

February 25, 1994

APPLICANT: Westinghouse Electric Corporation

FACILITY: Not Applicable

SUBJECT: SUMMARY OF MEETING TO DISCUSS SHARING OF CONTROL ROOMS FACILITIES
IN ADVANCED PLANTS

On February 16, 1994, representatives of the Westinghouse Electric Corporation (Westinghouse) and the Nuclear Regulatory Commission (NRC) met to discuss the licensing and safety issues (or potential issues) related to the design and use of shared control room facilities for multi-unit sites. Enclosure 1 is a list of attendees. Enclosure 2 is a copy of Westinghouse's presentation.

Westinghouse indicated that they were trying to elicit feedback on alternatives to control room design, and were trying to identify issues concerning shared control rooms. The designer then discussed possible control room arrangements, and the potential issues that they had identified.

The participants then discussed the regulatory bases for control room design (General Design Criteria 5, NUREG-0737), information sources that addressed operating experience with such matters (licensee event reports, generic letters, NRC bulletins and information notices, and generic safety issues), and examples of other similar designs (Sequoyah Nuclear Plant, the Modular High Temperature Gas Reactor). The staff discussed potential issues concerning instrumentation and controls, human factors, and operator interactions.

Original Signed By

Thomas J. Kenyon, Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc w/enclosures:
See next page

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OTM-6-MEETINGS
X-RD-8-2
Westinghouse

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1. RETURN TO REGULATORY CENTRAL FILES
ROOM

Westinghouse Electric Corporation

cc: Mr. Nicholas J. Liparulo
Nuclear Safety and Regulatory Analysis
Nuclear and Advanced Technology Division
Westinghouse Electric Corporation
P.O. Box 355
Pittsburgh, Pennsylvania 15230

Mr. B. A. McIntyre
Advanced Plant Safety & Licensing
Westinghouse Electric Corporation
Energy Systems Business Unit
Box 355
Pittsburgh, Pennsylvania 15230

Mr. John C. Butler
Advanced Plant Safety & Licensing
Westinghouse Electric Corporation
Energy Systems Business Unit
Box 355
Pittsburgh, Pennsylvania 15230

Mr. M. D. Beaumont
Nuclear and Advanced Technology Division
Westinghouse Electric Corporation
One Montrose Metro
11921 Rockville Pike
Suite 350
Rockville, Maryland 20852

Mr. Sterling Franks
U.S. Department of Energy
NE-42
Washington, D.C. 20585

Mr. S. M. Modro
EG&G Idaho Inc.
Post Office Box 1625
Idaho Falls, Idaho 83415

Mr. Steve Goldberg
Budget Examiner
725 17th Street, N.W.
Room 8002
Washington, D.C. 20503

Mr. Frank A. Ross
U.S. Department of Energy, NE-42
Office of LWR Safety and Technology
19901 Germantown Road
Germantown, Maryland 20874

Mr. Victor G. Snell, Director
Safety and Licensing
AECL Technologies
9210 Corporate Boulevard
Suite 410
Rockville, Maryland 20850

Mr. Raymond N. Ng, Manager
Technical Division
Nuclear Management and
Resources Council
1776 Eye Street, N.W.
Suite 300
Washington, D.C. 20006-3706

MEETING ON SHARED CONTROL ROOM FACILITIES

FEBRUARY 16, 1994

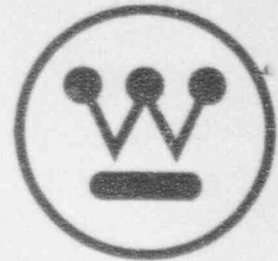
MEETING ATTENDEES

NAME

AFFILIATION

Thomas Kenyon	NRC/NRR/PDST
Neil Hunemuller	NRC/NRR/DORS/OEAB
Ed Fox	NRC/PEPB, DRSS, NRR
Donna L. Smith	NRC/NRR/DRCH
Hulbert Li	NRC/NRR/DRCH/HICB
Greg Galletti	NRC/NRR/DRCH/HHFB
James Bongarra	NRC/NRR/DRCH/HHFB
Warren Swenson	NRC/NRR/HHFB
Jesse Arildsen	NRC/NRR/HHFB
Bob Brill	NRC/RES/DSR/HFB
Andrea Sterdis	Westinghouse APSL
Chuck Brockhoff	Westinghouse Advanced PWR Dev.
Joseph Birsa	Westinghouse PI & CS
Brian Reid	Westinghouse PI & CS
Jim Easter	Westinghouse MMD

