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W3F1-2004-0060

July 16, 2004

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Supplement to License Amendment Request NPF-38-254
Reactor Coolant System Leakage Detection
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

Reference:
1) Entergy Letter dated May 7, 2004, "License Amendment Request NPF-38-254, Reactor Coolant Leakage Detection"
2) Entergy Letter dated July 8, 2004, "Reactor Coolant System Leakage Detection"

Dear Sir or Madam:

Entergy Operations, Inc. (Entergy) submitted License Amendment Request NPF-38-254 on May 7, 2004 (Reference 1). The request proposed to change the Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications (TS) to clarify the actions of TS 3.4.5.1, Reactor Coolant System (RCS) Leakage; some of the surveillance requirements (SR) of TS 3.4.5.2, RCS Operational Leakage; and delete duplication in TS 3.3.3.1, Radiation Monitoring Instrumentation.

This supplement to the original License Amendment Request is to provide revised pages in Attachment 2 (marked-up TS pages) and Attachment 3 (marked-up Bases pages), and provide justification for the changes in Attachment 2. Specifically, this change adds an allowance for a redundant containment sump monitor, deletes the allowance to have the containment sump monitor inoperable in conjunction with another RCS leakage detection monitor for 30 days, and restores the requirement to perform a CHANNEL CHECK on the containment sump level monitor. Changes to the Bases are controlled outside of the 10CFR50.92 process.

These changes are the result of issues related to the containment sump monitor currently being inoperable and to be consistent with NUREG-1432, "Standard Technical Specifications Combustion Engineering Plants," Revision 3, dated March 31, 2004 (STS).

Attachment 5 contains the Engineering Evaluation which justifies the use of the Containment Sump Level Instrumentation as a Regulatory Guide 1.45 qualified instrument for detecting

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RCS leakage. An additional Engineering Evaluation will be performed to implement the specific plant changes.

The original License Amendment Request was previously evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c) and it was determined that the change involved no significant hazards consideration. The basis for this determination was included in the previous submittal. The changes proposed in this supplement have no effect on the previous no significant hazards consideration, which encompass these changes. This supplement is within the scope of the previous License Amendment Request.

The proposed change includes one commitment as summarized in Attachment 4.

In the initial submittal, Entergy requested approval of the License Amendment Request by November 15, 2004. However, Waterford 3 is currently in a 30 day shutdown action due to the containment sump flow monitor being inoperable. The 30 day allowed outage time will expire on August 6, 2004 at 1115 hours. Therefore, Entergy is requesting that the License Amendment Request, as supplemented herein, be reviewed and approved on an exigent basis (as requested on July 8, 2004 in Reference 2) by August 2, 2004. Once approved, the amendment shall be implemented prior to the expiration of the allowed outage time.

If you have any questions or require additional information, please contact Charles DeDeaux at 504-739-6531 or Ronald Williams at 504-739-6255.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 16, 2004.

Sincerely,

K.T. Walsh
General Manager, Plant Operations
Waterford Steam Electric Station, Unit 3

Attachments:
1. Analysis of Proposed Supplement to Technical Specification Change NPF-38-254
2. Proposed Replacement Pages for Technical Specification Changes (mark-up)
3. Replacement Pages for Changes to Technical Specification Bases – For Information Only
4. List of Regulatory Commitments
5 ER-W3-2004-0396-000, Revision 0, "Alternate Containment Sump Leakage Flow Measurement"

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Attachment 1 To

W3F1-2004-0060

Analysis of Proposed Supplement to Technical Specification Change NPF-38-254

1.0 DESCRIPTION

This letter is a supplement to License Amendment Request NPF-38-254. The amendment will revise the submittal to allow crediting the containment sump level instrumentation or the containment sump flow monitoring instrumentation (weir) to be credited for the "one containment sump monitor," as required by the LCO. This change will delete the proposed allowance for a 30 day allowed outage time when the containment sump monitor and another Reactor Coolant System (RCS) leakage detection monitor are inoperable and thus eliminate the deviation from NUREG-1432, "Standard Technical Specifications Combustion Engineering Plants," Revision 3, dated March 31, 2004 (STS) from the original submittal. This change will also restore the requirement to perform a CHANNEL CHECK on the containment sump level monitor. This is consistent with guidance in Regulatory Guide 1.45, Revision 0, dated May 1973, "Reactor Coolant Pressure Boundary Leakage Detection Systems," (Regulatory Guide 1.45) and the STS. Also, the proposed changes will ensure Entergy Operations, Inc. (Entergy's) continued compliance with 10 CFR 50 Appendix A, General Design Criteria (GDC) 30, "Quality of Reactor Coolant System Pressure Boundary" at Waterford Steam Electric Station, Unit 3 (Waterford 3)."

2.0 PROPOSED CHANGE

There are three changes from those previously submitted being proposed in this supplement. The first change is to Limiting Condition for Operation (LCO) 3.4.5.1.b for the containment sump level and flow monitoring system, the second change is to the proposed Action that allows a 30 day allowed outage time when any two RCS leakage detection monitoring systems are inoperable, and the third change is to restore deleted Surveillance Requirement (SR) 4.4.5.2.1 to perform a CHANNEL CHECK on the containment sump level monitor.

The current Technical Specification (TS) LCO 3.4.5.1.a, b, and c require three RCS Leakage Detection Monitoring Systems to be operable. LCO 3.4.5.1.b requires the containment sump monitor to be operable and is depicted below.

The containment sump level and flow monitoring system, and

The May 7, 2004 submittal proposed that LCO 3.4.5.1.b be revised to the following.

One containment sump monitor (weir), and

The proposed revision, as requested by this supplement, is proposing LCO 3.4.5.1.b be revised to the following.

One containment sump monitor, and

This will allow Entergy to credit either the containment sump level monitoring instrumentation or containment sump flow monitor (weir) to meet the requirement of the proposed LCO.

The May 7, 2004 submittal proposed the following Action d when two RCS leakage detection monitors are inoperable.

d. Two required RCS leakage detection instrumentation inoperable.

Restore one required RCS leakage detection instrumentation to OPERABLE status within 30 days or be in MODE 3 in 6 hours and MODE 5 in the following 30 hours.

The proposed revision, as requested by this supplement, is proposing to split the current proposed Action into two Actions (d and e) as depicted below.

d. Required containment atmosphere particulate radioactivity monitor inoperable and required containment fan cooler condensate flow switch inoperable.

