed by contractor management.
- c. Complaints may be submitted to either contractor management or to the DOE by completing DOE F 5480.4 (Attachment II-1), by sending a letter or telegram, or by oral means. Oral complaints shall be recorded on DOE F 5480.4 by DOE and/or the contractor. Irrespective of the means of submission, the complaint should set forth with reasonable particularity the pertinent facts and circumstances involved. In all situations where the complaint is submitted to DOE and anonymity is requested by the complainant, the DOE shall not divulge the complainant's identity to contractor personnel or to any other persons not essential to the processing and investigation of the complaint.

2. INSPECTION.

- a. Should the contractor receive a complaint from an employee or an authorized representative, the contractor shall confer with the employee or the authorized representative and conduct a joint inspection of the conditions or circumstances identified by the complaint.
- b. Should the field organization receive a complaint, the facts and circumstances of the complaint shall be reviewed and, if determined necessary by the DOE, an inspection shall be made to investigate the complaint allegations within 15 days of receipt of the complaint. However, the inspection should be made as immediately as is possible. In making the inspection, the same procedures set forth on pages I-5 through I-7, paragraphs 6b-g, shall apply. Followup compliance inspections shall be conducted, as appropriate.

### 3. IMMINENT DANGER COMPLAINTS - SUBMISSION AND INSPECTION.

- a. Any employee or authorized representative of employees who believes that an imminent danger exists, shall bring this matter to the attention of the appropriate contractor, supervisor, or designated official. If the imminent danger is determined to be valid, the contractor shall take immediate and effective remedial actions to remove employees from the danger area and/or eliminate the danger. The contractor shall conduct an inspection as soon as possible thereafter to assure that appropriate actions have been taken to preclude recurrence of the imminent danger situation.
- b. The employee or the authorized representative also may visit or call the DOE at the field organization level to request an immediate elimination of the danger and an inspection of the alleged imminent danger situation. DOE shall ascertain immediately whether there is a reasonable basis for the imminent danger complaint. If the complaint is determined to be valid, DOE shall take immediate and effective actions to remove employees from the danger area and/or eliminate the danger. This may be accomplished by conducting an immediate DOE inspection and/or by contacting the contractor immediately. In any event, DOE shall conduct an inspection as soon as possible to assure that appropriate actions have been taken to preclude recurrence of the imminent danger situation. In making the inspection, the same procedures set forth on pages I-5 through I-7, paragraphs 6b-g, shall apply. Followup compliance inspections shall be conducted, as appropriate.

### 4. RESPONSE TO COMPLAINANTS.

- a. The contractor shall inform each complainant of the results of the inspection and the actions taken to address and/or correct the safety and health concerns, problems, and/or violations of the DOE-prescribed OSHA standards noted by a complaint filed with the contractor.
  - b. For complaints filed with DOE, DOE shall provide a written response to the complainant within 15 days after the completion of the complaint inspection, except, obviously, in those situations where the complainant's identity cannot be determined. The response shall be sent to the complainant's home address, unless he or she has specifically requested that mail be sent to his or her place of employment. The response shall provide the results of the DOE inspection prompted by the complaint, and shall document all actions taken on complaint-related allegations of unsafe/unhealthful conditions and/or violations of the DOE-prescribed OSHA standards. If it is determined that no inspection is necessary, DOE shall respond to the complainant within 15 days of receipt of the complaint, and state why an inspection was not conducted.
5. COMPLAINT RESOLUTION. Contractor employees or representatives thereof who are not satisfied with the adequacy or effectiveness of the field

DOE 5483.1A  
6-22-83

II-3 (and II-4)

organization's investigation of or response to their complaint allegations may submit a written request for complaint resolution to the Director of Operational Safety (EP-32). The request must include the pertinent facts and particulars, and the basis for the request (e.g., inadequate action taken on violation of a standard, or no employee or representative allowed to participate in inspection), along with a copy of the original complaint and the field organization's response thereto. EP-32 shall conduct an investigation of the situation, in coordination with the appropriate program office(s). Within 30 days of receipt of the request, EP-32 shall provide a written response to the employee or representative thereof, and to the field organization. The response shall indicate the actions taken or planned as a result of the request for complaint resolution.

