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DESCRIPTION

Ltr. ref our 12-3-76 ltr & 12-22-76 meeting furnishing information on Geologic safety significance features w/attached Appendix consisting of Evaluation of Geologic Discontinuities at the Nine Mile Point Plant...

( 7 pages )

NOTE: Distribution per Mr. Kane on 1-28-77

ENCLOSURE

ACKNOWLEDGED

DO NOT REMOVE

PLANT NAME: NINE MILE POINT UNIT # 2

FOR ACTION/INFORMATION ENVIRO JCM 1-28-77

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NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

300 ERIE BOULEVARD, WEST
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Regulatory Docket File

January 24, 1977

Director of Nuclear Reactor Regulation
Attn: Mr. Benard C. Rusche, Director
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Nine Mile Point Unit 2
Docket No. 50-410

Dear Mr. Rusche:

Our letter of December 13, 1976 noted certain geological discontinuities which have recently been noted at our Nine Mile Point site. In response to questions which arose during discussions at the December 22, 1976 meeting with members of the Nuclear Regulatory Commission Staff, and subsequent telephone conversations between Niagara Mohawk and the Commission Staff, we are providing information regarding the safety significance of these geologic features. Also, this letter presents information describing our program to evaluate the geologic discontinuities.

The discontinuities in the cooling tower area have been observed in the Oswego Sandstone and at some locations in the overlying glacial and postglacial deposits. The Oswego Sandstone is relatively undeformed in the region and dips gently to the south. The broken zone in the bedrock strikes approximately North-75°-West and its known length to date, including the recently excavated Trench 5, is approximately 2400 feet. The faulting was not encountered in two trenches (1 and 2) located northwest of the cooling tower trench. The information and the linearity of the fault observed in the other trenches indicates that the fault dies out to the northwest and does not pass under any safety-related structures. Based on the relatively narrow fault width (on the order of one to several feet) and the lack of significant displacement along the fault in the cooling tower area, we feel that the fault zone is minor. In the northwestern-most exposures the top of bedrock on both sides of an into the fault zone is glacially polished and rounded indicating that the fault existed in the bedrock prior to the last advance of the glacial ice. Regional

geologic studies indicate that the most recent episode of significant faulting occurred during the Cretaceous period, approximately 70 million years ago.

The observed discontinuities in the overburden consist of monoclinal folding and minor faulting. The maximum observed fault displacement in the overburden is approximately 2-1/2 inches.

We have been informed by Dames and Moore based on preliminary observations that the observed displacements suggest that the feature was caused as a result of a pop-up along a pre-existing fault (of minimum Cretaceous age). These preliminary interpretations are based on, in part, observations of opposing bedrock dips away from the fault zone and an apparent vertical displacement in the overburden. Based on the foregoing observations and the fact that no earthquakes are known to have occurred within a 25 mile radius around the Nine Mile Point site, we feel at this time that there is no reason to suggest that the fault represents an immediate hazard to the operating nuclear units at the site.

The firm of Dames and Moore has been retained to proceed with the ongoing program, attached, as an appendix to this letter. Dames and Moore, geologists, are currently onsite initiating the program.

In addition, Dr. Fred A. Donath of the University of Illinois and Dr. Donald R. Coates of the State University of New York at Binghamton have been recently retained as consultants to Niagara Mohawk Power Corporation for this investigation. Presently, we estimate that preliminary data regarding the geological discontinuities will be available for onsite review by April 1, 1977. We will continue to keep you advised of any significant findings.

Very truly yours,
NIAGARA MOHAWK POWER CORPORATION

GERALD K. RHODE
Vice President - Engineering

/sz

Attachment

# APPENDIX

## EVALUATION OF GEOLOGIC STRUCTURAL DISCONTINUITIES AT NINE MILE POINT

This program is designed to document, analyze, and determine the origin of the geologic discontinuities observed near the cooling tower excavation for Nine Mile Point Unit 2. The possibility of recurrent movement and related geologic significance, if any, will also be evaluated.