Restore the required containment atmosphere particulate radioactivity monitor or the required containment fan cooler condensate flow switch to OPERABLE status within 30 days

or

Be in MODE 3 in 6 hours and MODE 5 in the following 30 hours.

e. Required containment sump monitor inoperable and either the required containment atmosphere particulate radioactivity monitor inoperable or the required containment fan cooler condensate flow switch inoperable.

Restore the required containment sump monitor to OPERABLE status within 1 hour;

or

Restore the required containment atmosphere particulate radioactivity monitor or the required containment fan cooler condensate flow switch to OPERABLE status within 1 hour;

or

Be in Mode 3 in 6 hours and MODE 5 in the following 30 hours.

The current proposed Action e for all required RCS leakage detection instrumentation inoperable will be renumbered to Action f with no additional changes.

Surveillance Requirement 4.4.5.2.1.c, which was deleted from the current TS in the May 7, 2004 License Amendment Request, will be restored and relocated to SR 4.4.5.1.b for the containment sump level monitor. The new SR will appear in the proposed TS as depicted below.

b. Containment sump level and flow monitors – performance of a CHANNEL CHECK (containment sump level monitor only) at least once per 12 hours and a CHANNEL CALIBRATION at least once per 18 months

The applicable bases will also be revised. A draft markup of the proposed Bases pages is provided in Attachment 3 for information only.

In summary, Entergy is proposing to supplement License Amendment Request NPF-38-254, which was submitted to the NRC on May 7, 2004. The changes consist of allowing for the diversity of the Waterford 3 Containment Sump Monitoring System and eliminating the proposed deviation from the STS with regard to proposing a 30 day allowed outage time when the required containment sump monitor is inoperable along with another RCS leakage detection monitor being inoperable.

3.0 BACKGROUND

The reason for this supplement to License Amendment Request NPF-38-254 is to allow Waterford 3 to credit an additional method of monitoring RCS leakage into the containment sump. Also, this change will eliminate the proposed 30 day allowed outage time when any two of three RCS leakage detection instrumentation is inoperable. Specifically, the proposed 30 day allowed outage time will be eliminated when the containment sump monitor is inoperable along with any of the other two leakage detection monitors.

On July 7, 2004 at 1115 hours, the containment sump level and flow monitoring system was declared inoperable because of an apparent zero shift in the containment sump weir level/flow due to transmitter degradation. Technical Specification 3.4.5.1 Action was entered which requires the containment sump level and flow monitoring system to be restored to Operable status within 30 days, or to be in Mode 3 within 6 hours and Mode 5 in the following 30 hours.

The apparent cause for this condition is a degraded transmitter that can only be repaired during plant shutdown conditions due to severe hazardous conditions in the containment sump. These conditions include severe heat and a very high radiation field in the containment sump area.

At the time the containment sump level and flow monitoring system was declared inoperable, the containment weir was the only containment sump instrument credited to meet the Regulatory Guide 1.45 requirement to detect one gpm leakage within one hour. Since that time Entergy has engineered a method to meet the Regulatory Guide requirements using the containment sump level instrumentation. The specifics of this method are discussed in Section 4.0.

In the initial License Amendment Request, Entergy proposed a 30 day allowed outage time when any two of three RCS leakage detection instrumentation are inoperable. This included the containment sump monitoring instrumentation being inoperable along with one of the other two RCS leakage detection instrumentation being inoperable. This change was a

deviation from the STS. Entergy is revising the current License Amendment Request to be consistent with the STS.

These proposed changes to License Amendment Request NPF-38-254 will ensure the Waterford 3 Leakage Detection Monitoring Systems continue to meet the requirements of General Design Criteria 30 of Appendix A to 10 CFR 50 and Regulatory Guide 1.45. General Design Criteria 30 of Appendix A to 10 CFR 50 requires means for detecting and, to the extent practical, identifying the location of the source of RCS leakage. Regulatory Guide 1.45 describes acceptable methods for selecting leakage detection systems. These systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure.

4.0 TECHNICAL ANALYSIS

The proposed changes to License Amendment Request NPF-38-254 will ensure Waterford 3 credits the diverse methods available to monitor the containment sump for RCS leakage as required by the 10 CFR 50 Appendix A GDC 30 and Regulatory Guide 1.45. This proposed change will also ensure the proposed Actions, when two of three leakage detection instrumentation is inoperable, are consistent with the STS.

The May 7, 2004 License Amendment Request proposed to revise the LCO for the containment sump monitoring system to require *one containment sump monitor*, which is consistent with the STS. Waterford 3 has two methods to detect RCS leakage in the containment sump to meet the requirement for one containment sump monitor. One is the containment weir, which was discussed in the May 7, 2004 submittal, and the other is utilization of the containment sump level monitoring instrumentation. This method was not discussed in the May 7, 2004 submittal, but is discussed below.

The Containment Sump is located inside containment at the -25 foot elevation. It contains a leak detection tank with a triangular weir for in-leakage measurement and alarm. Monitored drains enter the sump via the weir. The leakage into this sump is recorded in the control room on a "CONTAINMENT LIQUID LEAK" recorder with a range of 0 to 20 gpm. There are two annunciators for sump in-leakage in the control room. "CONTAINMENT WATER LEAKAGE HI-HI" will alarm at a fixed leak rate of 10 gpm or more. There is also an adjustable setpoint alarm, "CONTAINMENT WATER LEAKAGE HI", which is normally set for one gpm above the current leak rate. This is the currently credited sump monitoring leakage detection system.

Containment Sump level is indicated in the control room over a range of 0 to 15 feet of water. Two containment sump level transmitters are located at the –6 elevation of the sump enclosure. These transmitters feed instruments labeled as "CONTAINMENT SUMP LEVEL" and are considered to be the "narrow range" containment sump levels as referred to by TS 3.3.3.6. There are also two "FLOOD LEVEL" recorders in the control room with a range of 0 to 16 feet. These refer to the Safety Injection System (SIS) Sump and are referred to by TS 3.3.3.6 as "wide range" containment sump level.

The containment sump system will operate in automatic which will maintain the sump level where the sump level verses volume curve is linear due to a constant cross-sectional area. In this range the containment sump level transmitter can be utilized to calculate the sump in-flow leak rate. A new plant monitoring computer point will be available that uses the data from one of the level transmitters to calculate the level change in the sump over a specified time period. The level change in the sump is then converted to a volume change based on the size of the sump. Using this data, the in-leakage flow rate can be calculated. The alarm associated with the new computer point will be set at less than or equal to 1 gpm greater than steady-state in-leakage. This system will now be the second credited sump monitoring leakage detection system for TS 3.4.5.1.

