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Early C. Ewing, III  
Director  
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Waterford 3

W3F1-98-0177  
A4.05  
PR

November 11, 1998

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

Subject: Waterford 3 SES  
Docket No. 50-382  
License No. NPF-38  
Response to NRC Generic Letter (GL) 98-04  
Potential for Degradation of the Emergency Core Cooling System and  
the Containment Spray System After a Loss-of-Coolant Accident  
Because of Construction and Protective Coating Deficiencies and  
Foreign Material in Containment

Gentlemen:

The purpose of this letter is to provide the Waterford 3 response to GL 98-04, dated July 14, 1998, which addresses issues regarding the potential for coating debris to impact operation of safety related systems, structures, and components (SSC) following a design basis loss of coolant accident (LOCA). The generic letter requested information on licensee programs for ensuring that Service Level 1 protective coatings inside the containment do not detach from their substrate and interfere with the operation of the Emergency Core Cooling System (ECCS) and the Containment Spray System (CSS).

The Waterford 3 response to GL 98-04 is provided in the Enclosure to this letter.

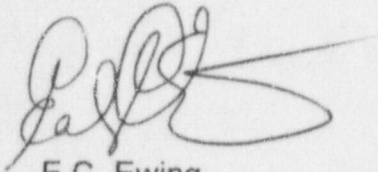
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Response to NRC Generic Letter (GL) 98-04  
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If you have any questions concerning this response, please contact myself at (504) 739-6242 or Roy Prados at (504) 739-6632.

Very truly yours,



E.C. Ewing  
Director  
Nuclear Safety & Regulatory Affairs

ECE/RWP/rtk

Attachment: Affidavit

Enclosure: Generic Letter 98-04 Response to Requested Information

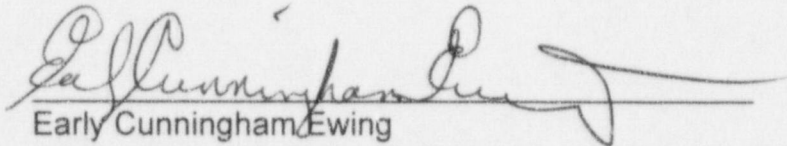
cc: E.W. Merschoff, NRC Region IV  
C.P. Patel, NRC-NRR  
J. Smith  
N.S. Reynolds  
J.R. Jolicoeur, NRC-NRR  
NRC Resident Inspectors Office

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the matter of )  
 )  
Entergy Operations, Incorporated ) Docket No. 50-382  
Waterford 3 Steam Electric Station )

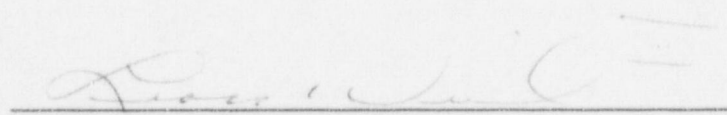
AFFIDAVIT

Early Cunningham Ewing, being duly sworn, hereby deposes and says that he is Director, Nuclear Safety & Regulatory Affairs - Waterford 3 of Entergy Operations, Incorporated; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the attached Response to NRC Generic Letter 98-04; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

  
Early Cunningham Ewing  
Director, Nuclear Safety & Regulatory Affairs -  
Waterford 3

STATE OF LOUISIANA )  
 ) ss  
PARISH OF ST. CHARLES )

Subscribed and sworn to before me, a Notary Public in and for the Parish and State above named this 11<sup>th</sup> day of November, 1998.

  
\_\_\_\_\_  
Notary Public

My Commission expires at death.



ENCLOSURE

Generic Letter 98-04 Response to Requested Information

## Generic Letter 98-04 Response to Requested Information

### ITEM 1:

A summary description of the plant-specific program or programs implemented to ensure that Service Level 1 protective coatings used inside the containment are procured, applied, and maintained in compliance with applicable regulatory requirements and the plant-specific licensing basis for the facility. Include a discussion of how the plant-specific program meets the applicable criteria of 10 CFR Part 50, Appendix B, as well as information regarding any applicable standards, plant-specific procedures, or other guidance used for: (a) controlling the procurement of coatings and paints used at the facility, (b) the qualification testing of protective coatings, and (c) surface preparation, application, surveillance, and maintenance activities for protective coatings. Maintenance activities involve reworking degraded coatings, removing degraded coatings to sound coatings, correctly preparing the surfaces, applying new coatings, and verifying the quality of the coatings.

