

UNITED STATES NUCLEAR REGULATORY COMMISSION

REGION IV 1600 E. LAMAR BLVD. ARLINGTON, TX 76011-4511

June 10, 2016

EA-15-276

Mr. Mark E. Reddemann Chief Executive Officer Energy Northwest P.O. Box 968, Mail Drop 1023 Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION – RESPONSE TO DISPUTED NON-CITED VIOLATION - NRC INSPECTION REPORT 05000397/2015003

Dear Mr. Reddemann:

On November 12, 2015, the U.S. Nuclear Regulatory Commission (NRC) issued the subject inspection report and non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," related to the verification of the adequacy of the design of the control room heating, ventilation, and air conditioning system (Agencywide Documents Access and Management System (ADAMS) Accession ML15316A834).

On December 22, 2015, you provided a response (ML15356A817) in which you contested the NCV (NCV 05000397/2015003-03) described in the inspection report. On December 31, 2015, the NRC acknowledged receipt of this letter (ML15365A496) and informed you that we would evaluate your response and inform you of the results of our evaluation.

The NRC conducted a detailed review of your response and the applicable regulatory requirements, in accordance with Part I, Section 2.2.8, of the NRC Enforcement Manual. The NRC staff who performed the review were not involved with the original inspection effort. After careful consideration of the basis for your denial of the NCV, the NRC has concluded that the inspection report adequately describes the violation and characterization of the finding; however, clarification regarding the basis for the NCV is provided in the enclosure to this letter. As a result, the NRC is upholding the NCV contained in the inspection report. The results of the NRC's evaluation of your reply to the NCV is contained in the enclosure to this letter.

M. Reddemann

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room and in the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,

/RA/

Marc L. Dapas Regional Administrator

Docket: 50-397 License: NPF-21

Enclosure: NRC Evaluation of Licensee Response to Non-Cited Violation

M. Reddemann

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's ADAMS. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Marc L. Dapas Regional Administrator

Docket: 50-397 License: NPF-21

Enclosure:

NRC Evaluation of Licensee Response to Non-Cited Violation

DISTRIBUTION:

RidsOeMailCenter Resource;
RidsSecyMailCenter Resource;
RidsEdoMailCenter Resource;
RidsOiMailCenter Resource;
RidsRgn3MailCenter Resource;
Marc.Dapas@nrc.gov;
Ryan.Lantz@nrc.gov;
Gregory.Kolcum@nrc.gov;
Ryan.Alexander@nrc.gov;
Matthew.Kirk@nrc.gov;
Marisa.Herrera@nrc.gov;
Jenny.Weil@nrc.gov;
Bill.Maier@nrc.gov;

NRREnforcement.Resource; RidsOcaMailCenter Resource; EDO_Managers; RidsRgn1MailCenter Resource; RidsOcfoMailCenter Resource; Kriss.Kennedy@nrc.gov; Anton.Vegel@nrc.gov; Dan.Bradley@nrc.gov; Thomas.Sullivan@nrc.gov; Victor.Dricks@nrc.gov; Karla.Fuller@nrc.gov; Angel.Moreno@nrc.gov; John.Kramer@nrc.gov; RidsNrrDirsEnforcement Resource; RidsOgcMailCenter Resource; RidsOigMailCenter Resource; RidsRgn2MailCenter Resource; Thomas.Hipschman@nrc.gov; Troy.Pruett@nrc.gov; Jeff.Clark@nrc.gov; Jeremy.Groom@nrc.gov; R4Enforcement John.Klos@nrc.gov; Loretta.Williams@nrc.gov; Jeremy.Bowen@nrc.gov;

DOCUMENT NAME: S:\RAS\ACES\ENFORCEMENT_EA CASES - OPEN\CGS EA-15-276\EA-15-276_CGS Response to Disputed NCV.docx

