

50-257/265



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

October 6, 1998

LICENSEE: Commonwealth Edison Company  
FACILITY: Quad Cities Nuclear Power Station, Units 1 and 2  
SUBJECT: SUMMARY OF MEETING CONCERNING THE PROCESS OF RESOLVING  
APPENDIX R ISSUES AT QUAD CITIES NUCLEAR POWER STATION

On September 10, 1998, the staff met with representatives from Commonwealth Edison Company (ComEd, the licensee) to discuss the progress and process the licensee is using to resolve fire protection (Appendix R) issues since the closure of the Confirmatory Action Letter (CAL) on May 22, 1998. A list of the attendees is provided as Enclosure 1.

The objective of the meeting was for ComEd to address their progress and process in evaluating the need to come into full compliance with 10 CFR Part 50, Appendix R. A copy of the licensee's presentation is included as Enclosure 2. Page 10a of the presentation was added on request of the staff during the meeting.

The licensee indicated that they are on schedule with this evaluation and that it will be completed in December 1998. The staff stated that the process outlined in Figure 1, "SSA [Safe Shutdown Analysis] Optimization Flowchart" (Enclosure 3) was an acceptable approach to improve fire protection and the post-fire safe shutdown capability at Quad Cities. The licensee stated that the objective of the evaluation was to reduce manual actions and not abandon the control room and to make the station emergency diesel generators as the primary electrical source during a fire.

Additional handouts include the licensee's Project Team/Resources organization chart (Enclosure 4), a chart indicating reactor inventory control equipment (Enclosure 5), and Figures 2.2-1 to 2.2-4, shutdown areas showing fire area boundaries in the plant (Enclosure 6).

It was agreed that the technical specification Unresolved Safety Question (USQ) amendment requests dated March 31, 1998, and April 13, 1998, for Quad Cities should be placed on hold until ComEd has advanced their evaluation to the point that it will be known whether these requests will still be needed. The staff noted that the CAL closure letter stated that if the appropriate compensatory measures are maintained, the revised Safe Shutdown Analysis and associated implementing procedures provide an interim safe shutdown methodology that is acceptable in the short-term while corrective actions are being developed to achieve full compliance with Appendix R.

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Further discussions will be held at the plant on October 8, 1998, during the Quad Cities management meeting and another working meeting will be scheduled for late October or early November.

Docket Nos. 50-254, 50-265

Enclosures: As stated

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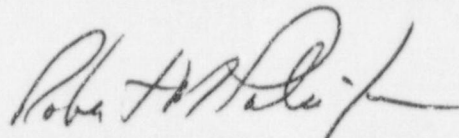
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OFFICE	PM:PD3-2	LA:PD32	NRR:SPLB	D:PD3-2
NAME	RPulsifer	CMoore	SWest	SRichards
DATE	9/30/98	9/30/98	10/01/98 #809	10/2/98

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Further discussions will be held at the plant on October 8, 1998, during the Quad Cities management meeting and another working meeting will be scheduled for late October or early November.

A handwritten signature in black ink, appearing to read "Robert M. Pulsifer". The signature is fluid and cursive, with a long horizontal stroke at the end.

Robert M. Pulsifer, Project Manager  
Project Directorate III-1  
Division of Reactor Projects-III/IV  
Office of Nuclear Reactor Regulation

Docket Nos. 50-254, 50-265

Enclosures: As stated

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October 6, 1998

- 2 -

Further discussions will be held at the plant on October 8, 1998, during the Quad Cities management meeting and another working meeting will be scheduled for late October or early November.

ORIG. SIGNED BY

Robert M. Pulsifer, Project Manager  
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Division of Reactor Projects-III/IV  
Office of Nuclear Reactor Regulation

Docket Nos. 50-254, 50-265

Enclosures: As stated

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NAME	RPulsifer*: <i>sp</i>		CMoore		SWest*		SRichards	<i>sp</i>		
DATE	9/30/98	<i>10/6/98</i>	10/1/98	<i>10/1/98</i>	10/01/98		10/7/98			

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Units 1 and 2

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QUAD CITIES APPENDIX R (FIRE PROTECTION)  
MEETING - SEPTEMBER 10, 1998

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Stuart Richards	NRC	301-415-1395
Pat Madden	NRC	301-415-2854
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Chris Miller	NRC	309-654-2227
Steven West	NRC	301-415-1220
L.B. (Tad) Marsh	NRC	301-415-2873

# Quad Cities Nuclear Power Station

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Briefing for NRC Staff

Fire Protection Improvement  
Project - Technical Meeting

Rockville, MD

September 10, 1998



# Briefing Objective

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- Reach a mutual understanding of ComEd's plan to improve fire protection and the post-fire safe shutdown capability at Quad Cities.

