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FPLEnergy.

Duane Arnold Energy Center

July 17, 2006

NG-06-0472
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Duane Arnold Energy Center
Docket 50-331
License No. DPR-49

Technical Specification Change Request (TSCR-083): Adoption of TSTF-478, Rev. 0, "BWR Technical Specification Changes that Implement the Revised Rule for Combustible Gas Control"
Affected Technical Specifications: Section 3.6.3.1 and 3.6.3.2

Pursuant to 10 CFR 50.90, FPL Energy Duane Arnold, LLC (FPL Energy Duane Arnold) hereby requests revision to the Technical Specifications (TS) for the Duane Arnold Energy Center (DAEC). The proposed Amendment revises the Limiting Condition for Operation (LCO) 3.6.3.1 to eliminate the requirement for the Containment Atmospheric Dilution (CAD) system, allowing its removal from the DAEC. LCO 3.6.3.2 is also revised to allow an additional 48 hours on plant start-up or shutdown sequences for the primary containment to be de-inerted. These proposed changes are consistent with those previously docketed by the Technical Specification Task Force (TSTF) as part of a generic traveler, TSTF-478, Rev. 0. The remaining portions of TSTF-478 dealing with drywell fans, purge systems, and igniters are not applicable to the DAEC's TS and are therefore not included.

FPL Energy Duane Arnold has chosen to request this TS change in advance of the completion of the Staff's generic review of the TSTF, as the CAD system at the DAEC has on-going maintenance problems and, as demonstrated in the attached application, the CAD system no longer has a safety function in the DAEC licensing basis as a result of the rulemaking revising 10 CFR 50.44 on combustible gas control in containment (68 FR 54123). Therefore, maintenance resources are being applied to comply with the current TS requirements for system Operability which are not in keeping with the true risk significance of the CAD system.

FPL Energy Duane Arnold requests approval of the proposed amendment by January 31, 2007. It is acknowledged that this date is within the one year schedule for normal processing of such license amendments. However, the TSTF on which this submittal is based was docketed in April 2005. As FPL Energy Duane Arnold has not deviated from those portions of the TSTF applicable to the DAEC design, a shorter than one year review

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schedule for this application is warranted.

In addition, the portion of this application regarding the elimination of the CAD system (a hydrogen dilution system) has a precedent in the Staff's approval of the deviations from TSTF-447, Rev. 1, the original TS changes accompanying the rulemaking to 10 CFR 50.44, for Davis Besse (Accession Number ML051780078).

The proposed Amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c). Associated TS Bases changes will be completed per the TS Bases Control Program (TS 5.5.10).

This application has been reviewed by the DAEC Plant Operations Review Committee. A copy of this submittal, along with the 10 CFR 50.92 evaluation of "No Significant Hazards Consideration," is being forwarded to our appointed state official pursuant to 10 CFR 50.91.

Lastly, FPL Energy Duane Arnold would like to request that the Staff take this opportunity when issuing the safety evaluation for this amendment request to correct an oversight in the original amendment issued in response to the subject rulemaking on combustible gas control, i.e., Amendment 254 (Accession Number ML041480049). Specifically, to ensure fidelity with the original amendment request (Accession Number ML040420424), Section 4.2 of the Staff's safety evaluation for Amendment 254 should contain a clarification that the commitment for oxygen monitoring equipment is for the post-accident monitoring function only, similar to the safety evaluation issued for the Monticello plant (Accession Number ML041180612), whose application was docketed in the same submittal as the DAEC.

This letter makes no new commitments or changes to any existing commitments.

If you have any questions or require additional information, please contact Mr. Tony Browning at (319) 851-7750.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 17, 2006.

Gary Van Middlesworth
Vice President, Duane Arnold Energy Center
FPL Energy Duane Arnold, LLC

Exhibits: A) EVALUATION OF PROPOSED CHANGE
B) PROPOSED TECHNICAL SPECIFICATION AND BASES CHANGES (MARK-UP)
C) PROPOSED TECHNICAL SPECIFICATION PAGES (RE-TYPED)

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC
D. McGhee (State of Iowa)

EXHIBIT A

EVALUATION OF PROPOSED CHANGE

Subject: TSCR-083: Adoption of TSTF-478, Rev. 0, "BWR Technical Specification Changes that Implement the Revised Rule for Combustible Gas Control"

1. DESCRIPTION

This letter is a request to amend Operating License DPR-49 for the Duane Arnold Energy Center (DAEC). The proposed Amendment would delete the Limiting Condition for Operation (LCO) 3.6.3.1, "CAD System" and its associated Bases from the DAEC Technical Specifications (TS) and would modify TS LCO 3.6.3.2, "Primary Containment Oxygen Concentration" and supporting Bases to extend the allowed time that the containment can be de-inerted, when otherwise required by the LCO Applicability, from the currently allowed 24 hours to 72 hours. Deletion of the TS requirement for the CAD System will permit its removal from the plant design and licensing basis, resulting in its physical removal from the facility.