ADAMS ACCESSION NUMBER: ML16162A735

SUNSI Review		ADAMS	Publicly Available		⊠Non-Se	⊠Non-Sensitive	
By: CHY		☑ Yes □ No □ Non-Publicly Available		□ Sensitive			
OFFICE	DRP/SPE/C	DRP/BC/C	ORA/ACES	ORA/RC	OE	NRR	DRP/D
NAME	CYoung	GWarnick	JKramer	KFuller	GFigueroa	LCasey	TPruett
SIGNATURE	/RA/	/RA/	/RA/	/RA/	/E/	/E/	/RA/
DATE	05/12/16	05/12/16	05/17/16	05/19/16	05/26/16	05/26/16	06/01/16
OFFICE	ORA/RA						
NAME	MDapas						
SIGNATURE	/RA/						
DATE	06/10/16						

OFFICIAL RECORD COPY

NRC EVALUATION OF LICENSEE RESPONSE TO NON-CITED VIOLATION

Restatement of the Violation

Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as, by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Final Safety Analysis Report, Section 9.4.1.1, "Design Basis," established the design of the control room heating, ventilation, and air conditioning (HVAC) system and specified, in part, that during emergency conditions, the control room temperature will be maintained within the habitability limit (85°F) by the control room chilled water. Service water can maintain the control room temperature limit of 85°F during colder weather. Service water will maintain the control room within the environmental qualification temperature limit for control room equipment (104°F).

Contrary to the above, prior to July 2, 2015, the licensee failed to implement design control measures for verifying or checking the adequacy of design, such as, by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Specifically, the licensee failed to verify the adequacy of the design of the control room emergency chillers involving loss-of-offsite power scenarios that result in transient losses of control room cooling, such that, the design basis established in Final Safety Analysis Report, Section 9.4.1.1, was ensured.

The licensee initiated Action Request 332565 to document the concern, issued Night Order 1662 to communicate the issue, aligned both control room air handling units to their respective chillers, created a quick card procedure to perform the chiller reset actions, and validated the quick card actions could be accomplished within 10 minutes. Because the finding is of very low safety significance (Green) and has been entered into the licensee's corrective action program, this violation is being treated as a non-cited violation (NCV), consistent with Section 2.3.2.a of the NRC Enforcement Policy. (NCV 05000397/2015003-03, Failure to Provide Design Control Measures for Control Room Emergency Chillers)

Summary of Licensee Response

In response to the NCV, the licensee contested it as described in a letter dated December 22, 2015. The letter provided the licensee's bases for denying the NCV, which included the following contentions:

- 1. There are no design basis requirements to maintain the control room temperature at less than or equal to 85°F at all times for all accident scenarios.
- 2. Columbia Generating Station's control room HVAC system design was approved with no requirement to have automatic features.
- 3. Columbia Generating Station's control room HVAC design has been previously evaluated by the NRC on at least two separate occasions and determined to be adequate.

4. Consideration for transient conditions during initial startup of support systems was established after Columbia Generating Station was licensed.

In addition, the licensee contended that the NRC introduced new requirements in the inspection report with regard to maintaining the control room below a maximum temperature limit for the duration of all accident scenarios.

NRC Evaluation

Review of System Design Basis

The NRC reviewed the design and licensing basis of the control room emergency chilled water (CCH) system, and identified the following key milestones applicable to the review of NCV 05000397/2015003-03, "Failure to Provide Design Control Measures for Control Room Emergency Chillers."

1. Initial Licensing and Regulatory Requirements for the Control Room Emergency Chillers

In February 1973, Columbia Generating Station (formerly Washington Public Power Supply System (WPPSS), Washington Nuclear Project, Unit 2) submitted its Preliminary Safety Analysis Report to the NRC. Preliminary Safety Analysis Report, Section 9.4, "Main Control Room/Cable Spreading Room/Critical Switchgear Area HVAC System," stated that the standby service water system is used as an emergency cooling medium and ...will maintain the control room temperature below 104°F, which is the temperature limit for maintaining equipment performance.