OCCUPATIONAL SAFETY OR HEALTH COMPLAINT

DOE Form 8450.4 (7-82)		U.S. DEPARTMENT OF ENERGY <b>CONTRACTOR EMPLOYEE OCCUPATIONAL SAFETY OR HEALTH COMPLAINT</b>	
This form is provided for the assistance of any DOE contractor employee or representative thereof who (1) believes that a violation of a DOE safety or health standard exists and (2) desires to file a complaint. It is not intended to constitute the exclusive means by which a complaint may be registered with the contractor or with the DOE.			
1. A. THE UNDERSIGNED BELIEVES THAT A VIOLATION OF A DOE OCCUPATIONAL SAFETY OR HEALTH STANDARD EXISTS AT THE PLACES OF EMPLOYMENT INDICATED BELOW, RESULTING IN A JOB SAFETY OR HEALTH HAZARD TO EMPLOYEES.			
(Check One) <input checked="" type="checkbox"/> Employee <input type="checkbox"/> Representative of employees <input type="checkbox"/> Other (Specify) _____			
B. DOES THE HAZARD(S) IMMEDIATELY THREATEN DEATH OR SERIOUS PHYSICAL HARM? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
2. CONTRACTOR'S NAME Computer Services, Ltd.	3. ADDRESS (Street, City, State, Zip Code) P.O. Box 1234 Mercury, NV 89023	4. TELEPHONE NO. 985-4000	
5. SPECIFY THE PARTICULAR BUILDING OR WORKSITE WHERE THE ALLEGED VIOLATION IS LOCATED, INCLUDING ADDRESS. Building 400X, Nevada Test Site, Nevada			
6. KIND OF ACTIVITY Computer Center	7. NAME AND PHONE NUMBER OF CONTRACTOR'S AGENT(S) IN CHARGE John A. Doe      985-4028		
8. DESCRIBE BRIEFLY THE HAZARD WHICH EXISTS INCLUDING THE APPROXIMATE NUMBER OF EMPLOYEES EXPOSED TO OR THREATENED BY SUCH HAZARD. (Continue on another sheet if necessary) Books and computer paper are stored in the hallways, presenting a fire and/or tripping hazard to all 150 employees of the Computer Center.			
9. LIST BY NUMBER AND/OR NAME THE PARTICULAR OSHA STANDARD(S) PRESCRIBED BY THE DOE WHICH YOU BELIEVE HAS BEEN VIOLATED; IF KNOWN. Title 29 CFR, Part 1910.36, Occupational Safety and Health Standards			
10. A. TO YOUR KNOWLEDGE, HAS THIS VIOLATION BEEN THE SUBJECT OF ANY UNION/MANAGEMENT GRIEVANCE OR HAVE YOU (OR ANYONE YOU KNOW) OTHERWISE CALLED IT TO THE ATTENTION OF, OR DISCUSSED IT WITH, THE EMPLOYER OR ANY REPRESENTATIVE? (Check one) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
B. IF "YES" IS CHECKED ABOVE, PLEASE GIVE THE RESULTS, INCLUDING ANY EFFORTS BY MANAGEMENT TO CORRECT THE VIOLATION. The situation has been brought to the attention of management, but nothing has been done yet to remove the hazard.			
11. PLEASE CHECK ONE: <input type="checkbox"/> I do not want my name revealed to the employer. <input checked="" type="checkbox"/> My name may be revealed to the employer.			
James R. Smith (Signature)		July 2, 1983 (Date)	James R. Smith (Typed or printed name)
IF YOU ARE A REPRESENTATIVE OF EMPLOYEES, GIVE THE NAME OF YOUR ORGANIZATION.			
ADDRESS OF ORGANIZATION (Street, City, State, Zip Code)			TELEPHONE NO.

6-22-83

CHAPTER IIINONDISCRIMINATION, INJURY AND ILLNESS INFORMATION, AND ACCIDENT INVESTIGATIONS1. NONDISCRIMINATION.