The proposed changes are consistent with those previously docketed by the Technical Specification Task Force (TSTF) as a generic traveler, TSTF-478, Rev. 0, transmitted by TSTF letter TSTF-04-12, dated April 25, 2005. The remaining portions of TSTF-478 dealing with drywell fans, purge systems, and igniters are not applicable to the DAEC's TS and are therefore not included.

2. PROPOSED CHANGE

The holders of license DPR-49 for the Duane Arnold Energy Center propose to amend the Technical Specifications by deleting the referenced pages and replacing those associated with LCO 3.6.3.2 and its BASES with the enclosed new pages.

SUMMARY OF CHANGES

TS Pages	BASES Pages
3.6 - 32 3.6 – 33 is deleted. 3.6 – 34	B 3.6 - 69 B 3.6 – 70 through 73 are deleted. B 3.6 – 74 B 3.6 – 75 B 3.6 – 76 B 3.6 – 77

LCO 3.6.3.1, "CAD System," and its associated Bases, are deleted from the DAEC TS. Note that the entire Specification is deleted and not relocated to a licensee-controlled document. The subsequent specification (LCO 3.6.3.2 and its Bases) will be renumbered accordingly.

The proposed revision to existing LCO 3.6.3.2, and the associated Bases, will expand the allowable time frame that the primary containment can be de-inerted, when otherwise required by the LCO Applicability, from the current 24 hours to 72 hours. The addition of an LCO 3.0.4.c Note to the Actions will allow entry into the Mode of Applicability (i.e., MODE 1) while relying upon the Required Actions and associated Completion Time, which is extended to 72 hours. A clarifying statement

is added to the Bases for Required Action A.1 to state that intentional entry into the Actions to allow the containment to be de-inerted during plant shutdowns is acceptable and not an "operational convenience" as discussed in the Bases for LCO 3.0.2. In addition, the Bases are modified to re-categorize the LCO for primary containment oxygen concentration from §50.36(c)(2)(ii), Criterion 2 to Criterion 4, based upon the subject rulemaking.

Technical Specification Bases are also modified to reflect the above changes (see Exhibit B). The Bases changes are included for information only. Bases changes will be completed per the TS Bases Control Program (TS 5.5.10).

3. BACKGROUND

The Nuclear Regulatory Commission (NRC) has revised 10 CFR 50.44 to amend its standards for combustible gas control in light-water-cooled power reactors (Reference 1). In that rulemaking the Commission eliminated the design basis accident (DBA) hydrogen release from §50.44 and consolidated the requirements for hydrogen and oxygen monitoring to §50.44, while relaxing safety classifications and licensee commitments to certain design and qualification criteria for equipment needed to mitigate such combustible gas mixtures. TSTF generic Technical Specification (TS) change package, TSTF-447, Rev. 1, "Elimination of Hydrogen Recombiners and Change to Hydrogen and Oxygen Monitors," implemented the corresponding TS changes resulting from this rule change. Specifically, TSTF-447 provided model changes for license amendment applications to remove requirements for hydrogen recombiners, and hydrogen and oxygen monitors from TS. TSTF-447 was approved for adoption using the Consolidated Line Item Improvement Process (CLIIP) on September 25, 2003 (68 FR 55416). The adoption of TSTF-447 was approved for the DAEC by License Amendment 254) (Reference 2).

As noted in the TSTF letter TSTF-04-12 (Ref. 3), additional changes to the TS as a result of the §50.44 rule change are warranted that went beyond the original content of TSTF-447. Those changes are included in TSTF-478, Rev. 0.

4. TECHNICAL ANALYSIS

Elimination of the CAD System

As a result of the requirements originally imposed by 10 CFR 50.44, BWRs with Mark I containment designs either installed hydrogen recombiners or credited existing CAD systems to meet requirements for hydrogen control. To ensure that a combustible gas mixture does not occur, oxygen concentration is kept < 5.0 volume percent (v/o), or hydrogen concentration is kept < 4.0 v/o. Hydrogen recombiners work to reduce the combustible gas concentration in the primary containment by recombining hydrogen and oxygen to form water vapor. The DAEC uses a CAD System, which was designed to maintain combustible gas

concentrations within the primary containment at or below the flammability limits following a postulated loss of coolant accident (LOCA) by diluting hydrogen and oxygen with nitrogen. The CAD system is only used for post-accident addition of nitrogen (UFSAR 6.2.5). A totally separate system is used at the DAEC for the initial nitrogen inerting of the containment (UFSAR 6.2.5.2.2) and DAEC also has a separate system which may be used for purging/controlled venting as part of severe accident management strategies (UFSAR 6.2.5.2.1).

