



**ENERGY  
NORTHWEST**

# Crediting Control Room Emergency Chilled Water System for Equipment Qualification

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# Participants

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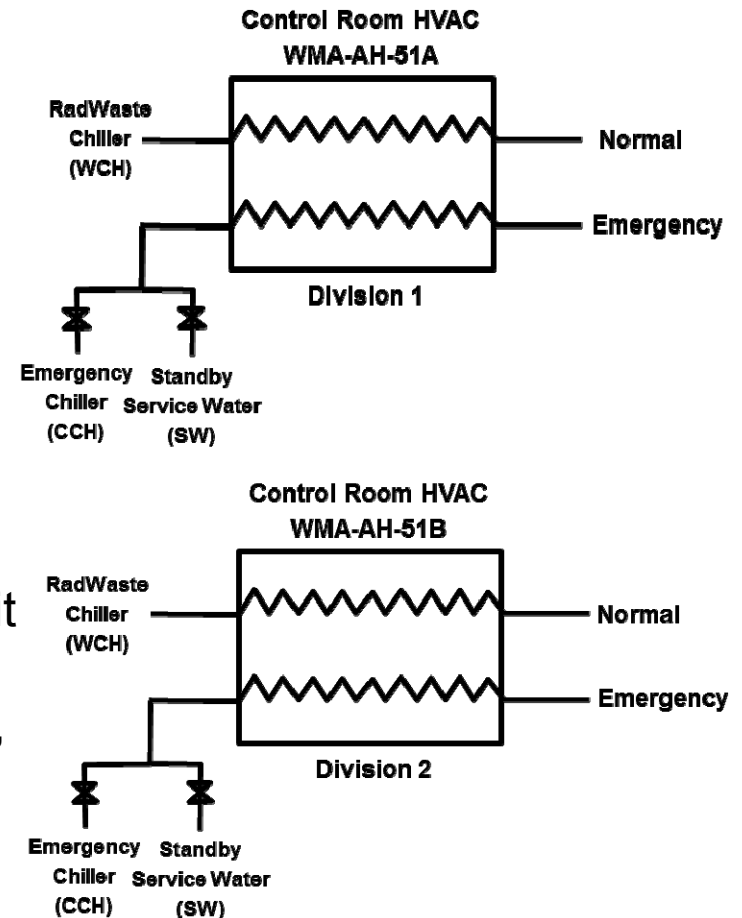
# Purpose

- ✦ Present path forward to credit the Control Room Emergency Chilled Water (CCH) System to maintain temperature within limits for equipment operability
  - Improved overall safety at the station
  - Supports future required modifications that will increase heat load in the main control room; crediting the chillers will increase the existing cooling margin and therefore improve safety.

Pursue an LAR to credit the chillers for control room cooling to maintain temperature for both equipment operability and operator comfort.

# System Description

- ✦ Temperature control for the main control room (MCR) provided by the Control Room Air Conditioning (AC) System.
  - System designator at Columbia is the Radwaste Mixed Air (WMA) system.
  - WMA system consists of two independent, redundant subsystems
  - Each subsystem contains an air handling unit with two cooling coils (one normal and one emergency), a control room recirculation fan, air filter, ductwork, dampers, and instrumentation & controls.



Normal cooling coil supplied by the Radwaste Chiller Water (WCH)  
Emergency cooling coil supplied by Standby Service Water (SW) or CCH

# History - Initial Licensing

- ✦ Safety related SW system capable of maintaining control room temperature within limits for equipment operability ( $\leq 104^{\circ}\text{F}$ ) post accident.
- ✦ Operating License granted with license condition 2.c.(21):
  - The licensee shall have operable before May 31, 1984, redundant, seismic Category I environmentally qualified water chillers for control room HVAC.
- ✦ Original Technical Specification (TS) Surveillance Requirement 4.7.2.a required control room to be  $\leq 85^{\circ}\text{F}$ .

Procured and installed as safety related (SR) but not credited.

# CCH – Current Licensing Basis

- ✦ SW credited to maintain control room temperature within limits for equipment operability ( $\leq 104^{\circ}\text{F}$ ).
- ✦ TS limit on control room temperature ( $\leq 85^{\circ}\text{F}$ ) no longer exists in TS with implementation of Improved Tech Specs in 1997.
- ✦ Capability to meet  $\leq 85^{\circ}\text{F}$  still used for determining when CCH is required to perform its support function.
  - If a CCH subsystem is inoperable, actions for an inoperable Control Room AC subsystem are entered unless SW can support  $\leq 85^{\circ}\text{F}$  (winter months).
  - Allowed outage time for one inoperable Control Room AC subsystem – 30 days
  - Two trains inoperable – 72 hours to restore one subsystem
  - Otherwise shutdown to Mode 4.

# Future

- ✦ Planned modifications will increase control room heat load and potentially exceed the capability of one division of SW to support control room equipment operability limit.
- ✦ Capability of one division of SW to maintain control room temperature  $\leq 104^{\circ}\text{F}$  is limited.
  - Crediting the chillers will recapture significant heat load margin
- ✦ A project has been initiated to credit CCH for maintaining control room temperatures within limits for equipment operability.
- ✦ This is considered a change requiring NRC approval per the 50.59 process.

A license amendment request will be pursued

# Requirements met by CCH

## ✦ Requirements met by CCH:

- Equipment procured and maintained safety related
- Quality Group C (ASME Section III, Class 3) in accordance with Regulatory Guide 1.26 requirements
- Seismic Category I
- Housed within Seismic Category I structure
- Redundant
- Environmentally qualified
- Powered by 1E safety buses (backed by emergency diesel generators)
- Cooled by safety related SW system
- CCH pumps included in IST program

Both CCH systems have been procured and maintained safety related



# General Design Criteria

- ✦ Energy Northwest commissioned a study to determine whether the current configuration of the CCH system can satisfy the General Design Criteria (GDCs)
- ✦ The following aspects need to be reviewed
  - GDC 3 – Chillers are located in the same fire zone
  - GDC 4 – Internally generated missile and area piping review for moderate energy line cracks.