# Agenda

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- ComEd Commitments
  - John Garrity
- Fire Protection Improvement Plan Initiatives
  - John Garrity/Charles Furlow/Mike Tucker
- Compliance Matrix
  - John Garrity
- Multiple Spurious Operations Study
  - John Garrity/Ron Kirven
- Summary

## ComEd Commitments of April 20 and May 22, 1998

-- John Garrity

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- Plant Modifications
- Fire Protection Improvements
  - » Reduce Control Room Evacuation
  - » Improve Availability of 125 Vdc Breaker Control
- Compliance Matrix
- Multiple Spurious Operations Study

## Status of Modifications

--John Garrity

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- In-Progress Modifications
  - » Fuel Oil Transfer Pump
  - » ADS Inhibit Switch
  - » Reactor Feed Pump Trip Logic
  - » Reactor Recirculation Pump Fuses
  - » SBO Cable Reroute
- Modifications Being Re-Evaluated
  - » 250 Vdc Switches
  - » RHR Valve (5 per unit) Hot Short Issue
  - » HPCI Room Penetrations

## Fire Protection Improvement Plan (FPIP) Initiatives

--John Garrity/Charles Furlow/Mike Tucker

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- **FPIP Objective**
  - » Improve Compliance
  - » Strengthen overall fire protection and safe shutdown capabilities
- **SSA Optimization Study**
  - » Reduce Inter-Unit Dependencies
  - » Increase Availability of 125 Vdc
  - » Reduce Evacuating the Control Room
- **GE Thermal-Hydraulic Analysis**
- **Fire Risk Model**
- **Additional Fire Protection Improvement Efforts**

## Fire Protection Improvement Plan (FPIP) Initiatives

--John Garrity/Charles Furlow/Mike Tucker

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- **SSA Optimization Study**

- » Objective: Perform Comprehensive Safe Shutdown Analysis with the following Goals
  - Compliance with Appendix R, III.G.2
  - Reduce the number of fire areas which require the evacuation of the control room
  - Reduce the inter-unit dependencies
  - Reduce the number of exemptions
  - Improve the availability of 125 Vdc

## Fire Protection Improvement Plan (FPIP) Initiatives

--John Garrity/Charles Furlow/Mike Tucker

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- SSA Optimization Study (cont'd)

- » Approach

- Identify additional systems that could be used to meet the safe shutdown requirements (HPCI, ADS, Core Spray, RHR (LPCI Mode) and the Emergency Diesel Generators)
- Develop an equipment list for each system
- Identify cables, including associated cables, and routing for each identified cable
- An evaluation will be completed for each fire area to determine the equipment that is affected by a fire

## Fire Protection Improvement Plan (FPIP) Initiatives

--John Garrity/Charles Furlow/Mike Tucker

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- SSA Optimization Study (cont'd)

- » Approach

- Perform a review on the systems/equipment that will be utilized for shutdown to determine if the proposed shutdown method complies with III.G.2
- If the requirements of III.G.2 are not met, evaluate options:
  - a) Reroute cables
  - b) Wrap cables in fire rated barriers
  - c) Create new fire areas
  - d) New tie-ins for mechanical systems
  - e) Procedure changes
- Proposed changes will be ranked based on compliance, risk benefit, and cost



## Fire Protection Improvement Plan (FPIP) Initiatives

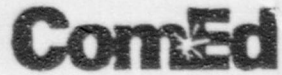
--John Garrity/Charles Furlow/Mike Tucker

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- SSA Optimization Study (cont'd)

- » Current Status

- The equipment list for the new systems to be used has been generated
- Identification and routing of cables for the components on the equipment list has been initiated



## Fire Protection Improvement Plan (FPIP) Initiatives

### 125 Vdc Availability

-- Michael Tucker

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- Concerns
  - » Loss of 125 Vdc control power due to fire damage in many fire areas
  - » Extensive manual actions outside the main control room
- Objectives
  - » Improve separation of 125 Vdc
  - » Improve Emergency Diesel Generator availability
  - » Improve Service Water availability
  - » No loss of control power on "unaffected" unit
- Key Project Elements
  - » 125 Vdc cable mapping
  - » Identify 125 Vdc service versus fire area to identify vulnerabilities
  - » Determine enhancements
- Implementation - based on cost, compliance, and risk benefit

## FIRE PROTECTION IMPROVEMENT PLAN PROCESS

--John Garrity

June through October

November

December

1999-Forward

### Studies

SSA Optimization Study

Timeline Review

Fire Risk Model

125 Vdc Study

Multiple Spurious Operations Study

Integrate Risk Based  
Decisions on  
Improvements

Present  
Improvements to  
Management

Implement  
Improvements

### Additional Fire Protection Improvement Efforts

(Independent issues to be completed by 12/31/98)

Life Safety Issues

Fire Penetration Seal Project

Minimize Fire Watches

Resolution of Red Stripe Issue

Combustible Load Calculations

Separate Hot & Cold S/D Procedures

## Compliance Matrix

--John Garrity

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- Compliance Matrix Objective
  - » Provide a roadmap to identify where documentation exists that demonstrates compliance with Appendix R
- Methodology/Technical Approach
  - » Same as for TB-II
  - » Comments documented
- Site Nuclear Oversight Review

## Compliance Matrix

--John Garrity

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### ● Results

- » Completed for remaining alternate shutdown fire areas (RB-1N, RB-1S, RB-2N, RB-2S, TB-I, TB-III, SB-I, 13-1, 24-1)
- » No additional issues were discovered beyond the issues raised at the inspection (multiple spurious operations, loss of 125Vdc control power)
- » 13 PIFs generated (9 administrative/documentation weaknesses, 4 technical)
- » Available for review

