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ACCESSION NBR:8111130582 DOC.DATE: 81/11/06 NOTARIZED: NO DOCKET #:
FACIL:50-244 Robert Emmet Ginna Nuclear Plant, Unit 1, Rochester G 05000244
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CRUTCHFIELD,D. Operating Reactors Branch 5

SUBJECT: Fulfills SEP redirection commitment for assessment of SEP Topic VI-1, "Organic Matls & Post-Accident Chemistry." Post-accident chemistry assessment & Wyle Lab rept "Analysis of Decomposition Effects of Vinycel Insulation in DBA" encl.

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JOHN E. MAIER
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November 6, 1981

Director of Nuclear Reactor Regulation
Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: SEP Topic VI-1, Organic Materials and Post-Accident Chemistry
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Crutchfield:

As part of the "SEP Redirection," Rochester Gas and Electric committed to provide certain topic assessments to the NRC. These would be based on "lead topic" assessments completed by the NRC. Two enclosures are being submitted. Enclosure 1 provides a topic assessment for the "post-accident chemistry" portion of SEP Topic VI-1, Organic Materials and Post-Accident Chemistry. Enclosure 2 provides responses to a letter from Vincent S. Noonan to Gus C. Lainas, dated January 17, 1981, requesting information about the Ginna "Vinylcel" insulation. The "organic materials" portion of this topic assessment will, by agreement, be performed by the NRC, using this response. Enclosure 2 includes as an attachment a Wyle Laboratory report "Analysis of the Decomposition Effects of Vinycel Insulation in a Design Basis Accident." The conclusion is reached that no significant safety problem exists. However, additional information on the effect of aqueous hydrochloric acid on the Ginna Carbo Zinc 11/Phenoline 305 coating system would be useful. RG&E is still pursuing any such available information.

Very truly yours,

John E. Maier

John E. Maier

Enclosure

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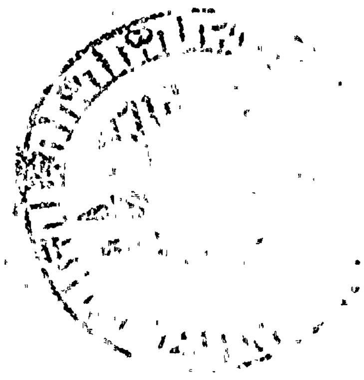

Enclosure 1: Assessment for SEP Topic VI-1, "Post-Accident Chemistry," for R. E. Ginna Nuclear Unit I

I. Introduction

Low pH solutions that may be recirculated within the containment after a Design Basis Accident (DBA) may accelerate chloride stress corrosion cracking and increase the volatility of dissolved iodines. The objective of Topic VI-1 is to assure that appropriate methods are available to raise or maintain the pH of solutions expected to be recirculated within containment after a DBA.

Post Accident Chemistry: An assessment of post accident chemistry includes a determination of proper water chemistry in the containment spray during the injection phase following a DBA and an assessment that appropriate methods are available to raise or maintain the pH of mixed solution in the containment sump.

II. Review Criteria

Post Accident Chemistry: The design was reviewed with regard to General Design Criterion 14, "Reactor Coolant Pressure Boundary" of Appendix A to 10 CFR Part 50. This requires that the reactor coolant pressure boundary be designed and erected so as to have an extremely low probability of abnormal leakage and gross rupture. Also considered in the review was General Design Criterion 41, "Containment Atmosphere Cleanup," of Appendix A to 10 CFR Part 50. This requires that systems be provided to reduce the concentration and quality of fission products released to the environment following a postulated accident.

III. Related Safety Topics

The effectiveness of the iodine removal system is evaluated as part of Topic XV-19, for a spectrum of loss-of-coolant accidents.

Topic VI-7.E reviews the ECCS in the recirculation mode to confirm the effectiveness of the ECCS.

IV. Review Guidelines

Post Accident Chemistry: Guidance for the review of post accident chemistry is provided in Sections 6.1.1, 6.1.2, and 6.5.2 of the Standard Review Plan. Sections 6.1.1 and 6.1.2 are related to assuring that appropriate methods are available to raise or maintain the pH of the mixture of the containment spray, ECCS water, and chemical additives for reactivity control and iodine fission product removal in

[illegible]

the containment sump during the recirculation phase and to preclude long term corrosion problems after the accident. Section 6.5.2 is related to providing proper water chemistry in the containment spray during the injection phase following a Design Basis Accident.

V. Evaluation

The Containment Spray System, used both to reduce post-DBA containment pressure and to remove post-accident fission products from the containment atmosphere (especially radioactive iodine), is automatically actuated by a high-high containment pressure signal. The system draws borated water, maintained at 2000-2300 ppm boron, directly from the refueling water storage tank. There is also a 30 w/o sodium hydroxide solution stored in a 5100 gallon storage tank. Air operated valves will open to direct a total of 20-30 gpm NaOH to the spray system by means of eductors. The valves have a two-minute delay timer, which would allow the operator to prevent NaOH addition if it were not deemed necessary. However, the Ginna Emergency Procedures have been modified, to prevent the operator from taking such preventive action.

