STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

April 18, 1994

Mr. William T. Russell, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Russell:

I have enclosed recent correspondence regarding a nuclear powered electric generating plant operating in Connecticut. The correspondence was received by Governor Weicker's office. The authors allege design deficiencies in the spent fuel pool at Millstone Unit I. The authors have raised safety concerns about the design characteristics of the residual heat removal system, which cools the spent fuel pool water. The allegers are concerned that the potential loss of fuel pool water during certain types of plant incidents would have catastrophic consequences.

The allegers are concerned with the fact that the U.S. Nuclear Regulatory Commission (NRC) is aware of, and has confirmed that these suspected design flaws exist at the Unit I facility. Since the U.S NRC is the cognizant federal agency regarding licensing of commercial nuclear power facilities, I would appreciate your technical attention, review and expedient response to these allegations.

Sincerely,

Kevin McCarthy

Kevin T.A. McCarthy
Director, Monitoring & Radiation
Bureau of Air Management

KM:ks
Encl

(Printed on Recycled Paper)
79 Elm Street • Hartford, CT 06106
An Equal Opportunity Employer

RECEIVED
GOVERNOR'S OFFICE
94 APR -8 PM 2:27
MAIL ROOM

April 5, 1994

David A. Lochbaum
80 Tuttle Road
Watchung, NJ 07060
(908) 754-3577

Donald C. Prevatte
7924 Woodsbluff Run
Fogelsville, PA 18051
(215) 398-9277

Governor Lowell P. Weicker, Jr.
State Capitol
Hartford, CT 06106

RECEIVED
APR 12 1994
DPS / Div. Fire & Bldg. Safety
Office of Emergency Management

Dear Governor Weicker:

In November 1992, the undersigned (engineers with 37 years combined experience in the nuclear power industry) reported to the United States Nuclear Regulatory Commission (NRC) a substantial safety hazard in the Susquehanna Steam Electric Station, a 2-unit nuclear power plant located in northeastern Pennsylvania. Because of design deficiencies, the potential exists for meltdown of irradiated nuclear fuel outside containment and the failure of emergency systems in the plant for the design basis accident. The consequences of such an accident would be deaths, injuries, and massive contamination of the surrounding countryside. We are also concerned with the approximately thirty five other nuclear units in the United States which have a similar design as the Susquehanna plant.

Subsequent evaluations by the plant's owners and the NRC have confirmed our concerns, and the NRC confirmed that these design deficiencies were the result of the owners having failed to meet numerous regulatory requirements at the time the plant was licensed - requirements which are still not being met. However, the NRC has failed to require the owners to correct the discrepancies in the Susquehanna plant or any of the other plants. Additionally, the NRC has demonstrated an attitude of complacency and even reluctance in resolving these concerns. Moreover, the NRC recently ruled that since the failures to comply with the regulations had not been identified by the owners or the NRC at the time of licensing, the requirement to comply was not within the plant's licensing basis, thus paving the way for more delays and the eventual dismissal of these discrepancies as insignificant, as they have done in several recent similar cases.

We believe that without outside intervention, the NRC will continue on their current path, and therefore, we have contacted the Chairmen of three Congressional Subcommittees with NRC oversight responsibilities, Senator Joseph Lieberman, Congressman Richard Lehman, and Congressman Phillip Sharp. We also feel responsible for informing officials in those states in which the other thirty five high risk nuclear units are located so that they may also pursue all available means to resolve these concerns. That is the reason for this letter. In Connecticut, the Millstone Unit 1 plant is of similar design.

Enclosed is a white paper which provides more details of these concerns. If after reading this you have any questions or comments, please do not hesitate to contact us at any time.

We appreciate very much your attention in this matter, and we look forward to a safe resolution.

Sincerely,

David A. Lochbaum

Donald C. Prevatte

Substantial Nuclear Safety Hazard
Loss of Spent Fuel Pool Cooling

A substantial nuclear safety hazard has been identified at the Susquehanna Steam Electric Station (SSES), a two-unit nuclear power plant located in Luzerne County, Pennsylvania about 30 miles southwest of Wilkes-Barre. The plant is owned by the Pennsylvania Power & Light Company (PP&L) and others. This hazard was identified to PP&L more than two years ago and to the U. S. Nuclear Regulatory Commission (NRC) approximately a year and a half ago. To date, this hazard has not been properly addressed by either PP&L or the NRC.

The level of hazard is such that were an accident to occur at Susquehanna similar to the Three Mile Island accident, the probability is very high that there would be numerous deaths and injuries and that the surrounding countryside would become uninhabitable for decades; in other words, an accident of Chernobyl proportions. The purpose of this paper is to explain the basic elements of this extremely complex technical issue, as well as the applicable regulatory requirements which have not been complied with by PP&L or the NRC.

Each unit in the Susquehanna plant contains a General Electric Boiling Water Reactor. Nuclear fuel is contained in reactor vessels which are housed within primary containments constructed of steel and reinforced concrete. Secondary containments (also called reactor buildings) surround these primary containments, as well as the spent fuel pools which are located on a refueling floor common to both units (see Figure 1 for a simplified arrangement drawing). Most of the plant's emergency systems as well as the systems for cooling the spent fuel pools are also located inside the secondary containments.