## Multiple Spurious Operations Study

--John Garrity/Ron Kirven

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- Objective

- » Identify equipment whose fire-induced operation could adversely impact the capability to achieve and maintain safe shutdown

## Multiple Spurious Operations Study

--John Garrity/Ron Kirven

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- Study Criteria

- » All unprotected components/cables within a fire area
- » Fire-induced failures considered grounds, open circuits, shorts or hot shorts
- » Electrical power assumed to be available

## Multiple Spurious Operations Study

--John Garrity/Ron Kirven

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- Study Criteria (cont'd)

- » The following conditions were evaluated:
  - Reactor coolant inventory loss
  - Damage to SSD equipment
  - Diversion of required flow
  - Draining of required tanks/vessels
  - Isolation of required instrumentation
  - Lack of room coolers with pumps operating



## Multiple Spurious Operations Study

--John Garrity/Ron Kirven

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- Methodology/Technical Approach
  - » Review of flow paths to identify components
  - » Identified cables and cable routing
  - » Highlighted "common" fire areas from cable routing
  - » Reviewed MOV's for possible mechanical damage
  - » Transient analysis based on Generic Letter 86-10

## Multiple Spurious Operations Study

--John Garrity/Ron Kirven

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### ● Results

- » 78 Potential Problems with 38 Resolved by Current Procedures
- » ADS
  - Inhibit switch to isolate ADS signal
  - Positive means provided to isolate all valves
- » MSIVs
  - Redundant circuits electrically separated
  - Positive means provided to isolate at least one valve
- » Possible equipment/pump damage due to inadequate flow
- » Possible diversion of flow from torus/vessel

