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 CRUTCHFIELD, D. Operating Reactors Branch 5

SUBJECT: Forwards assessment of SEP Topic II-4.F, "Settlement of Foundations & Buried Equipment," in response to NRC 810417 ltr.

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I have been thinking of you very much lately and wondering how you are getting on. I hope you are well and happy. I have been very busy lately but I will try to write to you more often. I have been thinking of you very much lately and wondering how you are getting on. I hope you are well and happy. I have been very busy lately but I will try to write to you more often.

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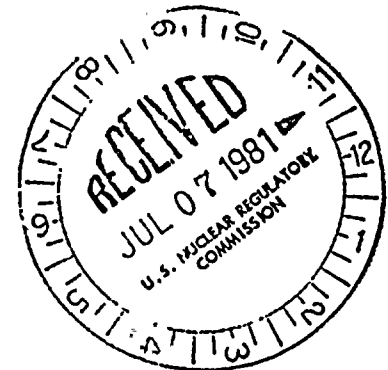
JOHN E. MAIER
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June 30, 1981

Director of Nuclear Reactor Regulation
Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555



Subject: SEP Topic II-4.F, Settlement of Foundations
and Buried Equipment
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Crutchfield:

Attached is Rochester Gas and Electric assessment of SEP Topic II-4.F, "Settlement of Foundations and Buried Equipment." The format for this assessment was derived from the NRC staff's assessment of this topic for the Palisades plant, transmitted by letter dated April 17, 1981 from Dennis M. Crutchfield, NRC, to David P. Hoffman, Consumers Power Company.

Very truly yours,

John E. Maier
John E. Maier

Attachment

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Attachment

SEP Safety Topic Evaluation R. E. Ginna Nuclear Power Plant Topic II-4.F Settlement of Foundations and Buried Equipment

Introduction

The purpose of this safety topic review is to ensure that safety-related structures, systems, and components are adequately protected against excessive settlement of foundations. Included in this topic is a review of information relative to existing settlement data, geotechnical soil properties at the site, and the ground water table. Using current criteria as a basis, the effect of existing settlement, if any, and the possibility of future settlement on safety-related structures, is evaluated.

Current Review Criteria

The current review criteria for this specific topic assessment are:

1. Standard Review Plan Section 2.5.4
2. 10CFR Part 100, Appendix A

Related Safety Topics and Interface

1. II-3.A, Hydrologic Description
2. II-4, Geology and Seismology
3. III-1, Classification of Structures, Systems, and Components

Evaluation

A geological reconnaissance of the general area surrounding the Ginna site was first performed in 1964-1965. A total of 18 test borings were initially drilled throughout the site to depths ranging from 40 to 100 feet beneath the ground surface. This information is provided in Reference 1.

Subsequent to the initial environmental studies, seven additional borings were drilled to depths between 35 and 90 feet in the reactor area for a supplementary foundation study, and nine borings were drilled for the intake and discharge tunnels. These borings extended from the shore to a distance of about 3,000 feet into Lake Ontario. This information is provided in References 2 and 3.

Finally, a major investigation concerning minor bedrock faulting encountered near the Ginna Station, transmitted by letter dated April 19, 1974, is described in Reference 4.

The site lies within the Erie-Ontario lowland physiographic province which is characterized by an erosional topography of low relief modified by glacial features. The land rises gradually to the south where it meets the Appalachian Uplands at the Portage Escarpment.

Geologic formations in the region include Lower and Middle Paleozoic sediments overlying the pre-Cambrian basement rocks. The pre-Cambrian surface dips to the south at approximately 60 feet per mile with local variations.