The spent fuel pools are used for storing the extremely radioactive spent fuel when it is removed from the reactors after this fuel can no longer produce power. The water in the pools serves two functions: First, it provides shielding from the radioactivity to allow the spent fuel to be handled by the operators using remote handling equipment. Second, the water serves as the medium to transport heat away from the spent fuel to the atmosphere by way of the Fuel Pool Cooling System and the Cooling Towers.

Federal regulations require nuclear facilities to be designed to prevent undue risk to the health and safety of the operators and the general public, even under the worst credible accident conditions. One of the accidents for which the facility must be designed is the "*design basis loss-of-coolant-accident*" (DBA LOCA). This is a sudden and complete break of the largest diameter pipe connected to the reactor vessel. If such a break were to occur, high pressure water and steam (approximately 1,000 pounds per square inch and 550°F) would be released into the primary containment, and numerous emergency systems would be automatically started to provide replacement cooling water to the reactor vessel and to contain the radioactive materials which could be released from the reactor.

One of the regulations which mandates the margins of safety for such an accident is Regulatory Guide 1.3 (the requirements of this "Guide" are mandatory). This document specifies that a substantial degree of nuclear fuel failure must be assumed in designing for the accident, and it also specifies the primary containment leakage rate which must be assumed. These required assumptions are consistent with the actual conditions which were experienced in the Three Mile Island accident. When analyses are performed using these assumptions, they reveal that for such an accident, the radiation levels inside the normally accessible reactor building would be so high as to prohibit safe operator entry.

The same accident signals which automatically start the emergency systems also turn off the electrical power to the Fuel Pool Cooling System. Thus, the accident results in the loss of cooling for the spent fuel pool. In order to restart the Fuel Pool Cooling System, operators must enter the reactor building. However, as described above, radiation levels would prohibit safe entry. Therefore, the system cannot be restarted.

If cooling is not restored, the water in the spent fuel pool will eventually boil. The time to boiling is dependent on the number of spent fuel bundles stored in the pool and the length of time since they were removed from the reactor. This time could be in as little as 20 hours for design fuel pool loading conditions, or as much as 55

Substantial Nuclear Safety Hazard
Loss of Spent Fuel Pool Cooling

hours for the current loading of the Unit 1 fuel pool. If the fuel pool boils, its water will rapidly evaporate, and replacement water must be provided. If it is not, within a short time the extremely radioactive spent fuel bundles, which are normally covered with water, will be uncovered. However, the valves which must be opened to provide this replacement water are also within the inaccessible reactor building. Therefore, the replacement water cannot be provided.

The consequences of uncovering the spent fuel would be catastrophic. First, onsite and offsite radiation would soar to extremely high levels - so high as to prevent any further intervention by the operators. Nothing could be done at this point to reverse the course of the accident. Without the cooling effect of the boiling water, the spent fuel in the pool would meltdown, and massive amounts of airborne radioactivity would be released outside the primary containment.

Even if early in the accident the operators would resort to the heroics of entering the reactor building to restart the Fuel Pool Cooling System, the system is not designed to operate in the extreme temperature, humidity, and radiation conditions which would be present. Therefore, the system could be assumed to fail. And since it does not possess the redundant design features present in emergency systems, any failure would cause a complete loss of fuel pool cooling capability.

Additionally, even if the Fuel Pool Cooling System could be restarted and no failures occurred, the plant Emergency Procedures have required the operators to disconnect power to the system at 24 hours into the accident.

PP&L and the NRC have contended that another system, the Residual Heat Removal (RHR) System, could be operated to cool the spent fuel pool. But analyses and tests by PP&L have demonstrated that this system cannot cool the fuel pool under accident conditions. Additionally, even if it could, its valves are also in the inaccessible reactor building. Furthermore, attempted operation in this manner would transport highly radioactive accident water to the fuel pool, significantly increasing the operator and public radiation exposures.

Even if replacement water could be provided to prevent the spent fuel from being uncovered, the temperature and humidity conditions which would be generated in the reactor building due to the boiling would cause the emergency systems to fail since none of them have been designed for these conditions. Their failure would cause additional meltdown of the fuel in the reactor and also failure of the primary and secondary containment. Additionally, the condensation from the pool would cause flooding of the reactor building basement where the emergency pumps are located, thereby causing their failure if they had not already failed due to the environmental conditions.

This scenario is not science fiction. Following the Three Mile Island accident in March 1979, the containment could not be entered for nearly a year due to the radiation. But the Three Mile Island spent fuel pool was never in jeopardy because it was outside the reactor building where it was not affected by the accident, and the operators had unimpeded access. If such an accident were to occur at Susquehanna, the results would be disastrous.

And the concern is not confined to Susquehanna. Approximately one third of the 109 nuclear power plants in the United States are of similar design. Many of these plant are expanding the spent fuel pool capacities, which will increase the risk.