- a. No contractor shall discharge or in any manner demote, reduce in pay, coerce, restrain, threaten, or take any other negative actions against any contractor employee as a result of the employee's filing of a complaint, or in any other fashion, exercising on behalf of himself or herself or others any right set forth in this Order.
- b. Any employee who believes he or she has been discharged or in any other manner discriminated against, in violation of this Order, may file a complaint with the cognizant CO or CO representative within 30 days after the alleged discrimination, setting forth the nature of the alleged discrimination. The CO or CO representative, the safety and health director, and other appropriate elements of the field organization shall investigate the complaint, and if it is found that such discrimination has occurred, the field organization shall assure that appropriate measures are taken by the contractor, including rehiring or reinstatement of the employee, restoration of lost seniority, and back pay. The field organization shall report the disposition of the matter to the contractor employee filing the complaint of alleged discrimination within 30 days after receipt of the complaint.

2. RECORDKEEPING.

- a. Contractors subject to the provisions of DOE PR 9-50.704-2(a) shall be responsible for recording and reporting recordable occupational illnesses and injuries, as required by DOE 5484.1, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION INFORMATION REPORTING REQUIREMENTS, of 2-24-81.
- b. All contractors shall be responsible for maintaining records of employees' exposures to toxic materials or harmful physical agents, as appropriate. Such records shall be maintained in perpetuity.
- c. A central file of all violations of DOE-prescribed OSHA standards noted during inspections (and abatement actions) shall be maintained by field organizations. A central file also shall be maintained by the field organizations of formal employee safety and health complaints and their disposition. Upon request, any of these safety and health violation or complaint-related records shall be made available for review by employees directly affected by such information, or by their authorized representatives. DOE 1324.1, RECORDS DISPOSITION, of 5-28-80, Attachment IV, DOE Records Schedule 25, paragraph 1b, specifies the retention period for these records.
- d. DOE contractors subject to the provisions of DOE PR 9-50.704-2(a) shall respond to requests for injury/illness recordkeeping information from the U.S. Department of Labor, Bureau of Labor Statistics, or the Bureau's cooperating State agencies, as appropriate. The information shall be

6-22-83

returned to the requestor on OSHA Form 200-S (included with the request) in accordance with the instructions accompanying the request, and a copy thereof shall be provided to the safety and health director of the field organization. The contractor shall include a statement on the OSHA Form 200-S which states: "With respect to work performed under contract with the DOE at (name of contractor and/or GOCO facility) this employer is not subject to the Occupational Safety and Health Act of 1970, under section 4(b)(1) of that Act."

3. POSTING.

- a. Each DOE contractor shall post DOE Forms 5480.2 and 5480.3 or DOE Forms EV-632 and EV-632S, as appropriate, and include the information specified.
  - b. Each year, from 2-1 until 3-1, DOE contractors subject to the provisions of DOE PR 9-50.704-2(a) shall post a completed DOE Form EV-102A.
  - c. The required forms shall be posted in a sufficient number of places to permit contractor employees working in or frequenting any portion of the GOCO facility to observe the information on the way to or from their place of employment.
4. ACCIDENT INVESTIGATIONS. Accident investigations shall be conducted in accordance with DOE 5484.1, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION INFORMATION REPORTING REQUIREMENTS, of 2-24-81.

# memorandum

DATE: February 25, 1987  
REPLY TO: EH-32  
ATTN OF:  
SUBJECT: Guidelines for the Use of Readiness Reviews

TO: Assistant Secretary for Defense Programs  
Assistant Secretary for Nuclear Energy  
Assistant Secretary for Management and Administration  
Assistant Secretary for Fossil Energy  
Assistant Secretary for Conservation and Renewable Energy  
Director of Energy Research  
Director of Civilian Radioactive Waste Management  
Managers, DOE Operations Offices  
Directors, Energy Technology Centers

The Office of Quality Assurance has sponsored the development of a guideline for readiness reviews within the Department of Energy (DOE). This guideline was developed by a Task Group composed of staff from Field Offices, Headquarters and contractors. It has been coordinated with the quality assurance professionals at the Field Offices and Headquarters and is transmitted herewith for your consideration. A readiness review is a structured method for determining that an activity is ready to proceed to the next phase.