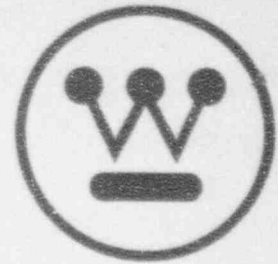
Enclosure 1



Westinghouse Meeting With the NRC on Shared Control Room Design

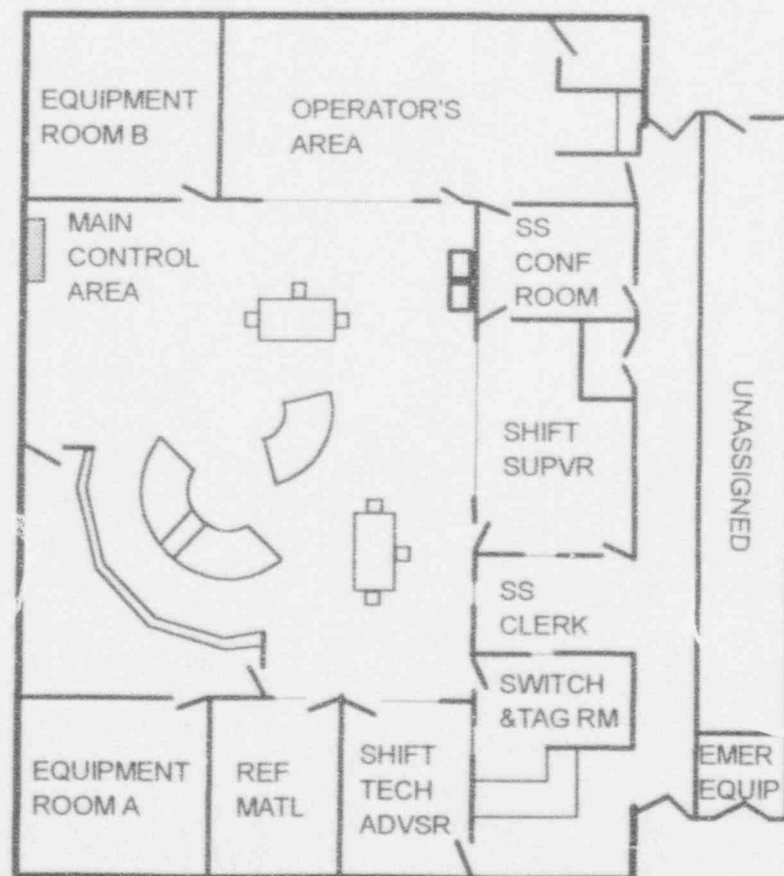
February 16, 1994
Rockville MD.

Objectives of Meeting

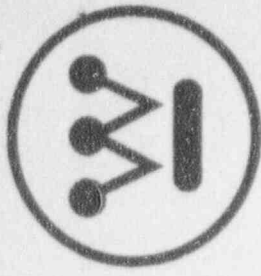


- Discussion of shared control room alternatives.
- Identify potential benefits and problems applicable to shared control room facilities.
- Discussion of staff views and licensing aspects of shared control rooms.

