UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

February 18, 2003

MEMORANDUM TO: Maggalean W. Weston
Senior Staff Engineer
ACRS

FROM: John D. Sieber, Chairman
Plant Operations Subcommittee
ACRS

SUBJECT: CERTIFICATION OF THE MINUTES OF THE MEETING OF THE ACRS SUBCOMMITTEE ON PLANT OPERATIONS, January 21, 2003, ROCKVILLE, MD

I hereby certify that, to the best of my knowledge and belief, the minutes of the Plant Operations subcommittee meeting on the Reactor Oversight Process (related to the December 20, 2001 SRM) issued February 18, 2003, are an accurate record of the proceedings for that meeting.

John D. Sieber 2/18/03
John D. Sieber, Chairman Date

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

February 10, 2003

MEMORANDUM TO: John D. Sieber, Chairman
Plant Operations Subcommittee
ACRS

FROM: Maggalean W. Weston
Senior Staff Engineer
ACRS

SUBJECT: WORKING COPY OF THE MINUTES OF THE PLANT OPERATIONS SUBCOMMITTEE MEETING HELD ON January 21, 2003, ROCKVILLE, MARYLAND

A working copy of the minutes for the Plant Operations Subcommittee Meeting on the Reactor Oversight Process (regarding the SRM dated December 20, 2001) is attached for your review. Please review and comment at your convenience.

Attachment:
As Stated

# Certified by Mr. John D. Sieber
# February 18, 2003

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**
**PLANT OPERATIONS AND RELIABILITY AND PRA SUBCOMMITTEES**
**ROOM T-2B3, 11545 ROCKVILLE PIKE**
**ROCKVILLE, MARYLAND**
**January 21, 2003**

## SUBCOMMITTEE MEETING MINUTES

The ACRS subcommittee on Plant Operations held a meeting on January 21, 2003, with representatives of the NRC staff to discuss the status of the Reactor Oversight Process (ROP) as it specifically relates to the staff requirements Memorandum dated December 20, 2001 which stated that the staff, with ACRS input, should provide recommendations for resolving, in a transparent manner, apparent conflicts and discrepancies between aspects of the revised reactor oversight process that are risk-informed (e.g., significance determination process) and those that are performance based (e.g., performance indicators). . The meeting was open to the public. Mrs. Maggalean W. Weston was the cognizant ACRS staff engineer and designated federal official (DFO) for this meeting. There were no written comments provided by the public. The Subcommittee Chairman, Mr. John D. Sieber, convened the meeting at 8:30 a.m. January 21, 2003, and adjourned it at 4:34 p.m. that afternoon.

Attendees

Attendees at this meeting included ACRS members and staff, NRC staff, and members of the public as follows.

ACRS Members/Staff

J. D. Sieber, Chairman
G. E. Apostolakis, Co-Chair
M. V. Bonaca, Member
M. W. Weston, DFO
F. P. Ford, Member
T. S. Kress
G. M. Leitch, Member
S. L. Rosen, Member
W. J. Shack, Member
G. M. Wallis, Member

NRC Staff

A. Barker, NRR
R. Barrett, NRR
T. Blount, NRR
T. Boyce, NRR
K. Brock, NRR
C. Carpenter, NRR
T. Chan, NRR
D. Coe, NRR
W. Cullen, RES
R. Frahm, NRR
T. Frye, NRR
K. Gort, RES
K. Gibson, NRR
A. Hayes, NRR
D. Hickman, NRR
V. Hodge, NRR
A. Mendiola, NRR
S. Klementowicz, NRR
R. Sullivan, NRR
B. Leslie, NMSS
M. Marshall, NRR
G. Parry, NRR
R. Pederson, NRR
M. Satorius, NRR
L. Turner, NRR
J. Wigginton, NRR

There was one member of the public in attendance at this meeting. A list of the attendee who registered is attached to the Office Copy of these minutes. No members of the public participated in the meeting discussions.

Presentations and Discussion

The presentation to the subcommittees and the related discussions are summarized below.

The presentation slides and handouts used during the meeting are attached to the Office Copy of the Minutes.

Chairman's Comments

Mr. J. Sieber, Subcommittee Chairman, convened the meeting. He indicated that the purpose of the meeting was to discuss the ROP as it relates to the staff requirements memorandum, which directed that the NRC staff, with input from the ACRS, resolve the apparent conflicts and discrepancies between aspects of the ROP that are risk-informed, for example, the significance determination process, and those that are performance-based, for example, performance indicators. Mr. Sieber then asked for comments from other ACRS members. Hearing none, the meeting proceeded according to the agenda.

NRR Staff Presentation

Ronald Frahm of the Inspection Program Branch (IIPB), NRR, and lead for this effort introduced the presenters and provided an overview of the ROP. The presenters were Doug Coe, Section Chief in IIPB and responsible for the SDP, Don Hickman, Task Lead for the Performance Indicator Program, Roger Pedersen occupational radiation safety, Steve Klementowicz, public radiation safety, and Randy Sullivan, emergency preparedness . They were joined by Ms Cindy Carpenter, Chief, IIPB.

The staff discussed four specific issues based on the September subcommittee and the December written response to the ACRS. They summarized their approach to addressing the SRM, the risk-informed and performance based elements of the ROP, concurrent findings, and actual examples of greater than green findings and their bases across several cornerstones.

The following were the topics to be discussed:

A. Reactor Oversight Process (ROP) Overview
B. Reactor Safety Performance Indicators (PIs)
C. Reactor Safety Significance Determination Process (SDPs)
D. Occupational Radiation Safety
E. Public Radiation Safety
F. Emergency Preparedness

Subcommittee Comments

- P. Ford asked if the PIs are reviewed on a regular basis. R. Frahm responded that they essentially review the program continuously.

- G. Leitch commented about two white findings listed on the webpage regarding one plant that had an inadequate critique of an emergency drill and a failure to declare an emergency with the required 15 minutes versus another plant that had a problem with auxiliary feed-water pump and a problem with a safety related valve and the relative equivalence assigned to these as both being white. In his mind, the two plant problems were not equivalent. D. Coe responded that the staff believes that the level of response to these two issues should be approximately the same.

- S. Rosen asked if the intent of the ROP was to make similar colors mean the same risk significance of was it to make similar colors mean the same action by NRC. R. Frahm responded that the intent was to make the action taken by the NRC the same.

- G. Apostolakis commented that he thought the who idea of risk-informing the regulations was to have a response that is commensurate to the risk level.

- W. Shack commented that the ROP is to assess performance, not the safety status of the plant.

- G. Apostolakis, T. Kress, W. Shack and M. Bonaca commented that they see a major problem with the Action Matrix because they mix indicators that are based on performance with indicators that are based on risk with indicators that are based on regulatory requirements.

- G. Apostolakis indicated that he continues to believe that the ROP could and should be improved. He recognizes that the staff has done a tremendous job given the pressures they had to produce the program and the magnitude of the program.

- J. Sieber commented on the problems with addressing emergency preparedness because of the pressures from local jurisdictions, the states, and public confidence.

- G. Apostolakis commented that he still did not think that the yellow and red PIs were needed because the thresholds were so high that you never get there. Plants would have taken action long before coming near the thresholds.

- G. Apostolakis commented that the concern for the both the industry and the agency are sequences of events, not the frequency of one event and that similar thinking should be used in the ROP. D. Coe responded that in some ways the Accident Sequence Precursor Program (ASP) does parallel the ROP and resolution is needed between the two offices that sponsor the two programs.

- J. Sieber commented that the problem with the ASP is that the results are obtained long after the event.

- Apostolakis, Leitch, and Sieber all commented on the problem with mixing risk-informed results with performance based results in the Action Matrix. They also discussed the treatment or lack thereof of concurrent findings or the risk significance of transients with complications. They continue to have problems with parity with regard to the colors between cornerstones and between PIs and inspection findings. It adds to the confusion because green is not good.

- G. Leitch indicated that using the PIs to measure the effectiveness of the licensee's corrective action program would be very significant in assessing licensee performance. D. Coe agreed with the comment.

- G Apostolakis raised the issue of process with regard to the SRM and emphasized that he does not believe that staff is addressing the issues as directed by the SRM.

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**
**PLANT OPERATIONS AND RELIABILITY AND PRA SUBCOMMITTEES**
**THE REACTOR OVERSIGHT PROCESS**
**ROOM T-2B3, 11545 ROCKVILLE PIKE**
**ROCKVILLE, MARYLAND**

**January 21, 2003**

**-AGENDA-**

| | SUBJECT | PRESENTER | TIME |
|---|---|---|---|
| I. | Introductory Remarks | | 8:30-8:35 a.m. |
| | Subcommittees Chairs | J. Sieber<br>G. Apostolakis | |
| II. | NRC Staff Presentation | | |
| | The Reactor Oversight Process | | |
| | Overview | Ronald Frahm | 8:35-9:30 a.m. |
| | Reactor Safety PIs | Donald Hickman | 9:30-11:00 a.m. |
| | *****BREAK***** | | |
| | Reactor Safety SDPs | Douglas Coe | 11:00-12:30 p.m. |
| | *****LUNCH***** | | 12:30-1:00 p.m. |
| | Occupational Radiation Safety | Roger Pedersen | 1:00-1:30 p.m. |
| | Public Radiation Safety | Steve Klementowicz | 1:30-2:00 p.m. |
| | *****RETIREMENT***** | | 2:00-2:45 p.m. |
| | Emergency Preparedness | Randy Sullivan | 2:45-3:45 p.m. |
| III. | General Discussion and Adjournment | | 3:45-4:15 p.m. |

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NOTE: Presentation time should not exceed 50 percent of the total time allocated for a specific item. The remaining 50 percent of the time is reserved for discussion.

Number of copies of the presentation materials to be provided to the ACRS is 35

ACRS CONTACT: Mrs. Maggalean W. Weston, mww@nrc.gov or (301) 415-3151.

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**
**SUBCOMMITTEE MEETING ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT AND PLANT OPERATIONS**

**JANUARY 21, 2003**
**Date**

**NRC STAFF PLEASE SIGN BELOW**
**PLEASE PRINT**

| NAME | NRC ORGANIZATION |
|---|---|
| Ron Frahm | NRR/DIPM/IIPB |
| LARRY TURNER | NRR/DIPM/IIPB |
| Robert Pascarelli | NRR/DIPM/IIPB |
| Roger Pedersen | NRR/DIPM/IEHB |
| Doug Coe | NRR/IIPB |
| ROBERT E. KAHLER | NRR/DIPM/IEHB |
| DON HICKMAN | NRR/DIPM/IIPB |
| R L Sullivan | NRR/DIPM/IEHB |
| Tim Frye | NRR/DIPM |
| Cindi Carpenter | NRR/DIPM |
| Allan Barker | NRR/DIPM/IIPB |
| Gareth Parry | NRR/DSSA |
| MARK SATORIUS | NRR/DIPM/IIPB |
| Jim WIGGINTON | NRR/DIPM/IEHB |
| AUDREY HAYES | NRR/DIPM/IEHB |
| Kathy Halvey Gibson | NRR/DIPM/IEHB |
| Bret Leslie | NMSS/RTG |
| TOM BOYCE | NRR/DIPM/IIPB |
| Tom Blount | NRR/DIPM/IEHB |
| Kathryn Brock | NRR/DIPM/IEHB |

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**
**SUBCOMMITTEE MEETING ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT AND PLANT OPERATIONS**

**JANUARY 21, 2003**
**Date**

**NRC STAFF PLEASE SIGN BELOW**
**PLEASE PRINT**

| NAME | NRC ORGANIZATION |
|---|---|
| Stephen Klementowicz | NRR/DIPM/IEHB |
| RICH BARRETT | NRR/DE/ |
| Vern Hodge | NRR/DE/EMCB/A |
| ANTHONY J MENDIOLA | NRR/DLPM/PD3-2 |
| Michael Marshall | NRR/DE/EMCB |
| Terence Chan | NRR/DE/EMCB |
| Bill Dean | NRR DE |
| Bill Reckley | NRR/DLPM |
| Bill Cullen | RES/DET/MEB |
| Karen Gott | RES/DET/MEB [SKI] |

# ADVISORY COMMITTEE ON REACTOR SAFEGUARDS SUBCOMMITTEE MEETING ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT AND PLANT OPERATIONS

**JANUARY 21, 2003**
**Today's Date**

**ATTENDEES PLEASE SIGN IN BELOW**

**PLEASE PRINT**

| NAME | AFFILIATION |
|---|---|
| S. Tina Ghosh | MIT |
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# ACRS ROP Subcommittee Meeting

January 21, 2003

Ronald Frahm

ROP Team

# ACRS Concerns from September 9 Briefing

- SRM Regarding Risk-Informed and Performance-Based Elements
- Risk-Informed Performance Indicator Thresholds
- Assessment of Concurrent Findings
- Discussion of Greater-Than-Green Examples and Their Basis

# SRM - Staff Approach

- Use Performance-Based Thresholds Linked to Appropriate Regulatory Response, Incorporating Risk Insights If Available
- Continue to Adjust PI and SDP Thresholds to Ensure a Consistent Regulatory Response
- Meet Competing ROP Objectives to Remain Predictable, Understandable, Risk-Informed, and Objective, and the 4 Strategic Performance Goals
- Seek Continued Improvements Through the ROP Self-Assessment and Feedback Processes and Interactions with Other Stakeholders