The use of the CAD System in lieu of installing a hydrogen recombiner was accepted by the Staff in their Safety Evaluations issued to the DAEC in response to NUREG- 0578, Item 2.1.5.a (NUREG-0737, Item II.E.4.1) (Reference 4), and Generic Letter 84-09 (Reference 5).

From the above, it is easily seen that the hydrogen recombiners and CAD system perform the exact same function for post-LOCA gas control. Considering that the 10 CFR 50.44 rule change allowed for elimination of hydrogen recombiners for post-LOCA gas control, it follows directly that the rule change basis would likewise allow for the elimination of CAD systems.

In addition, the portion of this application regarding the elimination of the CAD System (a hydrogen dilution system) has a precedent in the Staff's approval of the deviations from TSTF-447, Rev. 1, the original TS changes accompanying the rulemaking to 10 CFR 50.44, for Davis Besse (Accession Number ML051780078).

Changes to the Primary Containment Oxygen Concentration Specification

The Applicable Safety Analysis section of the Bases to LCO 3.6.3.2, Primary Containment Oxygen Concentration, currently states that the LCO satisfies 10 CFR 50.36(c)(2)(ii) Criterion 2. Criterion 2 is "A process variable, design feature or operational restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." As noted above, a combustible gas mixture is no longer postulated to occur as a result of any DBA. Thus, the DAEC UFSAR accident analyses for evaluating combustible gas mixtures from a design basis LOCA, performed pursuant to Safety Guide 7 (Regulatory Guide 1.7, Rev. 1) is no longer part of the DAEC licensing basis with the issuance of Amendment 254 and was subsequently removed from the DAEC UFSAR during the last update, pursuant to 10 CFR 50.71(e). Therefore, LCO 3.6.3.2 no longer meets the definition of Criterion 2. However, the regulatory analysis for the revised 50.44 rule change also concluded that combustible gases produced by severe (i.e., beyond design basis) accidents, involving both fuel-cladding oxidation and core-concrete interaction, would be risk significant for plants with Mark I containments, such as DAEC, if not for the inerted containment atmosphere. Thus, the final rule retains the existing requirement in 50.44(c)(3)(i) to inert Mark I containments. Thus, given the change in status of being needed

for severe accidents and not for a DBA, the Bases are revised to state that the LCO now meets 10 CFR 50.36(c)(2)(ii) Criterion 4 vice Criterion 2. Criterion 4 is "a structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety."

In keeping with the above change in status from mitigating a DBA to being relevant to risk for coping with beyond design basis (a.k.a. severe) accidents, the allowable outage time (i.e., the Completion Time) in the existing LCO for Primary Containment Oxygen Concentration (LCO 3.6.3.2) is being extended from the existing 24 hours to 72 hours. This allowance is generally used during initial startup operations to maintain the primary containment de-inerted and again during the shutdown process to de-inert the primary containment to allow personnel entry. However, the current 24 hour "window" to perform the inerting/de-inerting evolution creates operational hardships that are not commensurate with the risk of the beyond design basis event requiring the primary containment to be inerted to combustible gas mixtures.

Specifically, inerting the primary containment is an operational problem because it prevents containment access without an appropriate breathing apparatus. Therefore, the primary containment is permitted to be de-inerted for a short period of time following plant startup to facilitate containment access to perform required inspections during startup. The use of the LCO 3.0.4.c provision will allow the containment to remain de-inerted for up to 72 hours after entry into MODE 1 to permit containment entries to perform inspections or any needed repairs just after startup. It also allows the process of inerting the containment to be performed after the plant has reached steady state (i.e., full power) conditions, rather than during the plant startup process, when many other activities and Surveillances are being performed. The inerting/de-inerting process is complex (feed and bleed) and requires Operator vigilance to avoid exceeding the trip setting for Reactor Protection System (RPS), Emergency Core Cooling System (ECCS) and Primary Containment Isolation System (PCIS) on high containment pressure, which is nominally set at 2 psig at DAEC.

The current 24 hour allowance is sometimes not sufficient to prevent the inerting activity from becoming a critical path activity during startup/power ascension and can interfere with the performance of other required Surveillances (such as scram time testing at approximately 30% power), as the 24 hour clock is likely to expire before this testing can be completed. The first 24 hours of a plant startup is typically the most likely time for a maintenance issue to surface. For example, a maintenance issue can arise in the balance of plant during startup, which requires repair prior to continued power ascension. Meanwhile, the 24 hour clock to inert the primary containment is continuing to run. This can result in the Operators having to shift focus away from the repair activity to complete the inerting process within this short 24 window. Such "starting and stopping" is an Operator distraction that is not warranted. By allowing the inerting process to occur 72 hours after entering the Mode of Applicability, the likelihood of such an interruption is minimized.