Even though these concerns were reported to the NRC a year and a half ago, to date, they have not required any action at Susquehanna or any other plant. Additionally, the NRC recently ruled that even though regulations have existed since long before Susquehanna was licensed which required plants to be designed for these eventualities, since neither PP&L nor the NRC identified these concerns at the time of licensing, the requirement to consider them now is outside the licensing basis for the plant.

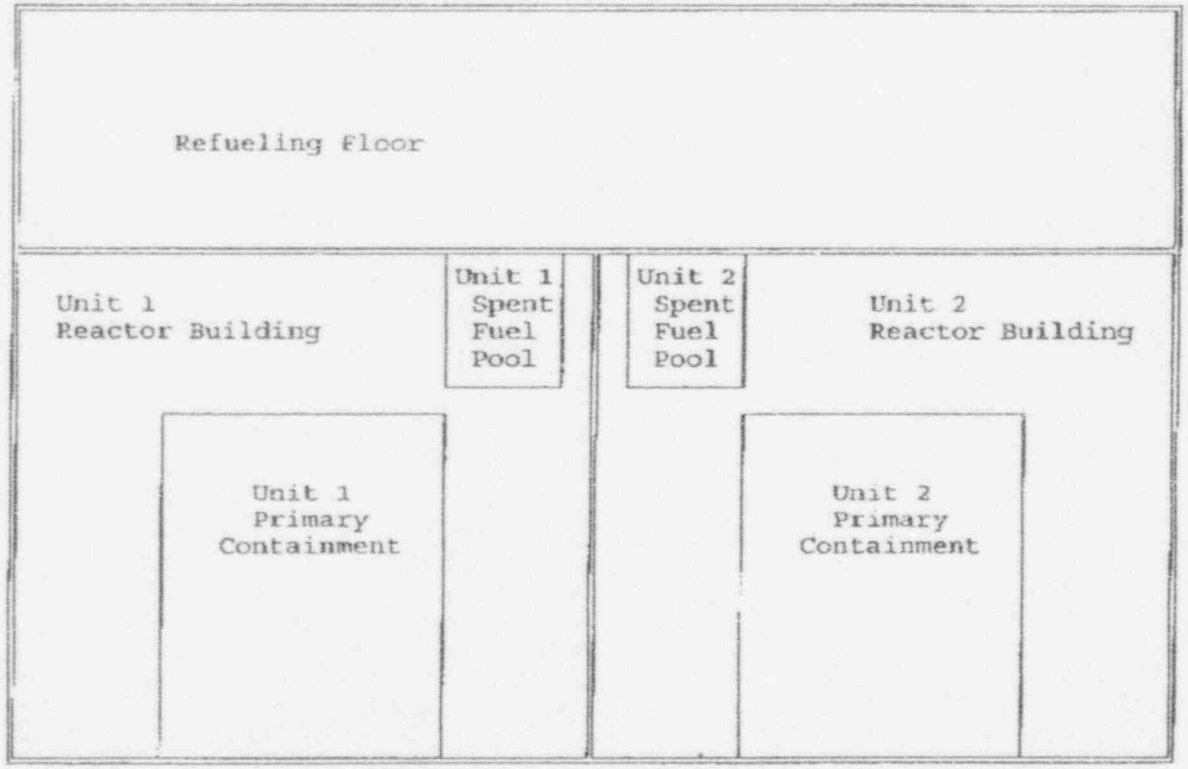
This ruling goes beyond the absurd and typifies recent NRC responses to significant safety issues having generic industry wide implications. There seems to be a great reluctance in the NRC to make any ruling which has the potential to cost money for the industry, regardless of the law or the risk. The NRC's ruling not only defies common sense, it violates the laws contained in 10CFR50.100, 10CFR50 Appendix A, NUREG-0737, various Regulatory Guides, and numerous precedents established with this and other licensees, all of which have been repeatedly brought to the attention of the NRC. It also paves the way for the NRC to bury this concern in the bureaucratic morass of the backfit rules contained in 10CFR50.109.

The NRC's recent track record in similar cases has been abominable, e.g. the Thermo Lag issue, the BWR Water Level Instrument issue, and numerous other issues which were resolved only after public outcry forced the NRC to do their jobs. This issue is such a case, but with potentially much more catastrophic consequences. This is why the NRC and the plants with this design flaw must be compelled to comply with the law and resolve these concerns without further delay.

David A. Lochbaum
80 Tuttle Road
Watchung, NJ 07060
908 754-3577

for Donald C. Prevatte
7924 Woodsbluff Run
Fogelsville, PA 18051
215 398-9277

Figure 1



Simplified side view of the Susquehanna Steam Electric Station showing the arrangement of the containment structures.

50-245

DISTRIBUTION: YELLOW TICKET 940095
Docket File (w/incoming)
NRC & Local PDRs (w/incoming)
PDI-4 Memo (w/incoming)
WRussell
FMiraglia
LReyes
AThadani
DCrutchfield
FGillespie
SVarga
JCalvo
JStolz
JAndersen (w/incoming)
JShea
RBangart
SNorris
KBohrer
NRR Mail Room (YT# 940095)
NOlson
CNagel
LDoerflein, RGI