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# SIREN MAINTENANCE AT PEACH BOTTOM/LIMERICK

Presentation to NRC Region I

October 1, 2001

# TOPICS

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- ◆ Apparent Violations
  - G. Vanderheyden: Vice President, Operations Support
- ◆ Timeline
  - D. Tailleart: Emergency Preparedness Manager
- ◆ Investigation Approach/Causes/Corrective Actions/Effectiveness
  - G. Vanderheyden: Vice President, Operations Support
- ◆ Siren Criteria/Siren Performance/Significance Determination
  - M. Gallagher: Director, Licensing & Reg. Affairs
- ◆ Closing
  - J. Hagan: Senior Vice President, MAROG

# APPARENT VIOLATIONS

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- ◆ Failure to meet the emergency preparedness function to notify the public of needed action, in case of an emergency, through ANS as required by 10 CFR 50.47(b)(5).
- ◆ Failure to adequately maintain and test the sirens as required by 10 CFR 50.47(b)(8).
- ◆ Failure to maintain complete and accurate maintenance and testing records as required by 10 CFR 50.9.

# TIMELINE

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- ◆ 9/15/00 PECO Energy Security Notifies NQA of Information Received From Employee Regarding Operability of Some Sirens Around LGS and PBAPS.
- ◆ 9/15/00 Sampling Plan Developed to Determine Extent of Problem.
- ◆ 9/16/00 Small Sample of Sirens Tested for Operability (Visual Test).
- ◆ 9/18/00 Investigation Reveals Use of Jumpers of the Detection Circuits in Some Individual Sirens.
- ◆ 9/21/00 Operability Testing of Remaining Sirens Initiated. Repairs Made To Sirens As Needed.
- ◆ 9/21/00 State and Local Agencies Notified About PBAPS Sirens.
- ◆ 9/22/00 State and Local Agencies Notified About LGS Sirens.
- ◆ 9/23/00 Testing Completed.
- ◆ 9/25/00 Root Cause Evaluation Team Formed.
- ◆ 9/28/00 Increased Testing Frequency Initiated.

# INVESTIGATION APPROACH

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- ◆ Investigation Team
- ◆ Full Root Cause Analysis

# CAUSES/CORRECTIVE ACTIONS

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- ◆ Lack of Technician Oversight by Contractor and Utility Personnel.
  - Developed Training Program and Procedure for Contract Owners.
- ◆ Failure to Enforce Contractual Requirements.
  - Strengthened Licensee Procedures to Invoke Contractual Penalties.
  - Strengthened Contract Terms by Inclusion of More Significant Penalties.
- ◆ Over Reliance on the Failure Detection System.
  - Developed Guidelines for Monitoring Contracts Concerning Work Performed Independent of Direct Utility Supervision.
- ◆ Lack of Adequate Oversight/Self-Assessment.
  - Developed a Siren Program Manual that Includes Self-Assessment Criteria and Activities.
  - Corrected PI Data Submitted to the NRC.

# EFFECTIVENESS

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- ◆ Closer Scrutiny of Siren Maintenance
- ◆ Improving Performance Indicator Data
  - Limerick @ 98.3%
  - Peach Bottom @ 98.0%
- ◆ Improved Site Ownership of EP Program and Equipment, Including Siren Systems
- ◆ Random In-field Verifications Initiated to Confirm Maintenance Activities and Siren Operability

# SIREN CRITERIA

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- ◆ Siren Design Criteria
- ◆ Performance Criteria
- ◆ Population Coverage Analysis



# SIREN CRITERIA

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## DESIGN

- ◆ Radiological Emergency Plans
- ◆ NUREG-0654/ FEMA-REP-1 Rev. 1
  - Alert Signal throughout the EPZ within 15 minutes
  - Essentially 100% Population Coverage within 5 miles
  - Special Arrangements for 100% Coverage within 45 minutes
- ◆ Emergency Planning Final Rule Supplementary Information (45 Federal Register 55402 (1980))
  - Not every individual would be reached by Alert Notification System (ANS).