The following range of parameters corresponding to the flows in each containment spray "train", were used to evaluate the upper and lower limits of pH in the containment spray following a design basis loss of coolant accident.

<u>Minimum pH</u>
RWST: 1650 gpm at 2300 ppm boron
NaOH Tank: 10 gpm at 30 weight percent

The resulting solution had a pH of 8.3.

<u>Maximum pH</u>
RWST: 1200 gpm at 2000 ppm boron
NaOH Tank: 15 gpm at 30 weight percent

The resulting solution had a pH of 9.1.

The pH range of these solutions are comparable to the guideline values of SRP 6.1 and BTP MTEB 6-1 (pH should be greater than 7.0), and the guideline values of SRP 6.5.2 (pH range should be 8.5-11.0).

The following range of parameters were used to evaluate the upper and lower limits of pH in the sump following a design basis loss of coolant accident:

<u>Minimum pH</u>
RWST: 300,000 gal at 2300 ppm boron
Boric Acid Tanks: 6000 gal at 20,000 ppm boron
Reactor Coolant System: 46713 gal at 1000 ppm boron
Accumulators: 2216 gal at 1800 ppm boron
NaOH Tank: 4500 gal at 30 weight per cent

The resulting mixed sump solution had a pH of 9.0.

Maximum pH
RWST: 215,000 gal at 2000 ppm boron
Boric Acid Tanks: 3000 gal at 20,000 ppm boron
Reactor Coolant System: 46713 gal at 0 ppm boron
Accumulators: 2268 gal at 1800 ppm boron
NaOH Tank: 2700 gal at 30 weight per cent

The resulting mixed sump solution had a pH of 10.3.

The pH range of these solutions are comparable to the guideline values of SRP 6.1 and BTP MTEB 6-1 (pH should be greater than 7.0), and the guideline values of SRP 6.5.2 (pH range should be 8.5-11.0).

Additional information relative to the use and effectiveness of the Ginna Containment Spray System is provided in the Ginna FSAR; Section 6.4.3; Appendix 6A, "Iodine Removal Effective Evaluation of the Containment Spray System"; Appendix 6C, "Design Intention Regarding the Slection of a Spray Additive"; and Appendix 6E, "Materials Compatability Review."

A review was made of the present Ginna Technical Specifications. The limiting conditions for operation, section 3.3.2, is very similar to Section 3.6.2.2 of the Westinghouse Standard Technical Specifications. These Ginna Technical Specifications are written in accordance with current regulatory practice, and are thus considered acceptable.

The "Surveillance Requirements" of the Ginna Technical Specifications, section 4.5, provide for demonstration of operability of the containment spray system pumps, valves, and nozzles. Table 4.1.2 of the Ginna Technical Specifications provide for monthly testing of the spray additive tank solution concentration, as is provided in the Westinghouse Standard Technical Specifications, section 4.6.2.2. The spray additive tank is provided with both a local and a main control board indication of level. The level indicating alarm has a low level set point of 40%. The spray additive flow rate is tested monthly. Thus, although these latter two items do not have Technical Specifications, provisions are in place to ensure proper operation. The need to include additional requirements into the Technical Specifications will be evaluated during the Ginna Integrated Assessment.

VI. Conclusions

Post Accident Chemistry: On the basis of the above evaluation, we conclude that the R. E. Ginna Iodine Removal System meets the post accident chemistry requirements of SRP 6.5.2 and GDC 41, SRP 6.1.1 (BTP MTEB 6-1), SRP 6.1.2, and GDC 14 and is, therefore, acceptable.

The need for an additional Technical Specification regarding surveillance requirements for the spray additive system will be determined during the Integrated Assessment.

VII. References

1. Rochester Gas and Electric Corporation, Robert Emmett Ginna Nuclear Power Plant Unit No. 1, Final Facility Description and Safety Analysis Report (FSAR), Volume 2, Chapter 6.

2. R. E. Ginna Plant Technical Specifications.

3. NUREG-0452, Standardized Technical Specifications for Westinghouse PWR's, June 15, 1978.

Enclosure 2: Response to January 17, 1981 Questions Regarding the R. E. Ginna Vinycel Insulation

1. The total weight of insulating foam in the containment building.

Response: The insulated area of containment is 36,181 ft^2. At a 4 lb/ft^2 density and a 1¼" thickness, the total weight of Vinylcel is about 15,075 pounds.

2. An estimate of the amounts of each gas, such as hydrogen, organic gases and hydrogen chloride, which would be produced by radiation from the decomposition of the foam during a DBA.

Response: See attached "Analysis of the Decomposition Effects of Vinycel Insulation in a Design Basis Accident," by J. F. Gleason, M. Bruce, and R. Thame of Wyle Laboratories, September 28, 1981.

3. Paths, if any, by which these gases might escape from the stainless steel boxes and enter the containment under accident conditions.

Response: For purposes of this analysis, it was assumed that all of the escaped gases resulting from Vinycel decomposition could escape.

4. The results of an analysis of the contribution of hydrogen and other gases generated from the foam to the amounts of combustible gases produced from other sources during a DBA.

Response: See attached report.

5. The results of an analysis of the effect of the hydrogen chloride generated during a DBA, including corrosion of components in the containment building.

Response: See attached report.