



# **EXELON/NRC MEETING LGS RHRSW PIPING REPAIRS/LAR**

**U.S. Nuclear Regulatory Commission  
Tuesday, January 26, 2010**

# **Exelon/NRC Meeting - RHRSW Piping Repairs/LAR**

- ✓ Introductions
- ✓ RHRSW Piping Repairs
- ✓ RHRSW AOT Extension LAR
- ✓ Conclusion

# Introductions

## ✓ Exelon Attendees

- E. Hosterman – Limerick Design Engineering
- G. Weiss – Plant Systems Engineering
- D. Vanover – PRA (ERIN Engineering)
- J. Quinn – Manager, Plant Engineering
- D. Helker – Manager, Corporate Licensing
- G. Stewart – Corporate Licensing

# **RHRSW System Piping Repairs**

- ✓ Background
- ✓ Scope of Repairs
- ✓ Plant Configuration

## RHRSW System Piping Repairs

### ✓ Background

- Limerick has two independent RHRSW return lines common to both units
- Existing common return piping is 30 inch diameter carbon steel pipe with some 20 inch diameter piping connecting to each unit
- Existing piping contains weld overlay temporary repairs for minimum wall conditions (localized ID corrosion)
- Current LCO requires shutdown after 72 hours
- Work required for proactive pipe replacement cannot be completed in 72 hours.

## RHRSW System Piping Repairs

### ✓ Scope of Repairs

- The scope of repairs is to replace the degraded portions of accessible RHRSW return piping common to both units
- “B” loop piping will be replaced during Unit 2 outages
- “A” loop piping will be replaced during Unit 1 outages
- Total replacement will require 2 – 3 outages per loop
- Each outage scope will be based on the amount of work that can be completed within the proposed 7 day LCO.

## **RHRSW System Piping Repairs**

### ✓ Plant Configuration

- Normal Configuration
  - Each RHRSW return loop carries the total return flow of one RHRSW loop and one ESW loop.
  - Both ESW loops have open connections to both RHRSW return loops
- Planned configuration during repairs
  - One unit in an outage; one unit operating
  - One RHRSW return loop operable
  - One RHRSW loop drained for repairs
  - Both ESW loops aligned to return through operable RHRSW return loop
    - o Valves to the operable loop will be locked open and de-energized
    - o Valves to the drained loop will be locked closed and de-energized

## **RHRSW AOT Extension LAR**

- ✓ Proposed Technical Specification Changes
- ✓ Plant System Impact
- ✓ Risk Impact
- ✓ Potential Compensatory Measures

## **RHRSW AOT Extension LAR**

- ✓ Proposed Technical Specification Changes
  - RHRSW TS 3.7.1.1, Action a.3 (one RHRSW subsystem inoperable)
    - 72 hours to 72 hours\*\*
    - \*\* may be extended for a one-time period up to 7 days per calendar year for repairs of one RHRSW subsystem piping with opposite unit not in OPCONs 1, 2, or 3.
  - RHR Suppression Pool Cooling TS 3.6.2.3, Action a (one SPC loop inoperable)
    - 72 hours to 72 hours\*\*
    - \*\* may be extended for a one-time period up to 7 days per calendar year for repairs of one RHRSW subsystem piping with opposite unit not in OPCONs 1, 2, or 3.

## **RHRSW AOT Extension LAR**

### ✓ Plant System Impact

- RHRSW
  - One loop drained and out of service
  - Both units share the operable RHRSW return loop (2 RHRSW pumps and 4 ESW pumps)
- ESW
  - Both loops return to operable RHRSW loop
  - Expected to meet required flows for all required components
    - o Will be demonstrated by flow balance prior to initial alignment for each loop
  - Single failure criteria
  - Loss of backup to TECW on the outage unit (non-safety function)
    - o TECW backup loop returns to RHRSW

