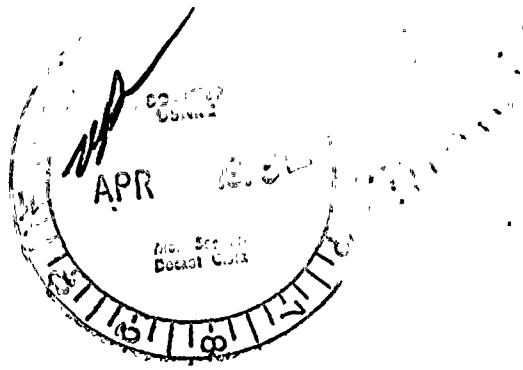
PP&L

TWO NORTH NINTH STREET, ALLENTOWN, PA. 18101 PHONE: (215) 821-5151

April 4, 1975

Regulatory File Cy

Mr. James P. O'Reilly
Director, Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406



SUSQUEHANNA STEAM ELECTRIC STATION
INTERIM REPORT ON POTENTIAL DEFICIENCY
ER 100450 FILE 840-4
PLA-60

Dear Mr. O'Reilly:

In accordance with 10CFR50.55(e), attached are two copies of an interim report on a potential deficiency which was discussed with your Mr. Heishman on March 6, 1975.

Very truly yours,

N. W. Curtis
Vice President-Engineering & Construction

Sworn to and subscribed before me
this 4th of April, 1975

David M. Landis
Notary Public

My Commission Expires: March 15, 1976.

c-Mr. Donald F. Knuth
Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, DC 20555

3745

DATE POTENTIAL DEFICIENCY IDENTIFIED: March 6, 1975

FACILITY: Susquehanna Steam Electric Station,
Units 1 and 2

TOPIC OF INTERIM REPORT:

Additional loads have been identified which should be considered in the design of the suppression pool structures and equipment. The magnitude of these loads and their applicability to the SSES design bases have not been determined.

SCOPE OF INTERIM REPORT:

As required by 10CFR50.55(e) this interim report is submitted to describe a potential deficiency which may have adverse affects on the Susquehanna Steam Electric Station Units 1 and 2 (SSES). This report also advises the Commission of the phenomena involved, provides a preliminary indication of implications, and describes corrective action underway.

IDENTIFICATION OF POTENTIAL DEFICIENCY:

The primary containment design bases and load combinations described in the SSES PSAR Sections 5.2.2 and C.2.6 do not explicitly include the following phenomena:

1) Suppression Pool Swell

2) Containment Vent Pipe Horizontal Loads from steam condensation

3) Main Steam Safety/Relief Valve discharge pipe air clearing

These phenomena were previously either considered not limiting or were considered not relevant to the SSES MK II pressure suppression containment. Two recent letters from General Electric Company (NSSS vendor) to Bechtel Power Corporation (Architect Engineer) identify information that has been developed from the Mark III Pressure Suppression Test Facility (PSTF) and which may be applicable to the SSES Containment. The phenomena and their implications are described below.

DESCRIPTION OF PHENOMENA:

Two groups of phenomena have been identified: One group occurs as a result of the postulated loss of coolant accident (LOCA) while the other group occurs as a result of the actuation of main steam safety/relief valves. It should be realized that the precise loads applicable to SSES have not been fixed at present, however, preliminary conservative estimates indicate that portions of the existing design may require modification.

LOCA

When the LOCA occurs the air in the drywell is forced down the vent pipes into the suppression pool. The compressed air bubble formed at the end of each vent

causes the water in the suppression pool to rise as a ligament when the bubble is formed and then expands. As the bubble expands and rises in the pool, the ligament of water decreases until a point at which the bubble breaks through the remaining layer forming a two phase "froth" of air and water. Structures and equipment that are above the suppression pool will be subjected to an impingement and/or drag load from this pool swell action. The type and magnitude of load is a function of the height above the initial water surface. These loads are not applied directly to the fission product barrier.

A conservative extrapolation of the data available from GE's Mark III verification test program in the PSTF has been prepared for preliminary determination of structural loads. From this preliminary conservative evaluation, there are indications that some modification and/or relocation of equipment or structural members could be required. Pipe seismic bracing, drywell to wetwell vacuum breakers, S/R Valve piping, suppression pool hydrogen recombiners and the diaphragm slab are in the region affected by pool swell.

Following the pool swell transient, there is a period of quasi steady state steam flow through the vent pipes to the suppression pool. Information from testing performed at a foreign pressure suppression containment indicates that there are lateral loads which occur on the vertical vent pipes. When applying a load which was determined from bounding the data available from the foreign tests, it was determined that additional bracing for the vents may be required to accommodate the load.

S/R VALVE DISCHARGE

The discharge piping of a safety/relief valve contains non-condensable containment atmosphere and a column of water prior to actuation. Following safety relief valve actuation pressure builds up inside the piping as steam compresses the non-condensables and forces the water from the pipe. The atmosphere follows the water in the form of a high pressure bubble. Once in the pool, the bubble expands analogous to a spring and accelerates the surrounding water radially outward. The momentum of the water causes the bubble to overexpand and the bubble pressure becomes negative. This negative pressure slows down and finally reverses the motion of the water, leading to the compression of the bubble, and the sequence repeats itself until the bubble reaches the surface of the pool. The bubble oscillation causes pressure throughout the suppression pool resulting in oscillatory loads on pool boundaries and submerged components.

For preliminary evaluation, clearing loads were established using the technique presented in NEDO-10859. It is felt that the loads used were very conservative. This preliminary investigation indicates that some modification to the safety relief valve discharge piping may be required. This piping may be re-routed to minimize the magnitude of the pressure oscillations on the liner plate or it may be necessary to change the configuration of the end of the pipe to break up the high pressure air bubble.

When loads specifically applicable to SSES due to these phenomena are defined a review of adequacy of the SSES design features will be made.

STATUS OF THE PROJECT

The construction of SSES is approximately 10% complete. The suppression pool base slabs and liner plates are complete and in place. The Unit 1 reactor support pedestal and its liner plate are complete up to the diaphragm slab and are also in place. The Unit 1 suppression pool rebar is complete and in place while the Unit 2 suppression pool rebar is being fabricated. Installation of structural steel and rebar for the Unit 1 diaphragm slab is nearly complete.

CORRECTIVE ACTION UNDERWAY

An intensive effort by PP&L, Bechtel and General Electric Co. to better identify the loads due to these phenomena is underway. The preliminary tasks of developing a plan for resolution of these issues and a schedule have nearly been completed. Work is proceeding on the development of mathematical models to determine dynamic load factors and to generate load data. This will be augmented by a test program which is applicable to verification of the mathematical models developed. The last task will be to determine the various loads for the SSES containment, to determine load combinations to be used, and to complete any required design changes. A schedule for these activities will be submitted to the NRC in the near future. PP&L will keep the Commission informed of developments as a result of the work underway.

Concrete pours and other critical activities involving the Containment will be suspended until necessary modifications in this area have been identified. Prior to resuming construction of any affected portion of the Containment, the proposed modifications will be reviewed with the NRC.