Waterford 3 currently performs a Channel Check to meet the requirements of SR 4.4.5.2.1.c

In the May 7, 2004 submittal, Entergy proposed a 30 day allowed outage time when any two of three leakage detection instrumentation are inoperable. This included the containment sump monitor being inoperable with any one of the other two leakage detection monitors being inoperable, which deviated from the STS. Entergy is proposing to supplement the original License Amendment Request as depicted in Section 2.0 to be consistent with the STS.

Also in the May 7, 2004 submittal, Entergy proposed the deletion of SR 4.4.5.2.1.c, which is the requirement to monitor the containment sump inventory and discharge at least once per 12 hours. This requirement was being met by performing a Channel Check on the containment sump level monitoring instrumentation once per 12 hours. Since, the containment level monitoring instrumentation will be credited as Regulatory Guide 1.45 instrumentation for detecting RCS leakage, SR 4.4.5.2.1.c will be relocated to SR 4.4.5.1.b instead of being deleted. The STS does not require a channel check however, to provide additional assurance the channels are operating properly, this SR is being retained.

The aforementioned changes provide the flexibility and consistency needed for the RCS leak detection instrumentation while maintaining the diversity, leak rate, and timing criteria of Regulatory Guide 1.45. The proposed changes to the May 7, 2004 Waterford 3 License Amendment Request NPF-38-254 will credit Waterford 3's diverse methods for measuring RCS leakage in the containment sump in accordance with the 10 CFR 50 Appendix A GDC 30 and the Regulatory Guide 1.45 requirements. Also this change ensures Waterford 3's continued consistency with the STS for the proposed TS 3.4.5.1 Actions. These changes will not have an adverse impact on the ability of the Waterford 3 to detect RCS leakage. For that matter, Waterford 3's ability to detect an RCS leak when the containment sump weir is inoperable is improved with the allowance to credit the containment sump level monitoring instrumentation.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

The proposed changes have been evaluated to determine whether applicable regulations and requirements continue to be met. This change does not affect the Waterford 3 ability to meet the requirement of 10 CFR 50 Appendix A, General Design Criteria (GDC) 30 and Regulatory

Guide 1.45, Revision 0, dated May 1973, (Regulatory Guide 1.45) requirements for detecting RCS leakage.

Waterford 3's compliance with Regulatory Guide 1.45 requirements with respect to the proposed changes are described below.

- Acceptable Detection Methods – Waterford 3 will employ three leakage detection methods endorsed by the Regulatory Guide: 1) Containment Atmosphere Particulate Radiation Monitor, 2) Containment Sump Level and Flow (weir) Monitor, and 3) Containment Fan Cooler (CFC) Condensate Flow Switch
- Detector Sensitivity – Waterford 3 leakage detection instrumentation meets the requirement to detect ≤ 1.0 gpm leakage. The particulate radioactivity monitor meets the Regulatory Guide requirement to have a sensitivity of at least 1E-9.
- Detector Response Time – Waterford 3 leakage detection instrumentation meets the requirement to detect a 1.0 gpm leakage within 1 hour.
- Signal Correlation and Calibration – Waterford 3 leakage detection instrumentation meets the requirements to be able to associate a signal or indication of a change in the normal operating condition with a quantitative leakage flow rate as applicable.
- Seismic Qualification – Waterford 3 leakage detection instrumentation meets the requirement for at least one detection system to be Operable after a safe shutdown earthquake.
- Regulatory Position (only those positions not covered above are addressed below)
    - Waterford 3 has the means to quantify identified and unidentified leakage.
    - Waterford 3 has monitors that are capable of detecting intersystem leakage (e.g., Waterford 3 has condenser off gas radiation monitors that can indicate primary to secondary leakage).
    - Waterford 3 leakage detection systems have indication and alarms in the control room and the calibration for the indicators account for needed independent variables.
    - Waterford 3 can perform channel checks, channel functional tests, and channel calibrations on the particulate radiation monitors while the plant is on line. Waterford 3 can perform the channel functional test on the CFC condensate flow switches while the plant is on line; however, a containment entry would be required, so by plant procedure this SR is performed while the plant is shutdown. Waterford 3 can perform the channel check on the containment sump level monitoring instrumentation while the plant is on line but the channel calibrations for the containment sump level and flow monitoring system can only be performed while the plant is shutdown. The regulatory guide requires that the leakage detection system be equipped with provisions to permit operability testing and calibration during plant operation. The particulate radiation monitor and the CFC flow switches meet this requirement. The Waterford 3 containment sump level and flow monitoring instrumentation do not meet this requirement; however, Waterford 3 was licensed with this configuration.
    - The TSs contain the LCOs for identified and unidentified leakage and contain requirements for the RCS leakage detection instrumentation.

Entergy has determined that the proposed changes do not require any exemptions or relief from regulatory requirements, other than the Technical Specifications (TS).

5.2 No Significant Hazards Consideration

The No Significant Hazards Consideration (NSHC) of License Amendment Request NPF-38-254 was reviewed for applicability to the above changes. It was determined that it remains valid and that no changes to the NSHC are required.

5.3 Environmental Considerations

The proposed supplement to the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Attachment 2 To

W3F1-2004-0060

Proposed Replacement Pages for Technical Specification Changes (mark-up)

REACTOR COOLANT SYSTEM

3/4.4.5 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION ~~SYSTEMS~~ (Instrumentation)

LIMITING CONDITION FOR OPERATION

3.4.5.1 The following Reactor Coolant System leakage detection ~~systems~~ shall be OPERABLE:

a. ~~A~~ (One) containment atmosphere particulate radioactivity monitor~~ing system~~;

b. ~~The~~ (One) containment sump ~~level and flow~~ monitor~~ing system~~, and

c. ~~Either the~~ (One) containment ~~air~~ (fan) cooler condensate flow switches ~~on at least three coolers or a containment atmosphere gaseous radioactivity monitoring system~~.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION: (INSERT ACTION)

~~With only two of the above required leakage detection systems OPERABLE, operation may continue for up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours when the required gaseous and/or particulate radioactivity monitoring system is inoperable; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.~~

SURVEILLANCE REQUIREMENTS

4.4.5.1 The leakage detection systems shall be demonstrated OPERABLE by:

a. Containment atmosphere ~~(gaseous and~~ particulate~~)~~ monitor~~ing~~ system performance of CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST ~~at the frequencies specified in Table 4.3-3~~;

b. Containment sump level and flow monitor~~ing system~~ (5) - performance of CHANNEL CALIBRATION at least once per 18 months,

c. Containment ~~air~~ (fan) cooler condensate flow switches - performance of a CHANNEL FUNCTIONAL TEST at least once per 18 months.

at least once per 92 days

at least once per 12 hours

at least once per 18 months

a CHANNEL CHECK (containment sump level monitor only) at least once per 12 hours and a

Relocated from SR 4.4.5.2.1

Inserted for Completeness Only. There were no changes to this page. Only pg 2 of 2 changed.