# SRM - Staff Conclusions

- ROP is Working Effectively, Plants Are Receiving Appropriate Level of Oversight
- There Are Acknowledged Differences Between Risk-Informed and Strictly Performance-Based Aspects of the ROP
- Need ROP Basis Document to Consolidate More Transparent Basis for PIs and SDPs
- Expect Continued Incremental Improvements via Ongoing Self-Assessment Process
- Plan to Work With RES to Explore the Use of Formal Decision Analysis for the ROP

# Performance Indicators

| Cornerstone | Threshold Method |
|---|---|
| Initiating Events | G/W - PB, W/Y/R – RI |
| Mitigating Systems | G/W - PB, W/Y/R - RI |
| Barrier Integrity | PB with Risk Insights |
| Emergency Preparedness | Performance-Based |
| Occupational Rad Safety | Performance-Based |
| Public Radiation Safety | Performance-Based |
| Physical Protection | Performance-Based |

# Risk-Informed Performance Indicator Thresholds

- Considering Eliminating the Yellow-Red Thresholds for the Initiating Events PIs
- Highly Unlikely Any Plant Would Cross These Yellow-Red Thresholds
- Provide a Gauge of the Relative Risk and Demonstrate the Safety Margin
- MSPI Pilot Program Will Evaluate the Mitigating Systems PI Thresholds

# SDP / Inspection Findings

| Cornerstone | Threshold Method |
|---|---|
| Initiating Events | PB with PS Risk Insights |
| Mitigating Systems | PB with PS Risk Insights |
| Barrier Integrity | PB with PS Risk Insights |
| Emergency Preparedness | PB with Gen Risk Insights |
| Occupational Rad Safety | PB with Gen Risk Insights |
| Public Radiation Safety | PB with Gen Risk Insights |
| Physical Protection | PB with Gen Risk Insights |

# Assessment of Concurrent Findings

- SDP Clarified in IMC 0609 Appendix A
- If Common Underlying Cause, Then Analyzed as Single Finding With Color Based on Combined Risk
- If Independent Causes, Then Analyzed as Separate Findings With Distinct Risk Determinations (Colors)
- Inputs into Action Matrix Accordingly

# Discussion of Greater-Than-Green Examples and Their Basis

## Reactor Safety Issues (IE, MS, BI)

- Ex. A - ESW Pump Failure
- Ex. B - S/G Tube Failure
- Ex. C - Loss of Instrument Air
- Ex. D - Operator Requalification Failures
- Ex. E - Fire Suppression

# Greater-Than-Green Examples and Their Basis (Cont.)

## Other Performance Issues

- Ex. F - ALARA Findings (ORS)
- Ex. G - Rad Material Control (PRS)
- Ex. H - Rad Material Transport (PRS)
- Ex. I - ANS Reliability PI (EP)
- Ex. J - Failure to Meet RSPS (EP)

# Ex. A – ESW Pump Failure

## Issue

- Essential Service Water (ESW) Pump Failed Surveillance Flow Test
- Foreign Material (Tygon Tubing) at Pump Inlet and Impeller
- Single Train of ESW Inoperable for ~ 132 Hours
- White as Result of At Power Reactor Safety SDP in IMC 0609, Appendix A

# Ex. A – ESW Pump Failure

## SDP Logic

- Phase 1: Finding Represented an Actual Loss of Safety Function for a Single Train for > AOT (Phase 2 Analysis Required)
- Phase 2: All Affected Sequences Evaluated and Dominant Sequence Identified
- LOOP(3) - Emergency AC Power (EAC)(2) - Recovery of AC Power in < 5 hrs (REC5)(1)
- 3+2+1= 6 (WHITE)

# Examples A – C

## Sensitivity and Assumptions

- Exposure Time
- Mitigation Capability
- Common Cause Effect
- Recovery

# Ex. B – S/G Tube Failure

## Issue

- S/G Tube Failure Results in a 146 gpm RCS Leak (ALERT)
- Minor Radiological Release (Within Regulatory Limits)
- Several Licensee Performance Issues Identified Which Complicated Event Response, and Delayed Plant Depressurization and Cooldown

# Ex. B – S/G Tube Failure

## SDP Logic

- Phase 1: Deficient S/G Inspection Program Considered More than Minor, Finding Contributed to The Likelihood of A Primary System LOCA Initiator (Phase 2 Required)
- Phase 2/3: Detailed Analysis Focused on Probability and Consequences of Spontaneous Tube Rupture
  - No Operator Recovery Credit With Resulting Core Damage and Containment Bypass
  - Estimated Incremental CDF Between 5E-5 and 1E-4 (RED)

# Ex. C – Loss of Instrument Air

## Issue

- Identified Potential for Damaging AFW System Pump on Loss of Instrument Air (LOIA)
- AFW Minimum Flow Recirculation Valves Fail Closed on LOIA
- Pumps Assumed to Fail Within Minutes
- LOOP, Loss of Service Water, and Seismic Event May Cause LOIA
- Condition Was Present Since Initial Startup

# Ex. C – Loss of Instrument Air

## SDP Logic

- Phase 1: More Than Minor Issue, Represents Loss of Safety Function (Phase 2 Required)
- Phase 2: All Affected Sequences Evaluated and Dominant Sequence Identified
- **<u>LOIA</u>** 2 LOIA (3) + AFW (0) = 3
- **<u>LOSW</u>** 2 LOSW (5) + TDAFW (0) = 5
- **<u>LOOP</u>** 1 LOOP (2) + AFW (0) + HPR (2) = 4
  2 LOOP (2) + AFW (0) + FB (2) = 4
  3 LOOP (2) + AFW (0) + EIHP (3) = 5 (RED)

# Ex. D – Operator Requalification Failures

- Issue: High Crew Failure Rate During Annual Simulator Examinations
- Logic: Yellow as Result of Operator Requal SDP in IMC 0609, Appendix I. Failure Rate (4 of 7) Exceeded 50% for the Annual Operating Test
- Sensitivity: White if Lower Failure Rate

# Simulator Operational Evaluation

September 21, 2000

Number of Crews
with
UNSAT Performance in the
Annual Operating Test

| Number of Crews that took the Annual Operating Test (Includes Dual Units) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 4 | G | W | Y | Y | NA | NA | NA | NA |
| 5 | G | W | Y | Y | Y | NA | NA | NA |
| 6 | NF | G | W | Y | Y | Y | NA | NA |
| 7 | NF | G | W | Y | Y | Y | Y | NA |
| 8 | NF | G | W | W | Y | Y | Y | Y |
| 9 | NF | G | G | W | Y | Y | Y | Y |
| 10 | NF | G | G | W | W | Y | Y | Y |
| 11 | NF | NF | G | W | W | Y | Y | Y |
| 12 | NF | NF | G | G | W | W | Y | Y |
| 13 | NF | NF | G | G | W | W | Y | Y |
| 14 | NF | NF | G | G | W | W | W | Y |
| 15 | NF | NF | G | G | G | W | W | Y |
| 16 | NF | NF | NF | G | G | W | W | W |

NF = < 20% Failure Rate - No Finding
G = 20 - 34% Failure Rate
W = >34 - 50% Failure Rate (NUREG-1021, Rev 8 - UNSAT Requalification Program)
Y = >50% Failure Rate
NA = Not Applicable

Note: If more than 16 crews are tested, or more than 8 crews are UNSAT in a given cycle, use the percentages above to determine the appropriate color.

18A

# Ex. E – Fire Suppression

- Issue: Degradation of Fire Suppression Capability
- Logic: White as Result of Fire Protection SDP in IMC 0609, Appendix F
- Sensitivity: Credit Given for Manual Suppression, No Credit for Fire Barriers or Automatic Suppression

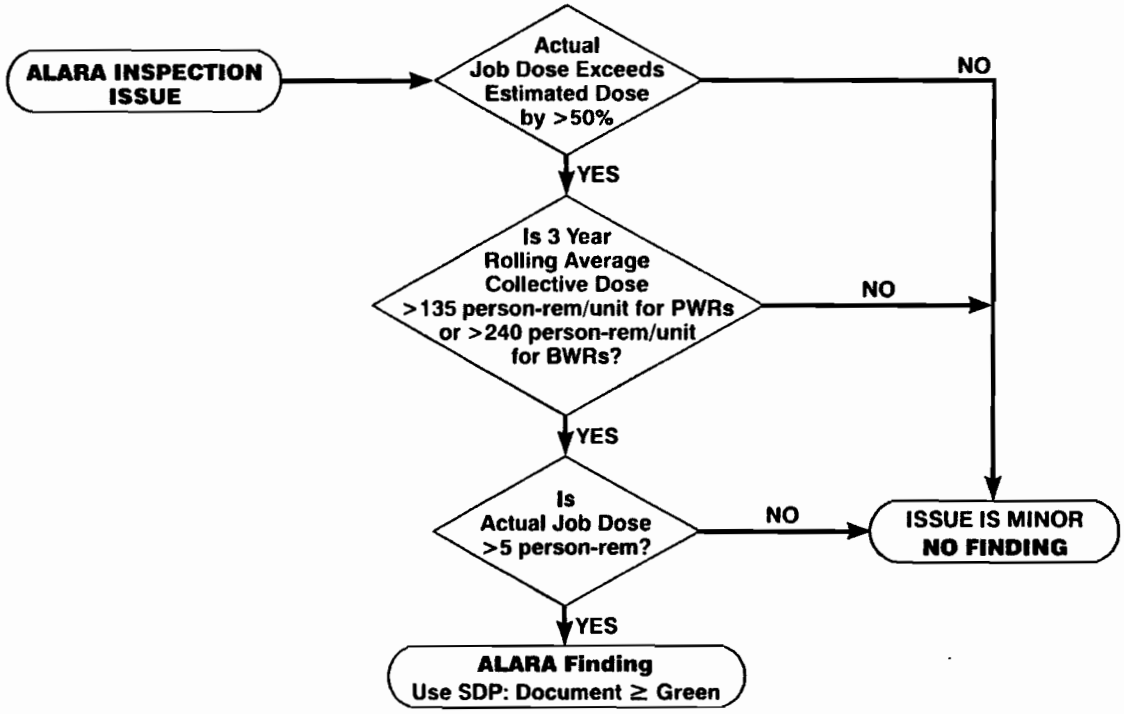
# Ex. F – ALARA Findings

- Issue: ORS – Failures to Maintain Radiation Dosage ALARA
- Logic: White per Occupational Radiation Safety SDP in IMC 0609, App. C
- Sensitivity: No Higher Than White for an ALARA Issue

# Ex. F – ALARA Findings (cont.)

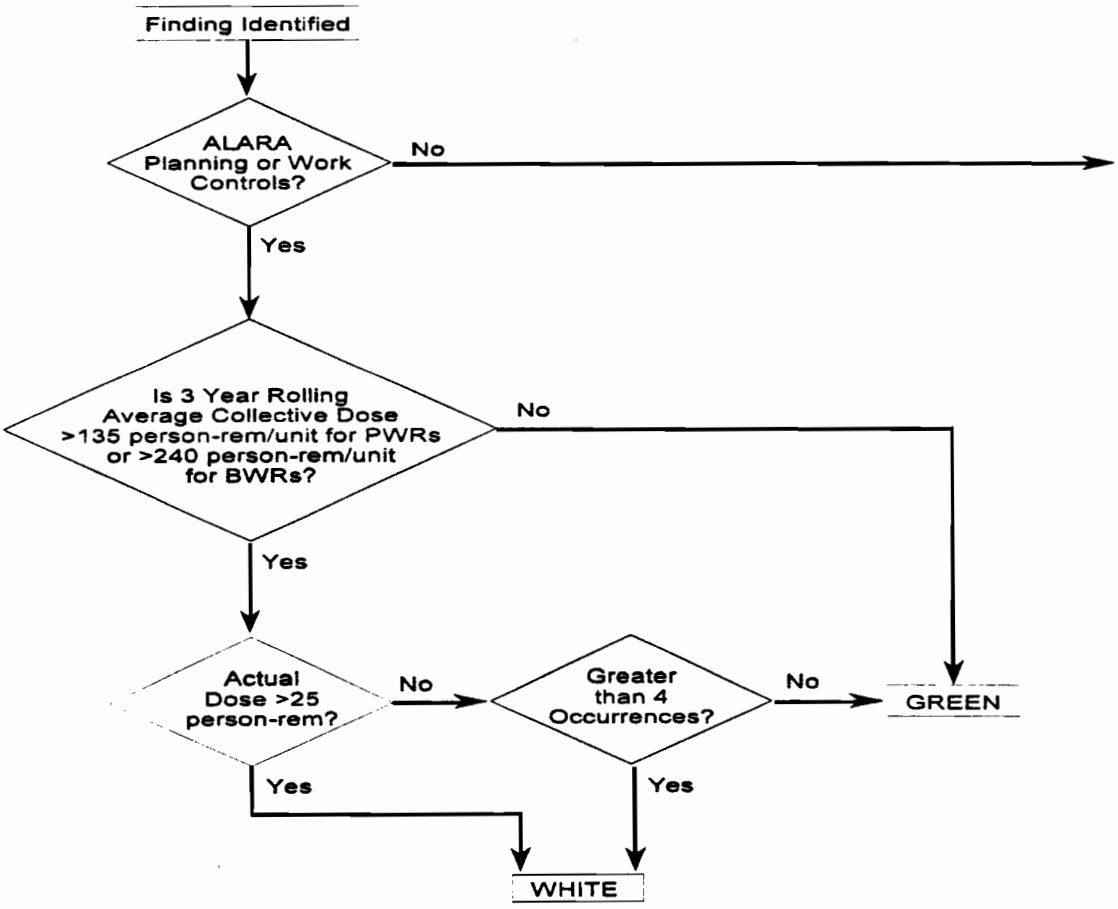
- S.O.C. for 1994 Part 20 Revision (Federal Register Vol 56, No 98, Pg 23367)
- Compliance Judged by "admittedly subjective criteria"
- Program Performance Assessed Against:
  (1) Average Industry Performance
  (2) Licensee's Own Planning