URD Evolutionary Plant Control Room



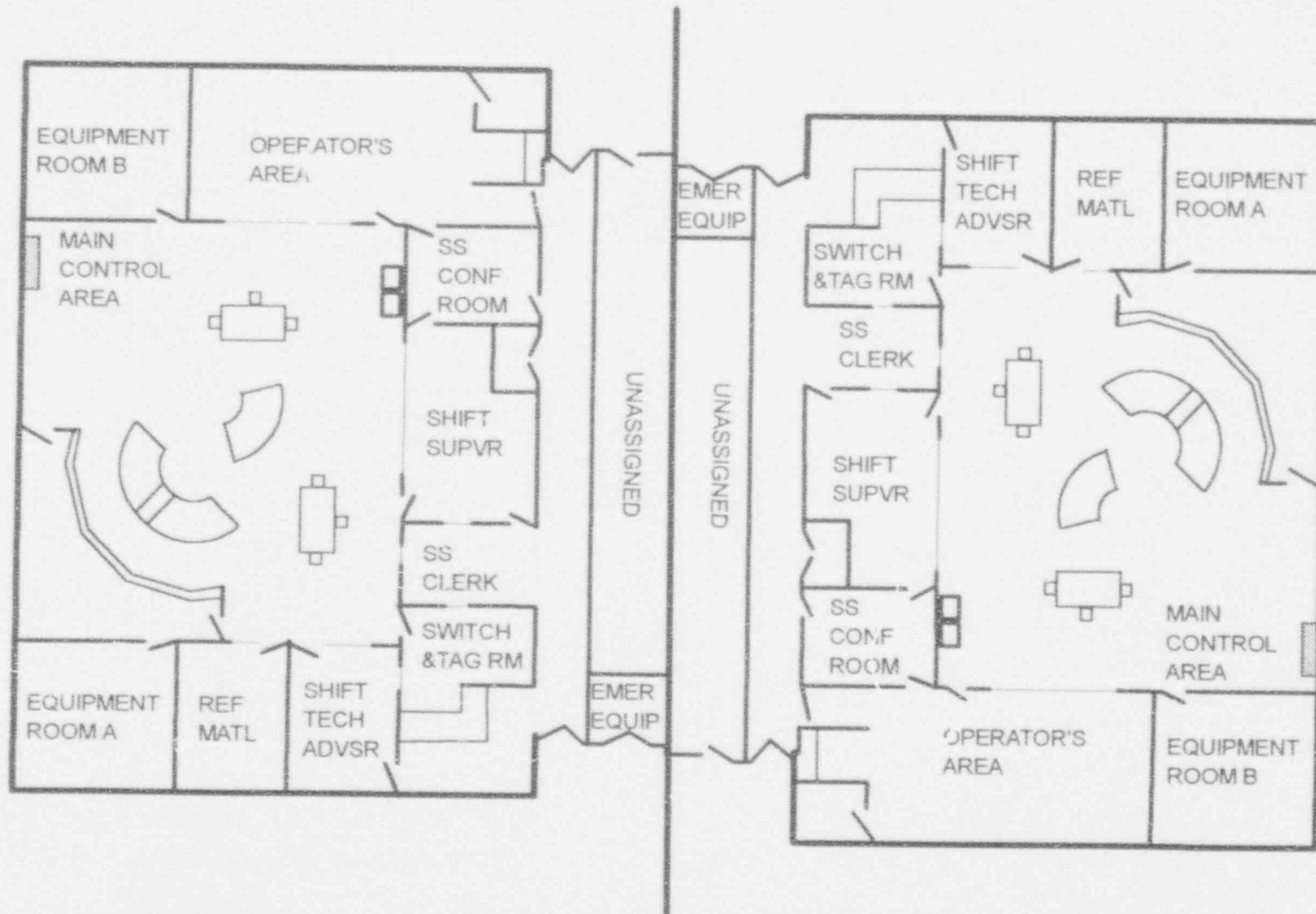
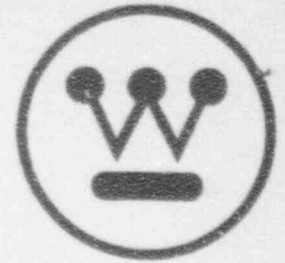
Alternative Control Room Design Concepts



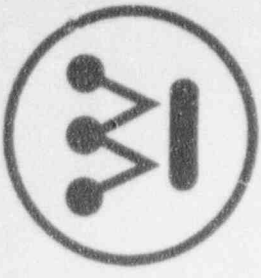
Three alternative design concepts will be considered:

- Separate Control Room Complexes
- Single Control Room Complex
 - Separate Control Rooms
- Shared Control Room and Shared Support Facilities