In addition, the Completion Time of 72 hours for Required Action A.1 will allow the containment to be de-inerted earlier in the routine plant shutdown process. This eliminates a complex task from the shutdown process, when many other activities are underway requiring Operator vigilance. The current provision of 24 hours prior to shutdown requires estimating when the Mode of Applicability (i.e., MODE 1) will be exited, so that the 24 hour clock can be started appropriately. Any interruption or delay in the shutdown process can cause the plant to stop the de-inerting process and re-inert the containment in order to comply with the LCO. Such "starting and stopping" is an Operator distraction that is not warranted. By allowing the de-inerting process to occur 72 hours prior to exiting the Mode of Applicability, the likelihood of such an interruption is minimized.

Per the technical analysis supporting the rulemaking to 10 CFR 50.44 (Reference 6), the likelihood of the beyond design basis event that leads to a combustible gas mixture is very low. Combustible gas mixtures are a result of core damage events and not part of the accident sequence leading up to core damage. Thus, the proposed extension of the allowance for the containment to be de-inerted has no impact on Core Damage Frequency (CDF). As noted in Reference 6, the impact on containment failure probability is generally after the initial 24 hour period after core damage has occurred. Thus, the impact on Large Early Release Frequency (LERF) is deemed to not be significant, assuming the containment was initially inerted. However, the additional 48 hour allowance above the current 24 hours is judged to not be a risk-significant increase in LERF, as the additional time the containment will be de-inerted while in the Mode of Applicability will be only a 1.2% increase annually (assuming one plant shutdown and startup sequence per year = 96 additional hours de-inerted and a 30 day shutdown). Per Reference 6, it was judged that the conditional probability of a large early release approached unity (1.0) if a Mark I containment was not inert at the onset of core damage. With this assumption, using the baseline LERF value for the DAEC of 1.39 E-6/yr (Rev. 5C), a 1.2% increase would yield a delta-LERF (ΔLERF) value of 1.67 E-8, which is within the guidelines of Regulatory Guide (RG) 1.174 for an acceptable increase (i.e., < 1.0 E-7).

5. REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

FPL Energy Duane Arnold has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The Containment Atmosphere Dilution (CAD) system and primary containment oxygen concentration are not initiators to any accident previously evaluated in the DAEC Updated Final Safety Analysis Report (UFSAR). The CAD system and containment oxygen concentration were previously relied upon to mitigate the consequences of a design basis accident (DBA) combustible gas mixture. However, the revised 10 CFR 50.44 (68 FR 54123) no longer defines a DBA hydrogen release (i.e., combustible gas mixture) and the Commission has subsequently found that the DBA loss of coolant accident (LOCA) hydrogen release is not risk significant. In addition, hydrogen control systems, such as CAD, have been determined to be ineffective at mitigating hydrogen releases from the more risk significant beyond design basis accidents that could threaten containment integrity. Therefore, elimination of the CAD system will not significantly increase the consequences of any accident previously evaluated. The consequences of an accident while relying on the revised Required Actions for primary containment oxygen concentration are no different than the consequences of the same accidents under the current Required Actions. As a result, the consequences of any accident previously evaluated are not significantly increased.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

No new or different accidents result from utilizing the proposed change. The changes do not involve a physical alteration of the plant, except for the elimination of the CAD system (i.e., no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. The CAD system is not considered an accident precursor, nor does its existence or elimination have any adverse impact on the pre-accident state of the reactor core or post accident confinement of radionuclides within the containment building from any DBA. In addition, the changes do not impose any new or different requirements. The changes to the Technical Specifications for oxygen concentration do not alter assumptions made in the safety analysis, but reflect changes to the safety analysis requirements allowed under the revised 10 CFR 50.44. Specifically that an inerted containment is no required to mitigate any DBA, but has been found to be helpful in mitigating certain beyond design basis events (i.e., severe accidents) that could generate combustible levels of hydrogen.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Does the proposed amendment involve a significant reduction in a margin of safety?**

Response: No.

The installation of combustible gas control systems, such as CAD, required by the original §50.44(b)(3) was intended to address the limited quantity and rate of hydrogen generation that was postulated from a design-basis LOCA. The Commission has found that this hydrogen release is not risk-significant because the design-basis LOCA hydrogen release does not contribute to the conditional probability of a large release up to approximately 24 hours after the onset of core damage. In addition, these systems were ineffective at mitigating hydrogen releases from risk-significant accident sequences that could threaten containment integrity. (68 FR 54123). The proposed changes to CAD and primary containment oxygen concentration reflect this new regulatory position and, in light of the remaining plant equipment, instrumentation, procedures, and programs that provide effective mitigation of and recovery from reactor accidents, including postulated beyond design basis events, does not result in a significant reduction in a margin of safety.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

CONCLUSION

Based on the preceding 10 CFR 50.92 evaluation FPL Energy Duane Arnold concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

Attorney for Licensee: Robert E. Helfrich, Esquire
Senior Attorney, Florida Power and Light Company,
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5.2 Applicable Regulatory Requirements/Criteria

By letter dated July 17, 2006, FPL Energy Duane Arnold submitted a request for revision of the TS for the DAEC. The proposed amendment would delete the TS Limiting Condition for Operation (LCO) 3.6.3.1 and modify LCO 3.6.3.2 to extend the allowable time for the primary containment to be de-inerted, when otherwise required by the LCO Applicability.

