Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

November 4, 1992

Dr. Thomas E. Murley, Director
Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

Subject: LaSalle County Station Unit 1
Proposed Spent Fuel Pool Rerack Amendment
NRC Docket 50-373

Reference: September 30, 1992 B.L. Siegel letter to T.J. Kovach, Request for Additional Information (RAI), LaSalle Station, Unit 1 spent Fuel Pool Rerack

Dear Dr. Murley:

The referenced letter requested additional information to support NRC review of the proposed Technical Specification amendment request to rerack the Unit 1 Spent Fuel Pool. The questions pertain to heavy loads concerns and the spent fuel pool cooling system. Responses to these questions are included in the Attachment to this letter.

If you have any questions, please call this office.

Sincerely,

JoAnn Shields
Nuclear Licensing Administrator

Attachment

cc: A.B. Davis, Regional Administrator - RIII
B.L. Siegel, Project Manager - NRR
D.L. Hills, Senior Resident Inspector - LSCS
Office of Nuclear Facility Safety - IDNS

100028

A001
1/1

ZNLD2119/43

ATTACHMENT

A. HEAVY LOADS CONCERNS

Question A.1

In considering the drop of a rack (page 2-4 of the June 5, 1992, submittal) you select the heaviest rack, clearly a conservative assumption. However, you limit the drop from the pool water level, apparently not a conservative premise. Justify not having selected the top of the pool (or higher) as the level from which the rack could fall.

Response A.1

The apparent density of the LaSalle high density racks (weight divided by the external prismatic volume) is less than the density of water. As a result, the dropping of a rack from the maximum possible evaluation during the handling operations over the pool (less than 6 feet above the top of water) will provide a surface impact between the rack and the water mass, resulting in dissipation of the momentum of the falling rack through splashing of water. Following the abrupt deceleration, the rack will sink into the pool and accelerate downwards. The velocity of the rack as it propels towards the pool slab will essentially correspond to that of one starting its descent from the top of the water line. Therefore, simulating the drop of a rack from the top of the pool water surface is identical in its consequences to that from a higher evaluation.

Question A.2

Can the Unit 1 spent fuel pool (SFP) be completely separated from the Unit 2 pool by a valve, gate, or other means?

Response A.2

The Unit 1 and Unit 2 spent fuel pools are joined by a transfer canal and fuel storage vault. Each pool is separated from the transfer canal by gates.

Question A.3

On what basis can you exclude the possibility of a load drop which includes a rack and the 15 ton auxiliary hoist?

Answer A.3

The 15 ton auxiliary hoist and its connection to the main hoist is single-failure-proof.

Question A.4

The duality feature for the remotely engageable lifting rig includes dual load paths. However, each load path must be capable of supporting three times the load before any rig component is stressed to the yield point and five times the load before any component is stressed to the ultimate stress in order to be considered single-failure-proof. Does your rig conform to these criteria?

Answer A.4

The load transfer from the rack to the hoist hook occurs through a minimum of four independent paths. Failure of any one load path will not cause loss of load maintaining ability inasmuch as uncontrolled lowering of the rack cannot occur. Postulating the failure of one load path still retains the required margins, namely a factor of safety of three and five, respectively, between the material yield stress and the maximum primary stress in the rig, and the material ultimate stress and the maximum primary stress.

Question A.5

You appear to have mixed methods of resolving heavy load concerns in reracking the Unit 1 SFP by following guidelines (1) and (2) of Section 5.1, "Recommended Guidelines," of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants." Clarify which approach you are following and provide further details, if needed, or cite those already provided to delineate that approach.

Answer A.5

Our method of dealing with heavy load issues does indeed follow a mixed approach as provided for in Section 5.1.6 of NUREG-0612, which provides for improving the reliability of the handling system "through increased factors of safety and through redundancy or quality in certain active components." All components below the main hook, namely the intermediate hoist, the lift rig and the connecting assemblage (e.g. the turnbuckles) are single-failure-proof due to built-in redundancies.

The main crane, on the other hand, meets the enhanced reliability requirement through a large factor of safety (over 10) between its ultimate capacity and the maximum load being lifted (15 tons).

Question A.6

Do you plan to use the lifting rig for some time after reracking the Unit 1 SFP? If so, discuss your plans for maintaining compliance with ANSI N 14.5-1978.

Response A.6

CECo has no plans to reuse the lifting rig after the Unit 1 rerack is complete.

B. SPENT FUEL POOL COOLING

Question B.1

In your submittal you cite two cases of validated codes. These are (1) numerical integration code "Onepool," page 5-7, and (2) the code used for numerical integration of the last equation on page 5-7. Briefly describe the process of validation.