Separate Control Room Complexes



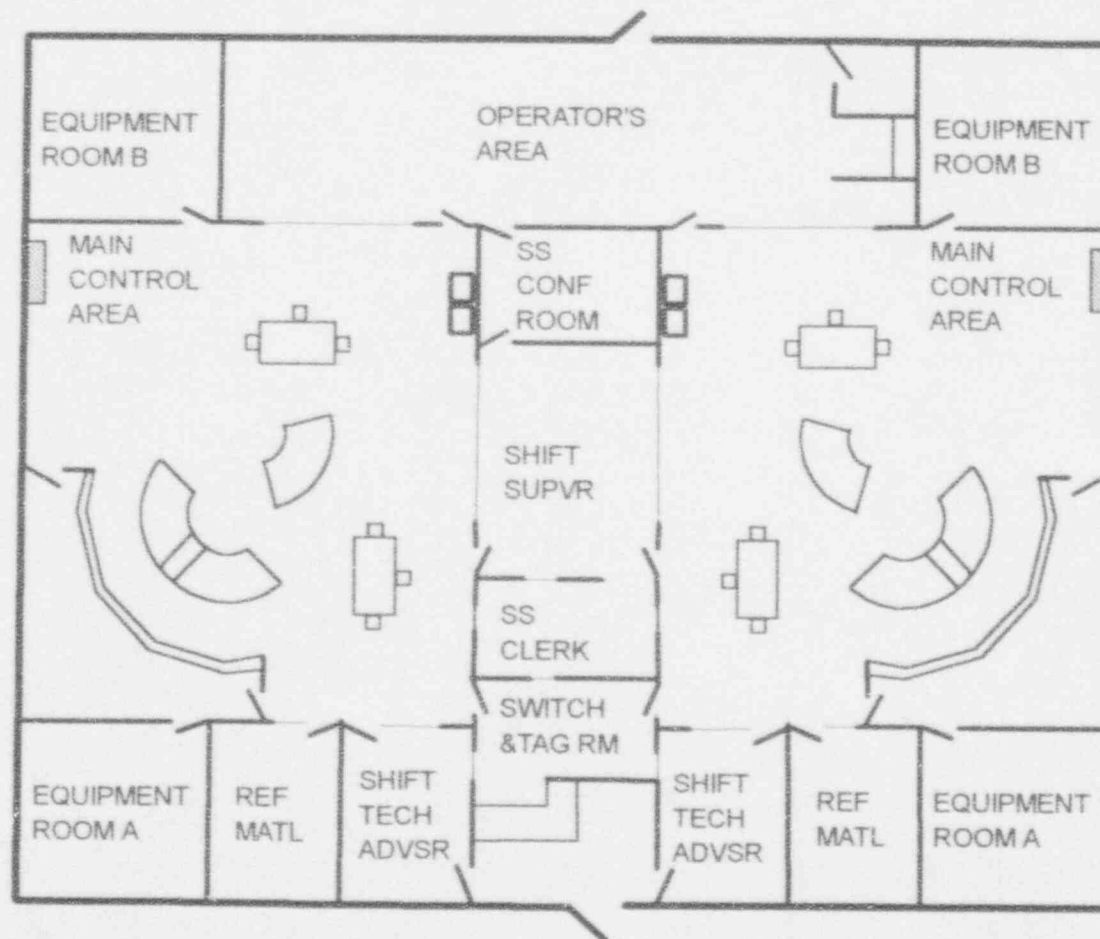
Separate Control Room Complexes



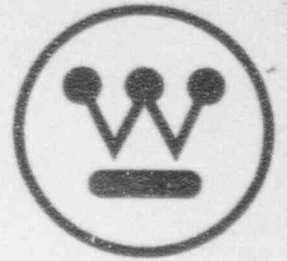
- Two Identical Control Room Complexes
- Control Rooms and Support Facilities
Are Not Shared Between the Units.