# SIREN CRITERIA

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## PERFORMANCE

### ◆ **FEMA-REP-10**

- Siren reliability remains at or above 90% averaged over a 12 month period.
- Commitment in our Emergency Plan is to meet NUREG-0654/FEMA-REP-1 and FEMA-REP-10.

### ◆ **NRC Alert and Notification System Reliability PI**

- Percentage of ANS sirens that are capable of performing their function, as measured by periodic siren testing in the previous 12 months.
  - » > 94% ANS reliability – GREEN
  - » 90% < ANS reliability < 94% – WHITE
  - » < 90 % ANS reliability – YELLOW

### ◆ **Emergency Planning Routine Test Procedures**

- The requirements of the above documents have been incorporated into our Routine Testing procedures for the sirens.

# SIREN PERFORMANCE

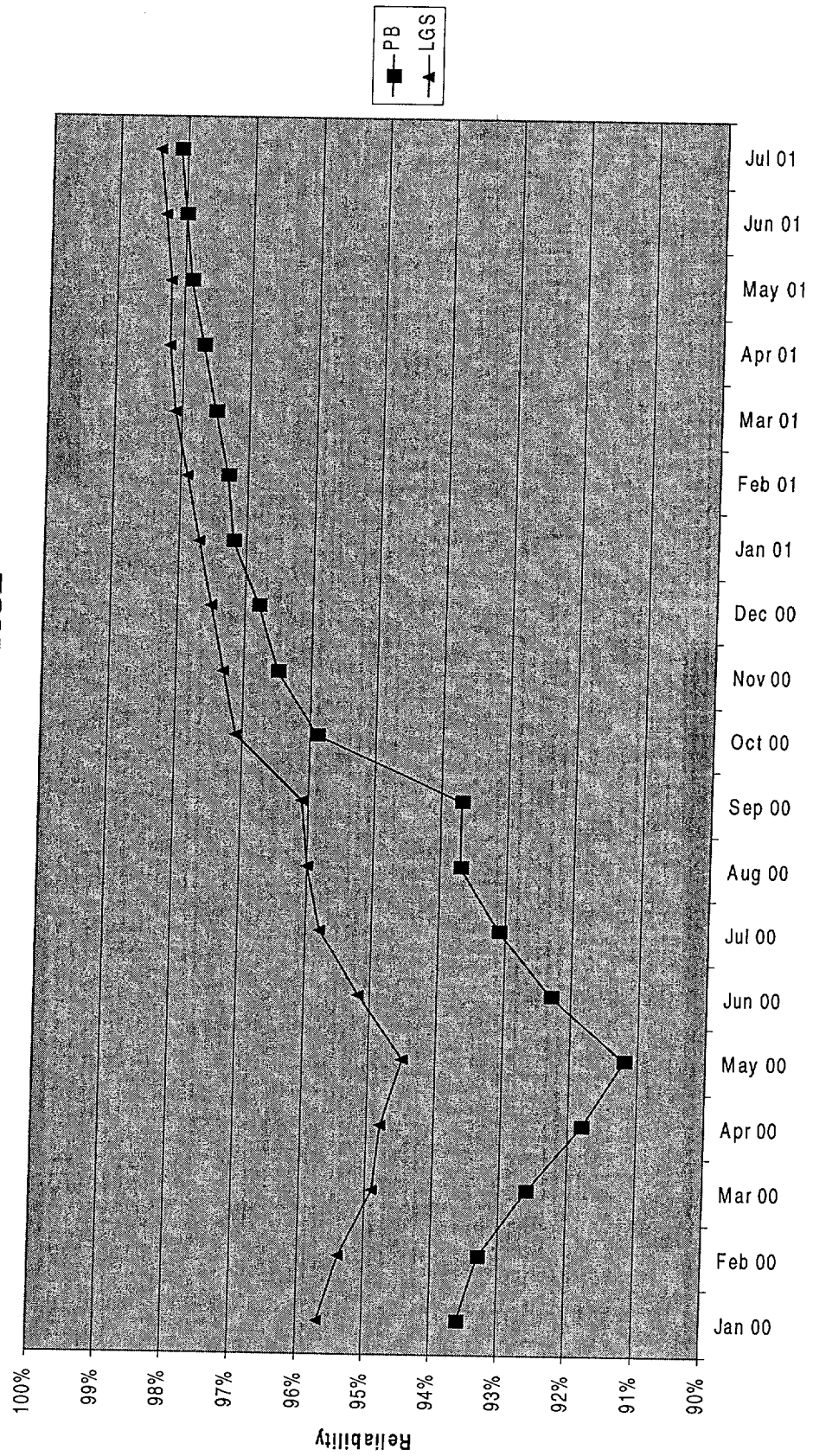
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## ◆ 2000 and 2001 PI Results

