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METEOROLOGY SECTION FOR REPORT TO THE ACRS ON KEWAUNEE NUCLEAR POWER
PLANT - DOCKET NO. 50-305

Enclosed is the meteorology section for inclusion in the report to the
ACRS on Kewaunee.

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Enclosure:
As stated

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DATE ▶	5/15/72	5/15/72				

KEWAUNEE NUCLEAR POWER PLANT
DOCKET NO. 50-305
ACRS REPORT INPUT
METEOROLOGY

The plant is situated on the west shore of Lake Michigan and the terrain in the vicinity of the plant is relatively flat. Therefore, airflow at low levels over the area is influenced by land-lake temperature differences. However, airflow generated by large scale meteorological features ~~over the~~ region tends to dominate the prevailing airflow over the region such that 60% of the time the airflow is in the offshore directions.

The onsite meteorological program consisted of measurements of wind direction, wind speed and wind direction fluctuations (sigma theta) at a height of 180 feet above the ground. Sigma theta was determined from a wind variance computer and supplemented by wind direction range data to improve the data recovery. These data for the 1969 calendar year were used as a basis for evaluation of atmospheric diffusion characteristics of the site for accidental and routine airborne releases of radioactive material. The data recovery during the year was 76%. The data derived from comparisons with the Zion site were not used because the recovery for Zion data was only 31% and these data did not indicate that the two sites were meteorologically similar.

For evaluation of accidental releases from the plant vents, the joint frequency of wind speed at the 180-foot level extrapolated to the 30-foot level using the power law relationships suggested in the ASME Recommended

Guide for Prediction of the Dispersion of Airborne Effluents and sigma theta were used. Only onshore airflow directions were considered.

Assuming a ground level release with a building wake factor c_A of 800 m^2 , the relative concentrations which are exceeded 5% of the time were calculated to be $2.9 \times 10^{-4} \text{ sec/m}^3$ at the minimum exclusion distance (1200m) and $5.2 \times 10^{-5} \text{ sec/m}^3$ at the outer boundary of the low population zone (4800m). These values are equivalent to Pasquill Type F diffusion with a wind speed of 1.2 meters/second. The values appear to be adequately conservative because the sigma theta categorization of stability based on measurements at the 180-foot level usually overestimates the frequency of stable atmospheric conditions affecting ground level sources. Also, the applicant has shown (NUS 808, Amendment 15) that the variance computer provides more conservative sigma theta results than the wind direction range method.

For longer time period accidental release calculations at the outer boundary of the low population zone (4800m), onsite meteorological data were used as a basis for ^{deviation from the use of} modification Safety Guide 4 relative concentrations. The relative concentration for the 0-8 and 8-24 hour time periods are indicated to be at least a factor of two better than those presented in the safety guide. Also, the relative concentration for the 1-4 and 4-30 day time period should be at least 50% better than the safety guide values.

The limiting annual average relative concentration of $3.8 \times 10^{-6} \text{ sec/m}^3$ for vent releases was found at the 1200m site boundary distance south-southwest of the plant.

It is our opinion that adequately conservative estimates of atmospheric dilution factors have been made from the meteorological data presented in the FSAR and amendments. The applicant used less conservative X/Q values, *by as much as a factor of two* in his evaluations because he did not extrapolate the wind speeds down to the 30-foot level.