Single Control Room Complex

Separate Control Rooms



Single Control Room Complex

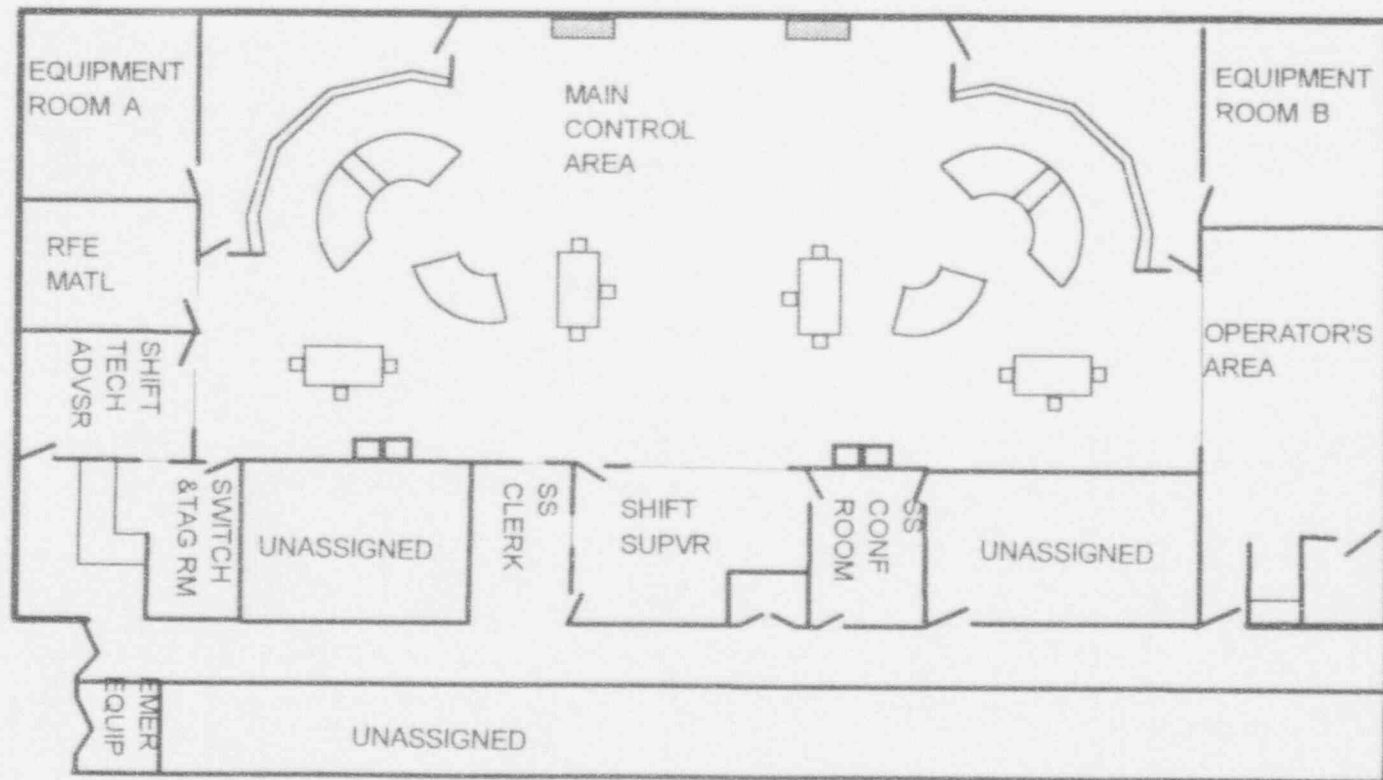
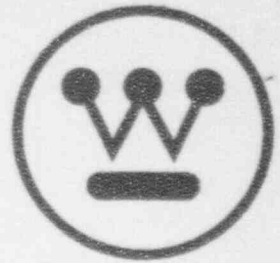


Separate Control Rooms

- Two Separate, Identical Control Rooms
- Certain Support Areas Are Shared
 - Shift Supervisor's Office
 - Shift Supervisor's Clerk Area
 - Switching and Tagging Area
 - Operator's Area
 - Kitchen
 - Restroom
 - Shift Turnover

Shared Control Rooms

Shared Support Facilities



Shared Control Rooms

Shared Support Facilities



- Single Control Room
 - Separate, Identical Areas for Each Unit's Crew
 - Removable Room Divider May Be Provided
- All Support Areas are Shared

Control Room Design Issues



- Fire Protection
- Control Room Habitability
- Plant Design - Shared Systems
- Man-Machine Interface Design
- Plant Staffing
- Operator Training

Control Room Design Issues

(continued)



- Adjacent Unit Operating State
- Plant Layout
- Access Control
- Construction/Maintenance
- URD Compliance
- PRA Impact

Regulatory Basis



10CFR50 Appendix A - General Design Criterion 5 -
"Sharing of structures, systems, and components - Structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units."