During the initial licensing of Columbia Generating Station, the NRC staff expressed concern about the 104°F maximum temperature for the main control room. In response to the NRC staff's concern, the licensee committed to provide seismic, Category I, redundant, environmentally qualified water chillers for control room heating, ventilation, and air conditioning to maintain ambient conditions compatible with the comfort zone, as defined by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). The need to add control room chillers to the Columbia Generating Station design is reflected in following Final Safety Analysis Report (FSAR) question:

<u>NRC Staff Question 010.063, dated December 1981</u>: Discuss the control room environment which will result from the most extreme ambient and accident conditions (including the worst single failure for the HVAC). Note: The temperature/humidity for all operating/accident conditions shall be maintained within the comfort zone as defined by ASHRAE. This requirement applies to all areas which require operating personnel.

<u>Licensee response</u>: To maintain the control room at an ambient condition which is compatible to the comfort zone defined in ASHRAE, redundant seismic and environmentally qualified liquid chillers are being incorporated into the control room HVAC design. Sections 9.4.1 and 6.4 will be updated when this design is complete. The control room is the only area with essential equipment where personnel are routinely required during accidents. The NRC staff concluded in NUREG-0892, "Safety Evaluation Report related to the operation of WPPSS Nuclear Project No. 2," dated December 1983, that with the addition of the control room emergency chillers, the requirements of 10 CFR Part 50, Appendix A, General Design Criteria 19, "Control Room," with respect to ambient operator/equipment environmental conditions would be satisfied. The NRC modified the operating license for Columbia Generating Station by adding Condition 2.C.(21), which required these emergency chillers be operable for control room HVAC prior to May 31, 1984.

2. Licensee Actions to Satisfy License Condition 2.C.(21)

Based on the requirement in License Condition 2.C.(21), the licensee approved a change to the FSAR under Burns and Roe Safety Analysis Report Change Notice 84-07 on February 8, 1984. This FSAR change was implemented in parallel with a design change under Project Engineering Directive S215-B-6897, "CCH System SRM List Addition," approved on March 14, 1984. This design change added a chilled water system to, "maintain area habitability in the control room under accident conditions." The licensee performed a 10 CFR 50.59 evaluation for this design change and concluded the addition of these chillers did not meet any unreviewed safety question criteria such that the design change would require prior NRC approval.

The addition of the control room emergency chillers was reflected in Amendment 35 of the FSAR dated November 1984. The temperature that the control room HVAC system, including the control room emergency chillers, would be capable of maintaining was established in this amendment. Final Safety Analysis Report, Section 9.4.1.2.1, stated:

"During emergency condition, emergency chilled water or standby service water is supplied to the air handling units for cooling. In this mode of operation the control room ambient temperature will be maintained at $75^{\circ}F \pm 3$ degrees, which is sufficient to ensure critical equipment operation and area habitability."

Amendment 35 of the FSAR also established that portions of the control room emergency chilled water system would function automatically during a design basis accident (DBA). In particular, FSAR, Section 9.4.1.5.1, stated:

"In the emergency condition (loss-of-radwaste building chilled water during design basis accident), the cooling coil WMA-CC-51A1 serving air-handling unit WMA-AH-51A is automatically supplied with standby service water and the cooling coil WMA-CC-51B1 is automatically supplied with emergency chilled water. If necessary, cooling coil WMA-CC-51A1 can be supplied with emergency chilled water by manual opening or closing of valves in standby service water and emergency chilled water lines to chiller CCH-CR-1A."

The NRC determined that Amendment 35 to the FSAR was the first point where the CCH system was described in the FSAR, and incorporated the initial design basis information for the CCH system. Specifically, the licensee, in Amendment 35, identified specific functions required of the CCH system during emergency conditions, such as a DBA.

Title 10 of CFR 50.2 defines design bases as that information which identifies the specific functions to be performed by a structure, system, or component of a facility, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be (1) restraints derived from generally accepted "state of the art" practices for achieving functional goals, or (2) requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals.