## Multiple Spurious Operations Study

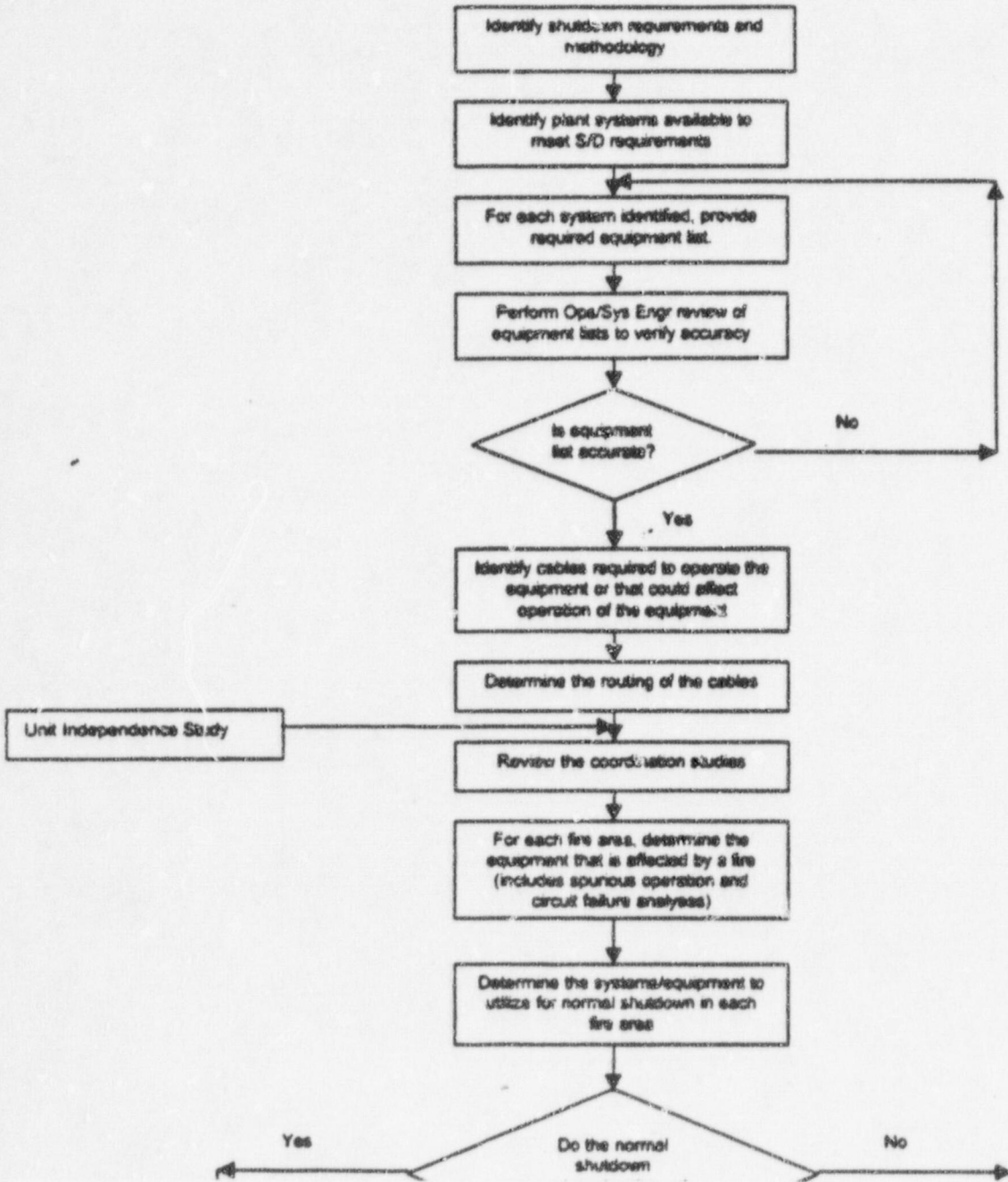
--John Garrity/Ron Kirven

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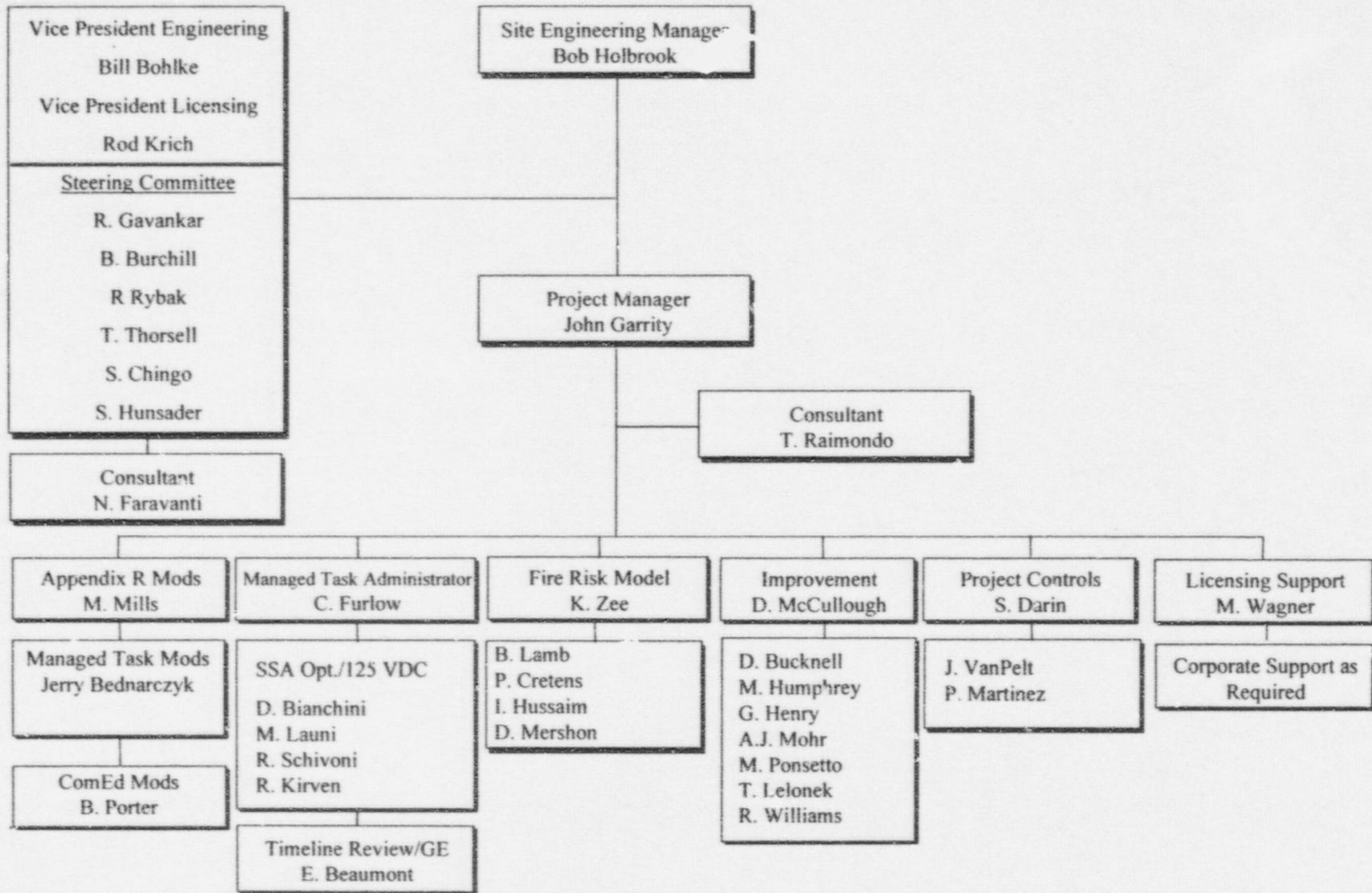
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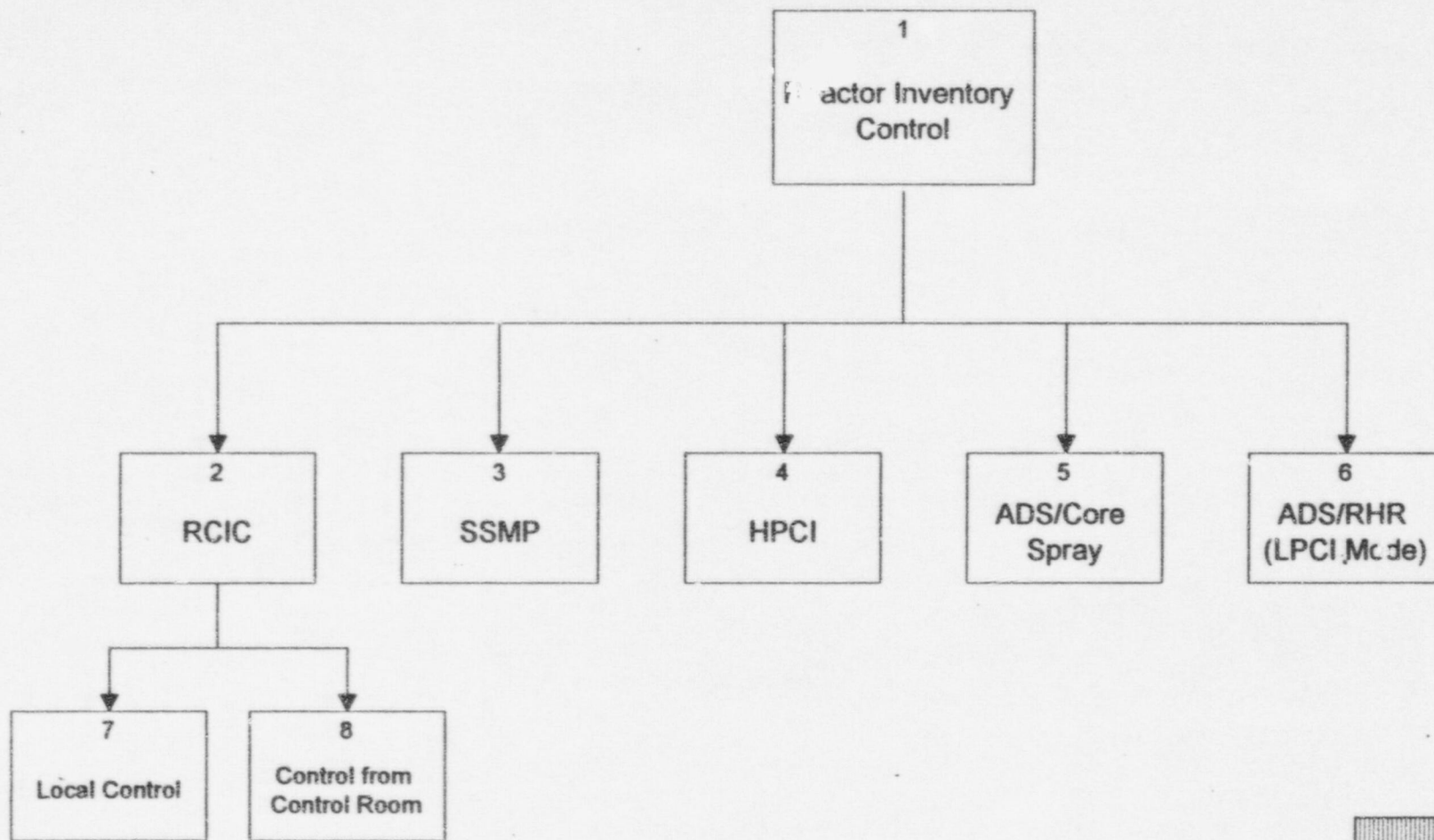
- » Ongoing efforts as a result of the study - Identifying possible solutions such as mods, procedure changes, reanalysis
- » ComEd is sensitive to NRC concerns and is acting in good faith to resolve the issue:
  - Evaluating combinations of spurious operations
  - Working closely with the industry (BWROG)
  - Compensatory measures currently in place