The program outlined herein identifies the types of data to be obtained and the methods and reasons for acquiring these specific data. Its scope will permit preliminary data to be reviewed at the site within 90 days, with the date of the final report and analysis to be determined as the work progresses.

## SCOPE

The program consists of four main fields of investigation:

1. General Geology/Structural Geology - characterization of structural discontinuities.
2. Geomorphology - relationship of discontinuities to topographic levels and recent geomorphic history of the area.
3. Analysis of stress field - relationship of discontinuities to stress field at time of disruption and at present.
4. Seismicity - relationship of seismic history of the region to known geologic structures.

Data from each of these four fields will be used in the evaluation of the geological features and their relationship to the site. This program will be periodically evaluated and, if necessary, will be modified as data are gathered.

PROCEDURES AND METHODOLOGY

The following tasks have been outlined to investigate initially the geological features observed at Nine Mile Point:

1. Excavation of trenches - continuation of excavation and cleanup in existing trenches to expose the geological cross-section of rock and sediments. Additional trenches to the southeast will be excavated to trace relevant geological features. The observed features will be compared with glacially related structures in the region. The extent and nature of the features should add information about the processes that formed the observed discontinuities.
2. Drilling - a rock coring program will be initiated to determine the attitude of the fault and the nature and extent of displacements along the fault observed in the cooling tower area. Initially, borings will be drilled on opposite sides of the fault to determine the dip angles of the strata and the rock disturbance. If necessary, angle borings will be used to investigate the depth and nature of the highly fractured zone. Further drilling may subsequently be employed to analyze the in situ stress field.

3. Mapping - a detailed depiction of relevant structural features will be made at exposures of the structural discontinuities. The geometry of the features, including lateral extent, vertical extent and orientation, will be determined. The direction, sense, magnitude and age of any displacements will be investigated and documented. These observations will be evaluated in an attempt to determine the origin of the features. Data collected will be analyzed to calculate the orientation and magnitude of stresses capable of producing the observed movements.

4. Sampling and Analysis - rock samples will be extracted for testing and determination of the strength characteristics of the rock. These strength characteristics will be utilized in the analysis of the existing stress field.

5. Age Dating - Selected minerals or materials from the unconsolidated deposits and from the bedrock will be collected when possible for radiometric age-dating. The age relationships of these materials are expected to provide information to date the observed displacements.

6. Geomorphology and Stratigraphy of Glacial and Post Glacial Deposits - the glacial and postglacial deposits of the site area will be investigated to determine their origin, attitude, and relation to topographic levels of

the region. A literature search for information concerning the postglacial history and units of the area will be conducted. Additionally, if necessary, field mapping and aerial photo reconnaissance will be used to define more precisely the recent geomorphic history of the area.

Data gathered during this portion of the investigation will be used to date the time of formation of the structural features and to define the relationship between the topographic levels, stress field and structural features at the time of the formation of the discontinuities.

7. Stress Measurements - measurements will be made of the in situ stress field in the area. Initially, a study will be undertaken to determine the best method available for use in this particular geological setting. This method will be subsequently employed to measure the stresses. A knowledge of the stress field will be utilized to evaluate the potential for recurrent movement.

8. Seismicity - A review of the seismic history of the region will be conducted in an attempt to correlate recent seismic events with known geologic structures. Postglacial events such as pop-ups will be studied to determine the nature and magnitude of the seismic events they may generate.

## INTERPRETATION AND CONCLUSIONS

The various tasks and observations previously outlined will be performed to determine the dynamics (stress orientation and magnitude) responsible for producing the discontinuities at the site. An evaluation will be made of the possible mechanisms and probability of reactivating this zone.

## WORK IN PROGRESS AND SCHEDULES

Detailed mapping across the cooling tower area and in the existing trenches has been in progress for several weeks. It is expected that borings to investigate the vertical nature of the structural features will be initiated within several weeks. A literature review of the geomorphic data available for the area is in progress, as is a study of the potential *in situ* stress measuring methods to be employed. It is expected that preliminary data concerning the nature and possible causes of the observed structural discontinuities will be available by April 1, 1977.