Your comments are solicited on this concept and on its specific details prior to issuance as guidance. After about a year, the experience gained in using the guideline will be reviewed to determine if the use of readiness reviews should be expanded and made mandatory (readiness reviews are already required for most nuclear activities). If you have any questions about this proposal, please have your staff contact Dr. Neal Goldenberg (FTS 233-5644) or Mr. Charles Grua (FTS 233-5516) before March 17, 1987.

*Mary L. Walker*  
Mary L. Walker  
Assistant Secretary  
Environment, Safety and Health

Attachment



GUIDELINES FOR APPLICATION OF  
READINESS REVIEWS  
TO DEPARTMENT OF ENERGY ACTIVITIES

PREPARED FOR  
ASSISTANT SECRETARY FOR ENVIRONMENT, SAFETY AND HEALTH  
DIRECTOR, OFFICE OF QUALITY ASSURANCE

JANUARY 1987

PREPARED BY  
TASK GROUP FOR READINESS REVIEW

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# Readiness Reviews

## Table of Contents

	<u>Page</u>
I. Introduction .....	1
II. Purpose .....	2
III. Scope .....	2
IV. References .....	2
V. Definitions .....	2
VI. Guidelines .....	3
VII. Principles .....	3
VIII. Roles and Responsibilities	
A. Program Senior Officials .....	3
B. Assistant Secretary for Environment, Safety and Health .....	4
C. DOE Field Organization Managers .....	4
IX. RR Performance and Projection	
A. Projection of RR Needs .....	5
B. Establishment of Procedures .....	5
C. Planning and Scheduling an RR .....	6
D. Organization of Review Teams .....	6
E. RR Structure Determination .....	8
F. Verification of Readiness .....	8
G. Granting of Exemptions .....	9

## DOE GUIDELINES FOR READINESS REVIEW

### I. Introduction

Readiness Reviews (RRs) are a systematic approach for determining the status of a facility, process, system or activity. Presently, the application of the RR process is mandatory only under certain conditions that involve unreviewed safety questions or new nuclear facilities delineated in DOE 5480.5, "Safety of Nuclear Facilities," (9-23-86) and DOE 5480.6, "Safety of Department of Energy-Owned Nuclear Reactors," (9-23-86).

The RR process provides management with well organized, visible objective evidence demonstrating the readiness for the initiation and/or continuation of an activity (see definitions). The documented objective evidence provides management increased confidence to authorize the activity.

The RR process recognizes the many other requirements imposed on DOE activities such as the Safety Analysis and Review System, National Environmental Policy Act, environmental permits and reports, other safety and health reporting requirements, the DOE Project Management System requirements and the like; as well as the typical industrial engineering practice of subsystem preoperational checks. The RR procedure brings all these requirements and verifications to a focused formal assurance review prior to proceeding to the next phase of the activity.

An RR program is not intended to replace line management's primary responsibility for project completion, quality assurance, technical adequacy, resolution of safety or process-related considerations, etc. Rather, a readiness review fulfills a final review function to assure that all necessary actions by the responsibility line organizations have been completed.

RRs provide a methodology for assuring all necessary activities and actions have been satisfactorily completed before activity initiation is authorized. A RR will enhance:

- early identification of design, construction and operations and product/component deficiencies which, if not identified as early as practicable, could result in programmatic delays or setbacks, and/or safety problems;
- predictability thru planned start-ups, operations, activity initiation or progression to next phase;
- assured total coverage of activity readiness with only known exceptions clearly identified;
- accountability for activity work and readiness;
- visibility of data demonstrating activity readiness to management;  
and
- compliance with permitting and reporting requirements of Federal, State, and local agencies.

## II. Purpose

To provide guidance, set forth principles, and describe roles and responsibilities for establishing and implementing RRs for DOE activities.

## III. Scope

The provisions of these guidelines may be applied to all Departmental Elements and contractors performing work for the Department as provided by law and/or contract and as implemented by the appropriate contracting officer.