## RHRSW AOT Extension LAR

- ✓ Plant System Impact (continued)
  - RHR Decay Heat Removal Capability
    - Reactor Water Cleanup and Fuel Pool Cooling will be able to handle outage unit decay heat
    - One operable RHR heat exchanger per unit
  - Remote Shutdown System
    - Fire protection compensatory measures may be required

## **RHRSW LAR Risk Impact**

- ✓ CDF impact measured from internal events, internal floods, and internal fires
- ✓ Bounding assessment performed for seismic impacts
- ✓ Other external events screened based on likelihood of threat or limited role of RHRSW
- ✓ LERF impact only measured from internal events and internal floods, but due to nature of RHRSW function, LERF acceptance guidelines not seriously challenged

## Preliminary Risk Results

Figure of Merit	Unit 1 Risk Assessment Result	Unit 2 Risk Assessment Result
$\Delta$ CDF	1.0E-6/yr	9.9E-7/yr
ICCDP (RHRSW Loop A)	5.9E-7	6.7E-7
ICCDP (RHRSW Loop B)	1.4E-6	1.2E-6

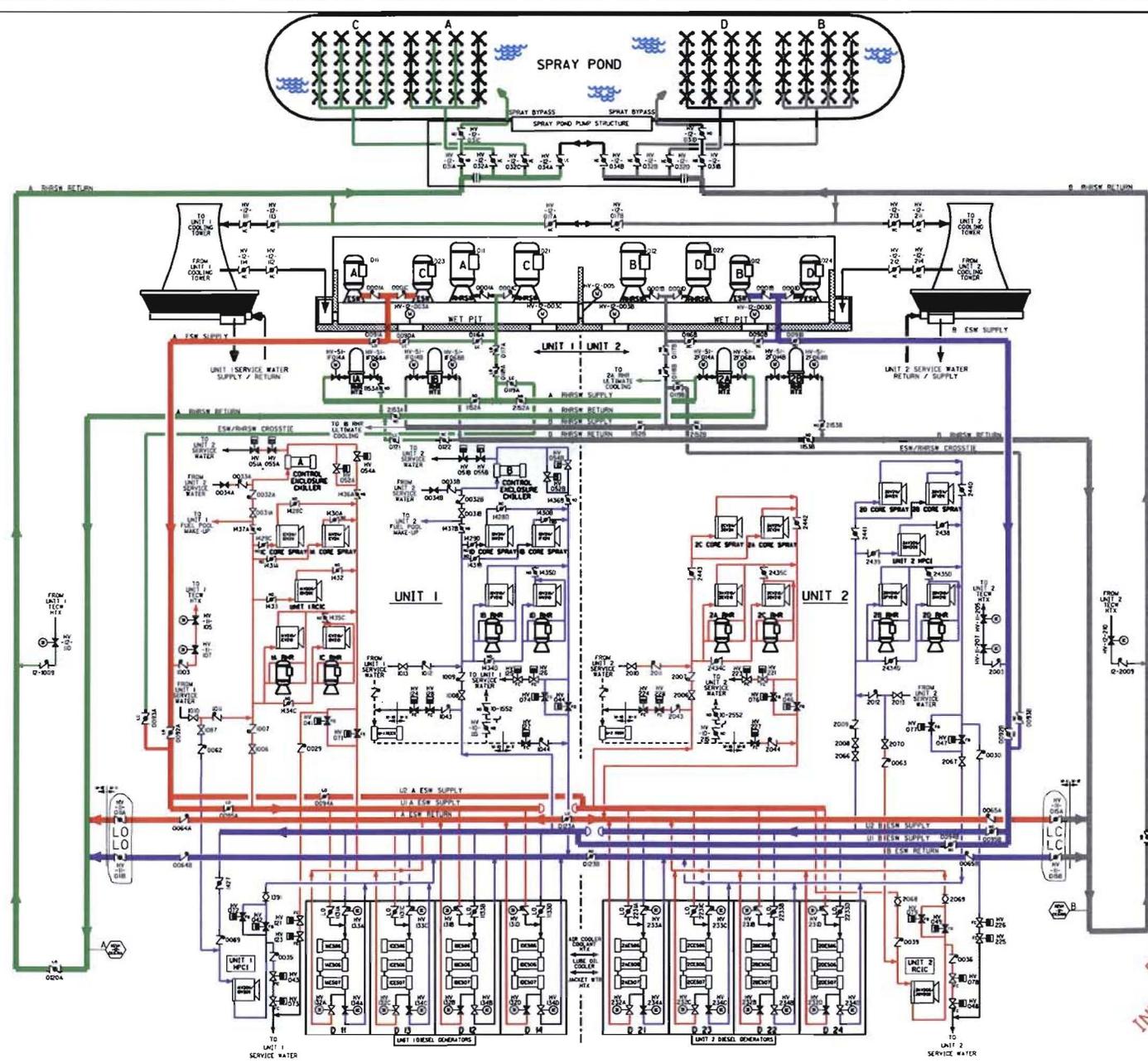
- ✓ Results do not significantly exceed current acceptance guidelines for permanent changes
- ✓ Results well within NUMARC 93-01 acceptance guidelines for voluntary maintenance activities requiring risk management actions
- ✓ Compensatory measures ensure sources of risk are reduced