INSERT ACTION
(Page 1 of 2)

NOTE: TS 3.0.4 is not applicable.

a. Required containment atmosphere particulate radioactivity monitor inoperable.

NOTE: SR 4.4.5.2.1 is not required until 12 hours after establishment of steady state operation.

Analyze grab samples of the containment atmosphere once per 24 hours or perform SR 4.4.5.2.1 once per 24 hours;

and

Restore required containment atmosphere particulate radioactivity monitor to OPERABLE status within 30 days or verify one containment fan cooler condensate flow switch is OPERABLE within 30 days;

or

Be in MODE 3 in 6 hours and MODE 5 in the following 30 hours.

b. Required containment sump monitor inoperable.

NOTE: SR 4.4.5.2.1 is not required until 12 hours after establishment of steady state operation.

Perform SR 4.4.5.2.1 once per 24 hours and restore the containment sump monitor to OPERABLE status within 30 days;

or

Be in MODE 3 in 6 hours and MODE 5 in the following 30 hours.

c. Required containment fan cooler condensate flow switch inoperable.

NOTE: SR 4.4.5.2.1 is not required until 12 hours after establishment of steady state operation.

Perform a CHANNEL CHECK on the containment atmosphere particulate radioactivity monitor once per 8 hours or perform SR 4.4.5.2.1 once per 24 hours;

or

Be in MODE 3 in 6 hours and MODE 5 in the following 30 hours.

INSERT ACTION
(Page 2 of 2)

d. Required containment atmosphere particulate radioactivity monitor inoperable and required containment fan cooler condensate flow switch inoperable.

Restore the required containment atmosphere particulate radioactivity monitor or the required containment fan cooler condensate flow switch to OPERABLE status within 30 days

or

Be in MODE 3 in 6 hours and MODE 5 in the following 30 hours.

e. Required containment sump monitor inoperable and either the required containment atmosphere particulate radioactivity monitor inoperable or the required containment fan cooler condensate flow switch inoperable.

Restore the required containment sump monitor to OPERABLE status within 1 hour.

or

Restore the required containment atmosphere particulate radioactivity monitor or the required containment fan cooler condensate flow switch to OPERABLE status within 1 hour;

or

Be in Mode 3 in 6 hours and MODE 5 in the following 30 hours.

f. All required RCS leakage detection instrumentation inoperable.

Initiate ACTION within 1 hour to be in MODE 3 within the next 6 hours and MODE 5 in the following 30 hours.

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.5.2 Reactor Coolant System leakage shall be limited to:

a. No PRESSURE BOUNDARY LEAKAGE,

b. 1 gpm UNIDENTIFIED LEAKAGE,

c. 1 gpm total primary-to-secondary leakage through all steam generators and 720 gallons per day through any one steam generator,

d. 10 gpm IDENTIFIED LEAKAGE from the Reactor Coolant System, and

e. 1 gpm leakage at a Reactor Coolant System pressure of 2250 ± 20 psia from any Reactor Coolant System pressure isolation valve specified in Table 3.4-1.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With any PRESSURE BOUNDARY LEAKAGE, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With any Reactor Coolant System leakage greater than any one of the limits, excluding PRESSURE BOUNDARY LEAKAGE and leakage from Reactor Coolant System pressure isolation valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With any Reactor Coolant System pressure isolation valve leakage greater than the above limit, isolate the high pressure portion of the affected system from the low pressure portion within 4 hours by use of at least one closed manual or deactivated automatic valve, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.4.5.2.1 Reactor Coolant System leakages shall be demonstrated to be within each of the above limits by:

a. Commencing an RCS inventory balance within 1 hour to determine the leak rate when RCS leakage is alarmed and confirmed in a flow path with no flow rate indication.

b. Monitoring the containment atmosphere gaseous and particulate radioactivity monitor at least once per 12 hours.

c. Monitoring the containment sump inventory and discharge at least once per 12 hours.

Relocate to SR 4.4.5.1.b

Attachment 3 To

W3F1-2004-0060

Replacement Pages for Changes to Technical Specification Bases
For Information Only

3.4.5.1 BASES

Background

GDC 30 of Appendix A to 10 CFR 50 (Ref. 1) requires means for detecting and, to the extent practical, identifying the location of the source of RCS leakage. Regulatory Guide 1.45 (Ref. 2) describes acceptable methods for selecting leakage detection systems.

Leakage detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus an early indication or warning signal is necessary to permit proper evaluation of all UNIDENTIFIED LEAKAGE.

Industry practice has shown that water flow changes of 0.5 gpm to 1.0 gpm can readily be detected in contained volumes by monitoring changes in water level or in flow rate. The containment sump used to collect UNIDENTIFIED LEAKAGE and the containment fan cooler (CFC) condensate flow switches are instrumented to alarm for increases of 0.5 gpm to 1.0 gpm in the normal flow rates. This sensitivity is acceptable for detecting increases in UNIDENTIFIED LEAKAGE.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by radiation monitoring instrumentation. Reactor coolant radioactivity levels will be low during initial reactor startup and for a few weeks thereafter until activated corrosion products have been formed and fission products appear from fuel element cladding contamination or cladding defects. Radioactivity detection systems are included for monitoring particulate activities, because of their sensitivities and rapid responses to RCS leakage.

Air temperature and pressure monitoring methods may also be used to infer UNIDENTIFIED LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements is affected by containment free volume and, for temperature, detector location. Alarm signals from these instruments can be valuable in recognizing rapid and sizable leakage to the containment. Temperature and pressure monitors are not required by this LCO.

Applicable Safety Analyses

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary. The system response times and sensitivities are described in the UFSAR (Ref. 3). Multiple instrument locations are utilized, if needed, to ensure the transport delay time of the leakage from its source to an instrument location yields an acceptable overall response time.

The safety significance of RCS leakage varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring RCS leakage into the containment area are necessary. Quickly separating the IDENTIFIED LEAKAGE from the UNIDENTIFIED LEAKAGE

provides quantitative information to the operators, allowing them to take corrective action should leakage occur detrimental to the safety of the facility and the public.
RCS leakage detection instrumentation satisfies Criterion 1 of 10 CFR 50.36(c)(2)(ii).

Limiting Condition for Operation

One method of protecting against large RCS leakage derives from the ability of instruments to rapidly detect extremely small leaks. This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide a high degree of confidence that small leaks are detected in time to allow actions to place the plant in a safe condition when RCS leakage indicates possible RCPB degradation.