Evaluation:

The proposed changes are consistent with the current regulations and thus, an exemption pursuant to 10 CFR 50.12 is not required. The current regulations (e.g., §50.36) only require LCOs be included in the TS that satisfy the criteria listed in §50.36(c)(2)(ii). The elimination of the CAD LCO is warranted, as its previous inclusion in TS was based upon satisfying Criterion 3, as a system required to mitigate a DBA. With the rule change to §50.44, the DBA hydrogen release has been re-categorized as a beyond design-basis or severe accident. The rule change also deemed that current combustible gas control systems, such as CAD, were not capable of dealing with the severe accident cases. Thus, the CAD LCO would not satisfy Criterion 4 either. Therefore, the elimination of the CAD LCO from TS is consistent with the requirements of §50.36.

The same rulemaking determined that having the primary containment inert at the beginning of these beyond design-basis events that generate significant quantities of combustible gas was risk significant. Thus, the re-categorization of the LCO for primary containment oxygen concentration from Criterion 2, which applies to DBAs, to Criterion 4, which is associated with risk, is consistent with the change in regulations. In keeping with the Criterion 4 designation, the extension in the time allowance for the containment to be de-inerted has been evaluated to not be a significant increase in risk.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. Therefore, FPL Energy Duane Arnold has concluded that the proposed revision to the DAEC Technical Specifications is acceptable.

6. ENVIRONMENTAL CONSIDERATION

10 CFR Section 51.22(c)(9) identifies certain licensing and regulatory actions which are eligible for categorical exclusion from the requirement to perform an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant

hazards consideration; (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite; and (3) result in a significant increase in individual or cumulative occupational radiation exposure. FPL Energy Duane Arnold has reviewed this request and determined that the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Section 51.22(c)(9). The basis for this determination follows.

Basis

1. As demonstrated in the 10 CFR 50.92 evaluation included in this exhibit, the proposed amendment does not involve a significant hazards consideration.

2. The proposed changes do not result in an increase in power level, do not increase the production, nor alter the flow path or method of disposal of radioactive waste or byproducts. There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

3. The proposed changes do not result in changes in the level of control or methodology used for processing of radioactive effluents or handling of solid radioactive waste nor will the proposal result in any change in the normal radiation levels within the plant. There is no significant increase in individual or cumulative occupational radiation exposure.

Pursuant to 10 CFR Section 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the amendment.

7. REFERENCES

1. 68 FR 54123 (Combustible Gas Control in Containment), September 16, 2003.
2. D. Beaulieu (USNRC) to M. Peifer (NMC), "Duane Arnold Energy Center - Issuance of Amendment Re: Relocation of Requirements for Hydrogen and Oxygen Monitors (TAC NO. MC1900)," June 10, 2004.
3. Technical Specification Task Force letter, TSTF-04-012, "Submittal and Request for Fee Waiver for Review of TSTF-478, Revision 0, "BWR Technical Specification Changes that Implement the Revised Rule for Combustible Gas Control," dated April 25, 2005.
4. NRC Letter, T. Ippolito (USNRC) to D. Arnold (IELP), "Evaluation Of Licensee's Compliance With Category "A" Items Of NRC Recommendations Resulting From TMI-2 Lessons Learned," dated March 10, 1980.
5. NRC Letter, M. Thadani (USNRC) to L. Liu (IELP), "Safety Evaluation Regarding Hydrogen Recombiner Capability," dated June 3, 1986.
6. SECY-00-0198, "Status Report on Study Of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.44 (Combustible Gas Control)," dated September 14, 2000.

EXHIBIT B

PROPOSED TECHNICAL SPECIFICATION

AND

BASES CHANGES

(MARK-UP)

13 Pages to Follow

3.6 CONTAINMENT SYSTEMS

3.6.3.1 Containment Atmosphere Dilution (CAD) System

LCO 3.6.3.1 The CAD System shall be OPERABLE.

APPLICABILITY: MODE 1 when the Primary Containment is required to be inerted per LCO 3.6.3.2, "Primary Containment Oxygen Concentration."

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CAD System inoperable.	A.1 Restore the CAD System to OPERABLE status.	7 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	12 hours

Pages 3.6 -32 and 3.6 - 33 are deleted.

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.6.3.1.1	Verify ≥ 67,000 scf of nitrogen is contained in the CAD System.	31 days
SR 3.6.3.1.2	Verify by administrative means that each CAD System manual, power operated and automatic valve in the required flowpath(s) that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	31 days

3.6 CONTAINMENT SYSTEMS

3.6.3.2 Primary Containment Oxygen Concentration

1 1

LCO 3.6.3.2 The primary containment oxygen concentration shall be < 4.0 volume percent.