- Corrections were made to previously submitted PI data based on the discovery of the event and resulted in the indicator changing from GREEN to WHITE for Peach Bottom.
- NRC Performance Indicators (rolling 4 quarter average)
  - LGS: lowest value reported is 94.9%
  - PBAPS: lowest value reported is 92.3%
- FEMA Performance Value (calendar year)
  - LGS:** 97.49% (2000)  
Lowest 12 month rolling value: 94.5%
  - PBAPS:** 96.83% (2000)  
Lowest 12 month rolling value: 91.2%

# SIREN PERFORMANCE

LGS & PBAPS SIRENS 12 MONTH ROLLING AVERAGE



# SIREN PERFORMANCE

## LGS SIREN POPULATION COVERAGE ANALYSIS (9/21/00)

Siren No.	Failed Condition	Detection Operable (Yes or No) (If Yes, then Route Alerting Credited)	Population Affected	Location (in Miles)
6	Siren Sounds w/o Rotation	Yes	0	5-10
7	Siren Sounds w/o Rotation	Yes	0	0-5
10	Siren would not Sound	Yes	0	5-10
11	Siren would not Sound	Yes	0	5-10
13	Siren Sounds w/o Rotation	No	229	5-10
16	Siren Sounds w/o Rotation	Yes	0	0-5, 5-10
21	Siren would not Sound	Yes	0	0-5
46	Siren Sounds at Reduced Volume	Yes	0	0-5
54	Siren Sounds at Reduced Volume	Yes	0	0-5
61	Siren Sounds w/o Rotation	Yes	0	0-5
65	No Status Feedback	Yes	0	0-5
69	Siren Sounds at Reduced Volume	Yes	0	5-10
71	Siren Sounds w/o Rotation	Yes	0	0-5
75	Siren would not Sound	Yes	0	0-5
81	Siren Sounds w/o Rotation	No	0	5-10
88	Siren would not Sound	Yes	0	5-10
100	Siren Sounds w/o Rotation	No	0	5-10
129	Siren would not Sound	Yes	0	5-10
140	Siren Sounds w/o Rotation	No	0	5-10
143	No Status Feedback	Yes	0	5-10