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitors (either the containment sump level instrumentation or the containment flow instrumentation (weir)), in combination with a particulate radioactivity monitor and a CFC condensate flow switch, provide acceptable monitoring capability for leakage detection.

The required CFC condensate flow switch must be associated with one of the two required OPERABLE CFCs that are in operation.

Applicability

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS leakage detection instrumentation is required to be OPERABLE.

In MODE 5 or 6, the temperature is ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are far lower than those for MODES 1, 2, 3, and 4, the likelihood of leakage and crack propagation is much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

Actions

The Actions are modified by a Note that indicates the provisions of TS 3.0.4 are not applicable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

ACTION a

With the containment atmosphere particulate radioactivity monitoring instrumentation inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed, or water inventory balances, in accordance with SR 4.4.5.2.1, must be performed to provide alternate periodic information. With a sample obtained and analyzed or an inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the radioactivity monitor. Alternatively, continued operation is allowed if the CFC flow switch is OPERABLE, provided grab samples are taken or water inventory balance performed every 24 hours.

The 24 hour interval provides periodic information that is adequate to detect leakage. A Note is added allowing that SR 4.4.5.2.1 is not required to be performed until 12 hours after establishing steady state operation (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown). The 12 hour allowance provides sufficient time to establish stable plant conditions. The 30 day allowed outage time recognizes at least one other form of leakage detection is available.

If ACTION 'a' cannot be met within the allowed outage 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 6 hours and to MODE 5 within the following 30 hours. The allowed outage times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

ACTION b

If the containment sump monitor is inoperable, (both the containment level instrumentation and the containment flow instrumentation (weir)), no other form of sampling can provide the equivalent information.

However, the containment atmosphere radioactivity monitor and the CFC flow switch will provide indication of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 4.4.5.2.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A Note is added allowing that SR 4.4.5.2.1 is not required to be performed until 12 hours after establishing steady state operation (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown). The 12 hour allowance provides sufficient time to establish stable plant conditions.

Restoration of the required sump monitor to OPERABLE status is necessary to regain the function in an allowed outage time of 30 days after the monitor's failure. This time is acceptable considering the remaining OPERABLE leakage detection instrumentation and the frequency and adequacy of the RCS water inventory balance required by the ACTION.

If ACTION 'b' cannot be met within the allowed outage 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 6 hours and to MODE 5 within the following 30 hours. The allowed outage times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

ACTION c

If the required CFC condensate flow switch is inoperable, alternative action is again required. Either SR 4.4.5.1.a (containment atmosphere particulate radiation monitor CHANNEL CHECK) must be performed, or water inventory balances, in accordance with SR 4.4.5.2.1, must be performed to provide alternate periodic information. Provided a CHANNEL CHECK is performed every 8 hours or an inventory balance is performed every 24 hours, reactor operation may continue while awaiting restoration of the CFC condensate flow switch to OPERABLE status.

The 24 hour interval provides periodic information that is adequate to detect RCS leakage. A Note is added which states that SR 4.4.5.2.1 is not required to be performed until 12 hours after establishing steady state operation (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown). The 12 hour allowance provides sufficient time to establish stable plant conditions.

If ACTION c cannot be met, when contingency Actions cannot be completed within the Action 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 6 hours and to MODE 5 within the following 30 hours. The allowed outage times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

ACTION d

If the required containment atmosphere particulate radioactivity monitor and the required containment fan cooler condensate flow switch are inoperable, the only means of detecting RCS leakage is the containment sump monitor. This condition does not provide the required diverse means of RCS leakage detection. The ACTION is to restore either of the inoperable monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day allowed outage time ensures the plant is not operated in a reduced configuration for a lengthy time period. Also 30 days is acceptable because contingency actions are required to be taken in ACTION a or c.

For example, if the containment atmosphere particulate radioactivity monitor and the CFC condensate flow switch are declared inoperable, ACTION a, c, and d will have to be entered and contingency Actions performed per ACTION a and c. ACTION d requires one monitor to be restored within 30 days or to commence a plant shutdown. If prior to the 30 days, the containment atmosphere particulate radioactivity monitor is restored to OPERABLE status, ACTION a and d can be exited; however, the Actions of ACTION c are still applicable.

If ACTION d cannot be met within the allowed outage 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 6 hours and to MODE 5 within the following 30 hours. The allowed outage times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

ACTION e

If the required containment sump monitor is inoperable (both the containment sump level and flow (weir) instrumentation) and either the required containment atmosphere particulate radioactivity monitor or the required containment fan cooler condensate flow switch is inoperable, there is only one means of detecting RCS leakage. In this condition, the containment sump monitor, which is the best method for detecting RCS leakage, is inoperable along with one of the other leakage detection methods. This condition does not provide the required diverse means of RCS leakage detection. The ACTION is to restore either of the inoperable monitors to OPERABLE status within 1 hour to regain the intended leakage detection

diversity. The 1 hour allowed outage time ensures the plant is not operated with two RCS leakage detection monitors inoperable for a lengthy time period.

If ACTION e cannot be met within the allowed outage 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 6 hours and to MODE 5 within the following 30 hours. The allowed outage times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

Because of the short duration of the allowed outage time, the contingency Actions of a, b, or c do not have to completed while the requirements of Action e are being followed. If one of the monitors are restored to OPERABLE status, Action e may be exited and the requirements of Action a, b, or c, whichever is applicable must be complied with.

ACTION f

If all required monitors are inoperable, no automatic means of monitoring leakage are available and immediate plant shutdown is required. ACTION must be initiated within 1 hour to be in MODE 3 within the next 6 hours and MODE 5 in the following 30 hours. These times are consistent with TS 3.0.3.

Surveillance Requirements

SR 4.4.5.1.a , 4.4.5.1.b - Channel Check

SR 4.4.5.1.a requires the performance of a CHANNEL CHECK of the required containment atmosphere particulate radioactivity monitor. SR 4.4.5.1.b requires the performance of a CHANNEL CHECK on the required containment sump level monitor. The CHANNEL CHECK is not required to be performed on the containment sump flow monitor (weir). The check gives reasonable confidence the channel is operating properly. The frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 4.4.5.1.a – Channel Functional Test

SR 4.4.5.1.a requires the performance of a CHANNEL FUNCTIONAL TEST of the required containment atmosphere particulate radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. A successful test of the required contacts of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The frequency of 92 days considers instrument reliability, and operating experience has shown it proper for detecting degradation.