Physical separation issue will require further review

# GDC 3 and 4



CCH subsystems are not physically separated.

# GDC 4 – Approach / Analysis Required

- ✦ Both CCH subsystems directly adjacent to each other potentially susceptible to missiles, pipe whipping and discharging fluids.
- ✦ Missile Protection (Internally Generated)
  - CCH system components currently not evaluated for missile generation.
- ✦ Protection Against Dynamic Effects Associated with the Postulated Rupture of Piping
  - No high energy lines pass in the vicinity of the CCH system components.
  - Current CCH system design satisfies the energized line break design criteria; however, not all moderate energy lines have been reviewed for moderate energy line cracks.

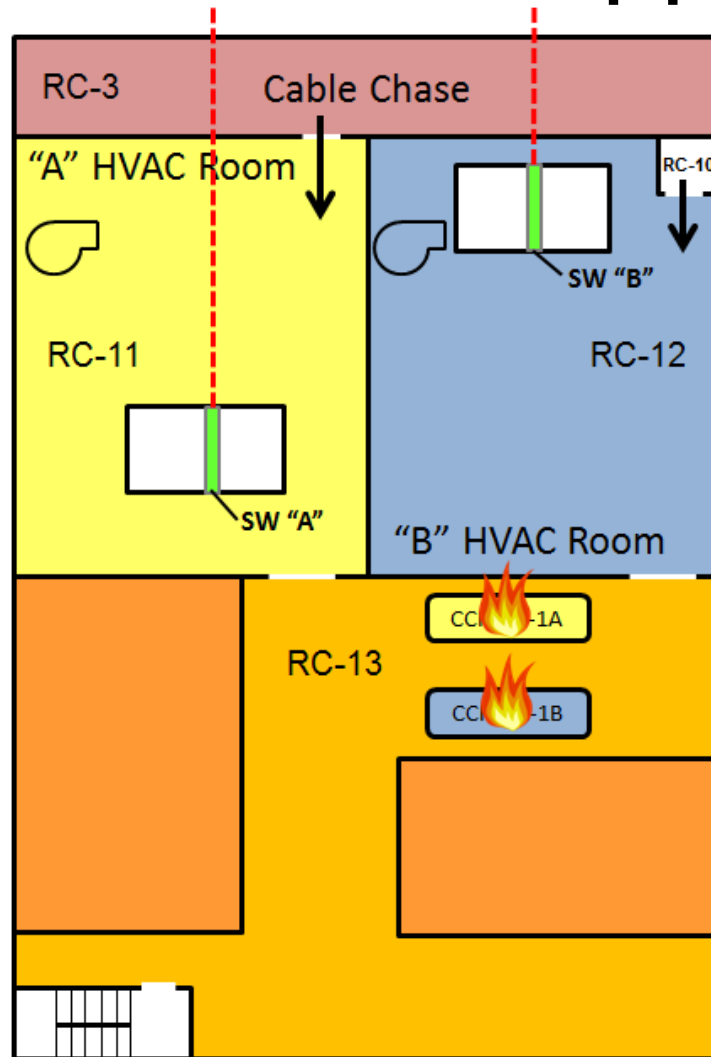
Issues can be resolved analytically.

# GDC 3 – Approach / Analysis Required

- ✦ Initial licensing established a control room temperature limit of  $\leq 104^{\circ}\text{F}$  for a fire in RC-13 (chiller area).
- ✦ For a fire that disables both CCH subsystems:
  - SW will be manually aligned to the WMA emergency cooling coils.
  - Both divisions of WMA will be available to provide control room cooling.
  - A fire in the chiller area will not affect the WMA air handling units.
  - Analysis will demonstrate sufficient heat removal capacity to maintain control room temperature  $\leq 104^{\circ}\text{F}$  to support safe shutdown.
- ✦ Analysis of manual actions will be completed pursuant to NUREG-1852 to show actions are feasible/reliable.
- ✦ Changes will be evaluated under the requirements of License Condition 2.c.(14).

For a fire which disables both CCH subsystems, SW cooling to both divisions of WMA will maintain control room temperature  $\leq 104^{\circ}\text{F}$  to support safe shutdown.

# GDC 3 - Fire in RC-13 - Approach



Operator Manual Action in RC-12 is to account for future added control room heat load.

Realignment can be performed without accessing the chillers' fire area.

Red is Service Water Pipes  
Arrows are Operator Manual Action Entry Locations

# Auto-Start Feature

- ✦ CCH system has an auto-start feature tied to SW pressure and other associated permissives.
  - Feature not used, as the SW system is started on a frequent basis which would place undue duty cycles on the chillers.
- ✦ Currently, Energy Northwest does not assume that 85°F is a hard limit.
- ✦ The CCH system is manually started on loss of normal cooling, high control room temperature, LOOP, or accident signals.
- ✦ Proposed design change will consider implementing an auto-start feature.

Design change will consider implementing an auto-start feature.

# Summary

- ✦ Licensing action planned to credit CCH for maintaining control room temperatures for equipment operability.
- ✦ Technical evaluation will show that safety is maintained by original design and supplemental analysis.
- ✦ Regulatory evaluation will show General Design Criteria are met.
- ✦ Regulatory evaluation will compare to guidance in Standard Review Plan.

LAR to credit the chillers for control room cooling to maintain temperature for equipment operability planned for 4Q 2017

# Questions