Figure 1  
SSA Optimization Flowchart

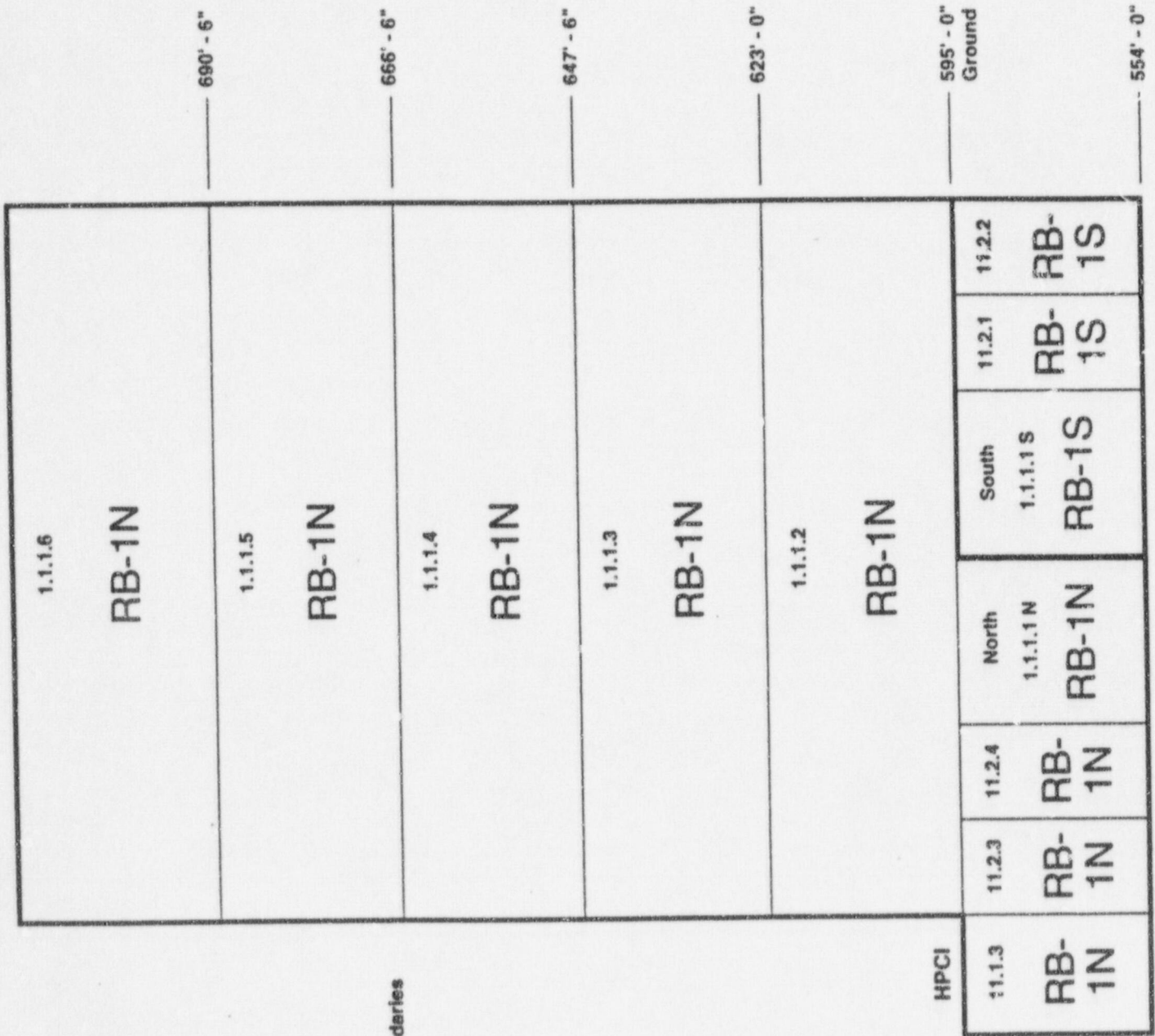


# Project Team/Resources





Typical for All Systems



The bold lines show fire area boundaries

**QUAD-CITIES STATION  
UNITS 1 & 2**

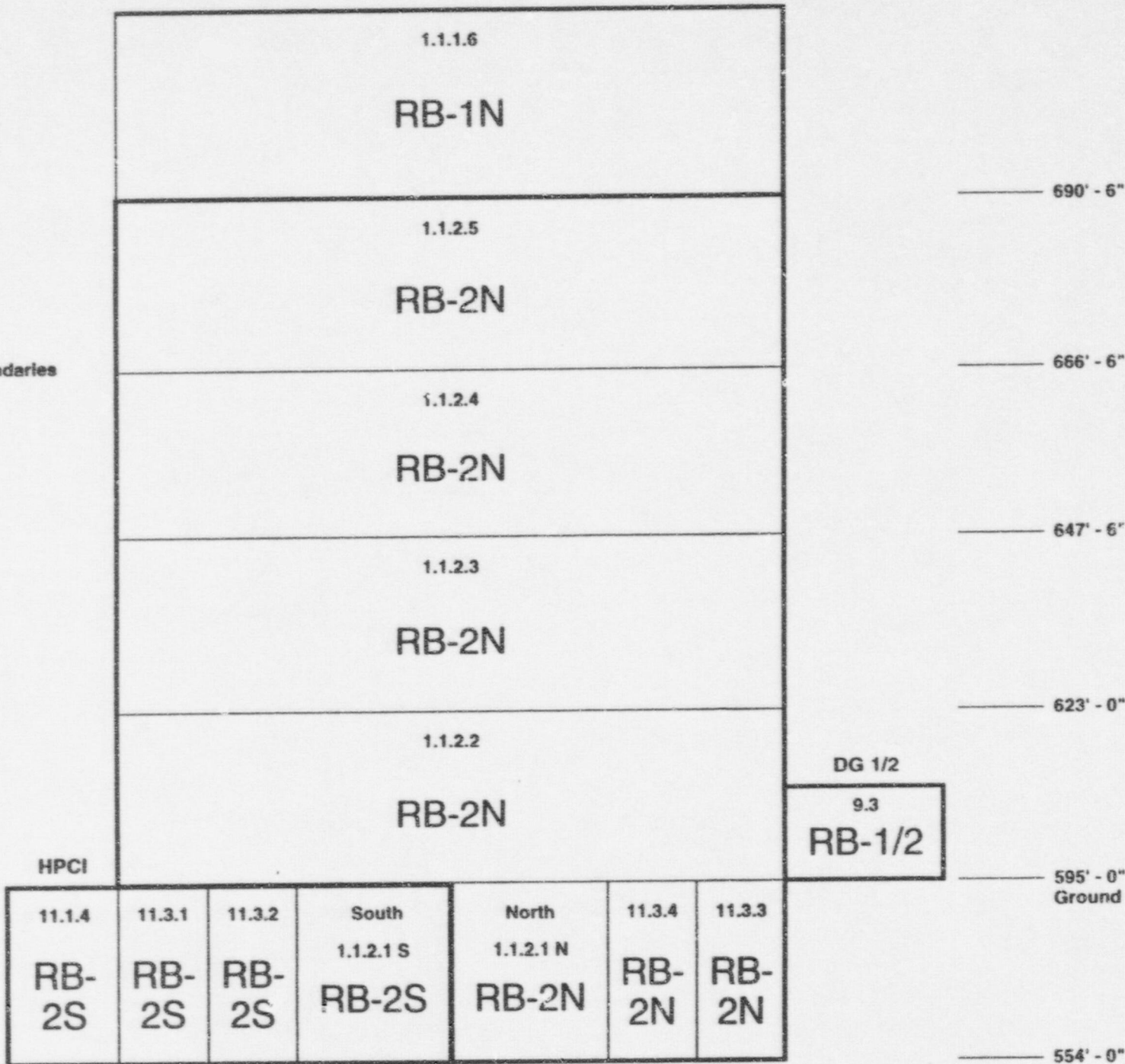
FIGURE 2.2-1  
SHUTDOWN AREAS FOR  
QUAD-CITIES UNIT 1  
REACTOR BUILDING (RB)