# Original
# ALARA Group 2 Screening Questions



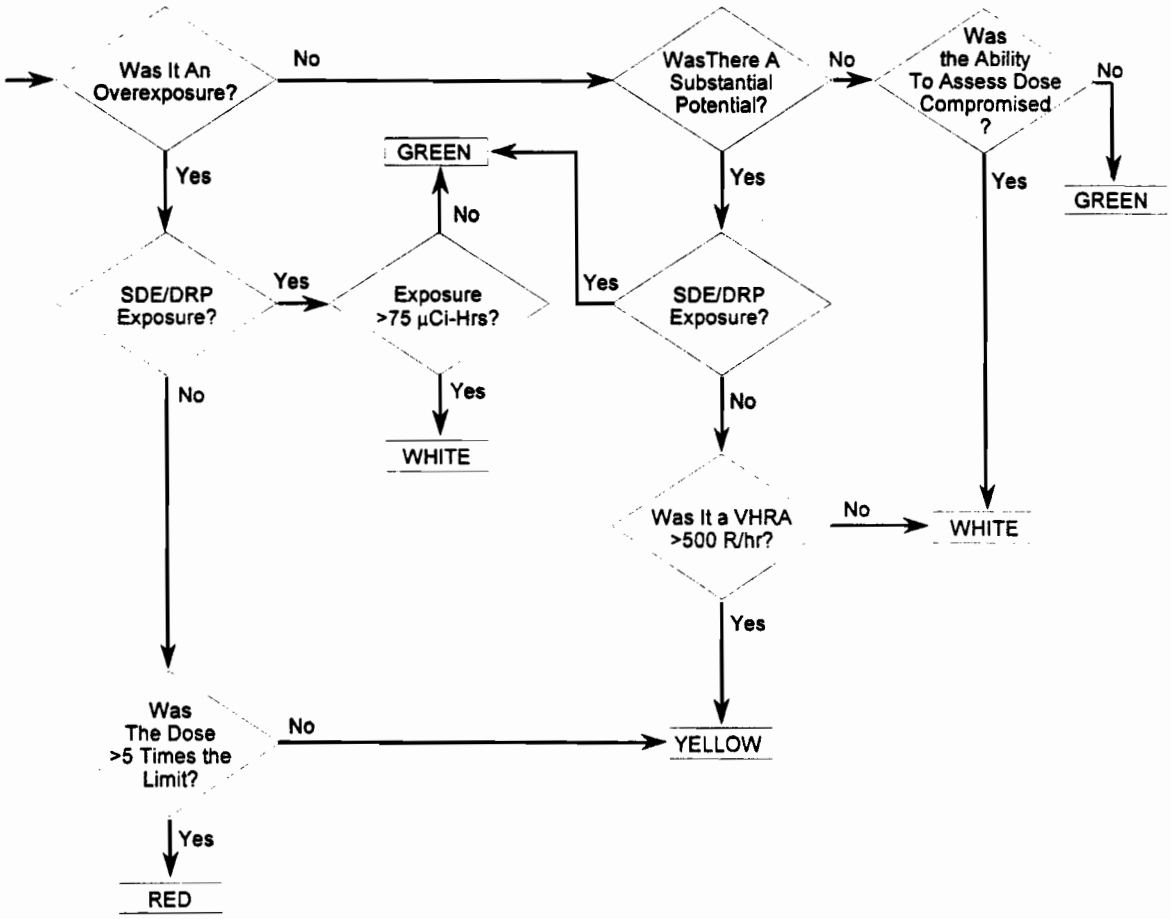

Logic for designating an ALARA inspection issue as an ALARA finding or as a minor issue.

# Occupational Radiation Safety SDP




2/B

# Occupational Radiation Safety SDP

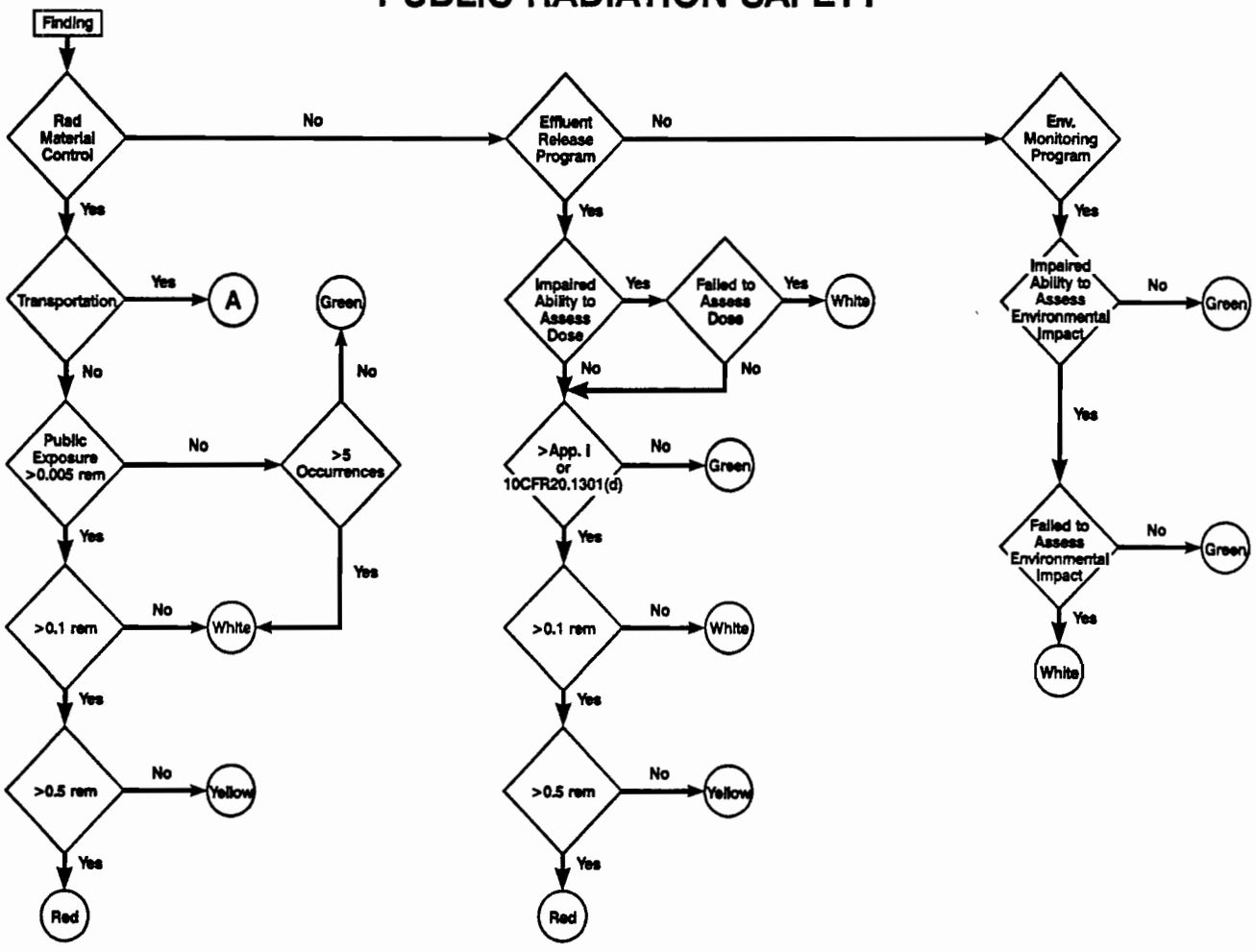



21C

# Ex. G – Rad Material Control

- Issue: PRS – Failure to Control Radioactive Material
- Logic: White per Public Radiation Safety SDP in IMC 0609, App. D Based on < 0.005 rem Public Dose and > 5 Occurrences
- Sensitivity: Yellow if Dose > 0.1 rem, Red if Dose > 0.5 rem

# PUBLIC RADIATION SAFETY

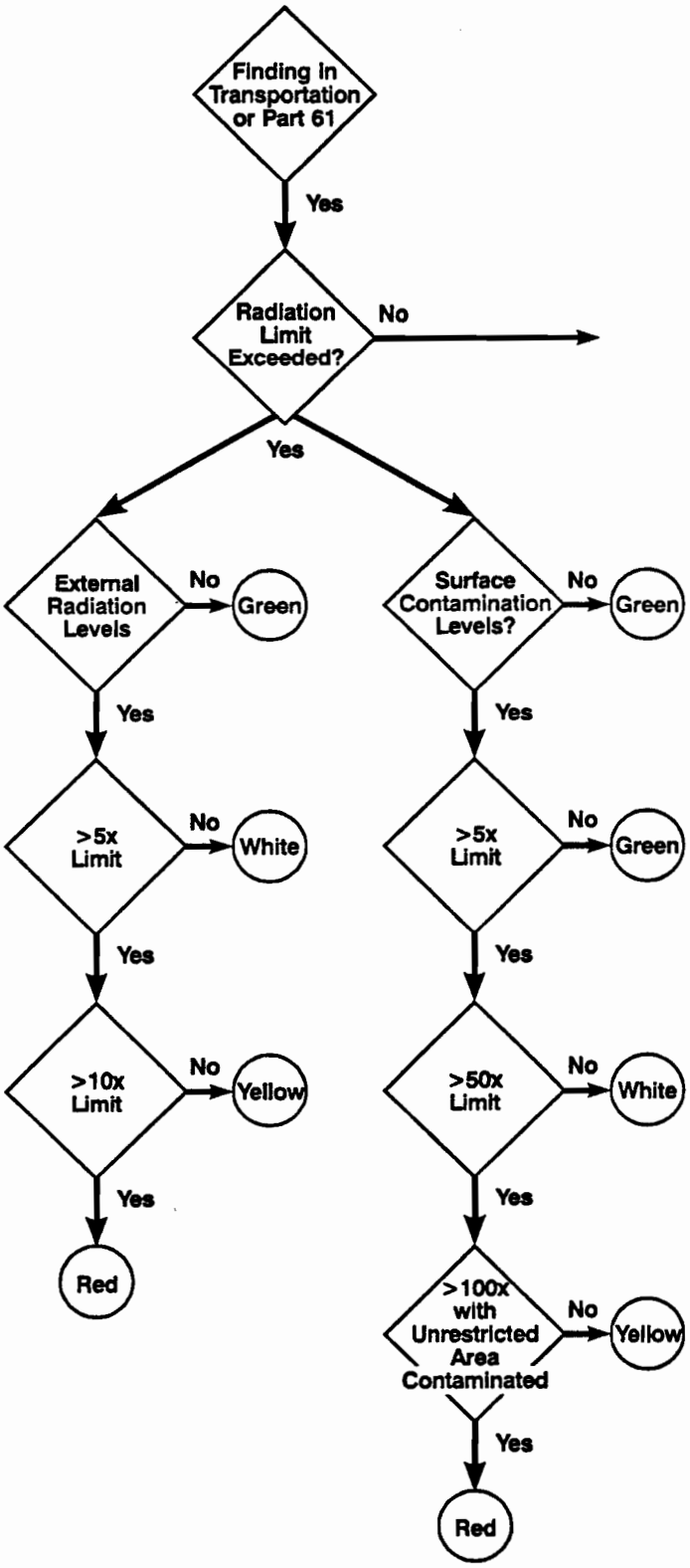



22A

# Ex. H – Rad Material Transport

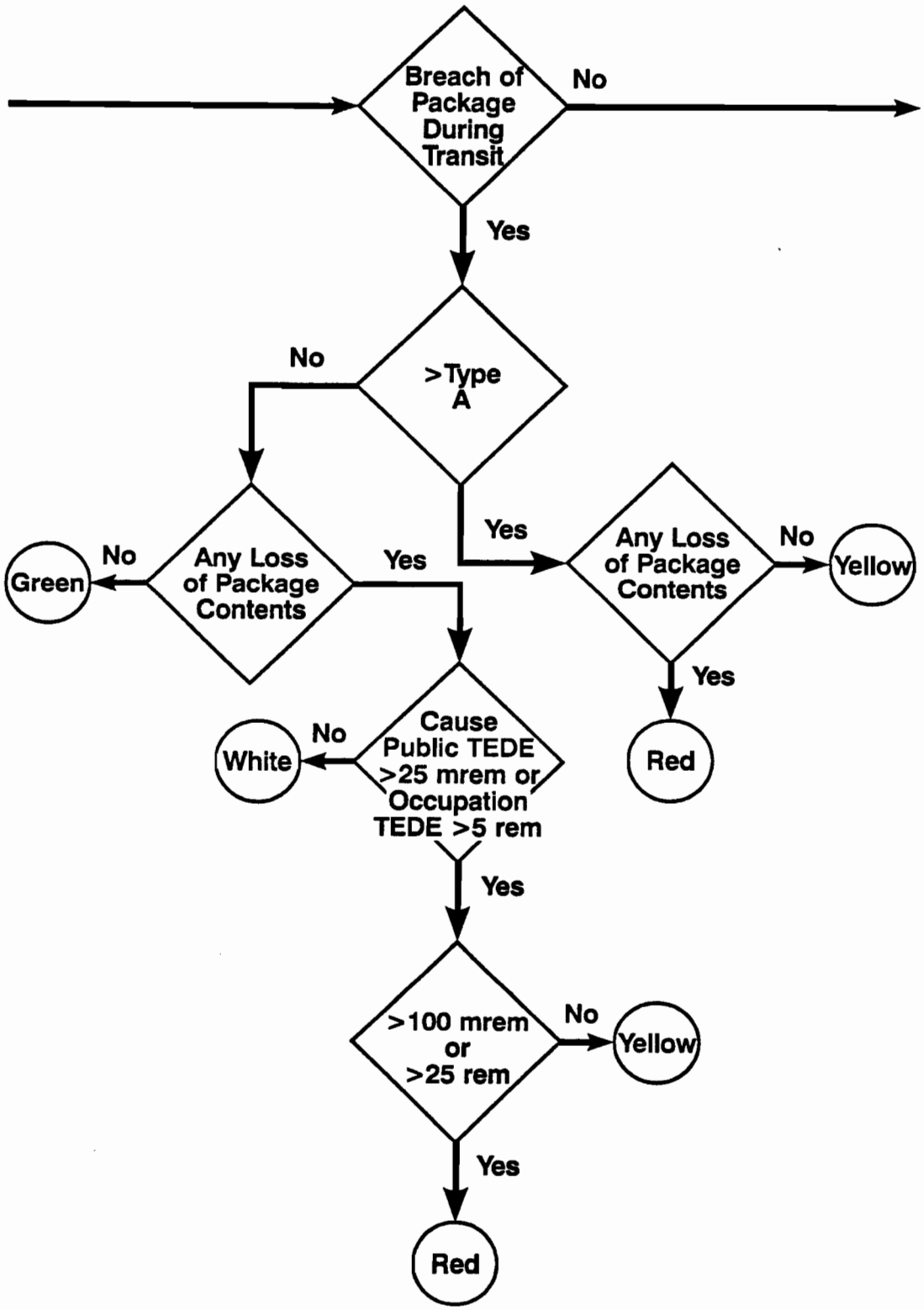
- Issue: PRS – Failure to Properly Classify Radioactive Waste Shipment
- Logic: White per Public Radiation Safety SDP in IMC 0609, App. D for Nonconservative Classification
- Sensitivity: Yellow if Nonconformances Lead to Suspension of Burial Rights