For the control room HVAC system, the control room emergency chillers are an integral part of the design. Functional goals were established for the system to be capable of ensuring that area temperatures will support critical equipment operation and area habitability. In Amendment 35 to the FSAR, the system was described as achieving those functional goals to automatically start and supply cooling water to the control room air handling units in order to maintain control room temperatures that are sufficient to ensure critical equipment operation and area habitability.

3. Design Change from Automatic to Manual

On November 11, 1989, the licensee approved FSAR Change 89-068. The purpose of this FSAR change was to, "change the automatic supply WMA-CC-51B1 with chilled water to manually starting the chilled water pump and emergency control room chiller during an emergency condition (post LOCA [loss-of-coolant accident] or during a LOOP [loss-of-offsite power])." This change resulted in a revision to FSAR, Section 9.4.1.5.1, (see above) in Amendment 42 to state that, "cooling coil WMA-CC-51B1 is manually supplied with emergency chilled water." The licensee performed a 10 CFR 50.59 evaluation for FSAR Change 89-068 and documented the following conclusions when evaluating the change with respect to the following unreviewed safety question criteria:

• Can the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR be increased?

Licensee Evaluation: [No] "The proposed change requires manual action to start the chilled water system and the chiller.... The accident that requires the "B" emergency control room chiller is LOCA or LOOP. The service water A pump fails to start, which is valved to the cooling coil in the 51A air handling unit. The B control room ventilation system is required to maintain the control room habitable. The time for the control room temperature to rise from the normal setpoint to 85°F would be approximately 30 minutes (preliminary calculations 30+ minutes). The time to a temperature of 104°F would be conservatively 85 minutes. Operator action to turn on the pump breaker and control power to the chiller could be accomplished in 35 minutes. A short time increase in the control room temperature would have minimum effect on personnel."

• Can a possibility for an accident or malfunction of a different type than evaluated previously in the FSAR be created?

Licensee Evaluation: [No] "The chilled water pump and chiller will start with operator action. Previously, the chilled water [emergency chilled water system] was started when service water pressure exceeded 100 psig. No other changes have been made. The time required to close the breaker and to turn on control power has been increased, this will delay start of the emergency chilled water system by 35 minutes. The FSAR has evaluated the manual line up of an emergency chiller for control room cooling if it is required. This manual action takes about ½ hour."

• Is the margin of safety as defined in the basis for any technical specification reduced?

Licensee Evaluation: [No] "The technical specifications basis is temperature less than or equal to 85°F in the control room for personnel habitability for 30 days post-accident. The time for operator action to start the emergency cooling [emergency chilled water system] has increased to about 35 minutes (no action for 30 minutes; 5 minutes for action) – the temperature may rise to 85°F or slightly above, but the effect on habitability is minimal for the short duration."

The NRC's evaluation of the NCV in question included a review of the change that incorporated the manual starting of the chilled water pump and emergency control room chiller during an emergency condition (post LOCA or during a LOOP). The NRC agreed that a change from automatic to manual operation of the control room emergency chillers would not result in any of the unreviewed safety question criterion being met, provided that the licensee adequately justified the proposed changes. The NRC identified the following deficiencies in the licensee's justification for the proposed change:

• The licensee's evaluation stated that the time required to, "close the [emergency chill water breaker] and to turn on control power has been increased, this will delay start of the emergency chilled water system by 35 minutes." The NRC concluded that this statement does not accurately reflect the design of the control room emergency chiller system. Specifically, the NRC determined that the time required to manually start the control room emergency chillers may be longer than the 35 minutes asserted in the licensee's evaluation because of an anti-recycle relay in the chiller start circuitry that actuates on a loss of power to prevent chiller re-start for 30 minutes. This time delay associated with the anti-recycle relay coupled with the time needed to diagnose and respond to a loss of control room air conditioning would likely result in a longer manual action response time.

During the inspection that resulted in the NCV in question, the NRC also determined that the licensee was unable to demonstrate that during certain DBAs, there would be an appropriate time sensitivity to the required manual actions necessary to start the control room emergency chillers.

