MAY 10 1973

R. C. DeYoung, Assistant Director for PWR's, L

METEOROLOGY SECTION FOR SAFETY EVALUATION REPORT

PLANT NAME: Indian Point Nuclear Generating Unit 3
LICENSING STAGE: OL
DOCKET NUMBER: 50-286
RESPONSIBLE BRANCH: PWR #1
REQUESTED COMPLETION DATE: 5/11/73
APPLICANTS RESPONSE DATE NECESSARY FOR
NEXT ACTION PLANNED ON PROJECT: None
DESCRIPTION OF RESPONSE: N/A
REVIEW STATUS: Site Analysis Branch (Meteorology) - Complete

Attached is the meteorology section for inclusion in the safety evaluation report on the subject plant. This section was prepared by E. H. Markee, Jr., Site Analysis Branch, L.

signed by
H. R. Denton

Harold R. Denton, Assistant Director
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Enclosure:
As stated

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Form AEC-318 (Rev. 9-53) AECM 0240   GPO: c43-16-81465-1 445-678

INDIAN POINT NUCLEAR GENERATING UNIT 3
DOCKET NUMBER 50-286
SAFETY EVALUATION REPORT INPUT

2.3 METEOROLOGY

2.3.1 Regional Meteorology

The plant is in a climatic region which is primarily continental in character, but is subjected to some modification by marine air which can penetrate to the site area. The regional topography ranges from hilly to mountainous.

2.3.2 Local Meteorology

The plant site lies along the Hudson River in a bowl surrounded on almost all sides by high ground ranging from 500 to 900 feet above plant grade. This topography decisively influences meteorological conditions in the valley in the following ways:

a. Orientation of the ridges channels the valley airflow.

b. The wind speeds in the valley tend to be lower than in open level terrain.

c. Differental heating of the hillsides and the plain at the mouth of the valley create local air circulations (e.g., diurnally-regulated up-and-down-valley flow).

The prevailing winds show the influence of valley channelling but this channelling effect is not as pronounced during the winter months due to generally stronger westerly airflow aloft.

2.3.3 Onsite Meteorological Measurements Program

Several meteorological studies of atmospheric diffusion conditions with onsite data have been made. The initial onsite meteorological measurements program was conducted during the years 1956 and 1957. The program consisted of measurements of wind and temperature taken on a 300-foot tower. The joint frequency distribution of wind direction and speed at the 100-foot level and vertical temperature difference between the 150-and 7-foot levels were presented in the Safety Analysis Reports for Units 1, 2 and 3. The joint data recovery for this period is not known because the data were presented as fractions of total recovered data and the original records were not kept.

Another meteorological study was conducted during the years 1969 and 1970. The program utilized measurements of wind and temperature on a 100-foot tower in the same location as the 300-foot tower and at other stations along the Hudson River located within five miles of the site. This study was conducted primarily to describe the diurnal wind direction reversals in the Hudson River valley. Data for the period November 26, 1969-October 1, 1970, with recovery near 80% were used in the analysis. Although joint frequency distributions of wind direction and speed by vertical temperature difference class were not presented, the applicant concludes that the annual average statistics of wind direction and speed, and vertical temperature difference were substantially the same as the 1956-1957 data thereby indicating that meteorological conditions are reasonably consistent from year to year. Diurnal valley flow wind reversals were found wherever the winds aloft were very light.

More recent data acquired during the years 1970 - 1972 were submitted by the applicant so that an analysis could be performed in accordance with our current practice and verification of the representativeness of the 1956-57 data could be made. In order to obtain an annual cycle of data with acceptable data recovery, joint frequency distributions of wind direction and speed at the 100-foot level by vertical temperature difference between the 95- and 7-foot level were presented for a composite year (ie, January-July 1970, August 1971, September-October 1972 and November-December 1970). The data recovery for the composite year was 95%. The calculations of atmospheric diffusion were based on the joint frequency distribution of wind direction at the 100-foot level, wind speed at the 100-foot level extrapolated to represent conditions at the 33-foot level and atmospheric stability class based on vertical temperature difference (ΔT) between the 95- and 7-foot levels adjusted to represent the ΔT between the 150- and 30-foot levels. A power law extrapolation was used on the wind speed and a logarithmic extrapolation was used on the vertical temperature difference.

In Supplement 14, the applicant has presented, for the staff's consideration, an analysis of diffusion conditions using the "split sigma model" to allow greater wind meander, a procedure to allow diffusion to the distance of the actual site boundary by direction instead of the minimum site boundary, a procedure to allow the effect of averaging diffusion conditions over a two hour period, and turbulent building wake diffusion models developed from New York University wind tunnel tests.

2.3.4 Short Term (Accident) Diffusion Estimates

In evaluation of diffusion of short term (0-2 hr) accidental releases from the plant, a ground level release with a building wake factor, cA, of $1000m^2$ was assumed. The relative concentration (X/Q), using the composite year of data (1970-1972), which is exceeded 5% of the time was calculated to be $1.8x10^{-3}$ sec/m^3 at the minimum exclusion radius of 330m (measured from edge of containment to nearest site boundary). This relative concentration is equivalent to dispersion condition produced by Pasquill type F stability and a wind speed of 0.7 meters/second with the building wake effect being limited to a factor of three over the diffusion condition produced by a point source. A similar analysis of the 1956-57 data tends to confirm these results. Our consultant (National Oceanic and Atmospheric Administration) has calculated a value which is not significantly different and the applicant estimates a value which is 40% lower than ours.

The staff has evaluated the methods of estimating diffusion conditions presented by the applicant in Supplement 14 and has concluded that the applicant has not presented sufficient substantiation to depart from the standard models and procedures used above.

Using the diffusion models presented in Safety Guide 4 and the onsite meteorological data, the appropriate relative concentrations for design basis accidents have been estimated at the outer boundary of the low population zone (1100m). The relative concentrations are 4.7×10^{-4} sec/m^3 for the 0-8 hour period, 1.4×10^{-4} sec/m^3 for the 8-24 hour period, 6.5×10^{-5} sec/m^3 for the 1-4 day period and 2.2×10^{-5} sec/m^3 for the 4-30 day period. The applicant has presented values which are in essential agreement with the staff's values for the first 24 hours but are a factor of two to three less for time periods from one to 30 days.

2.3.5 Long Term (Routine) Diffusion Estimates

The maximum annual average relative concentration, which is 2.8×10^{-5} sec/m^3, was found SSW of the plant at the site boundary (330m). Both the applicant and our consultant have presented values which are in essential agreement with ours.

2.3.6 Conclusion

We conclude that the composite year of data presented in the FSAR provide a reasonable basis for estimating atmospheric diffusion conditions during accidental and routine gaseous effluent releases from the plant. It is not expected that subsequent data collection and analysis will change our estimates significantly because the data from the years 1956, 1957, and 1969 confirm the climatic representativeness of the data for the composite year.