# Radiation Limits

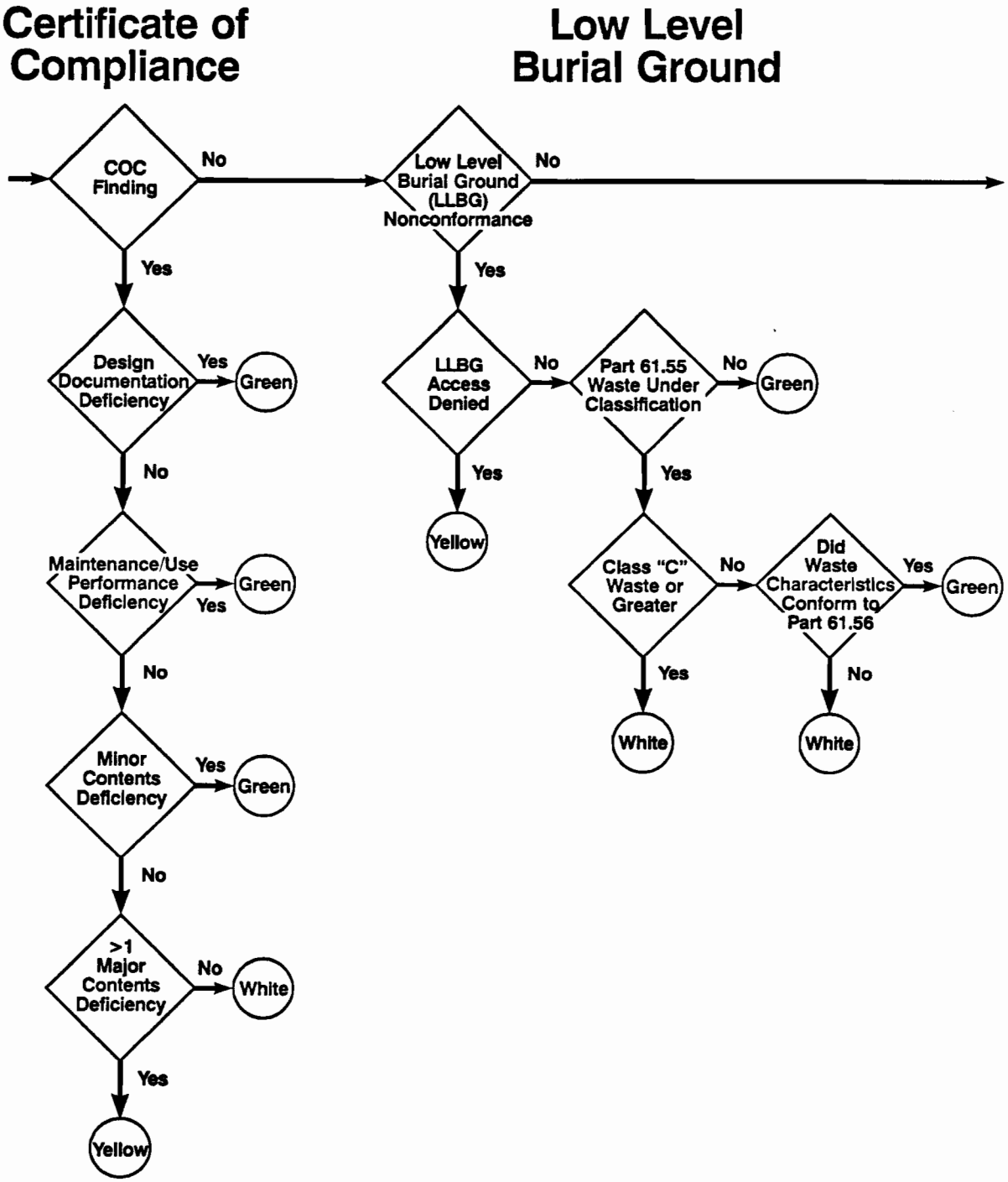



23A

# Package Breach

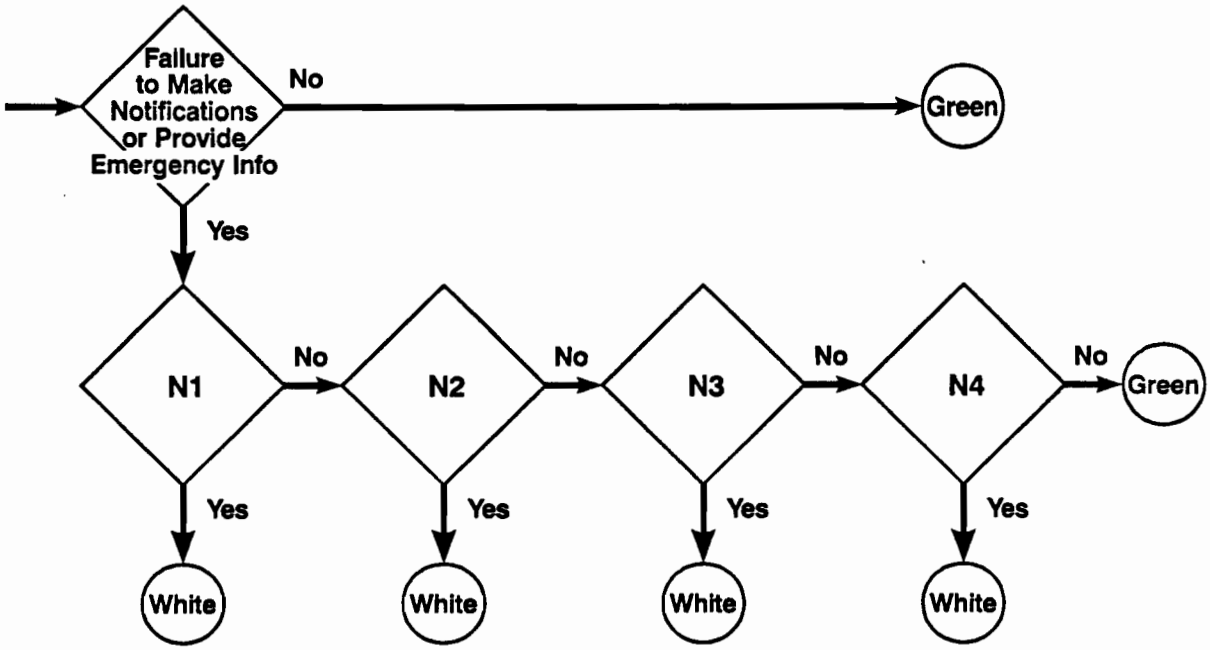



23 B


Certificate of Compliance
Low Level Burial Ground
COC Finding
No
Yes
Design Documentation Deficiency
Yes
Green
No
Maintenance/Use Performance Deficiency
Yes
Green
No
Minor Contents Deficiency
Yes
Green
No
>1 Major Contents Deficiency
No
White
Yes
Yellow
Low Level Burial Ground (LLBG) Nonconformance
No
Yes
LLBG Access Denied
No
Yes
Yellow
Part 61.55 Waste Under Classification
No
Green
Yes
Class "C" Waste or Greater
No
Yes
White
Did Waste Characteristics Conform to Part 61.56
Yes
Green
No
White

23 C

# Notification & Emergency Information




**N1 - Failure to comply with 10 CFR 71.97 - Made a shipment w/o notifying state governor prior to shipment entering state**

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**N2 - Failure to provide emergency response info required by 49 CFR 172.602**

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**N3 - Failure to respond during actual request IAW 49 CFR 172.604**

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**N4 - Failure to make notification of 5x limits exceeded as required by 10 CFR 20.1906**

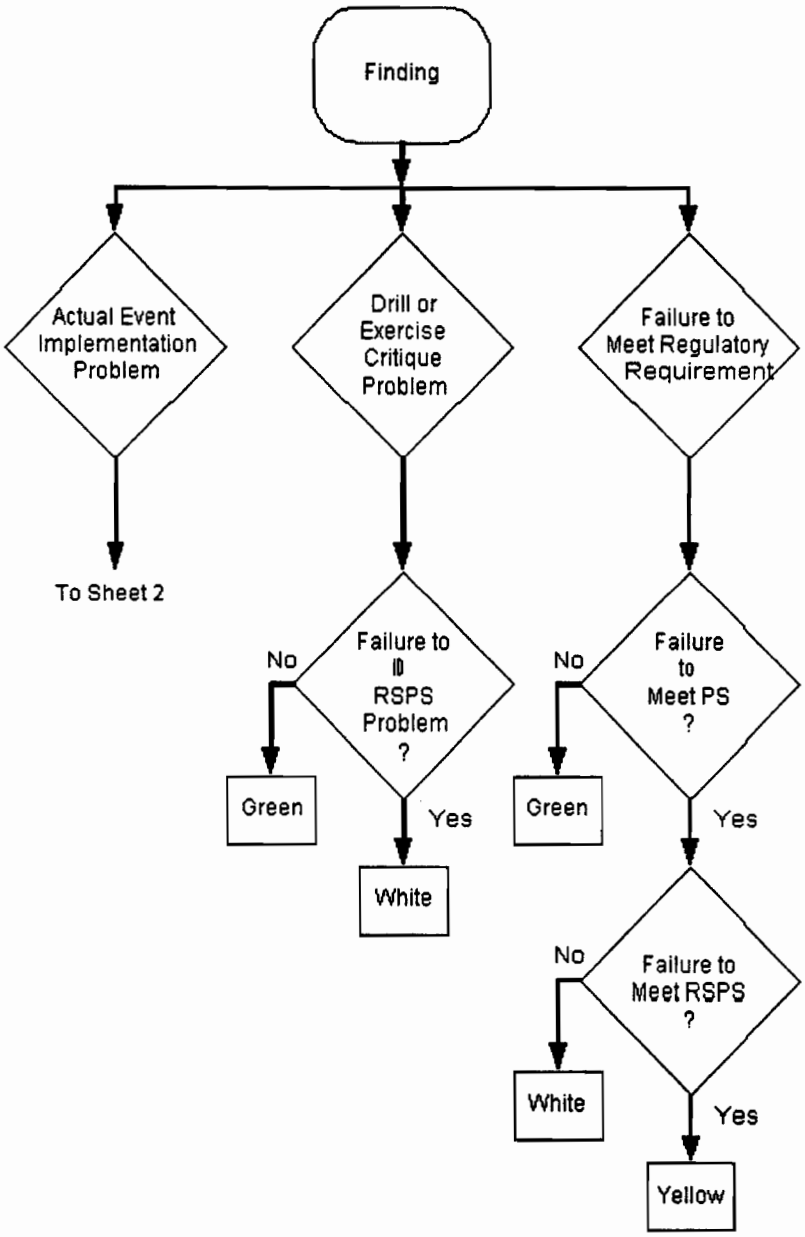
23 D

# Ex. I – ANS Reliability PI

- Issue: EP – Alert and Notification System Reliability of 92.3%
- Logic: Reliability Below White Threshold of 94% Over Past 4 Quarters
- Sensitivity: Yellow Threshold of 90%, No Red Threshold