Fire Protection



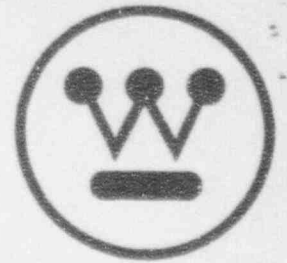
- Propagation
- Effects of Fire on Instrumentation and Controls
 - Inadvertent Plant Trip/ESF Actuation
- Other Effects of Fire
 - Control Room Evacuation
 - Long Term Plant Availability

Control Room Habitability



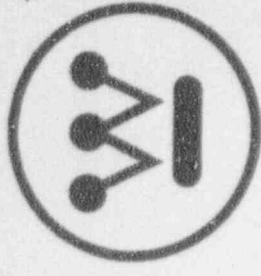
- Safe shutdown capability
 - Maintained for both units
- Common remote shutdown room(?)

Plant Design - Shared Systems (Assumptions)



- Safety System Vs. Nonsafety System
- Failure Does Not Affect:
 - Safety Systems
 - Availability
 - Power Production
- Provides Plants with External Interfaces
- Does Not Require Attention from Main Control Room
- Provides Utilities or Services for Entire Site

Plant Design - Shared Systems (Issues)



- What Components Controlled from Either Unit?
- Close Coordination Between Units Required?
- Tight Coupling of Both Units?



Man-Machine Interface

- Situational Awareness of the other unit
- Crew Interaction and Coordination
- Crew Distraction
- Operator Errors as a Result of Multiple Units
 - Operation of wrong component
 - Tagging or untagging of wrong component
 - Operator entering wrong control room



Plant Staffing

- Level of staff sharing
 - Level of supervision of both crews
- Access of shared staff to both units
- Transfer of staff between units during shift
 - Anticipated needs
 - Unanticipated needs



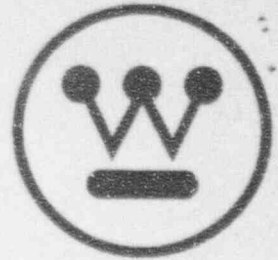
Operator Training

- Training applicable to both units
- Training simulator fidelity
 - One or two simulators

Adjacent Unit Operating State



- Units may be in significantly different operating states (for example - refueling and power operation)
- Impact from unanticipated combinations of operating states
 - Control room support system design
- Shared control room resources
 - Space
 - Equipment
 - Facilities
 - Personnel



Plant Layout

- Minimize floor space
- Access routes
 - To control room complex
 - Within control room complex
 - Between control room complexes



Access Control

- Number of access control points
- Access control to workstations
 - Unauthorized personnel
 - Authorized personnel at wrong unit's workstation

Construction/Maintenance



- Maintenance Errors
- Maintenance Coordination
- Dust
- Dirt
- EMI/RFI
- Electrical surges (ie. from welding)
- Need for access to outside to move large items in or out

URD Compliance



- II-06-4.1.4 -Rev- 0 Multi-Unit Sites
..... For a dual or multiple unit plant, arrangement of the PGC (Power Generation Complex) shall be such that the units duplicate each other (i.e., there shall be no mirror image arrangement of facilities or equipment).
- II-01-8.2.4.2.2 -Rev- 0
Multi-unit stations shall have identical, but separate control rooms except those controls which are common to both units.
- II-01-8.2.4.3 -Rev- 0 Multi-Units
Multi-units shall have identical equipment, equipment and systems layout and orientation.

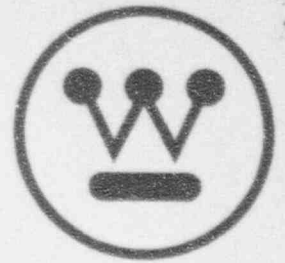


PRA Impact

- Probability of events propagating from one unit to other through shared control room included.
- Potential ways for both units to become coupled identified and probabilities assigned.

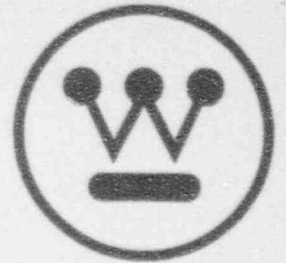
Industry Experience

Lessons Learned



- Database Searches
 - Licensee Event Reports
- Public Document Room
 - Licensee Event Reports
 - NUREG's
 - Information Notices
 - Inspection Reports
 - Memorandums

Conclusion



- Other Items?
- Where to From Here?