Response B.1

ONEPOOL integrates the governing differential equation (Equation 5.1 on page 5-6 in the licensing report) numerically to compute the pool water temperature T as a function of the time coordinate τ. ONEPOOL was benchmarked by running it against Holtec's older computer code BULKTEM which solves the governing differential equation analytically and provides the results by computing the value of T from the algebraic equations for T obtained from the analytical solution. BULKTEM was used in several dockets (such as Grand Gulf Unit One, Byron, Braidwood, and St. Lucie Unit One) before it was superseded by the more versatile code ONEPOOL. Nontheless, BULKTEM serves as a validation tool for ONEPOOL. The code TBOIL used to compute the time-to-boil and boil-off rate also uses the standard numerical integration procedure to solve for the dependent variables. It was validated by checking overall enthalpy balance and also by hand calculation.

Question B.2

In Section 9.1.3.1.1, "Safety Design Bases" of the LaSalle Updated Final Safety Analysis Report (UFSAR) the emergency heat load is calculated to be 42 MBTU/HR while you show a value of approximately 37 MBTU/HR on Table 5.8.2 of your submittal. Provide assurance that these values are not inconsistent or make the necessary changes in your calculations or in the UFSAR.

Response B.2

The reracking of the LaSalle Unit 2 spent fuel pool was approved as Amendment 48 to Facility Operating License NPF-18, Docket 50-374. The technical justification for the Unit 2 change documented the ability of one train of the spent fuel pool cooling system to remove the resultant heat due to a maximum heat generation rate of 42.0 MBtu/Hr. As a result of this amendment, the UFSAR section 9.1.3.1.1 was revised to reflect the worst case Emergency Heat Load, the Unit 2 value of 42.0 MBtu/hr.

Table 5.8.2 of the LaSalle Unit 1 rerack submittal reports a maximum heat generation rate of approximately 37 MBtu/Hr. CECo has evaluated the off-load scenarios associated with the two respective maximum heat generation rates and has concluded that the maximum heat generation loads shown on Table 5.8.2 are bounded by those previously documented for Unit 2. After NRC approval of the Unit 1 amendment, the UFSAR will be revised to reflect the Unit 1 rerack design.

Question B.3

Tech Spec 3.9.4 permits movement of irradiated fuel in the Unit 1 reactor vessel after a minimum decay (actually subcriticality) period of 24 hours, while your submittal regarding Cases I and II on page 5-4 states that offloading occurs after 100 hours decay in the reactor. What means have you taken to assure that spent fuel will not be moved before a decay period of 100 hours?

[illegible] B.3

[illegible] el handling procedure LFS-100-4, Core Alterations Shiftly [illegible] ance, will be revised to incorporate a decay period of 100 hours.

Question B.4

In discussing your calculations relating to bulk pool coolant temperatures (page 5-12) you note that system calculations indicate a total system flow rate of 5050 gpm in lieu of the 6000 gpm anticipated by Table 9.1-3 of the UFSAR. Discuss these results and show how you arrive at your estimate that such flow decrease will result in a bulk coolant temperature increase of less than 12°F.

Response B.4

The estimated upper bound on the expected temperature increase was based on previous experience of Holtec engineers with such analyses. To respond to this question, a rigorous calculation has been performed to obtain the pool temperature profile for the case of 5050 gpm spent fuel water rate. In order to perform this analysis the temperature effectiveness of the fuel pool heat exchanger for the reduced flow scenario had to be calculated. Calculations show that the effectiveness of cooler drops from 0.292 to 0.279 when the flow rate is reduced from 6000 gpm to 5050 gpm. ONEPOOL was utilized to determine the pool water temperature profile for Case II in Table 5.8.2 (the governing case). The temperature profile is shown in Figure 1, which indicates that the maximum pool water temperature is 128.6°F. Thus, the actual increase is only 1.4°F (128.6°F minus 127.2°F), which is conservatively bounded by the estimate of 12°F presented in the licensing report.

Question B.5

Provide an estimate of the decay heat generated and concomitant bulk coolant temperature in the event a normal offload is used to fill the SFP after reracking.

Response B.5

The NRC clarified that "normal offload" means normal fuel pool cooling system line-up, or one fuel pool cooling train in service.