# Ex. J – Failure to Meet RSPS

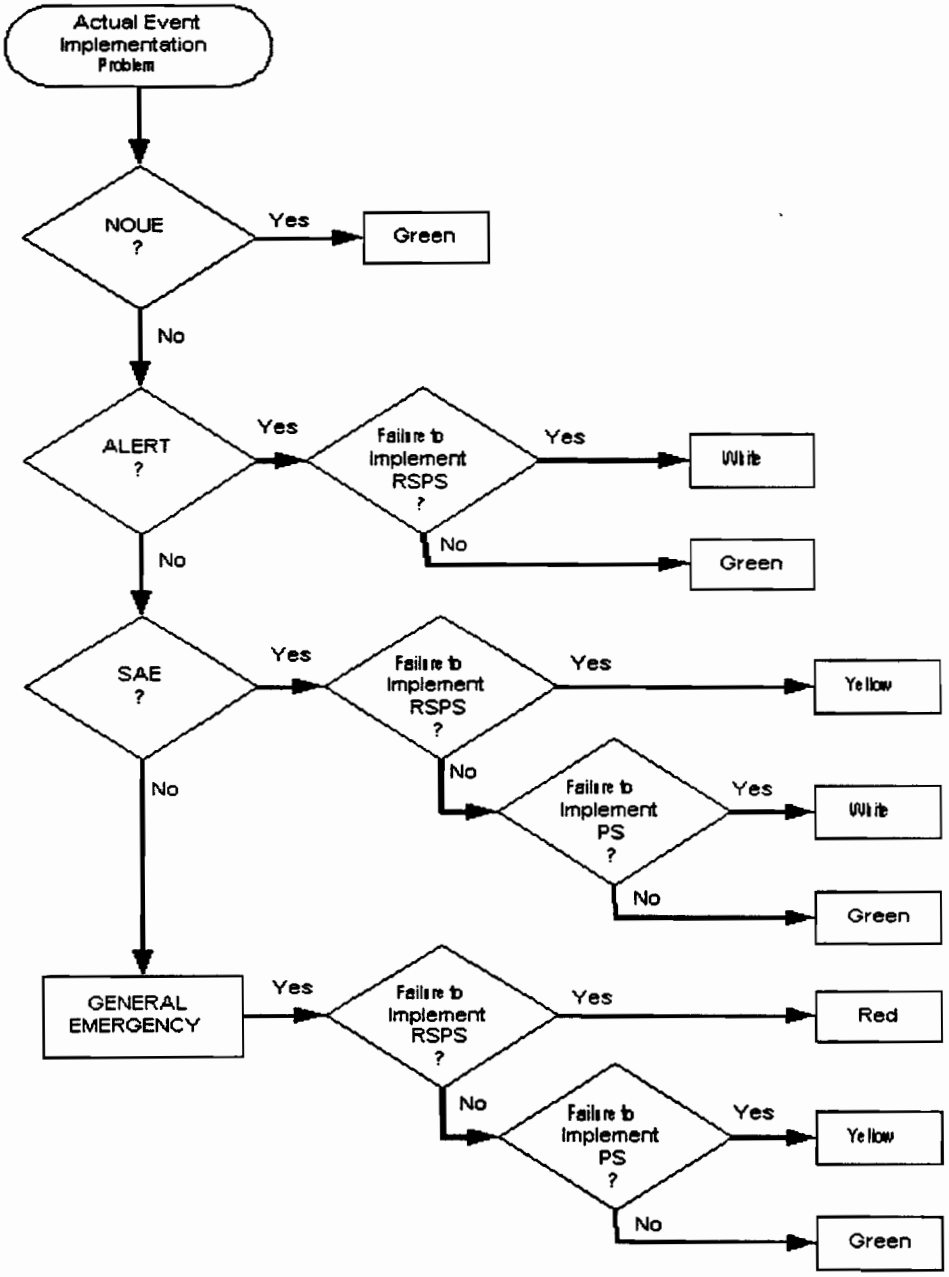
- Issue: EP – Failure to Meet Risk Significant Planning Standard to Promptly Notify Public
- Logic: Initially Yellow per EP SDP in IMC 0609, Appendix B, Changed to White by SERP
- Sensitivity: Yellow if RSPS was Inoperable Vice Degraded




Sheet 1

2/18/00

25A




Sheet 2

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# Back Up Slides

# SRM Regarding Risk-Informed and Performance-Based Elements

"The staff, with ACRS input, should provide recommendations for resolving, in a transparent manner, apparent conflicts and discrepancies between aspects of the revised reactor oversight process that are risk-informed (e.g., significance determination process) and those that are performance based (e.g., performance indicators)."

# SRM - Background

- Performance-Based Thresholds Linked to Appropriate Regulatory Response, Incorporating Risk Insights If Available
- ROP Regulatory Framework Includes Seven Equivalent Cornerstones of Safety
- Regulatory Response Based on the Action Matrix With Equal Weighting to PIs and Inspection Findings Across All Cornerstones
- Assessment Reviews Performed on a Continuous, Quarterly, and Annual Basis For All Plants

# Documents Provided to ACRS

- Draft ROP Basis Document - October 10
- NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," – December 3
- Written Response to Issues Discussed During September 9 ACRS Briefing - December 19

# ROP Program Documents

- MD 8.13 Reactor Oversight Process
- MC 0608 Performance Indicator Program
- MC 0609 Significance Determination Process
- MC 0305 Assessment Program
- MC 0307 ROP Self-Assessment Program
- ROP Basis Document
- Annual SECY Papers

# Results as of December 2002

| Cornerstone | PI Results | SDP Results |
|---|---|---|
| IE | 13 W | 1 R |
| MS | 1 Y, 16 W | 1 R, 2 Y, 24 W |
| BI | 3 W | 2 W |
| EP | 1 Y, 3 W | 2 Y, 18 W |
| ORS | None | 5 W |
| PRS | None | 4 W |
| PP | 2 W | 1 Y, 3 W |

# 2002 Action Matrix Summary

| **Column** | **# of Units** |
|---|---|
| Licensee Response | 63 |
| Regulatory Response | 30 |
| Degraded Cornerstone | 6 |
| Multiple Repetitive Degraded Cornerstone | 3 |
| Unacceptable Performance | None |

**Table 1 – PERFORMANCE INDICATORS**

| Cornerstone | Indicator | | Thresholds (see Note 1) | | |
|---|---|---|---|---|---|
| | | | Increased Regulatory Response Band | Required Regulatory Response Band | Unacceptable Performance Band |
| **Initiating Events** | Unplanned Scrams per 7000 Critical Hours (automatic and manual scrams during the previous four quarters) | | >3.0 | >6.0 | >25.0 |
| | Unplanned Scrams with a Loss of Normal Heat Removal (over the previous 12 quarters) | | >2.0 | >10.0 | >20.0 |
| | Unplanned Power Changes per 7000 Critical Hours (over previous four quarters) | | >6.0 | N/A | N/A |
| **Mitigating Systems** | Safety System Unavailability (SSU) (average of previous 12 quarters) | **All Plants** | | | |
| | | ≤2EDG | >2.5% | >5.0% | >10.0% |
| | | >2EDG | >2.5% | >10.0% | >20.0% |
| | | Hydro Emerg. Power | TBD | TBD | TBD |
| | | **BWRs** | | | |
| | | HPCI | >4.0% | >12.0% | >50.0% |
| | | HPCS | >1.5% | >4.0% | >20.0% |
| | | RCIC | >4.0% | >12.0% | >50.0% |
| | | RHR | >1.5% | >5.0% | >10.0% |
| | | **PWRs** | | | |
| | | HPSI | >1.5% | >5.0% | >10.0% |
| | | AFW | >2.0% | >6.0% | >12.0% |
| | | RHR | >1.5% | >5.0% | >10.0% |
| | Safety System Functional Failures (over previous four quarters) | BWRs | >6.0 | N/A | N/A |
| | | PWRs | >5.0 | N/A | N/A |

Note 1: Thresholds that are specific to a site or unit will be provided in Appendix D when identified.

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| Table 1 - PERFORMANCE INDICATORS Cont'd | | | | |
|---|---|---|---|---|
| **Cornerstone** | **Indicator** | **Thresholds (see Note 1)** | | |
| | | **Increased Regulatory Response Band** | **Required Regulatory Response Band** | **Unacceptable Performance Band** |
| **Barriers** Fuel Cladding | Reactor Coolant System (RCS) Specific Activity (maximum monthly values, percent of Tech. Spec limit) | >50.0% | >100.0% | N/A |
| Reactor Coolant System | RCS Identified Leak Rate (maximum monthly values, percent of Tech. Spec. limit) | >50.0% | >100.0% | N/A |
| **Emergency Preparedness** | Drill/Exercise Performance (over previous eight quarters) | <90.0% | <70.0% | N/A |
| | ERO Drill Participation (percentage of Key ERO personnel that have participated in a drill or exercise in the previous eight quarters) | <80.0% | <60.0% | N/A |
| | Alert and Notification System Reliability (percentage reliability during previous four quarters) | <94.0% | <90.0% | N/A |
| **Occupational Radiation Safety** | Occupational Exposure Control Effectiveness (occurrences during previous 4 quarters) | >2 | >5 | N/A |
| **Public Radiation Safety** | RETS/ODCM Radiological Effluent Occurrence (occurrences during previous four quarters) | >1 | >3 | N/A |
| **Physical Protection** | Protected Area Security Equipment Performance Index (over a four quarter period) | >0.080 | N/A | N/A |
| | Personnel Screening Program Performance (reportable events during the previous four quarters) | >2 | >5 | N/A |
| | Fitness-for-Duty (FFD)/Personnel Reliability Program Performance (reportable events during the previous four quarters) | >2 | >5 | N/A |

2 Note 1: Thresholds that are specific to a site or unit will be provided in Appendix D when identified.
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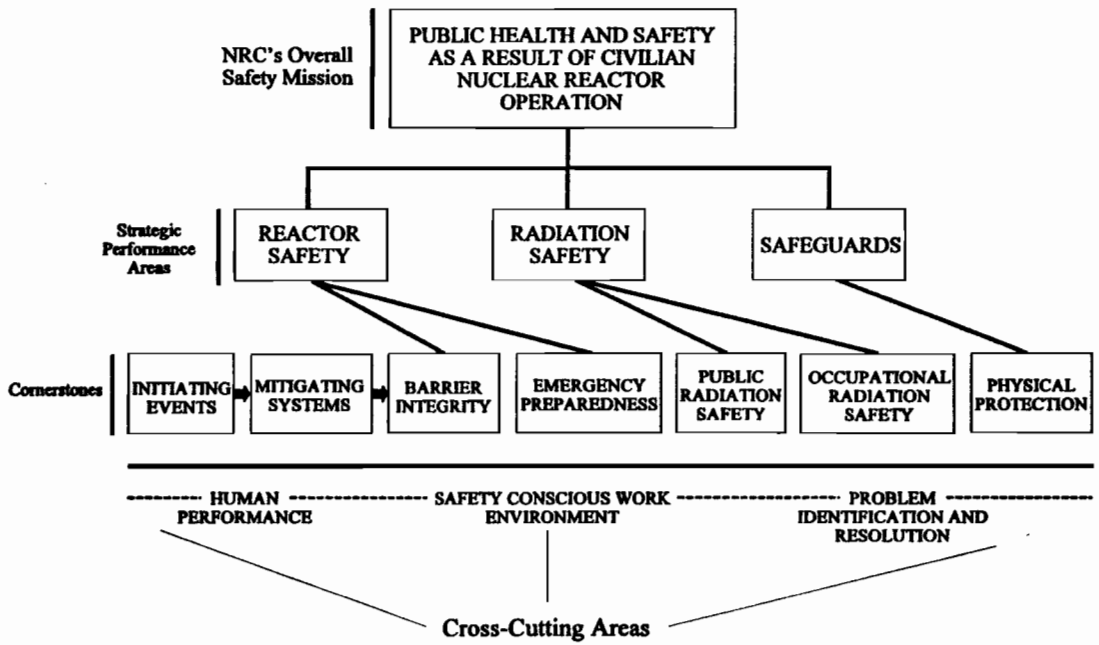
# REGULATORY FRAMEWORK



# ACTION MATRIX

| | | Licensee Response Column | Regulatory Response Column | Degraded Cornerstone Column | Multiple/ Repetitive Degraded Cornerstone Column | Unacceptable Performance Column |
|---|---|---|---|---|---|---|
| RESULTS | | All Assessment Inputs (Performance Indicators (PIs) and Inspection Findings) Green; Cornerstone Objectives Fully Met | One or Two White Inputs (in different cornerstones) in a Strategic Performance Area; Cornerstone Objectives Fully Met | One Degraded Cornerstone (2 White Inputs or 1 Yellow Input) or any 3 White Inputs in a Strategic Performance Area; Cornerstone Objectives Met with Moderate Degradation in Safety Performance | Repetitive Degraded Cornerstone, Multiple Degraded Cornerstones, Multiple Yellow Inputs, or 1 Red Input; Cornerstone Objectives Met with Longstanding Issues or Significant Degradation in Safety Performance | Overall Unacceptable Performance; Plants Not Permitted to Operate Within this Band, Unacceptable Margin to Safety |
| RESPONSE | Regulatory Performance Meeting | None | Branch Chief (BC) or Division Director (DD) Meet with Licensee | DD or Regional Administrator (RA) Meet with Licensee | RA (or EDO) Meet with Senior Licensee Management | Commission meeting with Senior Licensee Management |
| | Licensee Action | Licensee Corrective Action | Licensee root cause evaluation and corrective action with NRC Oversight | Licensee cumulative root cause evaluation with NRC Oversight | Licensee Performance Improvement Plan with NRC Oversight | |
| | NRC Inspection | Risk-Informed Baseline Inspection Program | Baseline and supplemental inspection procedure 95001 | Baseline and supplemental inspection procedure 95002 | Baseline and supplemental inspection procedure 95003 | |
| | Regulatory Actions[1] | None | Supplemental inspection only | Supplemental inspection only | -10 CFR 2.204 DFI<br>-10 CFR 50.54(f) Letter<br>- CAL/Order | Order to Modify, Suspend, or Revoke Licensed Activities |
| COMMUNICATION | Assessment Letters | BC or DD review/sign assessment report (w/ inspection plan) | DD review/sign assessment report (w/ inspection plan) | RA review/sign assessment report (w/ inspection plan) | RA review/sign assessment report (w/ inspection plan) | |
| | Annual Public Meeting | SRI or BC Meet with Licensee | BC or DD Meet with Licensee | RA (or designee) Discuss Performance with Licensee | EDO Discuss Performance with Senior Licensee Management | |
| | Commission Involvement | None | None | None | Plant discussed at AARM | Commission Meeting with Senior Licensee Management |
| | INCREASING SAFETY SIGNIFICANCE ----------> | | | | | |

Note 1: The regulatory actions for plants in the Multiple/Repetitive Degraded Cornerstone column are not mandatory agency actions. However, the regional office should consider each of these regulatory actions when significant new information regarding licensee performance becomes available.



