JAN 0 4 1977

MEMORANDUM FOR: J. C. Stepp, Chief, Geology and Seismology Branch, DSE

FROM: R. McMullen, Geologist, Geology Section, GSB, DSE
R. Jackson, Geologist, Geology Section, GSB, DSE

THRU: R. Hofmann, Leader, Geology Section, GSB, DSE

SUBJECT: VISIT TO NINE MILE POINT TO EXAMINE FAULT EXPOSED IN TEST PITS

NRC geologists and a seismologist traveled to Nine Mile Point on December 22 to examine recently excavated test pits exposing other portions of the fault first reported to NRC by Niagara Mohawk on September 29, 1976. The purpose of the site visit was to follow up on a December 2, 1976 telephone conversation among representatives from Niagara Mohawk, its architectural engineer, Stone and Webster, its geotechnical consultant, Dames and Moore, and the Nuclear Regulatory Commission. During the phone conference, Niagara Mohawk reported on an exposure in an exploratory pit dug along the southeast projection of the fault (see memorandum of December 17 to J. Stepp from R. McMullen). Since excavation of the test pit described in the telephone memorandum Niagara Mohawk has excavated 2 additional exploratory trenches: the first along a southeast projection of the fault at the Niagara Mohawk property boundary; and the second along the northwest projection of the fault, approximately 800 feet northwest of the edge of the cooling tower trench. The former is designated as Trench #4 and the latter Trench #2. An exploratory pit was dug about 50 feet northwest of the cooling tower canal and is briefly described in the September 13 site visit memorandum to Stepp from McMullen. The excavation described in the December 17 memorandum has been designated as Trench #3. Trench #1 is located 1600 feet northwest of the north wall of the cooling tower canal. Enclosed is a figure showing the relative locations of the reactor units, fault, proposed cooling tower and canal, and the exploratory excavations.

At the time of this site visit Trench #2 was not available for examination because it was filled with ice. Trench #3 was in poor condition as slumping had occurred the day before and the fault was not well exposed. However, a section of the northwest scarp was visible. The Oswego sandstone was highly fractured on this face. Although it could not be seen

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in this exposure, representatives from the Niagara Mohawk's geotechnical consultants described the features as follows: a four foot southwest facing scarp at the top of bedrock (the geotechnical consultants believe that about 2 feet of this scarp is offset, and 2 feet is the result of ice plucking during glaciation); 30 inches of till with fragments of the bedrock incorporated within it. This till is offset 2 1/2 feet by a monoclinal fold that is up to the north. Overlying the till is a 2 1/2 foot thick layer of lakebed clay, which also reflects the monoclinal fold. Above the lakebed is about 6' of laminated and cross bedded sand and silt, the top of which is offset about 2 1/2 inches by monoclinal folding. All bedding on both sides of the fault is relatively horizontal several feet away from the fault but dip upward as they approach the fault.

Trench #3 was in relatively good condition. The pit is approximately 15 feet deep. The fault zone in bedrock is 30 inches wide and consists of sandstone breccia and gouge. A southwest facing scarp several feet high is present at the surface of bedrock. The bedrock surface is broken and irregular and it is therefore difficult to tell the exact height of the scarp which is on the order of 4 feet. Bedding within bedrock dips away from the fault in both directions: 20° to the southwest, and 5 to 7° to the northeast. Till overlies bedrock. About 4 inches of displacement by a monoclinal fold can be seen at the top of the till, and also within the thin lakebed clay overlying it. Incorporated within the till and immediately above the fault is a large sandstone boulder. The boulder has been broken in half and displaced about a foot, north side up. Overlying the lakebed clay are several feet of laminated sands and silts, containing ripple marks and cross bedding. An unconformity, which was also present in the other trenches appears to have controlled, to some extent, distribution of the sands and silts, in that it is tilted to the northeast, and truncates the bedding. Monoclinal folding continues up through the thin beds of sands and silts, though of less magnitude. Capping the section is a foot or more of organic soil, the base of which is not offset.

As stated above, Trenches 1 and 2 were not available for examination, however, Trench #1 was examined during the site visit of November 4. There was no faulting apparent in Trench #1. Niagara Mohawk has stated, as a result of mapping Trench #2, that there is no faulting there either. Based on this information, the fault terminates somewhere between

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the northwest edge of the canal and Trench #2. Niagara Mohawk plans to conduct investigations to determine the southeastern extent of the fault, the age of last movement along the fault, and whether that movement was tectonic or of glacial ice shove origin. The investigations will be carried out by Dames & Moore and Stone and Webster. A panel consisting of two geological experts has been assembled by Niagara Mohawk to review: (1) the data gathered thus far; (2) the proposed investigation program; and (3) later to review the results of that program. The panel members are Dr. D. Coates, SUNY Binghamton, and Dr. F. Donath, University of Illinois.