SR 4.4.5.1.a, SR 4.4.5.1.b, and SR 4.4.5.1.c – Channel Calibration

These SRs require the performance of a CHANNEL CALIBRATION for each of the RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The frequency of 18 months is a typical refueling cycle and considers channel reliability. Operating experience has shown this frequency is acceptable.

References

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45, Revision 0, dated May 1973.
3. UFSAR, Sections 5.2.5 and 12.3.

Attachment 4

W3F1-2004-0060

List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
A new plant monitoring computer point will be available that uses the data from one of the level transmitters to calculate the level change in the sump over a specified time period.	✓		8/6/05

Attachment 5 To

W3F1-2004-0060

ER-W3-2004-0396-000, Revision 0
"Alternate Containment Sump Leakage Flow Measurement"

ER COVER SHEET

ER #: ER-W3-2004-0396-000	Revision #: 0	Grade: R.O.N.95	

Title: Alternate containment sump leakage flow measurement

ORIGINATING DEPARTMENT

Originator: Gavigan,Arthur J	Date: 7/9/2004	Ext: 5047396626	Dept:

System ID: SP

Date Required:

Equipment ID:

Sugg. Milestone:_____

Problem/Proposed Solution/Justification: (Attach additional sheets as required)

Determine a method to measure leakage into the containment sump using the existing containment sump level instruments. This method is to be used while the containment sump weir box flow method is inoperable.

CLASSIFICATION AND ENGINEERING RESPONSE

Quality Classification: Non Safety

Implementation:

Response Type: Evaluation

Problem Resolution: (Attach additional sheets as required)

See Attached

LBD Impacted ☐ YES ☒ NO

Responsible Engineer: Touma,Medhat L

Date: 7/12/2004

REVIEW

☒ Technical Reviewer Finch,Richard T — Date: 7/12/2004

☐ Design Verifier — Date:

APPROVAL

☒ Supervisor Pellegrin,Bryan J — Date: 7/12/2004

☐ Engineering Manager — Date:

☐ PSRC Required — PSRC Meeting Number: — Date:

☐ GMPO — Date:

ER COVER SHEET

ER: ER-W3-2004-0396-000	Engineering Request
Revison: 0	Review Results

Title: Alternate containment sump leakage flow measurement

REVIEWS

Assigned To	Review Type	Name and Date	
COMPUTER SUPPORT SYSTEMS	Package	Phillips,Burton L	07/12/2004
Dufrene,Kurt	Package	Dufrene,Kurt	07/12/2004
I AND C ENGINEERING	Package	Tran,Ricky T	07/12/2004
IST	Package	Fugate,Jeffrey E	07/12/2004
LICENSING	Package	DeDeaux,Charles E	07/12/2004
OPERATIONS	Package	Proctor,Bruce N	07/12/2004
SYSTEM ENGINEERING	Package	Gavigan,Arthur J	07/12/2004
COMPUTER SUPPORT SYSTEMS	Final Team	Touma,Medhat L via telecon for Phillips,Burton L	07/12/2004
Dufrene,Kurt	Final Team	Touma,Medhat L via telecon for Dufrene,Kurt	07/12/2004
I AND C ENGINEERING	Final Team	Touma,Medhat L via telecon for Tran,Ricky T	07/12/2004
IST	Final Team	Touma,Medhat L via telecon for Fugate,Jeffrey E	07/12/2004
LICENSING	Final Team	Touma,Medhat L via telecon for DeDeaux,Charles E	07/12/2004
OPERATIONS	Final Team	Touma,Medhat L via telecon for Proctor,Bruce N	07/12/2004
SYSTEM ENGINEERING	Final Team	Touma,Medhat L via telecon for Gavigan,Arthur J	07/12/2004

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1.0 Description

1.1 Structure, System, or Component Description

The Containment Sump is located inside Containment at the -25 foot elevation. It contains a leak detection tank with a triangular weir for in-leakage measurement and alarm. Drains that are monitored for leak detection enter the sump via the leak detection tank. Discharge from the leak detection tank to the Containment Sump flows through a triangular weir and level transmitter SP-ILT-6710 and is recorded on CP-1 on a "CONTAINMENT LIQUID LEAK" recorder, SP-IFR-6710, with a range of 0 to 20 gpm. Two annunciators on CP-8 alert operators on high Containment Sump in-leakage based on SP-ILT-6710 indication. "CONTAINMENT WATER LEAKAGE HI HI", will alarm at a fixed leak rate of 10 gpm or more. An adjustable setpoint alarm, "CONTAINMENT WATER LEAKAGE HI", is normally set for one gpm above the current leak rate.

Containment Sump level is indicated by level transmitters SP-ILT-6705A(B) on CP-8 over a range of 0 to 15 feet of water at meter SP-ILI-6705A and recorder SP-ILR-6705B. These are labeled as "CONTAINMENT SUMP LEVEL" and are considered to be the "narrow range" Containment Sump levels as referred to by Technical Specifications 3.3.3.6. There are also two "FLOOD LEVEL" recorders on CP-8, SI-ILR-7145A(B), with a range of 0 to 16 feet. These refer to the Safety Injection System (SIS) Sump and are referred to by T.S. 3.3.3.6 as "wide range" Containment Sump level. The Containment Sump level transmitters are located at the –6 elevation of the sump enclosure, and have an effective range of 0 to 15 feet.

1.2 Reason for Change

The Containment Sump weir flow transmitter SP-ILT-6710 has been declared inoperable (CR-WF3-2004-2028). Therefore, another means for monitoring Containment Sump in-leakage flow is required to satisfy Technical Specification 3.4.5.1, RCS Leakage – Leakage Detection Systems.

This ER supports the supplement to License Amendment Request NPF-38-254. A linked ER will provide the configuration change authority to implement a redundant Containment sump monitor to meet the requirements for Regulatory Guide 1.45.

1.3 Design Objective to Resolve Problem

The Containment sump level instrumentation can be utilized to formulate an in-flow leakage rate. With the Containment sump system operating in automatic, the sump level is maintained in the deep pit. The deep pit of the Containment Sump has a constant cross-sectional area, thus volume varies linearly with level. In this range, the Containment sump level transmitter, SP-ILT-6705B, can be utilized to calculate the sump in-flow leak rate. SP-ILT-6705B is safety-related, seismic qualified and environmentally qualified. SP-ILT-6710 is non-safety-related and capable of performing its function following seismic events up to a safe shutdown earthquake per Regulatory Guide 1.45.