- The licensee's evaluation stated that the time for the control room temperature to rise from the normal setpoint to 85°F would be approximately 30 minutes (preliminary calculations 30+ minutes). During the inspection that resulted in the NCV in question, the NRC determined that the licensee had not maintained an analysis or calculation that supported the assertion that the temperature rise to 85°F would be approximately 30 minutes. Therefore, the inspectors were unable to verify the validity of this assertion. The lack of a supporting analysis that demonstrated the ability of the control room HVAC system to maintain control room temperatures to ensure critical equipment operation and area habitability was the basis for the NCV in question.
- The licensee's evaluation stated that, "the temperature [in the control room] may rise to 85°F or slightly above, but the effect on habitability is minimal for the short duration." The NRC noted that this conclusion relies on the qualitative judgment that operator performance would not be negatively impacted by the temperature increase. The NRC also determined that the validity of this conclusion is dependent on: (1) a manual action time of approximately 35 minutes to start the control room emergency chiller, and (2) an appropriate analysis that determines the control room temperature profile (i.e., peak temperature and duration of elevated temperature) during the time period associated with the actions necessary to place the system in service.

The NRC determined that the licensee may make a change to the facility design that relies on qualitative judgment in assessing whether operator performance would not be negatively impacted by temperature excursions above 85°F. However, it is the responsibility of the licensee to ensure there is adequate justification for the change and that the change is accurately reflected in the facility design basis.

The NRC also noted that the description of the system operation in FSAR, Section 9.4.1.5.1, which was referenced above as having been revised in a 1989 change from automatic to manual with respect to cooling coil WMA-CC-51B1 being supplied with emergency chilled water, has since been further revised by the licensee. The current FSAR (Amendment 63), Section 9.4.1.5.1, states that "When the Off-Auto control switch in the control room, which is normally in the Off position, is set to Auto, the cooling coil WMA-CC-51B1 will be automatically supplied with emergency chilled water."

Evaluation of Non-Cited Violation

As indicated above, FSAR, Section 9.4.1, "Main Control Room/Cable Spreading Room/Critical Switchgear Area," Section 9.4.1.1, "Design Bases," states that, "the control room chilled water system or standby service water system is used as the cooling medium for the control room HVAC system during emergency conditions." This section further states that, "in the event both radwaste chillers are inoperative (emergency condition) the control room temperature will be maintained within the habitability limit (85°F) by control room chilled water. Standby service water can maintain the control room temperature limit of 85°F during colder weather. Standby service imit for control room equipment (104°F)."

These design limits are also included in the bases for Technical Specification 3.7.4, "Control Room Air Conditioning (AC) System," as follows, "The design condition for the control room environment is 85°F for control room habitability. The environmental qualification temperature for control room equipment is 104°F."

As described in NRC Inspection Report 05000397/2015003, the inspectors identified that the licensee does not have an evaluation to demonstrate the capability of the control room HVAC system to perform its safety function of maintaining control room temperature within established limits for habitability and equipment qualification during DBA scenarios that involve the need for system realignment to place the system in service. In the introduction and analysis sections that described the finding in the inspection report, as well as in the report's summary of findings, the NRC stated, as a basis for the NCV in question, that, "the licensee failed to demonstrate the ability of the control room HVAC design to maintain the temperatures in the main control room below habitability and environmental qualification limits, for the duration of all accident scenarios."

In order to more clearly characterize the basis for the NCV, the above phrase, "for the duration of all accident scenarios," could be better stated as, "as described in the system design basis, under applicable DBA conditions." The NRC's intent is not to indicate that there is a specific or unique requirement for this system to maintain temperature below a certain limit at all times throughout all DBA scenarios. The statement was intended to reflect a requirement for design verification by which a safety system must be evaluated to be capable of performing the function that is described in the facility design basis, under the worst-case conditions included in applicable DBA scenarios. In the absence of any properly evaluated exception or allowance to the contrary being included in the design basis, the system's capability to perform its specified function during a DBA would be for the duration of the event.