Total Population Affected = 229  
 Estimated Total LGS EPZ Population = 205247

% Coverage 0-5 miles = 100.00%  
 Total Coverage of 10 mile EPZ = 99.89%

# SIREN PERFORMANCE

## PBAPS SIREN POPULATION COVERAGE ANALYSIS (9/22/00)

Based on National Average Background

Siren No.	Failed Conditions	Detection Operable (Yes or No) (If Yes, then Route Alerting Credited)	Population Affected	Location (in Miles)
12	Siren Sounds w/o Rotation	No	180	5-10
13	Siren Sounds w/o Rotation	No	523	5-10
14	Siren would not Sound	No		5-10
15	Siren would not Sound	No		5-10
16	No Status Feedback	Yes	0	5-10
26	Siren Sounds w/o Rotation	No	222	5-10
33	Siren Sounds w/o Rotation	No	41	0-5
36	Siren Sounds w/o Rotation	No	128	5-10
43	Siren Sounds w/o Rotation	Yes	0	5-10
44	No Status Feedback	Yes	0	5-10
51	Siren would not Sound	Yes	0	0-5
66	Siren would not Sound	No	622	5-10
75	Siren would not Sound	No	12	0-5
76	Siren would not Sound	No	68	0-5
85	No Status Feedback	Yes	0	5-10
86	Siren Sounds w/o Rotation	Yes	0	5-10
88	Siren would not Sound	Yes	0	5-10
90	Siren would not Sound	Yes	0	5-10

Total Population Affected = 1795  
 Estimated Total EPZ Population = 44516

% Coverage 0-5 miles = 98.17%  
 Total Coverage of 10 mile EPZ = 95.97%

# SIREN PERFORMANCE

## PBAPS SIREN POPULATION COVERAGE ANALYSIS (9/22/00)

Based on Measured Background

Siren No.	Failed Condition	Detection Operable (Yes or No) (If Yes, then Route Alerting Credited)	Population Affected	Location (in Miles)
12	Siren Sounds w/o Rotation	No	85	5-10
13	Siren Sounds w/o Rotation	No	380	5-10
14	Siren would not Sound	No		5-10
15	Siren would not Sound	No		5-10
16	No Status Feedback	Yes	0	5-10
26	Siren Sounds w/o Rotation	No	74	5-10
33	Siren Sounds w/o Rotation	No	30	0-5
36	Siren Sounds w/o Rotation	No	65	5-10
43	Siren Sounds w/o Rotation	Yes	0	5-10
44	No Status Feedback	Yes	0	5-10
51	Siren would not Sound	Yes	0	0-5
66	Siren would not Sound	No	340	5-10
75	Siren would not Sound	No	15	0-5
76	Siren would not Sound	No	45	0-5
85	No Status Feedback	Yes	0	5-10
86	Siren Sounds w/o Rotation	Yes	0	5-10
88	Siren would not Sound	Yes	0	5-10
90	Siren would not Sound	Yes	0	5-10