## IV. References

- A. DOE 5480.5, Safety of Nuclear Facilities (9-23-86)
- B. DOE 5480.6, Safety of Department of Energy-Owned Nuclear Reactors (9-23-86)
- C. ERDA 76-45-1, SSDC-1, Occupancy Use Readiness Document which describes development and the process for RR
- D. DOE 76-45/14, SSDC-14, Rev. 1, Events and Causal Factors Charting which describes the management oversight and risk tree development and use

## V. Definitions

- A. Readiness Review - A structured method for determining that an activity is ready to operate or proceed to the next phase, and includes, as a minimum, comprehensive review of the readiness of the plant and hardware, personnel, and procedures. The review includes a determination of compliance with all DOE requirements.
- B. Readiness Review Plan - A document approved by management for a specific activity which defines the management processes for implementing an RR. It delineates the responsibilities and authorities, defines the actions to be taken, establishes the schedule for RR implementation.
- C. Activity - A facility, operation, process, system, construction activity or project that may have the RR process applied to determine the readiness for proceeding with start-up or to the next phase of the activity.
- D. Technical Justification - An analysis and evaluation of the basis for requesting an exemption or waiver that fully describes the consequences of the exemption decision and the risk.

## VI. Guidelines

RRs should be applied to processes, systems, facilities or activities which are:

- new or significantly modified;
- reactivated from inactive status;
- assessed for operation resulting from shutdown for cause (significant disruption, accident, etc.);
- operated in a new or significantly different mode;
- considered for authorization to proceed to next phase; and
- designated for review by responsible management.

## VII. Principles

RRs should determine if the facilities, equipment, procedures, training, personnel, and management control systems are ready to fulfill the system's functional objectives.

- A. Projections of RR needs should be documented and approved by Senior Management early in the life of the activity. These needs should be scheduled with sufficient time to allow responsible organizations to correct any deficiencies noted.
- B. DOE Field Organizations and DOE Contractors should develop the specific RR plans, procedures, and criteria.
- C. RRs, when appropriate, should be developed for discrete, well identified stages or phases, depending on complexity, to assure a comprehensive in-depth review of all aspects, especially interfacing and possibly overlapping systems/areas. This will also assure that proper attention is given to multiple systems interface areas, and enable conformance to schedule.
- D. Each RR stage/phase should be overviewed and accepted by DOE only after contractor work has been accomplished and recommended for acceptance by Contractor Senior Management.

## VIII. Roles and Responsibilities

The roles of organizations participating in an RR program are identified as follows:

- A. Program Senior Official (PSO)
  - (1) Reviews RR documentation and approves/disapproves action for initiation or continuation of activities, as defined under DOE 5480.5 and DOE 5480.6 or other selected activities, to the Field Office Manager.

- (2) Makes a determination with EH and the appropriate field office during the Phase I construction of systems, facilities, and major modifications which involve moderate hazard (activities that do not specifically require RRs in the DOE Orders), of the RR review and approval level that will be required.
- (3) May participate in RR activities or act as an observer during facility start-up activities.

B. Assistant Secretary for Environment, Safety and Health

- (1) Reviews RR documentation and other appropriate documentation and indicators of plant status and concurs in approval/disapproval for initiation of high hazard and selected moderate hazard activities to the appropriate Program Senior Official.
- (2) Makes a determination with PSO and the appropriate field office during the Phase I construction of systems, facilities, and major modifications which involve moderate hazard (activities that do not specifically require RRs in the DOE Orders), of the RR review and approval level that will be required.
- (3) May participate in RR activities or act as an observer during facility start-up activities.

C. DOE Field Organization Manager

- (1) Prepares Order supplements and management directives implementing DOE/HQ Orders and incorporates RR requirements, as appropriate.
- (2) Consistent with the provisions of DOE 5480.1B, "Safety Analysis and Review System," (9-23-86) has responsibility to have RRs performed. Establish a projection and schedule of those activities that require an RR and determines the level of DOE authorizations.
- (3) Require contractors to establish detailed RR procedures.
- (4) Assure via observation, discussion, surveillance or audit, the adequacy of the contractor RR checklists and activities.
- (5) As appropriate, establish DOE review teams to verify a contractor's RR request to proceed with or start-up an activity.
- (6) Provides contractor prepared RR documentation and Field Organization recommendations to appropriate Headquarters program offices and EH for review to enable those organizations to meet their responsibilities in regard to facility start-up in accordance with DOE 5480.5 and DOE 5480.6 or as required by the PSO.