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A new computer point will be developed that uses the data from SP-ILT-6705B to calculate the level change in the sump over a specified time period. The level change in the sump will be converted to a volume change based on the size of the sump deep pit. The change in volume over time will be used to calculate the in-leakage flow rate. The new computer point would also have a computer alarm set at 1 gpm and a high-high alarm at 10 gpm. ER-W3-2004-0396-001 will implement the configuration change to provide a redundant indication for Containment sump in-leakage flow rate.

1.4 Components List

This ER does not perform any configuration changes.

2.0 Documents

2.1 List of Affected Documents

2.1.1 Document Revision Notices

None.

2.1.2 Documents affected by this ER response without attached DRNs

None.

2.1.3 Documents voided by this ER response

None.

2.1.4 Design Change Documents affected by this ER response

None.

2.2 Reference Documents

2.2.1 G-173, Sheet 3, Flow Diagram Sump Pump System
2.2.2 G-854, HVAC Reactor Building Sheet 1
2.2.3 G-503, Reactor Building Interior Base Concrete – Plan
2.2.4 G-504, Reactor Building Interior Base Concrete – Sections
2.2.5 B-424, Sheet 861, Containment Sump Pumps
2.2.6 B-430, Sheet L19.1, Instrument Installation Detail
2.2.7 B-430, Sheet X65, Instrument Installation Detail
2.2.8 OP-003-024, Rev. 9, Sump Pump Operation
2.2.9 MI-003-320, Rev. 4, Containment Level Loop Check & Calibration
2.2.10 ECM97-075, Rev. 0, Design Basis Review for SP-105 and SP-106
2.2.11 MNQ6-4, Rev. 2, Water Levels Inside Containment
2.2.12 DBD-26, Rev. 0-7, Containment Isolation and Leak Rate Testing
2.2.13 UNT-006-019, Rev. 4, Control of Local Leak Rate Testing

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2.2.14 SEP-APJ-001, Rev 0D, Primary Containment Leakage Rate Testing

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3.0 Evaluation/Design Summary

3.1 Evaluation Resolution

3.1.1 Sump Level vs. Sump Volume

In order to utilize the Containment sump level instrumentation to calculate the in-flow leakage rate the volume change per inch level change needs to be calculated. The sump dimensions are shown in References 2.2.3 and 2.2.4. The cross sectional area of the containment sump is constant from the -25' elevation to the -22' elevation. The cross sectional area in this region is as follows;

$8' \times 4.5' = 36\ ft^2$

The amount of volume that the sump pumps and piping occupy in the sump is neglected. This is a conservative assumption. Therefore, a 1 inch level change would equate to the following volume;

$(36\ ft^2) \times (1'/12") \times (7.48\ gal/ft^3) =$ 22.44 gallons for a 1" level change

3.1.2 Operation of Sump Pumps

Currently the Containment sump pumps are operated by opening containment isolation valves SP-105 and SP-106 with the indicated sump level greater than 18" in accordance with OP-003-024, Sump Pump Operation. The sump pumps automatically stop when a level of 12" is reached at which time valves SP-105 and SP-106 are closed. Normally the sump level is allowed to rise to the high level alarm set point (30" indicated level) before the sump pumps are operated.

The pumps automatically stop when sump level reaches an indicated level of 12" due to level switch SP-ILS-6707. The pumps automatically start when the sump level rises to an indicated level of 18" due to level switch SP-ILS-6705. OP-003-024 will be revised to maintain the isolation valves SP-105 and SP-106 open and allow the Containment sump pumps to operate automatically and maintain the sump level between 12" and 18". This equates to an actual level of -22' and -22' 6" respectively.

3.1.3 Leak Rate Formulation

With the Containment sump indicated level being maintained between a range of 12" to 18" via automatic sump pump operation described in section 3.1.2 above, the volume change per inch level change factor calculated in section 3.1.1 remains valid and the Containment sump in-flow leakage can be formulated as follows:

$$\text{Leak rate in gpm} = \frac{(Level_2) - (Level_1)}{(Time_2) - (Time_1)} \times (22.44)$$

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Nuclear Computing Information System (NCIS) will develop and implement a Plant Monitoring Computer (PMC) application which calculates the delta between containment sump level values obtained from two different time periods. The application will first convert A42613 from feet to inches by multiplying CNTMT SUMP LEVEL by 12 and placing the result in a new PMC point (CNTMT SUMP LEVEL IN INCHES). This new PMC point will provide Operations with a more precise sump level indication, as well as an PMC Alarm at 18". The resolution of the level indication is evaluated in Attachment 9.1 and was determined to be acceptable for indicating a 1 gpm leak rate.

The application will then continually monitor the CNTMT SUMP LEVEL IN INCHES. The scan rate for A42613 is one second. This number will be saved into a circular array containing all data points. These data points will be analyzed to determine the rate of leakage. The result will be placed in the second external real point. This second new external real point will provide Operations with a running leak rate, as well as a PMC Alert at 0.5 gpm and a PMC Alarm at 1.0 gpm.

The containment sump level switches SP ILS6705 and SP ILS6707 have a tolerance of +/- 1 inch which means that the level maintained by the sump pumps could be 19" to 11". This equates to an actual level of -21' 11" and -22' 7" respectively. As discussed in section 3.1.1 the cross sectional area of the containment sump is constant from the -25' elevation to the -22' elevation. Therefore, the top band of the sump level could potentially enter 1" into the region were the cross-sectional area of the sump increases. However, trending indicates that the level switch activates the sump pump at a level less than or equal to 18". In addition, the new computer point discussed above will alert Operations if the level exceeds 18" by the PMC alarm.

3.2 Design Bases Discussion (Include related Codes and Standards)

Not applicable. ER-W3-2004-0396-001 will implement the configuration change to provide this redundant indication for Containment sump in-flow leakage.

3.3 Design Input Considerations (Not required when a DIR is attached)

Not applicable. ER-W3-2004-0396-001 will implement the configuration change to provide this redundant indication for Containment sump in-flow leakage.

3.4 Relationship with Other Modifications

None.

3.5 Licensing Basis Document Review (Not required if a 50.59 is required)

General Design Criteria (GDC) 30 of Appendix A to 10 CFR 50 requires means for detecting and, to the extent practical, identifying the location of the source of RCS leakage. Regulatory Guide (RG) 1.45 describes acceptable methods for selecting leakage detection systems. These systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Therefore, an early indication or warning is necessary to permit proper evaluation of all

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unidentified RCS leakage. As noted in the W3 UFSAR Section 5.2.5.1 and TS Bases 3.4.5.1, the RCS Leak Detection System is consistent with RG 1.45.