### ITEM 1 RESPONSE:

Programs exist at Waterford 3 which provide controls for the procurement, application, and maintenance of Service Level 1 protective coatings used inside the containment in a manner that is consistent with the Waterford 3 licensing basis and regulatory requirements. The requirements of 10 CFR Part 50 Appendix B are implemented through specification and procedures which delineate appropriate technical and quality requirements for the Service Level 1 coatings program that include ongoing maintenance activities. Adequate assurance that the applicable requirements for the procurement, application, inspection, and maintenance are implemented is provided by the procedures and programmatic controls, approved under the Waterford 3 Quality Assurance Program.

Waterford 3 Service Level 1 coatings were selected and tested to meet design basis accident and normal conditions. Section 6.1.2.1 of the FSAR states that these coatings meet the requirements of ANSI Standards N5.12, "Protective Coatings (Paints) for the Nuclear Industry," dated June 20, 1974 and N101.2, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities," dated May 30, 1972. The FSAR also states that quality assurance during manufacturing, transportation and storage is in compliance with ANSI Standard N101.4, "Quality Assurance for Protective Coating Applied to Nuclear Facilities," dated November 1972, in conjunction with the general quality assurance requirements of N45.2, "Quality Assurance Program Requirements for Nuclear Power Plants."

- (a) Service Level 1 coatings used for new applications or repair/replacement activities are procured from vendors with a quality assurance program meeting the requirements of 10 CFR Part 50 Appendix B. Waterford 3 specifies the applicable technical and quality requirements a vendor is required to meet in procurement documents. Acceptance activities are conducted in accordance with procedures consistent with ANSI N45.2 requirements (e.g., receipt inspection, source surveillance, etc.). The specification of required technical and quality requirements combined with appropriate acceptance activities provides adequate assurance that the coatings received meet the requirements of the procurement documents.
- (b) The qualification testing of Service Level 1 coatings used for new applications or repair/replacement activities inside the containment meets the applicable requirements contained in the standards referenced above. These requirements are stated in the procurement documents. Minimal amounts of coatings on equipment that do not meet the required qualification testing for Service Level 1 coatings are maintained in an indeterminate coatings log per procedure. Since Waterford 3 evaluated the potential adverse effects of the failure of coatings inside the containment using highly conservative assumptions (refer to the response to Item 2(ii)), these minimal amounts of coatings will not adversely affect the performance of post accident fluid systems.
- (c) The surface preparation, application and surveillance during installation of Service Level 1 coatings used for new applications or repair/replacement activities inside containment meet the applicable portions of the standards referenced above. Documentation of completion of these activities is performed consistent with the applicable requirements. Procedures are in place to ensure the above activities are performed in accordance with standards reference above.

Waterford 3 periodically conducts condition assessments of Service Level 1 coatings inside the containment as a result of a commitment to the NRC in Letter W3P85-0449, "LP&L Report on the Evaluation of Containment Coatings," dated February 27, 1985. A visual inspection of affected areas of the containment is performed every refueling outage to detect any current or incipient failures on coated surfaces. As areas of degraded coatings are identified, those areas are evaluated and scheduled for repair or replacement, as necessary. Repairs of all deficient areas are performed in accordance with approved specifications and procedures pursuant to ANSI N101.2, N5.12, and N101.4.



**ITEM 2:**

Information demonstrating compliance with item (i) or item (ii):

- (i) For plants with licensing-basis requirements for tracking the amount of unqualified coatings inside the containment and for assessing the impact of potential coating debris on the operation of safety-related SSCs during a postulated design basis LOCA, the following information shall be provided to demonstrate compliance:

**ITEM 2(i) RESPONSE:**

Waterford 3 does not have a licensing-basis requirement for tracking the amount of unqualified coatings inside the containment.

- (ii) For plants without the above licensing-basis requirements, information shall be provided to demonstrate compliance with the requirements of 10CFR50.46b(5), "Long-term cooling" and the functional capability of the safety-related CSS as set forth in your licensing basis. If a licensee can demonstrate this compliance without quantifying the amount of unqualified coatings, this is acceptable.

**ITEM 2(ii) RESPONSE:**

The following describes the licensing basis for Waterford 3 relative to conformance with 10 CFR 50.46(b)(5), "Long-term cooling," specifically with regard to Waterford 3's ability to provide extended decay heat removal including related assumptions for debris that could block containment emergency sump screens.

The Safety Injection System (SIS) sump provides water to the Safety Injection and Containment Spray (CS) pumps during the long term cooling mode of operation. Design of the SIS sump meets Regulatory Guide 1.82 Revision 0, "Sumps for Emergency Core Cooling and Containment Spray Systems," with the exceptions described in the FSAR, and acknowledged by the NRC in the Safety Evaluation Report (SER), July 1981. The Waterford 3 FSAR Section 6.2.2.2.1, "SIS Sump Design," and design basis document W3-DBD-001, "Safety Injection System," describes the design. Section 6.2.2 of the SER states that the NRC reviewed the design of the sump and concluded the SIS sump design was acceptable. Waterford 3 has not made modifications to the sump design since the SER that changes the information provided to the NRC concerning the SIS sump.