Total Population Affected = 1034  
Estimated Total EPZ Population = 44516

% Coverage 0-5 miles = 98.63%  
Total Coverage of 10 mile EPZ = 97.68%

# SIREN PERFORMANCE

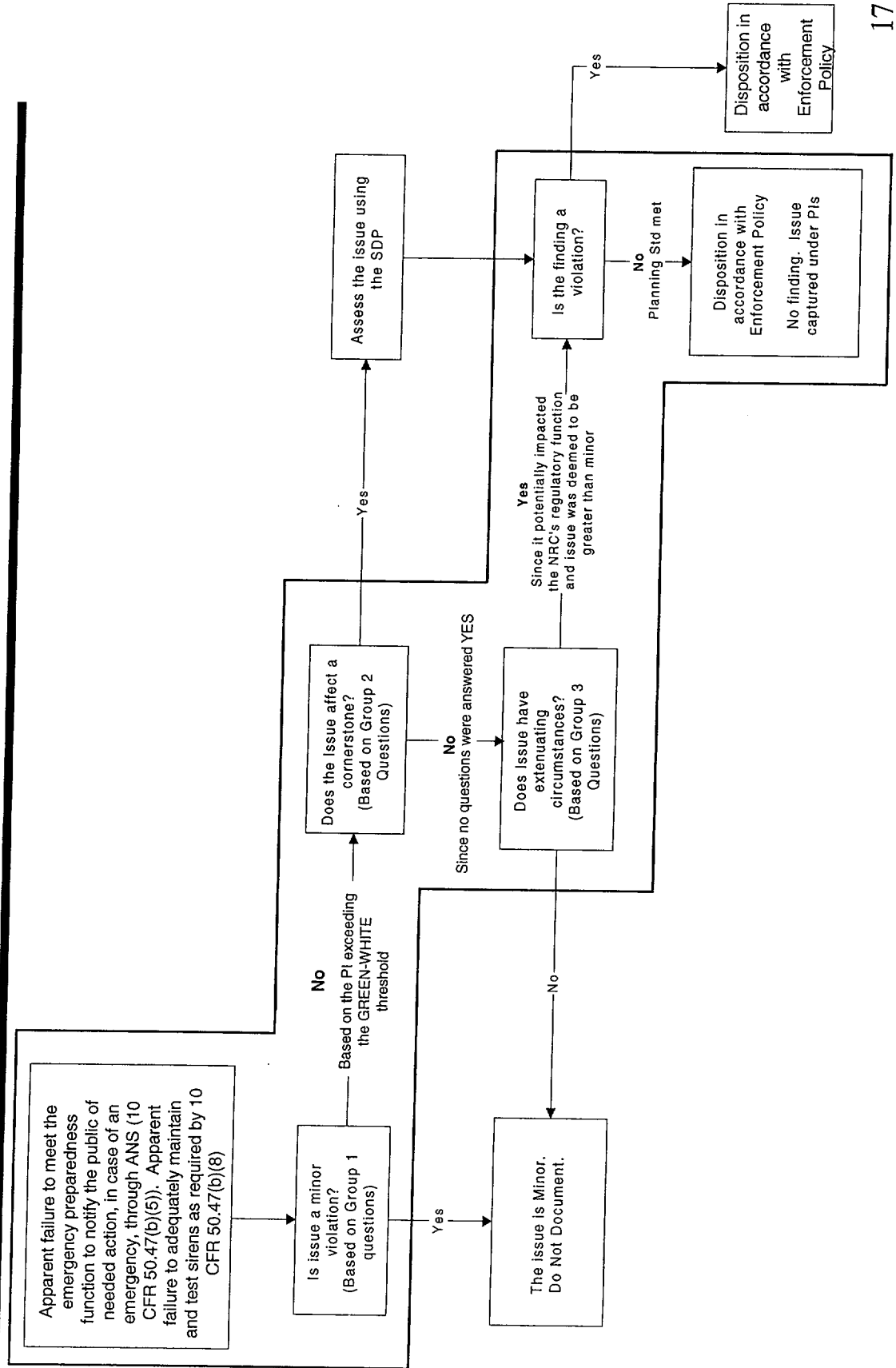
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## CONCLUSION