**ENCLOSURE 2**

# Three (3) White Findings

- 1st White Finding - Reactor Building Scaffolding (22 p-rem (est), 46.35 p-rem (act), 111%)
- 2nd White Finding - Steam Generator Activities (21.19 p-rem (est), 57.66 p-rem (act), 172%)
- 3rd White Finding
  - Steam Generator Manways/Inserts (3.99/8.54/114%)
  - HP Support SG Activities (2.46/5.64/129%)
  - Foreign Object Search & Retrieval (1.50/6.39/326%)
  - RCP Seal Replacement (6.61/12.87/94.7%)

# Notice of Violation

10 CFR 20.1101(b), requires, to the extent practical, the use of procedures and engineering controls to achieve doses ALARA:

- Conducting activities during RCS clean-up (Scaffolding/SG)
- Conducting activities prior to flushing SG drains (Scaffolding/SG)
- Conducting activities w/ SG secondary side drained (RCP/SG)
- Insufficient mock-up training (SG)
- Ineffective communications between RP personnel and craft (Generic)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

December 18, 2002

MEMORANDUM TO: Sher Bahadur, Associate Director for Technical Support, ACRS/ACNW

FROM: Maggalean W. Weston, Senior Staff Engineer

SUBJECT: FEDERAL REGISTER NOTICE REGARDING THE JOINT MEETING OF THE ACRS SUBCOMMITTEES ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT AND ON PLANT OPERATIONS, JANUARY 21, 2003, ROCKVILLE, MARYLAND

Attached is a Federal Register Notice regarding the subject meeting. Please have this Notice transmitted for publication as soon as possible.

Attachment:
FR Notice

cc with Attachment:
G. Apostolakis, ACRS
J. Larkins, ACRS
I. Schoenfeld, OEDO
J. Szabo, OGC
A. Bates, SECY
R. Jasinski, OPA
S. Collins, NRR
G. Holahan, NRR
A. Thadani, RES
S. Newberry, RES
M. Cunningham, RES
PMNS
Public Document Room

[7590-01-P]

NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
JOINT MEETING OF THE ACRS SUBCOMMITTEES ON RELIABILITY
AND PROBABILISTIC RISK ASSESSMENT AND ON PLANT OPERATIONS

Notice of Meeting

The ACRS Subcommittees on Reliability and Probabilistic Risk Assessment and on Plant Operations will hold a joint meeting on January 21, 2003, Room T-2B3, 11545 Rockville Pike, Rockville, Maryland.

The entire meeting will be open to public attendance.

The agenda for the subject meeting shall be as follows:

Tuesday, January 21, 2003 - 8:30 a.m. until the conclusion of business

The Subcommittee will continue its discussion of activities associated with the Reactor Oversight Process (ROP), specifically staff activities to address the issues in the Staff Requirements Memorandum of December 20, 2001, in which the Commission directed that the NRC staff, with input from ACRS, should provide recommendations for resolving in a transparent manner, apparent conflicts and discrepancies between aspects of the revised ROP process that are risk-informed (e.g., significance determination process) and those that are performance based (e.g., performance indicators). The purpose of this meeting is to gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Oral statements may be presented by members of the public with the concurrence of the Subcommittee Chairman and written statements will be accepted and made available to the Subcommittees, their consultants, and staff. Persons desiring to make oral statements should notify the Designated Federal Official named below five days prior to the meeting, if possible, so that appropriate arrangements can be made. Electronic recordings will be permitted only during those portions of the meeting that are open to the public.

During the initial portion of the meeting, the Subcommittees, along with any of their consultants who may be present, may exchange preliminary views regarding matters to be considered during the balance of the meeting.

The Subcommittees will then hear presentations by and hold discussions with representatives of the NRC staff and other interested persons regarding matters scheduled for this meeting.

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, and the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor can be obtained by contacting the Designated Federal Official, Ms. Maggalean W. Weston (telephone: 301-415-3151) between 8:00 a.m. and 5:30 p.m. (EST). Persons planning to attend this meeting are urged to contact the above named individual at least two working days prior to the meeting to be advised of any potential changes to the agenda that may have occurred.

Date 12/20/02

Sher Bahadur, Associate Director for
Technical Support, ACRS/ACNW

December 19, 2002

NOTE TO: John Larkins, Executive Director
Advisory Committee on Reactor Safeguards (ACRS)

FROM: Cynthia Carpenter, Chief
Inspection Program Branch
Nuclear Reactor Regulation

SUBJECT: STAFF RESPONSE TO ISSUES DISCUSSED DURING THE ACRS SUBCOMMITTEE BRIEFING ON THE REACTOR OVERSIGHT PROCESS ON SEPTEMBER 9, 2002

Please find attached 14 copies of our written response to the issues raised by the Advisory Committee on Reactor Safeguards (ACRS) Plant Operations Subcommittee during the Reactor Oversight Process (ROP) briefing on September 9, 2002.

We welcome the opportunity to further discuss this response and the subject staff requirements memorandum with the ACRS Plant Operations Subcommittee in January 2003. Please contact Mr. Ronald Frahm of my staff (at 301-415-2986, or via email to rkf@nrc.gov) if you have any questions prior to the January 2003 meeting.

December 19, 2002

# STAFF RESPONSE TO ISSUES DISCUSSED DURING THE ACRS SUBCOMMITTEE BRIEFING ON THE REACTOR OVERSIGHT PROCESS ON SEPTEMBER 9, 2002

Over the past several years, the staff of the U.S. Nuclear Regulatory Commission (NRC) has frequently interacted with the Advisory Committee on Reactor Safeguards (ACRS) on matters related to the Reactor Oversight Process (ROP). Most recently, the staff met with the ACRS Plant Operations Subcommittee on September 9, 2002, to discuss our plans to address issues raised in a Commission Staff Requirements Memorandum (SRM), which resulted from the ACRS briefing of the Commission on December 5, 2001. The resultant SRM, dated December 20, 2001, stated that "the staff, with ACRS input, should provide recommendations for resolving, in a transparent manner, apparent conflicts and discrepancies between aspects of the revised reactor oversight process that are risk-informed (e.g., the significance determination process) and those that are performance-based (e.g., the performance indicators)." As a result of the September 9 briefing, the staff decided to prepare this response to the issues raised at the September 9 ACRS briefing and in the ACRS letter dated February 13, 2002. We understand that a follow up ACRS briefing to further discuss this written response and the subject SRM will be held on January 21, 2003.

The staff has either addressed or is in the process of addressing the concerns noted in your previous correspondence of February 13, 2002. In that letter, you stated that although the ACRS concurs in general with the staff's responses to your previous concerns, the ACRS continues to believe that there are areas that require additional attention to address specific issues. Your specific remaining concerns are summarized below and include statements from your recent letter, as well as related statements from the previous letter dated October 12, 2001.

## ACRS Comment 1 (Risk-Based Performance Indicator Thresholds)

*February 13, 2002: Some of the threshold values for risk-based performance indicators (PIs) are not meaningful. It is important that the thresholds adequately reflect the levels at which the NRC will take action and the urgency with which this action will be taken. Some of the current thresholds do not do this.*

*October 12, 2001: A realistic assessment of the change in CDF cannot be related to the change in a single PI. This approach has produced threshold values that are too high to be meaningful. Specifically, the numerical values for the white-yellow and yellow-red thresholds for the Initiating Events and Mitigating Systems performance indicators are not useful and should be set by expert judgment to trigger the regulatory response associated with the particular threshold.*

## Staff Response

The staff acknowledges the ACRS's concern and is considering eliminating the yellow-red thresholds for the Initiating Events PIs. However, there is a basis for each of these thresholds, as discussed below, and any consideration of their elimination will require careful evaluation and implementation.

As noted in the staff's January 10, 2002, response to the ACRS's October 12, 2001, letter, the yellow-red thresholds for the Unplanned Scrams per 7,000 Critical Hours and Scrams with Loss of Normal Heat Removal PIs were risk-informed using the models available at the time. While it is highly unlikely that any plant would cross these yellow-red thresholds, the staff believes that these thresholds reflect the risk significance of the types of events monitored in these PIs individually. The green-white and white-yellow thresholds are set low enough to identify problems in individual plant areas that will trigger NRC engagement long before any serious decline in overall plant safety. The yellow-red thresholds provide a gauge of the relative risk of the number of plant scrams and show the safety margin available before reaching a high safety significance.

Nonetheless, the staff will consider eliminating the yellow-red threshold for these two Initiating Events PIs. The staff plans to discuss this option with the ROP working group during a future public meeting and will continue to evaluate whether the yellow-red thresholds should be eliminated (or adjusted).

Under the Mitigating Systems Performance Index (MSPI) pilot program, the Mitigating Systems PIs and associated thresholds are currently under review. At the conclusion of the MSPI pilot appropriate changes to those PIs will be made.

**ACRS Comment 2 (Assessment of Concurrent Findings)**

*February 13, 2002: Further discussion is needed regarding the assessment of concurrent findings.*

*October 12, 2001: Concurrent performance deficiencies are assessed collectively, as applicable to determine the total change in CDF, but each performance deficiency is assigned a color individually. There may be instances in which conclusions could be altered if the results are considered collectively, and thus such collective results should be considered in the Action Matrix.*

**Staff Response**

The staff agrees with the ACRS's concern regarding the handling of concurrent performance deficiencies. Accordingly, we clarified the Significance Determination Process (SDP) guidance to address this issue.

As stated in the staff's January 12 response, the staff agrees that Action Matrix response can differ depending on whether concurrent degradations in plant performance are viewed as probabilistically independent or are the result of a common performance deficiency. Under the SDP, concurrent findings with a common underlying cause are analyzed as a single finding and are assigned a single color appropriate to the combined risk. Concurrent findings that are determined to be the result of independent causes are analyzed separately, and each receives a color based on the calculation of its risk significance as if the other finding did not overlap. Similarly, the Action Matrix considers the SDP outcome of findings with a common underlying cause as a single input, while the results of independent concurrent deficiencies are considered as individual inputs.

To address this specific concern, the staff revised Inspection Manual Chapter (IMC) 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," on March 18, 2002. For more details, please see the attached excerpt (Enclosure 1) from Section III, "Concurrent Multiple Equipment or Functional Degradations," of IMC 0609, Appendix A.

**ACRS Comment 3 (SRM Regarding Risk-Informed and Performance-Based Elements)**

*February 13, 2002: As requested in the SRM dated December 20, 2001, we need to discuss performance deficiencies and apparent conflicts and discrepancies between elements of the ROP which are risk-informed (e.g., significance determination process) and those that are performance-based (e.g., PIs).*

*SRM dated December 20, 2001: The staff, with ACRS input, should provide recommendations for resolving, in a transparent manner, apparent conflicts and discrepancies between aspects of the revised reactor oversight process that are risk-informed (e.g., significance determination process) and those that are performance based (e.g., performance indicators).*

**Staff Response**

The staff agrees with the ACRS that we need to discuss the specifics of the subject SRM. We met with you to discuss these issues on September 9, 2002, and are providing this written response to address your concerns and to put forth our plan to address the subject SRM. The staff does not agree that there are apparent conflicts and discrepancies between elements of the ROP that are risk-informed and those that are performance-based. We recognize, however, the need for a more transparent basis for the PI and SDP thresholds and are developing a basis document. The staff believes the ROP appropriately addresses both risk-informed and performance-based issues, and the staff is taking reasonable actions to address identified issues.

Background

The ROP regulatory framework was developed by a task group with significant input from a variety of stakeholders. Seven cornerstones of safety were established across three strategic performance areas. These seven cornerstones were selected based on their importance in meeting the agency's mission to protect public health and safety. Each cornerstone was defined to be a significant contributor to the NRC's assessment of overall plant safety and performance.

Regulatory response to plant performance is determined by the ROP Action Matrix (Enclosure 2). Inputs to the Action Matrix include both PIs and inspection findings that have been given a color designation to represent their significance. Each of the seven cornerstones has both PIs and inspection findings to represent an indication of plant performance in each particular area. Several thresholds are based on expert judgement that degradation in performance associated with each color band is appropriately linked to a corresponding regulatory response. Risk insights were incorporated to the extent they were available. An underlying principle of the ROP is that crossing a PI or inspection finding threshold will have similar meaning with respect to subsequent NRC action. Therefore, by design the Action Matrix treats an individual "white" as a "white" and an individual "yellow" as a "yellow," regardless of the cornerstone or whether it is a PI or inspection finding. The Action Matrix logic is also structured to integrate at the cornerstone level (2 "whites" or 1 "yellow" degrades a cornerstone) and at the

strategic performance area level (3 "whites" degrades the reactor safety area). Finally, highly significant issues (multiple "yellows" or a "red") result in significant NRC/licensee actions by being placed in the multiple/repetitive degraded cornerstone column of the Action Matrix.