We required that Niagara Mohawk submit a letter report within two weeks summarizing the following:

1. The bases supporting its conclusion that the fault does not represent a hazard to the nuclear units nearby; and

2. The proposed investigation program

The report will include the input of the geological panel. The staff does not regard this fault as an immediate hazard to the operating reactors for the following reasons:

1. The fault does not pass beneath safety related structures. A northwest projection of the fault would pass several hundred feet south of Unit 1 at its closest approach;

2. The fault apparently dies out at some location between the Cooling Tower canal and Trench #2;

3. The region in which the site is located is relatively quiet seismically;

4. The vertical cut faces of the Nine Mile 2 excavation appear to be very stable and exhibit no evidence of high stresses in bedrock; and

5. Generally the bedrock in this region, with the exception of the subject fault, is relatively undeformed.

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JAN 04 1977

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Enclosure:
As stated

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R. Boyd
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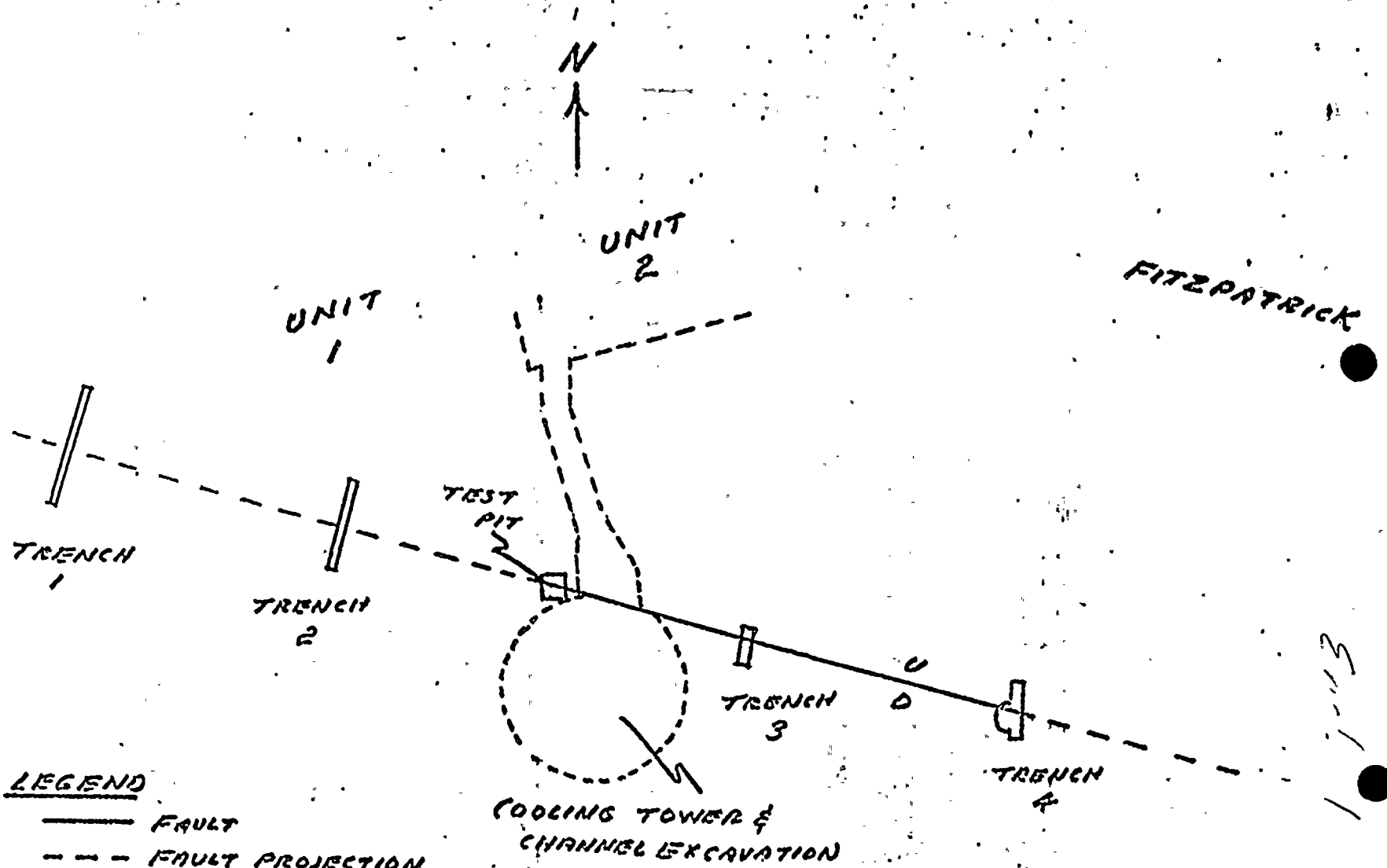

FIGURE 1

NINE MILE POINT
RELATIVE POSITIONS
OF FAULT, EXPLORATORY
TRENCHES, & EXCAVATIONS

Enclosure 2

LIST OF ATTENDEES

Niagra Mohawk

N. Rademacker
S. H. Haybrook

Stone & Webster

J. Mullin
E. E. Fricks
J. H. Peck
G. W. Page

Dames & Moore

J. G. McWhorter
A. Seanor
J. J. Markham
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