As discussed in response to Question B.2, the off-load scenario, as described in paragraph 5.2 of Attachment B of our submittal, results in a heat rate of 37 MBtu/Hr. The comparable Unit 2 value is 42 MBtu/Hr. In Section 2.2.1 of the Safety Evaluation Report issued with Amendment 48 to Facility Operating License NPF-18, the NRC verified that one fuel cooling train was capable of maintaining the bulk pool temperature less than 140°F at a maximum heat generation rate of 42 MBtu/Hr. After evaluation of the off-load scenarios associated with the two respective maximum heat generation rates, CECo believes that the Unit 1 maximum heat generation rate of 37 MBtu/Hr is conservatively bounded by the Unit 2 value of 42 MBtu/Hr.

HOLTEC INTERNATIONAL

LASALLE UNIT 1 - CASE2 (HEAT EXCHANGER CAPACITY BASED ON 6060 GPM)

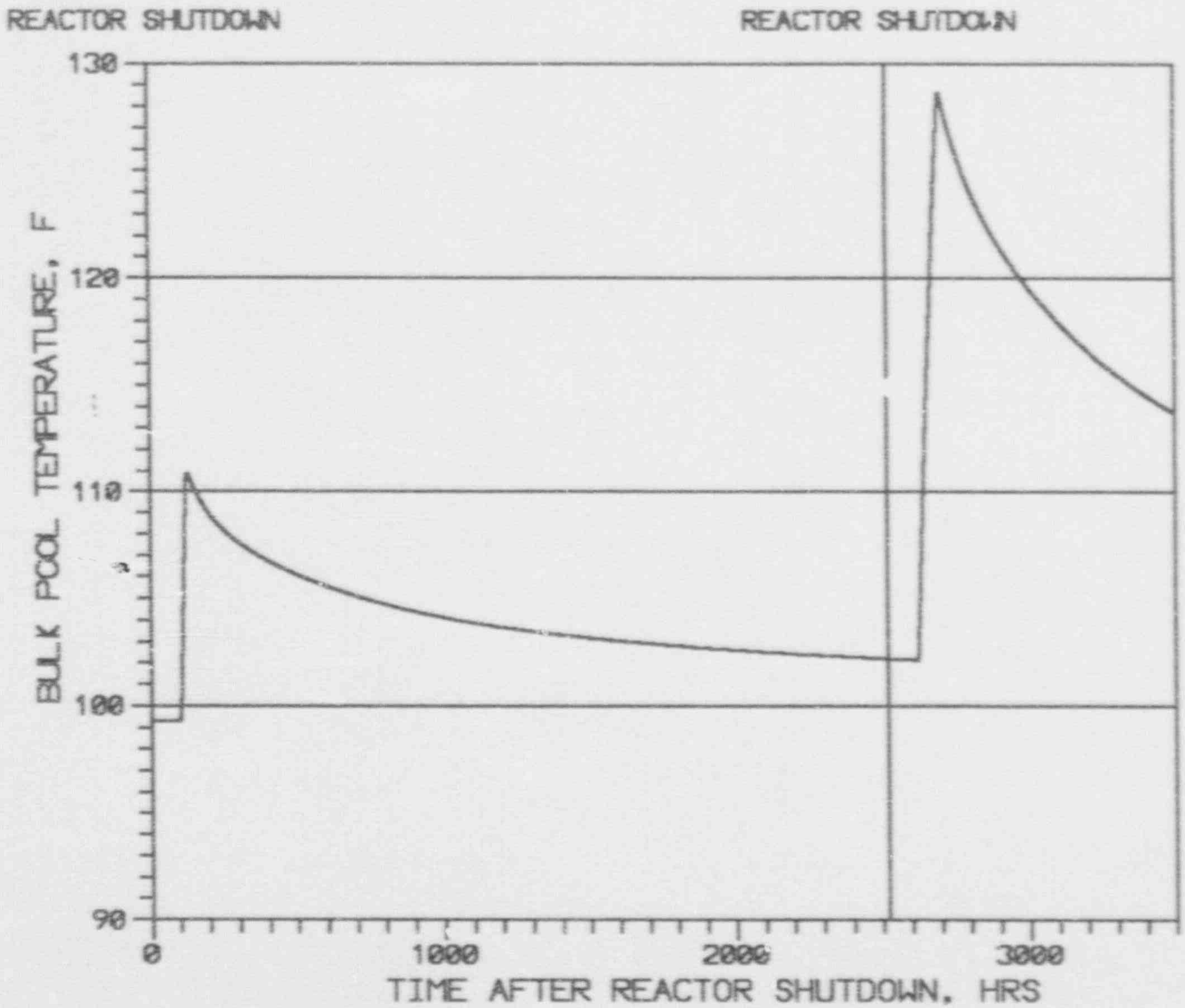

FIGURE 1