## Potential Compensatory Measures

- ✓ Additional onsite staffing
- ✓ ESW return valves administratively controlled
- ✓ Opposite RHRSW train equipment protected
- ✓ Elective maintenance on important risk contributors avoided
- ✓ Adverse work in electrical switchyards prohibited
- ✓ Operational risk activities restricted
- ✓ Briefing with crew operators to reinforce potentially important operator actions
- ✓ Heightened awareness of key fire areas and pre-job walkdowns to reduce and manage transient combustibles in those areas

## Conclusions

- ✓ Plant Impact
- ✓ Risk Impact



VALVE POSITIONS FOLLOWING ESW PUMP 'A' START

VALVE	DESCRIPTION	POSITION
WV-10-041	UNIT 2 RETURN	OPEN
WV-10-042	UNIT 2 RETURN LOOP A	OPEN
WV-10-043	UNIT 2 RETURN LOOP B	OPEN
WV-10-044	UNIT 2 RETURN LOOP C	CLOSED
WV-10-045	UNIT 2 RETURN LOOP D	CLOSED

VALVE POSITIONS FOLLOWING ESW PUMP 'C' START

VALVE	DESCRIPTION	POSITION
WV-10-071	UNIT 2 RETURN	OPEN
WV-10-072	UNIT 2 RETURN LOOP A	OPEN
WV-10-073	UNIT 2 RETURN LOOP B	OPEN
WV-10-074	UNIT 2 RETURN LOOP C	CLOSED
WV-10-075	UNIT 2 RETURN LOOP D	CLOSED

VALVE POSITIONS FOLLOWING ESW PUMP 'B' START

VALVE	DESCRIPTION	POSITION
WV-10-044	UNIT 2 RETURN	OPEN
WV-10-042	UNIT 2 RETURN LOOP B	OPEN
WV-10-043	UNIT 2 RETURN LOOP A	CLOSED
WV-10-045	UNIT 2 RETURN LOOP D	CLOSED
WV-10-041	UNIT 2 RETURN	CLOSED
WV-10-044	UNIT 2 RETURN	CLOSED

VALVE POSITIONS FOLLOWING ESW PUMP 'D' START

VALVE	DESCRIPTION	POSITION
WV-10-074	UNIT 2 RETURN	OPEN
WV-10-072	UNIT 2 RETURN LOOP B	OPEN
WV-10-073	UNIT 2 RETURN LOOP A	CLOSED
WV-10-075	UNIT 2 RETURN LOOP D	CLOSED
WV-10-071	UNIT 2 RETURN	CLOSED
WV-10-074	UNIT 2 RETURN	CLOSED

