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Department of Nuclear Energy

(516) 345-2362

March 18, 1980

Mr. Robert L. Gerguson
Plant Systems Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: Duane Arnold, Fire Protection Review, Item 3.2.6

Dear Bob:

We completed our input to Duane Arnold March 12, 1980. However, Mr. Leo Derderian recently asked us to expand our input to item 3.2.6- Diesel Generator Air Intakes-to reflect more of the work John Boccio has done on this item.

Enclosed is a more detailed input to item 3.2.6.

Sincerely yours,

A handwritten signature in cursive script, appearing to read 'Ed'.

Edward A. MacDougall
Reactor Engineering Analysis

EAM:cm

attachment

cc: J. Boccio
✓ L. Derderian
D. Eisenhut
W. Kato wo/att.
M. Levine wo/att.
E. MacDougall
V. Panciera
E. Sylvester

Dupe of 8003250526

Item 3.2.6 - Diesel Generator Air Intakes

Item 3.2.6 of the Duane Arnold SER requires the licensee to evaluate the need for a barrier between the diesel generator air intakes to prevent combustion products due to a fire in one room from entering the other room via the air intakes, and to propose modification if necessary.

Analyses by BNL and their consultants had indicated that even with a barrier separating the two 13'H X 11'W intake louvers which are mounted 1.5' apart on the side wall of the turbine building at a base elevation of 816 feet, vitiated air, comprising roughly 70% air and 30% products of combustion, at a temperature of 200°C, can be injected into the air-intake system. This vitiated air, resulting from a fire in one of the diesel generator rooms would normally efflux from the diesel generator exhaust system located approximately 40 feet below the air intake louvers. Induction of this gas mixture, at the temperature calculated, has been considered to significantly affect the performance of the other diesel generator in the adjacent non-fire involved room.

Accordingly, the licensee responded by letter, dated November 29, 1979, to this item. To reduce effects of possible fire-plume entrainment their proposal, consisting of a set of drawings, indicated how they intended to take intake suction from above the turbine roof instead of from side-wall mounted intakes.

As indicated on the drawings, the licensee will remove the common air intake plenum which presently serves both emergency diesel generators, and will separately duct the air intake for each diesel generator through the roof of the turbine building. An air intake penthouse will be provided on the roof for each of the two air intake ducts, with the two penthouses located 30 feet apart on the roof.

This modification has, in effect, reduced the problem significantly due to three basic factors:

- (1) Increasing the vertical separation between the intake/exhaust system necessarily provides further distance for the fire-plume to entrain the ambience thus reducing the plume temperature and increasing the mass fraction of oxygen within the plume before it can possibly be entrained by the intake system.
- (2) A 30 foot lateral separation of the roof-mounted intake ducts, in effect, provides an approximate 15 foot horizontal spacing between the fire plume centerline and the air intake to the non-involved diesel generator. This assures that a greater amount of fresh air can be inducted compared to that which would have been provided had the exhaust and intake ports been mounted in the same vertical plane.

- (3) Placing the exhaust ducts on the roof can insure that they are now in the "dead" air region of the fire plume as it travels (like a wall jet) up along the turbine building wall.

Accordingly, the licensee's proposal to separate the emergency diesel generator air intakes as described above, adequately addresses the concerns indicated in SER item 3.2.6 and is satisfactory. We recommend the staff accept this item.