September 20, 2007

MEMORANDUM TO: Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Peter Bamford, Project Manager ***/ra/***
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

SUBJECT: THREE MILE ISLAND, UNIT NO. 1 - ELECTRONIC TRANSMISSION, DRAFT REQUEST FOR ADDITIONAL INFORMATION REGARDING REACTOR BUILDING SUMP PH CONTROL SYSTEM BUFFER CHANGE (TAC NO. MD5963)

The attached draft request for additional information (RAI) was sent by electronic transmission on September 18, 2007, to Mr. David Distel, at AmerGen Energy Company, LLC (AmerGen). This draft RAI was transmitted to facilitate the technical review being conducted by the Nuclear Regulatory Commission (NRC) staff and to support a conference call with AmerGen in order to clarify certain items in the licensee's submittal. The draft RAI is related to AmerGen's submittal dated June 29, 2007, regarding a proposed change to the reactor building sump pH buffering agent from sodium hydroxide to trisodium phosphate. The draft questions were sent to ensure that the questions were understandable, the regulatory basis for the questions was clear, and to determine if the information was previously docketed. Additionally, review of the draft RAI would allow AmerGen to determine and agree upon a schedule to respond to the RAI. This memorandum and the attachment do not represent an NRC staff position.

Docket Nos. 50-289

Enclosure: As stated

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DRAFT

REQUEST FOR ADDITIONAL INFORMATION

REGARDING REACTOR BUILDING SUMP

PH CONTROL SYSTEM BUFFER CHANGE

THREE MILE ISLAND UNIT 1

DOCKET NOS. 50-289

By letter dated June 29, 2007, (Agencywide Documents Access and Management System Accession No. ML072070257), AmerGen Energy Company, LLC, the licensee, submitted a license amendment request pertaining to the replacement of the containment sump buffer at Three Mile Island (TMI), Unit 1.

The Nuclear Regulatory Commission (NRC) Staff has been reviewing the submittal and has determined that additional information is needed to complete its review.

1. In section 7.1, page 15 of Attachment 2 the licensee listed eight chemicals which will exist in the sump water after a loss of coolant accident (LOCA). In its analysis the licensee assumed that each of them will dissociate or speciate into positive or negative ionic species. By balancing the resulting positive and negative charges, to obtain neutrality of the solution, the licensee could determine the amount of trisodium phosphate (TSP) required for obtaining a given value of pH. Provide a list of the ionic species.

2. Describe the procedure for determining speciation of boron and TSP.

3. Explain the numerical data on page 16 of Attachment 2.

4. Explain the statement in section 2.6 on page 5 of Attachment 2 that “boron content will not be exceeded provided the power rate does not increase (2568 MWt) and the cycle duration (2 years) does not increase.”

5. In section 6, on page 13 of Attachment 2, it is stated that water and boric acid in the sump is determined from a mass balance with two bounding conditions for water and boric acid. What are they and how were they determined?

6. According to Regulatory Guide 1.183, if the sump pH is controlled at the minimum values of 7, the molecular iodine is prevented from formation and release to the containment. However, during the engineered safety feature (ESF) recirculation phase, a higher pH is assumed to support iodine flashing fractions at 5% for the first 24 hours and 2% for the following 29 days. In the submittal the licensee specified the required pH ≥7.3. Discuss: (1) the methodology for determining this pH value and (2) was the sump water pH buffered at this pH?

Enclosure

7. Proposed insert C to technical specification (TS) page 4-2b describes the need to perform periodic solubility tests on the TSP to ensure adequate dissolution time. However, Insert D to the proposed TS surveillance requirements, TS page 4-10c, does not include solubility as one of the verifications performed on the TSP. Describe this apparent discrepancy between the TS bases and the TS surveillance requirement.

8. When verifying the TSP buffering capability, solubility, and total mass, how is the sample obtained? How does the sampling account for the potential that the TSP on the interior of the basket may exhibit different properties (hydration, density, etc.) than samples taken from the basket periphery? Discuss the potential impact that variations in material properties within each basket may have on surveillance tests to determine buffer capability, solubility, and total mass of TSP available.

9. Proposed insert C to TS page 4-2b describes the need to periodically determine the mass of TSP because leaking valves and components may dissolve some of the TSP from the baskets. If a leaking valve or component were to result in a portion of the TSP being dissolved, how would the dissolved TSP be accounted for when adding additional TSP to the basket. If there is no mechanism for removing the dissolved TSP then addition of more TSP may result in a total mass that exceeds the TS limits. Discuss how the loss of TSP through operational dissolution is accounted for when determining the total mass of TSP.

10. TMI is proposing to switch to TSP as a buffering chemical. Testing indicates that TSP in the presence of dissolved calcium can result in rapid precipitation of calcium phosphate, which can create significant head loss across a sump strainer covered with a debris bed. Provide a list of all potential sources and amounts of calcium within the TMI containment and provide the calculated dissolved calcium concentration in a post-LOCA pool. Provide the relative chemical precipitate loading predicted by the WCAP 16530-NP model for TMI with TSP and at the maximum projected pH value (8) for the pool.