The bold lines show fire area boundaries

**QUAD-CITIES STATION  
UNITS 1 & 2**

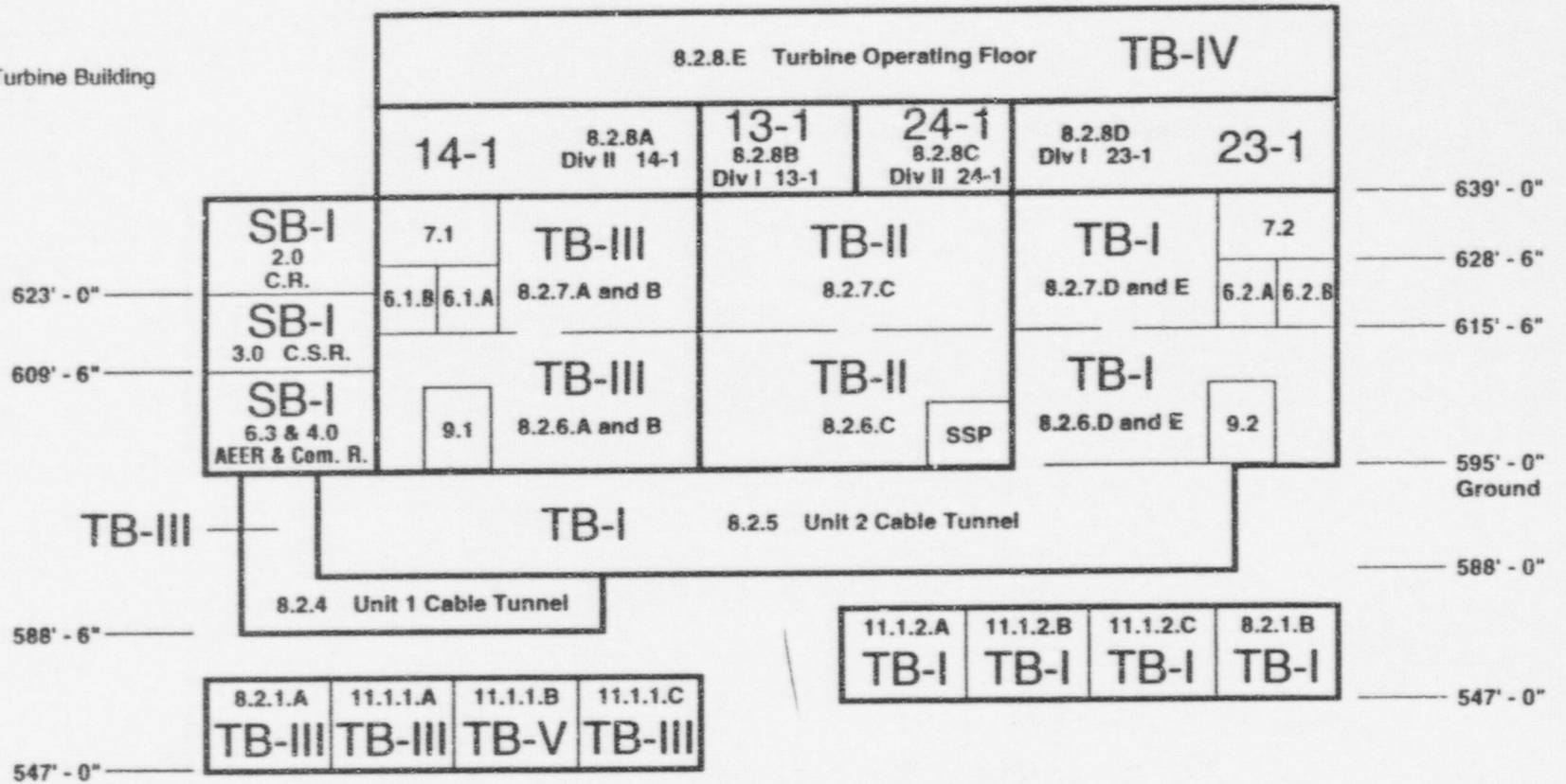
FIGURE 2.2-2

SHUTDOWN AREAS FOR  
QUAD-CITIES UNIT 2  
REACTOR BUILDING (RB)