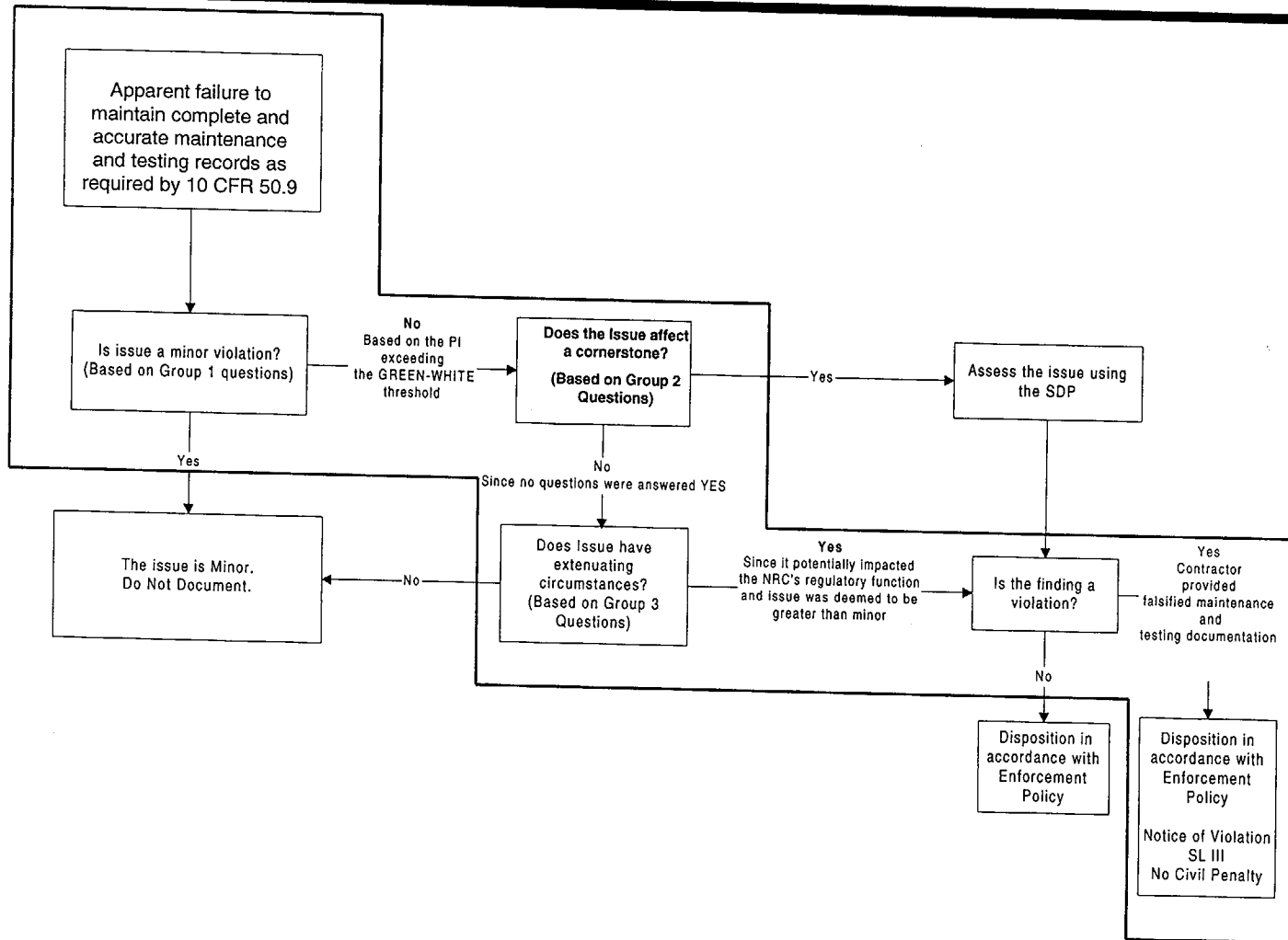
- ◆ The design of the Alert/Notification System meets the requirements outlined in NUREG-0654/FEMA-REP-1, Rev. 1 and FEMA-REP-10.
- ◆ The siren performance, determined through testing, also met established performance requirements as outlined in NUREG-0654/FEMA-REP-1, Rev. 1 and FEMA-REP-10.
- ◆ Procedures were in place to assure that equipment was maintained and repaired as required by 10 CFR 50.47 (b)(8).
- ◆ The sirens around LGS and PBAPS were not degraded to the extent that their availability and functionality impacted the implementation of the Emergency Plan.
- ◆ Based on population coverage analysis, safety significance of this issue is low.
- ◆ The requirements of 10 CFR 50.47 (b)(5) and 10 CFR 50.47 (b)(8) were met.



# SIGNIFICANCE DETERMINATION



# SIGNIFICANCE DETERMINATION



# CLOSING

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- ◆ Public Protection Maintained
- ◆ Self Identified
- ◆ In-Depth Root Cause Analysis
- ◆ Prompt and Comprehensive Corrective Actions
- ◆ Performance Indicator Data Corrected
- ◆ Contract Oversight Strengthened