Waterford 3 analyzed the sump performance with 50 and 65.5 percent blockage. The 50 percent blockage was based on the blockage recommended in Regulatory Guide 1.82 and the 65.5 percent blockage was based on the blockage due to assumed failed coatings in the containment. The details of the analyses are described below. In both cases, it was demonstrated that even with this blockage the systems designed to meet 10CFR50.46b(5) would continue to provide sufficient cooling flow.

In accordance with Regulatory Guide 1.82, Waterford 3 has evaluated the systems that draw from the sumps for emergency core cooling and containment spray systems (CSS) assuming the sump experiences 50 percent effective sump area blockage from debris generated as a result of a loss of coolant accident (LOCA). Sump performance was tested under these conditions utilizing SIS sump full-scale model testing. Testing was performed to evaluate the sump for vortex formation head losses. During these tests, no distinction was drawn between the various potential sources for post-LOCA debris; these systems were intended to function, even with debris partially obstructing the sumps, from whatever source derived. The analyses submitted as part of the licensing basis for Waterford 3 demonstrate that even with 50 percent blockage, the emergency core cooling and containment spray systems will continue to provide sufficient cooling flow as to fulfill the long-term cooling functions required to conform with 10 CFR 50.46(b)(5).

The NRC accepted these analyses and these systems as meeting the requirements of 10 CFR 50.46(b)(5) in SER Supplement No. 4 (Waterford 3 SSER 4) Section 6.3, dated October 1982. More recently, the NRC received the Waterford 3 response to Generic Letter 97-04, "Assurance of Sufficient Net Positive Suction Head For Emergency Core Cooling and Containment Heat Removal Pumps," which confirmed the adequacy of the net positive suction head (NPSH) available for the Containment Spray and High Pressure Safety Injection Pumps.

NFP-26 License Condition 2.C.16 required Waterford 3 to provide an evaluation of the potential adverse effects of the failure of coatings inside the containment on post accident fluid systems. In the evaluation that was performed, highly conservative assumptions were postulated and the protective coatings on all of the structural steel, uninsulated piping, and the containment vessel dome and liner plates were assumed to fail, approximately 375,725 sq. ft. of coatings. In actuality, less than 15,100 sq. ft. of the paint in the containment is considered unqualified. The evaluation determined that the SIS and the CSS would remain functional using the highly conservative assumptions stated above. The evaluation determined that the pool velocities 3.42 ft. or farther from the SIS Sump screens are not high enough to transport coatings debris to the sump screen. The evaluation also determined that the effect of coating failures near the



sump (i.e., coatings falling into an area near the SIS Sump surface) would result in 34.5 percent of the vertical SIS screen area remaining unblocked (65.5 percent blocked) as to not degrade sump performance. This unclogged area is more than sufficient to prevent surface vortexing and to provide adequate NPSH.

The secondary effects of paint debris ingestion by post accident fluid systems were also evaluated. The evaluation determined that there are no components in the post accident fluid systems that are susceptible to degradation resulting from paint debris because of the small size of the paint particle and the low flow of the crucial areas. This conclusion was predicated on the assumption that paint chips could reach the SIS Sump screen, pass through the screen, and enter the post accident fluid systems. The evaluation covered the SIS, CSS, and the Nuclear Steam Supply System.

In SER Supplement No. 10 (Waterford 3 SSER 10) Section 6.1.2, dated March 1985, the NRC concluded there was reasonable assurance that debris generated by the failure of unqualified coatings inside the containment under design basis accidents will not adversely affect the performance of post accident fluid systems pending confirmatory evaluations by Waterford 3. In a letter from the NRC to Waterford 3 dated August 7, 1985, the NRC stated they had received the confirmatory evaluation and considered the unqualified coating issued fully resolved. Waterford 3 has not made modifications to the inside of containment which change the conclusions of the evaluations submitted to the NRC.

The licensing basis for Waterford 3, as accepted by the NRC's SER and SSERs, and as implemented through specifications and procedures provide both the regulatory and safety basis for safety system performance.

**ITEM 2(ii) (2):**

**If commercial-grade coatings are being used at your facility for Service Level 1 applications, and such coatings are not dedicated or controlled under your Appendix B Quality Assurance Program, provide the regulatory and safety basis for not controlling these coatings in accordance with such a program. Additionally, explain why the facility's licensing basis does not require such a program.**

**ITEM 2(ii) (2) RESPONSE:**

Commercial-grade coatings are not used at Waterford 3 for Service Level 1 applications. Coatings used in Service Level 1 applications are controlled under the Appendix B Quality Assurance Program.