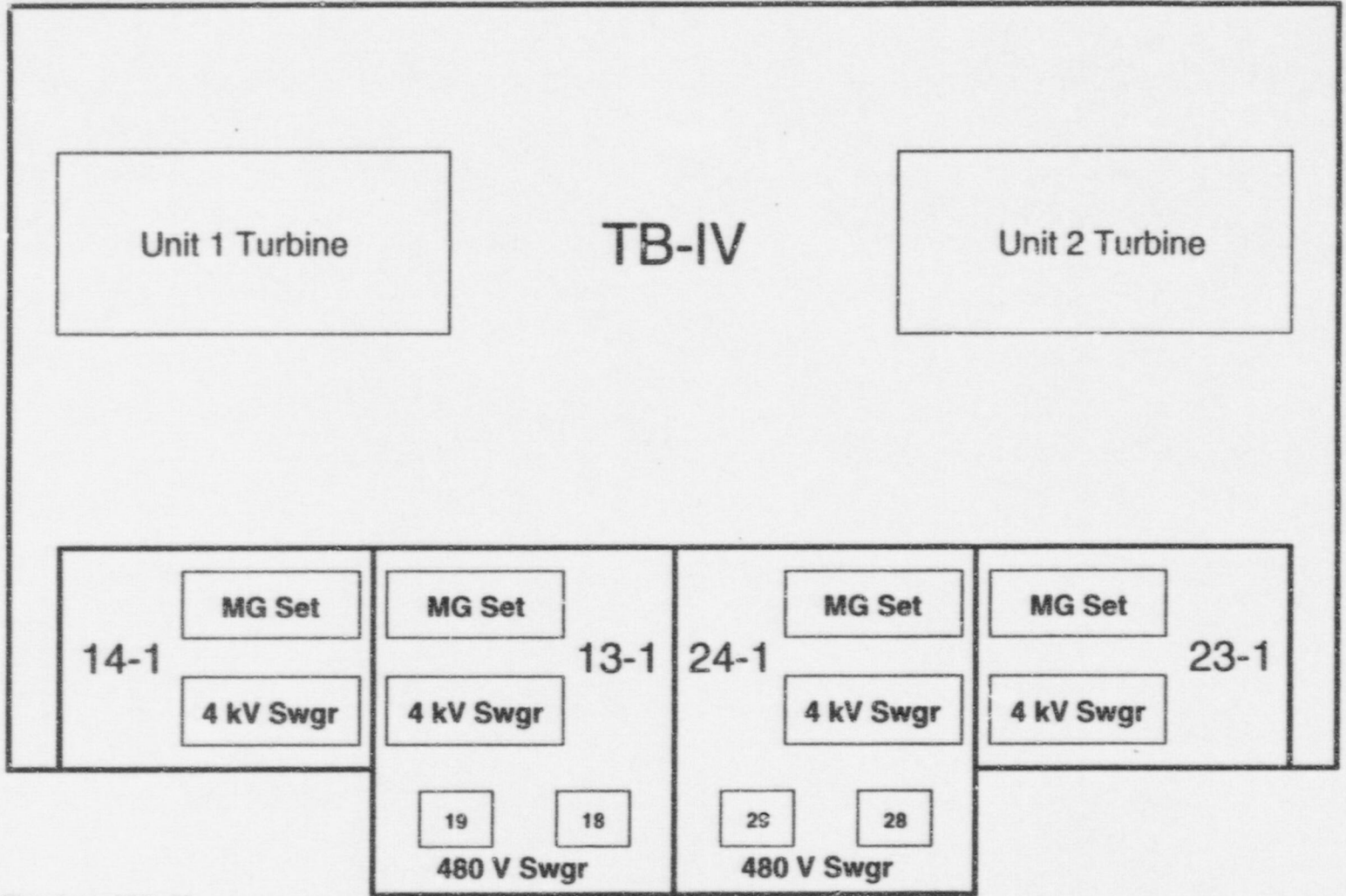


Units 1&2  
Elevation  
Hot Shutdown Turbine Building



The bold lines show fire area boundaries

QUAD-CITIES STATION  
 UNITS 1 & 2  
 FIGURE 2.2-3  
 SHUTDOWN AREAS FOR  
 QUAD-CITIES UNIT 1 & 2  
 TURBINE BUILDING (TB)



Elevation: 639' - 0"

The bold lines show fire area boundaries

**QUAD-CITIES STATION  
UNITS 1 & 2**

FIGURE 2.2-4

SHUTDOWN AREAS FOR  
QUAD-CITIES UNIT 1 & 2  
TURBINE BUILDING (TB) OPERATING FLOOR