Diverse monitoring principles are required to be operable in order to provide a high degree of confidence that extremely small RCS leaks are detected in time to allow actions to place the plant in a safe condition when RCS leakage indicates possible RCPB failure. The detection means currently recognized by the TS are:

- Containment atmosphere particulate radioactivity monitoring system
- The containment sump level and flow monitoring system, and
- Either the containment air cooler condensate flow switches or containment gaseous radioactivity monitoring system

Although not specifically identified by RG 1.45, Waterford 3 also employs a leakage detection method based on performing an RCS inventory balance. W3 considers this method the most accurate leak detection method. This method is capable of providing indication of small (less than 1 gpm) RCS leakage during steady state operation.

Industry experience has shown that water flow changes of 0.5 gpm to 1.0 gpm can be detected in contained volumes by monitoring changes in water level, in flow rate, or in the operating frequency of a pump. The containment sump level and flow monitor and the containment air cooler condensate flow rate monitor are instrumented to alarm for increases of 1.0 gpm in the normal flow or fill rates. RG 1.45 establishes the position that an acceptable leak detection system should be capable of detecting a leak of 1.0 gpm in 1 hour.

Autonomy was utilized to search for applicable licensing documents by sorting on the 50.59 database using keywords "containment sump" and "containment penetration". Identified documents that might be affected are UFSAR 5.2.5 and Table 6.3-32.

UFSAR 5.2.5 describes the RCS leak detection methods. UFSAR 5.2.5 will need to be revised to credit the redundant utilization of Containment sump level instrumentation to monitor in-leakage.

Table 6.2-32 of the UFSAR is affected and will have to be changed so as to allow operating valves SP MVAAA105 and SP MVAAA106 to be in the NORMALLY OPEN position as opposed to the NORMALLY CLOSED position as currently stated. This does not violate the requirements of General Design Criterion 54 or 56 which are referenced in UFSAR Table 6.3-32.

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4.0 Impact on Current Operational Basis

4.1.1 Operation of Sump Pumps

Currently the Containment sump pumps are interlocked with and operated by opening containment isolation valves SP-105 and SP-106 with the indicated sump level greater than 18" in accordance with OP-003-024, Sump Pump Operation. The sump level is allowed to rise to the high level alarm set point (30" indicated level) before the sump pumps are operated. The sump pumps automatically stop when sump level reaches an indicated level of 12" due to level switch SP-ILS-6707 at which time valves SP-105 and SP-106 are closed.

OP-003-024 will be revised to change the normal position of the isolation valves SP-105 and SP-106 to open and allow the Containment sump pumps to operate automatically and control containment sump level via SP-ILS-6707 and SP-ILS-6705. This will not create an open safety function for the valves since monitoring sump in-flow leakage is not a safety function. The close safety function will continue to be tested in accordance with the IST program. The time to close SP-105 and SP-106 in response to a CIAS will have negligible impact on the dose consequences assumed in the safety analyses. In addition, the operation of the thermal relief valve SP-1051 will not be affected which protects the penetration piping from thermal over pressurization when the isolation valves are closed.

4.1.2 Maintaining Sump Level Range

The Containment sump will be maintained in a 6" range (see section 3.1.2) which equates to a total volume of the following;

(6") x (22.44 gallons for a 1" level change) = 134.4 gallons

Therefore, with a leak rate into the containment sump of 0.1 gpm (assumed normal leak rate into sump based on trends) it would take the following time to increase level from the bottom to the top of the range;

(134.4 gallons) / (0.1 gpm) = 1344 minutes = 22.4 hours

The capacity of the one containment sump pump is 50 gpm. Therefore, it would take the following time to decrease the level from the top to the bottom of the range;

(134.4 gallons) / (50 gpm) = 2.7 minutes

Therefore, based on the above calculations the containment sump pump would cycle on automatically approximately every 22 hours and run for approximately 3 minutes.

4.1.3 Monitoring Sump In-Leakage Flow

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Two new computer points will be added to PMC. They will be utilized to monitor and alarm the Containment sump in-flow leakage to satisfy Technical Specification 3.4.5.1, RCS Leakage – Leakage Detection Systems.

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5.0 Engineering Instructions

None.

6.0 Engineered Materials List and Vendor Technical Information

None.

7.0 Special Process Requirements

None.

8.0 Tests & Inspections

None.

9.0 Attachments

9.1 Containment Sump Level Uncertainties

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Attachment 9.1
Resolution of Computer Point Impact on Accuracy

The process that will be used is to perform a calculation on the PMC that will compare Containment Sump level at the current time and compare it to a level some interval in the past using instrument SP IL6705 B (computer point A42613). The inaccuracies associated with the computer point will cancel each other when the two points are compared to each other. The only consideration for the computer point therefore is if the resolution of the computer point is sufficient to detect a 1 gallon per minute leakage within 60 minutes time frame.

The resolution available on the PMC according to procurement specification DES-I-012 is14 bits, however, the resolution is only 12 bits with sign and open thermocouple detect. Therefore a conservative estimate of 12 bits will be used. The conversion factor of 22.4 gallons per inch is used to relate containment sump level in inches to gallons. The span of instrument SP ILT6705 B is 15 feet.

The following calculation results in the resolution available on a computer point.

Span	= 15 feet
Conversion factor	= 22.4 gallons per inch
Resolution	= 12 bits
Resolution (feet)	= $15/2^{12}$ = 0.003662 feet (0.044 inches)

Resolution in gallons = (15 feet x 12 inches x 22.4 gallons per inch) / (2^{12})
Resolution in gallons = 0.984 gallons

A 1 gpm leak would cause a change of 60 gallons in one hour, which would equate to a level change of about 2.7 inches in the Containment Sump deep pit. Therefore, the existing level instrumentation is sufficient to indicate a 1 gallon per minute Containment Sump in-leakage flow rate.

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Attachment 9.1

References:

Document	Rev	Description
EC-I91-004	1	Containment Sump Level Instrumentation Loops Uncertainty Calculation
DCP-3504	1	Containment Sump Level Transmitter Replacement
B424 Sheet 623	21	Containment Pressure and SIS Sump Temp & Level Instrumentation Sh 1
B424 Sheet 624	23	Containment Pressure and SIS Sump Temp & Level Instrumentation Sh 2
B424 Sheet 861	19	Containment Sump Pumps
B424 Sheet 2964	3	QSPDS Misc Inputs Sheet 4
B425 L6705A	3	Control Loop Diagram SP-Containment Sump Level
B425 L6705B	2	Control Loop Diagram SP-Containment Sump Level
DES-I-012	0	Waterford 3 PMC Replacement/Upgrade
PASSPORT EDB		
SP ILS6705	4	Instrument Calibration Package
SP ILS6707	4	Instrument Calibration Package