Plant performance is assessed for each operating reactor on a continuous, quarterly, semiannual, and annual basis as described in Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program." Plant performance for plants with significant performance deficiencies is also discussed with senior NRC managers annually during the agency action review meeting (AARM) to confirm the appropriateness of NRC actions. In addition to discussions of plant performance, the AARM and subsequent Commission briefing also include discussions of ROP self-assessment results and industry trends.

The built-in ROP self-assessment program is another important aspect of the ROP, as described in IMC 0307, "Reactor Oversight Process Self-Assessment Program." In accordance with this program, the NRC routinely evaluates the effectiveness of the ROP in achieving the goals of being objective, risk-informed, understandable, and predictable, as well as the agency's strategic performance goals of (1) maintaining safety; (2) enhancing public confidence; (3) increasing the effectiveness, efficiency, and realism of NRC activities and decisions; and (4) reducing unnecessary regulatory burden. The ROP self-assessment program also provides the process for developing recommended improvements to the ROP, and culminates in an annual ROP self-assessment report and Commission paper.

Discussion

All inputs to the assessment process (i.e., Action Matrix) are essentially performance-based, including both PIs and inspection findings, though some of these inputs are more risk-informed than others. There is an important distinction between being risk-based (i.e., using a probabilistic risk assessment (PRA)) and being risk-informed. Many aspects of the ROP are risk-informed, in that they consider risk insights in the decision making process, although they may not be based on specific PRA results.

The staff believes that having both risk-informed and performance-based thresholds provides a balanced approach. We acknowledge that the ROP is still in its infancy, having only completed 2 full years of implementation, but most would agree it is an improvement over the NRC's previous oversight processes. Although we believe the existing processes are meeting the goals of the ROP, we recognize the need for continued improvements.

We have also designed and implemented the ROP self-assessment program to ensure that we continue to identify and strengthen potential ROP program weaknesses. As previously stated, this program provides a mechanism for the NRC to routinely evaluate the effectiveness of the ROP and a process for developing recommended improvements. We strive to continually improve the ROP through ongoing interactions with both internal and external stakeholders, including but not limited to our regional offices, the industry, the public, and advisory bodies like the ACRS. The staff is conducting both internal and external surveys of our stakeholders as part of the ROP self-assessment program in December 2002. Insights gained from these surveys will be conveyed (along with the staff's response to the subject SRM) in our upcoming annual ROP self-assessment Commission paper.

As previously noted, an underlying principle of the ROP is that crossing a PI or inspection finding threshold will have similar meaning with respect to regulatory response. The thresholds are not necessarily equal with respect to a measurable risk significance, but we have

incorporated risk insights in determining the threshold values to the extent that they were available and applicable. Nonetheless, certain aspects of the ROP cannot be directly measured and assigned a risk significance, but are still important in carrying out the agency's mission of protecting public health and safety. Accordingly, we established and continue to adjust the specific PI and SDP thresholds as necessary to ensure a consistent regulatory response for similar performance concerns. Enclosure 3 to this letter presents specific examples of greater-than-green inspection findings and PIs to demonstrate the basis for regulatory response for various performance deficiencies across several cornerstones. Many of these examples resulted in adjustments to certain PI and SDP thresholds based on lessons learned. As such, they demonstrate that we continue to evaluate and adjust the thresholds to ensure a consistent regulatory response. We look forward to discussing these examples with you in detail at the January 2003 ACRS Plant Operations Subcommittee meeting.

We recognize the need for a more transparent basis for the PIs and SDPs, and are in the process of developing and issuing the ROP Basis Document. A draft copy of the ROP Basis Document was provided to the ACRS on October 10, 2002. We envision that the ROP Basis Document will provide background on ROP development, along with the staff's basis for key attributes of the program, including the PI and SDP thresholds. This document will also provide the basis for process changes and other considerations that were not incorporated into the ROP. The ROP Basis Document should go a long way toward consolidating the basis for staff positions.

The staff believes that plants have been receiving the appropriate level of oversight since the initial implementation of the ROP in April 2000. Senior NRC management has confirmed that the staff's actions were appropriate, and there have been no changes in regulatory response as a result of senior management discussions at either of the first two AARMs. In addition, having recently completed mid-cycle reviews for the third ROP assessment cycle, the regions stated that those plants in the columns furthest to the right of the Action Matrix are indeed the plants with the more significant safety issues that warrant increased regulatory attention. Therefore, the NRC appears to be appropriately focusing its attention and resources on those plants with performance problems.

The staff has also begun preliminary discussions with the NRC's Office of Nuclear Regulatory Research to consider the feasibility of developing a formal decision analysis to determine regulatory response. This long-term project could potentially involve weighting the assessment inputs through a deliberative, consensus-building process, and developing appropriate utility functions to process inputs and calculate the desire response. Before expending significant resources on this effort, we will need to evaluate the potential added value against the cost of developing and implementing such a process, as well as the pros and cons of moving toward such a structured decision theory. As previously noted, we also believe that the current Action Matrix process is working effectively and requires additional run time before making any significant changes.

It is also important to note that there are two significant activities underway, namely the Davis-Besse Lessons Learned Task Force and the SDP Task Group, that may have a substantial effect on the ROP. Once available, the staff plans to evaluate the results of these efforts, and will make appropriate changes to the ROP to further improve its efficiency and effectiveness, if necessary.

Staff Conclusion and Plans

Certain aspects of the ROP are more risk-informed than others, but the specific PI and SDP thresholds were established and continue to be adjusted as necessary to ensure a consistent regulatory response for similar performance concerns. The staff believes that the ROP is working effectively today, but also recognizes that continued incremental improvements are warranted. We will continue to evaluate and improve the ROP, including the current PI and SDP thresholds, as part of our ongoing self-assessment process. In addition, we are developing an ROP Basis Document to consolidate the basis for staff positions in a transparent manner. We will also evaluate the feasibility of using formal decision analysis as a long-term approach for determining regulatory response.

The staff plans to address the subject SRM in its upcoming annual ROP self-assessment Commission paper. That paper will include a brief summary and discussion of the staff's interactions with the ACRS. We expect to issue this Commission paper in early April 2003 and plan to brief the Commission on the results of the AARM (which includes a discussion of ROP self-assessment) in early May 2003.

Enclosures:
1. Excerpt from Section III of Appendix A to Inspection Manual Chapter 0609, Revised March 18, 2002
2. Action Matrix and Regulatory Framework Chart
3. Examples of Greater-than-Green Inspection Findings and Performance Indicators

## EXCERPT FROM SECTION III OF APPENDIX A TO INSPECTION MANUAL CHAPTER 0609, REVISED MARCH 18, 2002

The Action Matrix response can differ depending on whether concurrent degradations in plant performance are viewed as probabilistically independent or are the result of a common performance deficiency. To address this specific concern, Inspection Manual Chapter (IMC) 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," was revised as illustrated in the following excerpt.

### III. CONCURRENT MULTIPLE EQUIPMENT OR FUNCTIONAL DEGRADATIONS

The manner in which concurrent multiple equipment or functional degradations are evaluated using the SDP is a function of their cause. If the concurrent multiple equipment or functional degradations resulted from a common cause (e.g., a single inadequate maintenance procedure that directly resulted in deficient maintenance being performed on multiple components), then a single inspection finding will be written and characterized for significance by the total increase in core damage frequency (CDF) from these degradations, for the time periods during which they existed, using a reactor safety phase 3 SDP. If multiple cornerstones were affected, the single finding will be assigned to the cornerstone that best reflects the dominant risk influences. The justification for existence of a common cause must be a stronger causal relationship than poor management or cross-cutting programs (e.g., an inadequate problem identification and resolution program is an inadequate basis to justify a common cause finding).

If independent causes are determined to have resulted in the multiple equipment or functional degradations, then separate inspection findings will be written and individually characterized for significance, assuming that none of the other independent findings existed. This is necessary to account for the probabilistic independence of the findings. Such findings that are greater than green will be combined by the Action Matrix in IMC 0305, "Operating Reactor Assessment Program." However, the conditional core damage probability (CCDP) of the concurrent independent findings should be evaluated in accordance with the guidelines for initiating a special inspection (SI), augmented inspection team (AIT), or incident investigation team (IIT), in accordance with Management Directive (MD) 8.3, "NRC Incident Investigation Program." The decision to initiate such a reactive inspection should be based, in part, on a determination that further information is needed to either fully identify and characterize the licensee performance deficiencies or identify whether the issues have a common cause.

In all cases, the risk of concurrent multiple equipment or functional degradations and the staff's basis for treating these effects as either having a common cause or being independent should be documented in an inspection report or other appropriate public correspondence.

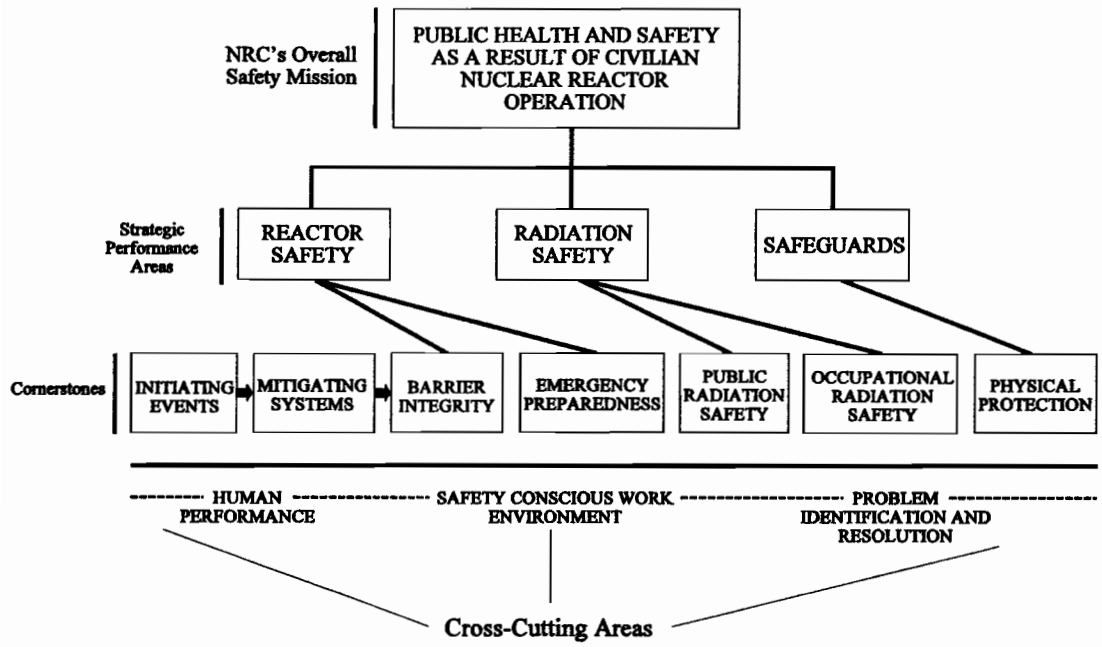
# ACTION MATRIX

| | | Licensee Response Column | Regulatory Response Column | Degraded Cornerstone Column | Multiple/ Repetitive Degraded Cornerstone Column | Unacceptable Performance Column |
|---|---|---|---|---|---|---|
| RESULTS | | All Assessment Inputs (Performance Indicators (PIs) and Inspection Findings) Green; Cornerstone Objectives Fully Met | One or Two White Inputs (in different cornerstones) in a Strategic Performance Area; Cornerstone Objectives Fully Met | One Degraded Cornerstone (2 White Inputs or 1 Yellow Input) or any 3 White Inputs in a Strategic Performance Area; Cornerstone Objectives Met with Moderate Degradation in Safety Performance | Repetitive Degraded Cornerstone, Multiple Degraded Cornerstones, Multiple Yellow Inputs, or 1 Red Input; Cornerstone Objectives Met with Longstanding Issues or Significant Degradation in Safety Performance | Overall Unacceptable Performance; Plants Not Permitted to Operate Within this Band, Unacceptable Margin to Safety |
| RESPONSE | Regulatory Performance Meeting | None | Branch Chief (BC) or Division Director (DD) Meet with Licensee | DD or Regional Administrator (RA) Meet with Licensee | RA (or EDO) Meet with Senior Licensee Management | Commission meeting with Senior Licensee Management |
| | Licensee Action | Licensee Corrective Action | Licensee root cause evaluation and corrective action with NRC Oversight | Licensee cumulative root cause evaluation with NRC Oversight | Licensee Performance Improvement Plan with NRC Oversight | |
| | NRC Inspection | Risk-Informed Baseline Inspection Program | Baseline and supplemental inspection procedure 95001 | Baseline and supplemental inspection procedure 95002 | Baseline and supplemental inspection procedure 95003 | |
| | Regulatory Actions[1] | None | Supplemental inspection only | Supplemental inspection only | -10 CFR 2.204 DFI<br>-10 CFR 50.54(f) Letter<br>- CAL/Order | Order to Modify, Suspend, or Revoke Licensed Activities |
| COMMUNICATION | Assessment Letters | BC or DD review/sign assessment report (w/ inspection plan) | DD review/sign assessment report (w/ inspection plan) | RA review/sign assessment report (w/ inspection plan) | RA review/sign assessment report (w/ inspection plan) | |
| | Annual Public Meeting | SRI or BC Meet with Licensee | BC or DD Meet with Licensee | RA (or designee) Discuss Performance with Licensee | EDO Discuss Performance with Senior Licensee Management | |
| | Commission Involvement | None | None | None | Plant discussed at AARM | Commission Meeting with Senior Licensee Management |
| | INCREASING SAFETY SIGNIFICANCE ----------> | | | | | |

Note 1: The regulatory actions for plants in the Multiple/Repetitive Degraded Cornerstone column are not mandatory agency actions. However, the regional office should consider each of these regulatory actions when significant new information regarding licensee performance becomes available.