RHR SERVICE WATER RADIATION MONITOR BYPASS SWITCH OPERATION:

BYPASS SWITCH	BYPASS FUNCTION
HSS-12-0028-1	NO HEAD / NO DISCH PRESSURE TRIP
HSS-12-0028-2	RHR SW PUMP 'B' D
HSS-12-0028-3	NO HEAD / NO DISCH PRESSURE TRIP

UTILIZATION OF COOLING TOWER DR SPRAY POND AS A HEAT EXCHANGER

VALVE	DESCRIPTION	POSITION
WV-10-0024	GATE A	CLOSED
WV-10-0025	GATE B	OPEN
WV-10-0026	GATE C	OPEN
WV-10-0027	GATE D	CLOSED
WV-10-0028	TAR 1 RETURN	CLOSED
WV-10-0029	TAR 1 TO POND	CLOSED
WV-10-0030	TAR 1 TO POND	CLOSED
WV-10-0031	TAR 2 RETURN	CLOSED
WV-10-0032	TAR 2 TO POND	CLOSED
WV-10-0033	TAR 2 TO POND	CLOSED
WV-10-0034	SPRAY INLET A	CLOSED
WV-10-0035	SPRAY INLET B	CLOSED
WV-10-0036	SPRAY INLET C	CLOSED
WV-10-0037	SPRAY INLET D	CLOSED
WV-10-0038	SPRAY BYPASS A/C	SEE BELOW
WV-10-0039	SPRAY BYPASS B/D	CLOSED
WV-10-0040	SPRAY BYPASS B/D	CLOSED
WV-10-0041	SPRAY BYPASS B/D	CLOSED

SPRAY / BYPASS SELECT SWITCHES IN BYPASS:

VALVE	DESCRIPTION	POSITION
HSS-12-0041-1	SPRAY / BYPASS SELECT SWITCH	SPRAY
HSS-12-0041-2	SPRAY / BYPASS SELECT SWITCH	BYPASS
HSS-12-0042-1	SPRAY / BYPASS SELECT SWITCH	SPRAY
HSS-12-0042-2	SPRAY / BYPASS SELECT SWITCH	BYPASS

SPRAY / TAR 2 SELECT SWITCHES IN SPRAY POND:

VALVE	DESCRIPTION	POSITION
WV-10-0034	SPRAY INLET A	OPEN
WV-10-0035	SPRAY INLET B	OPEN
WV-10-0036	SPRAY INLET C	OPEN
WV-10-0037	SPRAY INLET D	OPEN
WV-10-0038	SPRAY BYPASS A/C	CLOSED
WV-10-0039	SPRAY BYPASS B/D	CLOSED
WV-10-0040	SPRAY BYPASS B/D	CLOSED
WV-10-0041	SPRAY BYPASS B/D	CLOSED

NOTE: AUTO VALVE LINEUP BYPASS SWITCHES IN BYPASS. HSS-12-0041.C.D. OPERATE THE automatic transfer of the above RHR SW valves and bulk goes to the SPRAY POND equipment following the start of the appropriate ESW Pump(s).

RHR SERVICE WATER PUMP OPERATING RESTRICTIONS:

FLOW per Heat Exchanger: 5,000 TO 6,000 gpm  
 FLOW 100% per Load: 6,000 TO 8,000 gpm  
 MAXIMUM HEAD: 17.70 mpa @ 6.0 mpa MOTOR CURRENT: 1 1/2 mpa

SAFEGUARD POWER SUPPLY

EMERGENCY SERVICE WATER / RHR SERVICE WATER OVERVIEW

LIMERICK GENERATING STATION UNITS 1 & 2		PECO ENERGY COMPANY	
UNIT	STATUS	UNIT	STATUS
1	ONLINE	2	ONLINE

THIS SKETCH BASED ON SIM-M-12-Sht.1-Rev.9

80231 SIM-M-0012

FOR INFORMATION ONLY