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APPLICABILITY: MODE 1 ~~during the time period:~~

~~a. From 24 hours after THERMAL POWER is > 15% RTP following startup, to~~

~~b. 24 hours prior to reducing THERMAL POWER to < 15% RTP prior to reactor shutdown.~~

NOTE
LCO 3.0.4.c is applicable.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Primary containment oxygen concentration not within limit.	A.1 Restore oxygen concentration to within limit.	~~24~~ 72 hours
B. Required Action and associated Completion Time not met.	B.1 ~~Reduce THERMAL POWER to ≤ 15% RTP.~~ Be in MODE 2.	8 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.3.2.1 Verify primary containment oxygen concentration is within limits.	7 days

B 3.6 CONTAINMENT SYSTEMS

B 3.6.3.1 Containment Atmosphere Dilution (CAD) System

BASES

BACKGROUND

The CAD System functions to maintain postulated combustible gas concentrations within the primary containment at or below the flammability limits following a Loss of Coolant Accident (LOCA) by diluting hydrogen and oxygen with nitrogen. To ensure that a combustible gas mixture does not occur, oxygen concentration is kept < 5.0 volume percent (v/o).

The CAD System is manually initiated and consists of a nitrogen storage bank and two independent, 100% capacity nitrogen injection subsystems. Each nitrogen injection subsystem includes the pressure regulating valves, control valves and connected piping necessary to transport nitrogen from the storage bank to the drywell and suppression chamber volumes. CAD System OPERABILITY is not affected by the inability of the pressure regulators to regulate pressure, because regulator failure does not affect the CAD Systems ability to inject the required volume of nitrogen into the containment. The failure of the pressure regulators does not result in any piping being subjected to a pressure greater than design. The nitrogen storage bank contains ≥ 67,000 scf, which is adequate for 7 days of CAD System operation. The nitrogen cylinders that make up the storage bank, and the header up to the first normally closed valve in each of the redundant supply lines constitute a "passive" system and, accordingly, are not subject to the single failure criterion that applies only to "active" components. Therefore, it is not necessary that the CAD nitrogen storage bank be redundant.

The CAD System would typically be operated to add nitrogen in a step-wise fashion to dilute combustible gases. After approximately 36 days, containment pressure buildup may be sufficient to require venting.

APPLICABLE SAFETY ANALYSES

To evaluate the potential for hydrogen and oxygen accumulation in primary containment following a LOCA, hydrogen and oxygen generation is calculated (as a function of time following the initiation of the accident). The

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

conservative assumptions stated in Reference 1 are used to maximize the amount of hydrogen and oxygen generated. The calculation confirms that when the CAD system is actuated within 2.3 days after a LOCA, the peak oxygen concentration in primary containment is < 5.0 v/o (Ref. 2).

Hydrogen and oxygen may accumulate within primary containment following a LOCA as a result of:

a. A metal water reaction between the zirconium fuel rod cladding and the reactor coolant; or

b. Radiolytic decomposition of water in the Reactor Coolant System.

The CAD System satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The CAD System must be OPERABLE. The CAD System is considered to be OPERABLE if nitrogen can be injected into both the drywell and suppression chamber volumes via any combination of components in either nitrogen injection subsystem (i.e., the CAD System is considered to be OPERABLE if one nitrogen injection subsystem is capable of injecting into the drywell and the other nitrogen subsystem is capable of injecting into the suppression chamber volume). This ensures operation of the CAD System in the event of an accident of sufficient magnitude to generate hydrogen in significant amounts. Operation of the CAD System is designed to maintain primary containment post-LOCA oxygen concentration < 5.0 v/o for 7 days.

APPLICABILITY

In MODE 1, the CAD System is required to maintain the oxygen concentration within primary containment below the flammability limit of 5.0 v/o following a LOCA. The CAD System is not capable of inerting the containment from normal atmospheric concentration levels; it can only dilute the oxygen concentration to below the flammability limit once an inerted atmosphere has been initially established by

(continued)

BASES

APPLICABILITY (continued)

other means. Because the system is not capable of performing its intended safety function, i.e., it is not OPERABLE, until an inerted atmosphere has been established, the Mode 1 APPLICABILITY has been modified to allow the LCO to not be entered until the Primary Containment has been inerted per LCO 3.6.3.2, "Primary Containment Oxygen Concentration". This ensures that the relative leak tightness of primary containment is adequate and prevents damage to safety related equipment and instruments located within primary containment. In MODE 3, both the hydrogen and oxygen production rates and the total amounts produced after a LOCA would be less than those calculated utilizing the conservative assumptions contained in Ref. 1. Thus, if the analysis were to be performed starting with a LOCA in MODE 3, the time to reach a flammable concentration would be extended beyond the time conservatively calculated for MODES 1 and 2. The extended time would allow hydrogen removal from the primary containment atmosphere by other means and also allow repair of an inoperable nitrogen injection subsystem, and/or nitrogen storage bank, if CAD were not available. Therefore, the CAD System is not required to be OPERABLE in MODE 3.