- (7) Subject to Headquarters concurrences identified in the DOE 5480.5 and DOE 5480.6, authorizes contractors to start up or proceed to the next phase of designated activity.

## IX. RR Performance and Projection

### A. Projection of RR Needs

- (1) On a regular basis (preferably annually or semi-annually) all appropriate activities should be assessed by responsible program officials to establish those programs that require an RR. The assessment should include consideration of activities such as:
- (a) Start-up of new activities.
  - (b) Restart of activities that have been shut down or in standby status for periods of time in excess of that required for routine maintenance.
  - (c) Restart of activities after modifications which would change the functioning of safety or effluent monitoring and control features.
  - (d) Initiation of decontamination and decommissioning projects.
  - (e) Initiation of nonroutine transport of hazardous materials.
  - (f) Initiation of new type activities which may present an identifiable hazard to employees, the public, or the environment.
- (2) Projections of RR requirements should be initiated by program or project offices and should include scheduled start-up dates, proposed level of management approval required, concurrence requirements, and scoping of contractor and DOE review.
- (3) Safety and QA staff should collect and evaluate program projections and coordinate with program office and prepare a consolidated projected start-up list for submission through the program office to the field organization manager for review, comment and/or approval.

### B. Establishment Procedures

- (1) Written instructions for DOE Field Organization responsibilities developed by the Field Organization in RRs are highly desirable to insure appropriate planning and consistency of contractor actions.
- (2) Contractor RR procedures should be reviewed and evaluated by field offices as an integral part of DOE RR overview.

### C. Planning and Scheduling an RR

- (1) Planning is an integral part of the RR process. The analytical techniques (e.g., MORT, Ref. 4) are used to assure total coverage of hardware, personnel, and administrative items and provide a basic planning framework and should be implemented as soon as practical in the life of an activity. Likewise, establishing review boards, deciding the levels of management approvals, etc., are important front end decisions that can drive the timely completion of activity work with a minimum of errors.
- (2) Early issuance of an RR plan by contractors and DOE reviewers respectively should address paragraph C.(1) considerations. Actions described in the RR plan should be integrated into the master activity schedule to identify RR activities as a part of the critical path items toward activity completion rather than an add-on inspection. Figure 1 indicates a typical RR process chronology for a relatively simple activity.
- (3) Complex activities (e.g., reactor construction and/or start-up major systems acquisitions) require detailed planning and scheduling. RRs may be conducted on an incremental basis for a specified portion of the activity, rather than delaying approval until total activity is completed. The following principles are paramount if increments are used:
  - (a) Increments should be well identified units/modules of hardware and/or activities, e.g., systems, portions of facility, definitive design, construction, operational test, etc.
  - (b) Incremental acceptance should include contractor management and DOE.
  - (c) DOE acceptance of increments should be provided only after contractor review, comment and/or approval.
  - (d) Increments should always be open to additional review for verification of interfacing points or should new issues or questions be raised.

### D. Organization of Review Teams

#### (1) DOE Field Organization Guidance

Field Organizations generally provide overall management of the activities in support of issuance of a formal authorization to proceed by the designated DOE approval authority.

- (a) A representative of a field office line organization should be designated as the point of contact for interface between DOE and the contractor RR to coordinate review

activities and assure that there is an auditable record of DOE activities performed to verify readiness. The representative will also assure that DOE authorization is accompanied by a plan that clearly identifies:

- the specific tasks to be performed to determine readiness;
  - the individuals responsible for assuring that these tasks have been completed; and
  - justification that exempted/deferred items are not prerequisites to the start of the activity.
- (b) When requested, safety, environment and QA staff organizations may perform an independent readiness review to support the operating organization; however, this review will be independent of reviews coordinated with involved program management.