The licensee's response letter stated that there is no design basis requirement to achieve a control room temperature less than the habitability limit (85°F) within any certain amount of time following the onset of a design basis event. The NRC agrees that no certain time period is established or referenced in the facility design basis for control room temperature to depart from, and be subsequently re-established within, this temperature limit. Therefore, no allowance is currently provided in the design basis for the aforementioned temperature limits for control room habitability or equipment environmental qualification to be exceeded, or for these functions of the control room HVAC system to not be maintained at all times during a DBA.

As discussed above, the requirement for installation of the CCH system was established in order to ensure that the control room HVAC system would be capable of maintaining acceptable control room habitability, which is a function that must be maintained "for all operating/accident conditions." Maintaining control room habitability is of particular importance during operator response to a DBA. The NRC recognizes that certain DBA scenarios may involve a transient period during which a realignment of the control room HVAC system may be necessary. A corresponding transient departure above the established temperature limit for control room habitability may be acceptable from the standpoint of maintaining the function of providing acceptable control room habitability, provided that such a departure is appropriately evaluated as such, and included in the description of the safety system's function in the facility design basis.

The licensee's response letter stated that there is no requirement for the control room HVAC system's function to include automatic features. The NRC agrees that no requirement exists for the system's function to be automatic; however, the NRC noted the following:

- When the control room emergency chilled water system design basis was initially established and incorporated into the FSAR to meet the requirements of License Condition 2.C.(21), it was described as having automatic features. That design basis information was subsequently changed to indicate manual operations.
- The NCV in question is independent of whether the system's features are automatic. Regardless of whether the system's operation is automatic or manual or some combination thereof, the system must be evaluated to determine if it is able to perform its function as described in the design basis, which may or may not include incorporation of appropriately evaluated manual actions.

The licensee's response also stated that the adequacy of the control room HVAC system design had been previously evaluated by the NRC and determined to be adequate. The NRC's Reactor Oversight Process includes inspections, which provide for a continuous review of licensee activities, programs, processes, design output, and plant systems, in determining if regulatory requirements are being met. The results of previous NRC reviews to assess the adequacy of plant systems or licensee actions in meeting regulatory requirements, do not preclude the NRC from subsequently determining that deficiencies exist in a particular area based on additional NRC inspections of regulated activities. As indicated in the licensee's response, the NRC did not conclude from the previous reviews that the design of the control room HVAC system was inadequate. The NCV in question also does not challenge the adequacy of the design, but rather, it involves a deficiency with regard to the verification of the capability of the control room HVAC system to perform its design function as described in the FSAR.

The licensee's response also stated that consideration for transient conditions during initial startup of support systems was established after Columbia Generating Station was licensed. The licensee's response references recommendations contained in a memorandum issued by a working group of NRC staff in response to issues raised by the NRC's Advisory Committee on Reactor Safeguards. This memorandum is not part of the licensing basis for Columbia Generating Station. Applicable requirements that were incorporated into the licensing basis for Columbia Generating Station, involving systems to maintain control room temperatures, are discussed above in the section entitled Review of System Design Basis.

Verifying by analysis the capability of a safety-related plant system to perform its function as described in the facility design basis under applicable DBA conditions is not a new requirement. Therefore, the NRC is not invoking any provisions associated with 10 CFR 50.109, "Backfitting."

NRC Conclusion

With the support of an analysis of the control room temperature that would be achieved during a worst-case DBA by the operation of the control room HVAC system with a single failure, it may be acceptable for design basis documentation to reflect that the system's function of maintaining an acceptable environment for habitability and equipment qualification would be met, even with the established temperature limit for habitability being transiently exceeded (with an acceptable

peak temperature and duration). In the absence of such an analysis to verify the adequacy of the design, it cannot be concluded that the system function as described in the current design basis can be achieved.

Based on the results of the review described above, the NRC concluded that the NCV of 10 CFR Part 50, Appendix B, Criterion III, for the licensee's failure to verify the adequacy of the design of the control room HVAC system, as documented in NRC Inspection Report 05000397/2015003, is valid. Therefore, this NCV is being upheld.