In MODES 4 and 5, the probability and consequences of a LOCA are reduced due to the pressure and temperature limitations of these MODES. Therefore, the CAD System is not required to be OPERABLE in MODES 4 and 5.

ACTIONS

A.1

With the CAD System inoperable, the CAD System must be restored to OPERABLE status within 7 days. The 7 day Completion Time is based on the low probability of the occurrence of a LOCA that would generate hydrogen in the amounts capable of exceeding the flammability limit, the amount of time available after the event for operator action to prevent exceeding this limit, and the availability of other hydrogen mitigating systems.

(continued)

BASES

ACTIONS (continued)

B.1

If any Required Action cannot be met within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.3.1.1

Verifying that there is ≥ 67,000 scf of nitrogen supply in the CAD System will ensure at least 7 days of post-LOCA CAD operation. This volume is referenced to a pressure of 14.7 psia and a temperature of 32°F. This minimum volume of nitrogen allows sufficient time after an accident to replenish the nitrogen supply for long term inerting. This is verified every 31 days to ensure that the system is capable of performing its intended function when required. The 31 day Frequency is based on operating experience, which has shown 31 days to be an acceptable period to verify the nitrogen supply and on the availability of other hydrogen mitigating systems.

SR 3.6.3.1.2

Verifying by administrative means the correct alignment for manual, power operated and automatic valves necessary to establish CAD System OPERABILITY requires the valves necessary to allow nitrogen injection into both the drywell and suppression chamber volumes via any combination of components in either nitrogen injection subsystem to be in the correct position. This provides assurance that the proper flow paths exist for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.3.1.2 (continued)

A valve is also allowed to be in the nonaccident position provided it can be aligned to the accident position within the time assumed in the accident analysis. This is acceptable because the CAD System is manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The 31 day Frequency is appropriate because the valves are operated under procedural control, the probability of an event requiring initiation of the system is low, and the system is a manually initiated system.

REFERENCES

1. Safety Guide No. 7.

2. UFSAR, Section 6.2.5.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.3.2 Primary Containment Oxygen Concentration
1

BASES

BACKGROUND

Insert to BACKGROUND

Nuclear power plants must be designed to withstand events that generate hydrogen either due to the zirconium metal water reaction in the core or due to radiolysis. The primary method to control hydrogen in Mark I Containment is to inert the primary containment. With the primary containment inert, that is, oxygen concentration < 4.0 volume percent (v/o), a combustible mixture cannot be present in the primary containment for any hydrogen concentration. The capability to inert the primary containment and maintain oxygen < 4.0 v/o works together with the Containment Atmosphere Dilution System (LCO 3.6.3.1, "Containment Atmosphere Dilution (CAD) System") to provide redundant and diverse methods to mitigate events that produce hydrogen. For example, a postulated event that rapidly generates hydrogen from zirconium metal water reaction will result in excessive hydrogen in primary containment, but oxygen concentration will remain < 4.0 v/o and no combustion can occur. Long term generation of both hydrogen and oxygen from radiolytic decomposition of water may eventually result in a combustible mixture in primary containment, except that the CAD System dilutes hydrogen and oxygen gases faster than they can be produced from radiolysis and again no combustion can occur. This LCO ensures that oxygen concentration does not exceed 4.0 v/o during operation in the applicable conditions.

APPLICABLE SAFETY ANALYSES

Insert to APPLICABLE SAFETY ANALYSIS

The Reference 1 calculations assume that the primary containment is inerted when a Design Basis Accident loss of coolant accident occurs. Although the amount of hydrogen generated as a result of a DBA LOCA with successful ECCS mitigation is < 1%, large amounts of hydrogen generation (i.e.: ~ 5%) are postulated to occur in accordance with Safety Guide 7. Thus, the hydrogen assumed to be released to the primary containment as a result of metal water reaction in the reactor core will not produce combustible gas mixtures in the primary containment. Oxygen, which is subsequently generated by radiolytic decomposition of water,

(continued)

TSCR-083

Insert to BACKGROUND:

The Reference 1 Final Rule removed the definition of a design-basis LOCA hydrogen release and eliminated requirements for hydrogen control systems to mitigate such a release at currently-licensed nuclear power plants. However, the supporting analysis for this rulemaking concluded that combustible gases produced by beyond design-basis accidents, involving both fuel-cladding oxidation and core-concrete interaction, would be risk significant for plants with Mark I and II containments if not for the inerted containment atmosphere. Given the relatively small volume and large zirconium inventory, these containments, without inerting, would have a high likelihood of failure from hydrogen combustion due to the potentially large concentration of hydrogen that a severe accident could cause. With the primary containment inert, that is, oxygen concentration < 4.0 volume percent (v/o), a combustible mixture cannot be present in the primary containment for any hydrogen concentration. Thus, the Final Rule required plants with Mark I and II containments to maintain the containment atmosphere with a low concentration of oxygen (i.e., < 4.0 v/o), rendering it inert to combustion.