Upon notification by the program organization, Safety and QA staff will:

- Identify a lead Safety and QA staff member to coordinate the Safety and QA readiness review activities.
  - Coordinate visits to contractor worksites with the program organizations.
  - Prepare a recommendation with appropriate supporting information when the readiness review is complete and transmit through QA and Safety organization. The basic information should include the documentation prepared by each Safety and QA staff member participating in the readiness review.
  - Communicate concurrence to appropriate senior management.
- (c) In addition to the independent review described in paragraph 9.C.1.(b), the program organization may request Safety and QA staff assistance in performing a readiness review. Safety and QA should participate in a support mode if staff resources are available. The Safety and QA member should have some prior knowledge of readiness reviews and perform as an individual contributor supplementing the program organization. Other staff Safety and QA may still perform independent reviews.

## (2) Contractor Guidance

The contractor may establish a "hands on" start-up team and an "independent" review board.

- (a) Start-up Team - a working group who have the responsibility for the activity or who will be involved in the next phase of the activity. The team normally has a multi-discipline membership (e.g., Safety, QA, Construction, Production, Engineering, etc.) and will provide the evidence of the state of readiness to the contractor independent review board and/or the contractor authorizing official. Team members coordinate and obtain support as required for activities beyond their personal expertise. The start-up team chairman may be the individual who will be responsible for the activity after start-up is authorized.
- (b) Readiness Review Board - a group of functional representatives established to independently assess start-up team actions and recommendations, and concur or recommend to the authorizing official that the activity is ready for use. Safety and QA are usually included as members of the board.

#### E. RR Structure Determination

- (1) The RR process may be applied to virtually any activity and, therefore, the scope must be defined in proportion to activity complexity and cost, schedule and safety/quality consequences of activity failure. However, it must first be determined what total-RR coverage means. The use of analytical techniques such as MORT (Ref. 4) methodology lends itself to this task as it provides a list of all conceivable hardware, personnel and administrative items that could be checked for adequacy prior to initiating an activity. It is important that the checklist is based on some analytical methodology such as the Occupancy Use Readiness Manual, (a Mort derived methodology) ERDA-76-45-1, (SSDC-1) and be devised by qualified individuals, independent of the RR task.
- (2) After checklist development, the contractor start-up team with concurrence of the review board should systematically determine the applicability of checklist items. Additions are usually valid. However, deletions should be subject to thorough consideration, and prior to review board approval of the deletion, should be technically justified and documented. RR checklists and "trees" developed as part of the readiness review should be controlled documents so that revisions, modifications and status are maintained and assured traceable by the start-up team.

#### F. Verification of Readiness

- (1) Expert Approval - the most basic approval of a completion for RR checklist item should be the individual most knowledgeable

of the item and is often the cognizant craftsman or engineer. This approval must assure the technical adequacy of the item, i.e., does the work item meet the pre-determined specifications and does evidence exist indicating compliance with the teria.

- (2) Management Approval - this approval can range from first-line supervisors to senior managers. This approval should extend beyond technical considerations and should encompass careful examination of how specific work items integrate into total activity readiness. Interfaces between hardware items, hardware and procedures, procedures and personnel, etc., are especially critical.
- (3) Definitions of Signature Approval - expert and management approvals have been discussed above and while these concepts are often well understood by professionals, they must be specifically defined in a readiness review system if consistency, quality, and common understanding is to be assured. Failure to do this can result in readiness being measured against individual opinions of adequacy.
- (4) Background Documentation - Sign-off at all levels should indicate that sufficient evidence exists in support of the sign-off signatures (usually documentation such as test results, inspection reports, etc.). Individual signatures should provide a note that lists documentation specifically backing the sign-off signature.

NOTE: Usually such evidence will be readily available as a result of existing quality assurance/safety program implementation.