**ENCLOSURE 2**

# REGULATORY FRAMEWORK



## EXAMPLES OF GREATER-THAN-GREEN INSPECTION FINDINGS AND PERFORMANCE INDICATORS

### EXAMPLE 1

AREA: Emergency Preparedness

ISSUE: Performance Indicator–Alert and Notification System (ANS) Reliability

The licensee's percentage of ANS sirens capable of performing their function, as measured by periodic siren testing in the previous 12 months, was 92.3%.

SIGNIFICANCE: The ANS siren reliability figure of 92.3% is below the green-white threshold of 94%, but is not below the white-yellow threshold of 90%. This white performance indicator is determined to have low to moderate safety significance. This indicates that 7.7% of the ANS sirens within the 10-mile plume exposure pathway emergency planning zone (EPZ) could not be relied upon to activate and provide prompt notification to the public (within 15 minutes) of a need to take protective actions during a radiological emergency at the plant.

ACTION: The single white performance indicator (PI) in the emergency preparedness (EP) cornerstone placed the licensee in the Regulatory Response Column of the Action Matrix. The licensee identified the issue, determined the causes, and developed comprehensive corrective actions to address the causes and prevent recurrence. The NRC performed a 95001 supplemental inspection and determined that the licensee's root cause evaluation and corrective actions were appropriate.

DISCUSSION : The staff believes that these actions were appropriate to address this issue because the licensee's program was unable to maintain a level of performance within the licensee response band. Additional NRC attention and resources were warranted to independently review the licensee's extent of root cause evaluation and subsequent corrective actions in order to ensure that further degradation of system performance to less than 90% did not occur. At that point, the, capability to promptly notify the public of a radiological emergency at the plant site is considered to no longer exist (and the yellow threshold is exceeded) per industry standards. No change was made to the PI threshold or baseline inspection program as a result of this event.

**EXAMPLE 2**

AREA: Reactor Safety / Mitigating Systems

ISSUE: Inspection Finding–Essential Service Water (ESW) Pump Failure

Essential service water pump "B" failed to achieve rated flow and discharge pressure during surveillance testing and was declared inoperable for approximately 132 hours. Foreign material used during routine pump maintenance was discovered wrapped around the first stage impeller, blocking a portion of the suction flow path. The ESW system functions in conjunction with the ultimate heat sink to remove heat from several plant components that are required for the safe shutdown of the reactor. The ESW system also provides emergency makeup to the spent fuel pool and component cooling water system, and is the backup water supply to the auxiliary feed water (AFW) system.

SIGNIFICANCE: The ESW pump failure was determined to have a low to moderate safety significance (white) using the SDP for Reactor Inspection Findings for At-Power Situations, as described in Appendix A to IMC 0609. A phase 2 SDP evaluation was conducted because the finding represented an actual loss of safety function of a single train for greater than the outage time allowed by the plant's technical specifications (TS). Using the risk-informed phase 2 SDP notebook, the outcome was white (LOOP Sequence 6). A confirmatory phase 3 analysis was also completed.

ACTIONS: The single white finding in the Mitigating Systems cornerstone placed the plant in the Regulatory Response column of the Action Matrix. The NRC is planning a 95001 supplemental inspection to assess the licensee's root cause evaluation, assessment of extended conditions, and corrective actions.

DISCUSSION : In crossing the green-white threshold, this issue indicates a performance deficiency, which resulted in a temporary loss of function of a single train of a multi-train mitigating system, as well as a reduction in the margin of safety defined in the licensing basis and relied upon during normal operations. The prescribed agency action also takes into consideration the slight increase in core damage frequency (CDF) and expert judgement based on engineering and inspection experience. The staff believes that these actions were appropriate.

**EXAMPLE 3**

AREA: Emergency Preparedness

ISSUE: Inspection Finding–Failure to Meet the Risk-Significant Planning Standard

The Risk-Significant Planning Standard defined in Title 10, Section 50.47(b)(5), of the *Code of Federal Regulations* (10 CFR 50.47(b)(5)) requires, in part, that a means to provide early notification to the populace within the plume exposure pathway EPZ have been established. Contrary to this, proper siren activation could not be verified because of problems with the licensee's ANS siren feedback system. In addition, a review of the procedures in place identified that no procedural guidance existed regarding timeliness for initiating backup route alerting or how long to wait to identify failed sirens. Thus, the ability to notify the public in a timely manner (i.e., 15 minutes) was compromised.

SIGNIFICANCE: This failure to meet the Risk-Significant Planning Standard (10 CFR 50.47(b)(5)) was initially determined to have a substantial safety significance (yellow) using the Emergency Preparedness SDP, as described in Appendix B to IMC 0609. However, it was subsequently determined that the problems with the ANS siren feedback system did not have a substantial impact on the EP cornerstone objective and, therefore, the finding was more appropriately characterized as low to moderate safety significance (white) because the function of the planning standard was degraded as opposed to being inoperable. Although procedures, processes, and equipment to conduct route alerting were in place, there was a potential that the populace within the 10-mile EPZ may not be promptly notified in the event of a radiological emergency at the plant site.

ACTION: The single white finding in the EP cornerstone placed the plant in the Regulatory Response column of the Action Matrix and a 95001 supplemental inspection was conducted. The licensee entered this finding into its corrective action program and implemented interim corrective measures to address the issue.

DISCUSSION: The NRC believes that these actions were appropriate to address this issue because the licensee's implementation of its program did not ensure that the populace within the 10-mile plume exposure pathway EPZ would be promptly notified of a radiological emergency at the plant. The EP SDP specifically allowed for downgrading in certain circumstances because EP by its nature is somewhat subjective, and it was not intended to be rigid until lessons learned could be experienced. Currently, Appendix B to IMC 0609 is being revised, and the lessons learned from this finding will be incorporated. Specifically, the Risk-Significant Planning Standards will provide for the degradation of the planning standard function when it is not fully lost and more definitions of the planning standard thresholds will be provided (in the form of examples for each planning standard and risk significance). Concurrent with these changes, the allowance for downgrading will be removed.

**EXAMPLE 4**

| | |
|---|---|
| AREA: | Occupational Radiation Safety |
| ISSUE: | Inspection Finding–As Low As Reasonably Achievable (ALARA)<br><br>The licensee's ALARA planning and job controls performance during a refueling outage indicated multiple performance deficiencies that resulted in unnecessary radiation exposure to the workers. |
| SIGNIFICANCE: | These failures to maintain radiation doses ALARA were determined to each have a low to moderate safety significance (white) using the Occupational Radiation Safety SDP, as described in Appendix C to IMC 0609. A single work activity that contributes more than the 25 person-rem or three or more activities that contribute 5 person-rem each result in white findings. |
| ACTIONS: | These inspection findings in the Occupational Radiation Safety (ORS) cornerstone placed the licensee in the Degraded Cornerstone column of the Action Matrix. The licensee entered these findings into its corrective action program and performed an evaluation of the root and contributing causes. The NRC performed a 95002 supplemental inspection and determined that the licensee performed a thorough evaluation of the causes of radiation doses that were not ALARA and correctly identified the extent of the conditions that led to the doses. The licensee objected to, and appealed, these findings. |
| DISCUSSION: | The staff believes that these actions were appropriate to address this issue. The licensee's appeal highlighted some confusion regarding the threshold criteria, and some of the terminology, used in the ALARA portion of the SDP. The appropriateness of the ALARA SDP was the subject of a special breakout session of the ROP Lessons Learned Public Workshop and resulted in a series of four public stakeholder meetings to develop an SDP revision. Several changes were made to the ORS SDP and its supporting text in IMC 0609 as a result of the Lessons Learned Workshop. Although changes were made to the ORS SDP, most of the changes were clarifications of the process, and the original basis for a finding in this area remained. |

**EXAMPLE 5**

AREA: Public Radiation Safety

ISSUE: Inspection Finding–Radioactive Material Control

The licensee identified 11 contaminated items which were inadvertently released from the radiologically controlled area because of their failure to perform adequate radiation surveys. The failure to perform adequate radiological surveys was determined to be a violation of Technical Specification 5.4.1.a. Of the 11 items, nine were determined to be more than minor inspection findings that would be assessed as occurrences by the SDP.

SIGNIFICANCE: The failure to control radioactive material was determined to have a low to moderate safety significance (white) using the Public Radiation Safety SDP, as described in Appendix D to IMC 0609.

ACTIONS: The single white finding in the Public Radiation Safety (PRS) cornerstone placed the plant in the Regulatory Response column of the Action Matrix and a 95001 supplemental inspections was conducted. The licensee entered this finding into its corrective action program and implemented appropriate corrective measures to address the issue. In addition, the licensee appealed the validity of the assessment of the white finding. The white finding was upheld through the NRC appeal process, which included an appeal to the EDO.

DISCUSSION: The staff believes that the white finding was appropriate based on the SDP used to classify the finding. However, the staff agreed with the licensee that this finding did not result in any actual or potential consequence or increased risk to the public because the 11 items were found on the licensee's site. As a result of stakeholder input, the staff agreed that there were unintended consequences associated with this branch of the SDP and held a series of public meetings to discuss changes to the SDP. The meetings resulted in a change in the Public Radiation Safety SDP in that a contaminated item found within the Protected or Restricted area would be assessed through the SDP, but would not be counted by the "greater than 5 occurrence counter." However, the counter would continue to apply for contaminated items found beyond the licensee's Protected or Restricted areas because they have the potential to be transported offsite since there are no further licensee controls to prevent such a release, The "greater than 5 occurrence loop" is designed to balance risk to the public from multiple occurrences of exposure to licensed radioactive material and public confidence in the licenses ability to control radioactive material.

**EXAMPLE 6**

AREA: Public Radiation Safety

ISSUE: Inspection Finding–Transportation of Radioactive Material

The licensee incorrectly characterized and under-classified a Class B shipment of radioactive waste material as Class A. Upon receipt of the shipment, the burial facility operator notified the licensee that the description of the material on the shipping documents was incorrect based on a measured radioactivity level being greater than 1 rem/hr at 3 meters from the unshielded container. The facility operator also noted that the transport index was incorrectly stated in the shipping paper, although it was correctly specified on the Yellow III package label. With the exception of these errors in the shipping documentation, the package was properly prepared and packaged for shipment.

SIGNIFICANCE: The failure to properly classify and characterize a shipment of radioactive waste in a manner to meet the regulatory requirements in 10 CFR 61.55 was determined to have a low to moderate safety significance (white) using the Public Radiation Safety SDP, as described in Appendix D to IMC 0609. The Transportation SDP specified that any licensed radioactive material that was shipped and was under-classified in accordance with 10 CFR Part 61 requirements would be a white finding.

ACTIONS: The single white finding in the Public Radiation Safety (PRS) cornerstone placed the plant in the Regulatory Response column of the Action Matrix and a 95001 supplemental inspection was conducted. The licensee entered this finding into its corrective action program and implemented appropriate corrective measures to address the issue. The licensee requested a regulatory conference to discuss the white finding, and requested that the NRC revise the SDP used to classify this finding because it could not have resulted in any actual or potential consequence.

DISCUSSION: The staff believes the white finding was appropriate based on the SDP used to classify the finding. However, the staff agreed that this finding did not and could not have resulted in any actual or potential consequence or increased risk to the public because of the conservative measures taken by the licensee in packaging the radioactive waste material as if it were Class B. The staff proceeded with the SDP revision process, with significant stakeholder input, which resulted in a change in the Public Radiation Safety SDP. The SDP was changed to reduce the risk color from white to green for those under-classifications involving Class A and B waste which met the true packaging requirements for transportation. An under-classification finding would continue to be white if it involved the higher activity Class C waste.

**EXAMPLE 7**

AREA: Fire Protection / Mitigating Systems

ISSUE: Inspection Finding–Fire Suppression Capability

The licensee failed to provide a required fixed-suppression system for the plant area that housed the "B" train motor-driven AFW pump, the turbine-driven AFW pump, two 480-volt switchgear buses, and an instrument air compressor. The fire area also contained electrical cables for both the "A" and "B" trains of equipment. AFW is the safety related system used to provide emergency feedwater to the steam generators during transient (TRANS), steam generator tube rupture (SGTR), and loss of off sight power (LOOP) events.

SIGNIFICANCE: The degradation of suppression capability was determined to have a low to moderate safety significance (white) using the Fire Protection SDP, as described in Appendix F to IMC 0609. Using the phase 1 screening criteria, the finding was determined to affect manual suppression capability and the fixed fire suppression system. As such, a phase 2 analysis was performed using the risk significance estimation matrix, which resulted in the White determination.

ACTION: The single white finding in the Mitigating Systems cornerstone placed the plant in the Regulatory Response column of the Action Matrix and a 95001 supplemental inspection was conducted. The licensee entered this finding into its corrective action program and implemented appropriate corrective measures to address the issue.

DISCUSSION: In crossing the green-white threshold, this issue indicates a performance deficiency, which resulted in a temporary loss of function of a single train of a multi-train mitigating system, as well as a reduction in the margin of safety defined in the licensing basis and relied upon during normal operations. The agency action also takes into consideration the slight increase in CDF and expert judgement based on engineering and inspection experience. The staff believes that these actions were appropriate.