Insert to APPLICABLE SAFETY ANALYSIS:

The Reference 1 evaluation assumes that the primary containment is inerted when an event with significant core damage occurs. Thus, the hydrogen assumed to be released to the primary containment as a result of degraded core conditions is not likely to produce combustible gas mixtures in the primary containment.

BASES

APPLICABLE SAFETY ANALYSES (continued)

~~is diluted and removed by the CAD System more rapidly than it is produced.~~ Primary containment oxygen concentration satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).
4

LCO

The primary containment oxygen concentration is maintained < 4.0 v/o to ensure that ~~an event that produces any amount~~ of hydrogen does not result in a combustible mixture inside primary containment.
a beyond-design basis event that can produce significant amounts

APPLICABILITY

The primary containment oxygen concentration must be within the specified limit when primary containment is inerted. ~~except as allowed by the relaxations during startup and shutdown addressed below.~~ The primary containment must be inert in MODE 1, since this is the condition with the highest probability of an event that could produce hydrogen.

Inerting the primary containment is an operational problem because it prevents containment access without an appropriate breathing apparatus. Therefore, the primary containment is inerted as late as possible in the plant startup and de-inerted as soon as possible in the plant shutdown. As long as reactor power is < 15% RTP, the potential for an event that generates significant hydrogen is low and the primary containment need not be inerted. Furthermore, the probability of an event that generates significant amounts of hydrogen occurring within the first 24 hours of a startup, or within the last 24 hours before a shutdown, is low enough that these "windows," when the primary containment is not inerted, are also justified. The 24 hour time period is a reasonable amount of time to allow plant personnel to perform inerting or de-inerting. During reactor startups, a convenient and conservative start time for reducing primary containment oxygen concentration to less than 4.0 v/o within 24 hours occurs when the mode switch is placed in Run. Similarly, during reactor shutdowns, limiting the time oxygen can exceed 4.0 v/o to 24 hours prior to taking the mode switch out of Run is also conservative.

(continued)

1

A Note to the Actions permits the use of the provisions of LCO 3.0.4.c. This allowance permits entry into the Mode of Applicability while relying on the Actions.

BASES (continued)

ACTIONS

A.1

Intentional entry into the Conditions and Required Actions is permitted during the reactor startup and shutdown process.

If oxygen concentration is ≥ 4.0 v/o at any time while operating in MODE 1, ~~with the exception of the relaxations allowed during startup and shutdown,~~ oxygen concentration must be restored to < 4.0 v/o within ~~24~~ hours. ~~The 24~~ hour Completion Time is allowed when oxygen concentration is ≥ 4.0 v/o because of ~~the availability of other hydrogen mitigating systems (e.g., the CAD System) and~~ the low probability and long duration of an event that would generate significant amounts of hydrogen occurring during this period.

72

B.1

If oxygen concentration cannot be restored to within limits within the required Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, power must be reduced to ~~< 15% RTP~~ MODE 2 within 8 hours. The 8 hour Completion Time is reasonable, based on operating experience, to reduce reactor power from full power conditions in an orderly manner and without challenging plant systems.

1

SURVEILLANCE REQUIREMENTS

SR 3.6.3.~~2~~.1

The primary containment must be determined to be inert by verifying that oxygen concentration is < 4.0 v/o. The 7 day Frequency is based on the slow rate at which oxygen concentration can change and on other indications of abnormal conditions (control room alarms for containment high oxygen concentration, excessive cycling of the Containment Nitrogen Makeup System or unexplained changes in containment pressure). Indication of abnormal conditions would lead to more frequent monitoring of primary containment oxygen concentration. Also, this Frequency has been shown to be acceptable through operating experience.

(continued)

BASES (continued)

REFERENCES 1. ~~UFSAR, Section 6.2.5.~~ Federal Register Notice 68 FR 54123, Combustible Gas Control in Containment, Final Rule, dated September 16, 2003.

EXHIBIT C

PROPOSED TECHNICAL SPECIFICATION PAGES

(RE-TYPED)

2 Pages to Follow

Pages 3.6-32 and 3.6-33 are deleted.

3.6 CONTAINMENT SYSTEMS

3.6.3.1 Primary Containment Oxygen Concentration

LCO 3.6.3.1 The primary containment oxygen concentration shall be < 4.0 volume percent.

APPLICABILITY: MODE 1.

ACTIONS

----------NOTE----------
LCO 3.0.4.c is applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Primary containment oxygen concentration not within limit.	A.1 Restore oxygen concentration to within limit.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 2.	8 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.3.1.1 Verify primary containment oxygen concentration is within limits.	7 days