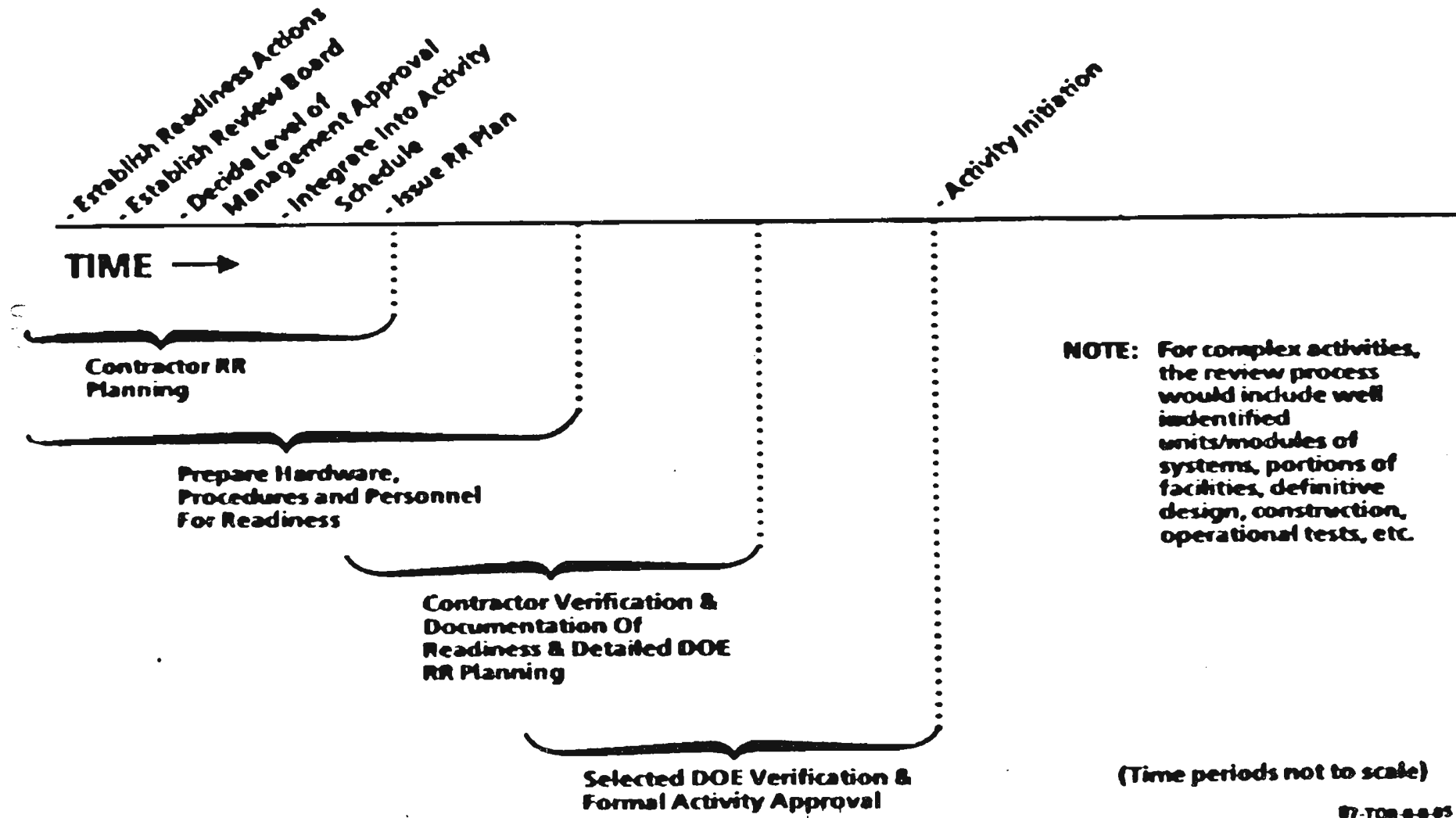
- (5) A focal point for collecting and coordinating approval signatures and supporting documentation such as a quality control person should be designated. Such coordination can significantly expedite the collection of valid documentation, its organization, and the ease and speed with which overviews (DOE, contractor managers) can complete their tasks.
- (6) An appropriate tracking system should be developed to assure that established milestones are met.

#### G. Granting of Exemptions

There may be instances when checklist items on an RR cannot be completed at the time the activity is authorized, but are intended to be complete prior to activity initiation. The quantity of these "prestart-up" items should be minimal and a large number may indicate that the activity is not ready for authorization to start-up. As the RR proceeds, it may be determined that some items do not need

to be completed prior to start-up but at some later time. Careful identification, tracking and scheduling for completion of these items must be assured. Such "post start-up" items should be carefully evaluated by management to assure that adequate documented technical justification exists for such exemptions.

# TYPICAL READINESS REVIEW PROCESS FOR NON-COMPLEX ACTIVITIES



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