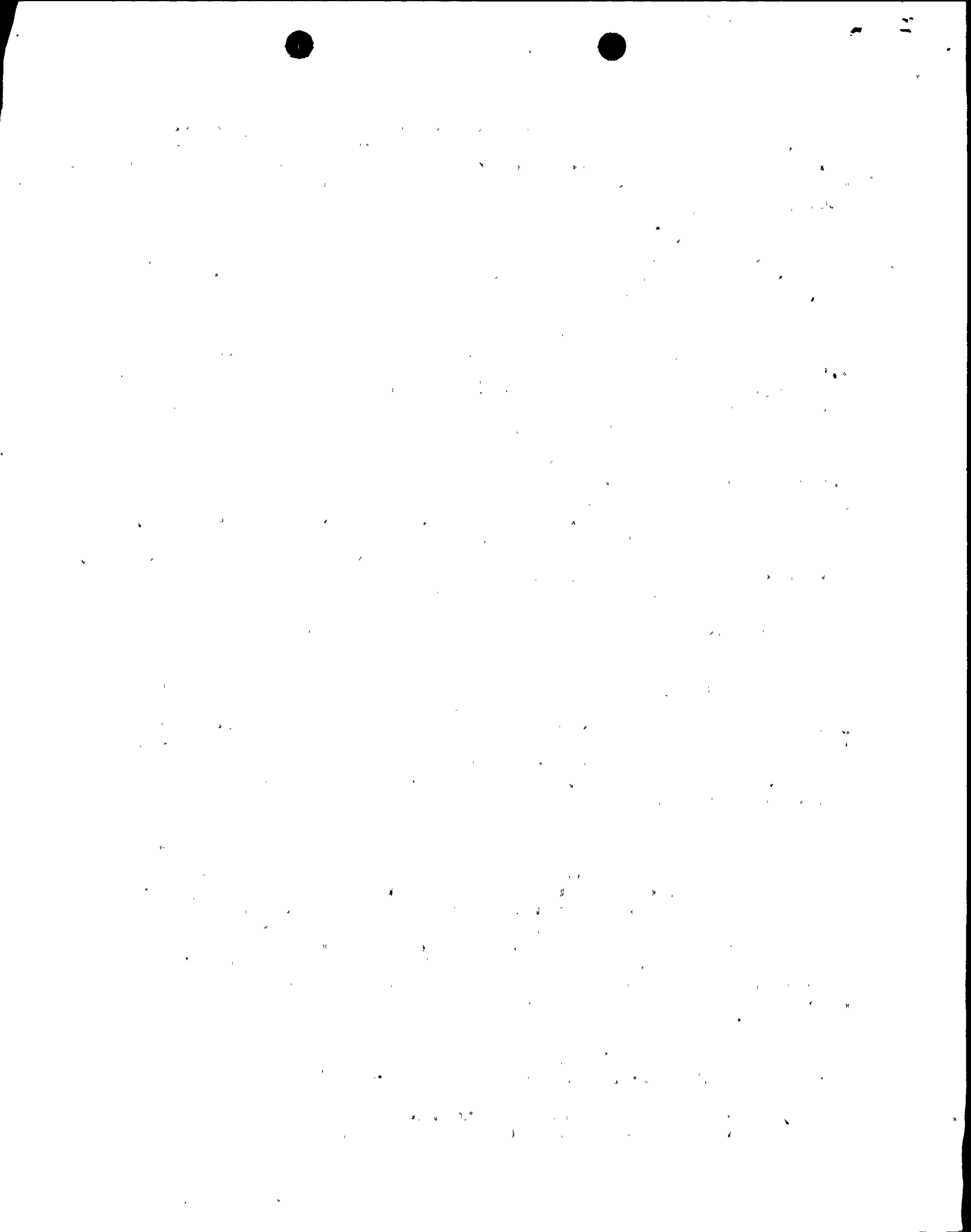
The youngest formation occurring at the site is the Queenston formation of Upper Ordovician Age. The Queenston is roughly 1,000 feet thick in this area and overlies approximately 80 feet of Oswego sandstone, approximately 600 feet of Lorraine shales and probably less than 30 feet of Potsdam sandstone. The pre-Cambrian surface is roughly 2,600 to 2,700 feet deep at the site.

The major nuclear station structures are supported in the Queenston Formation or atop a thin layer of natural or compacted granular soils immediately above the bedrock. The Queenston Formation, which is generally found at depths of 30 to 40 feet, is composed of alternating strata of thinly to thickly bedded, dense, fine grained sandstone, silty sandstone, and sandy siltstone, with occasional thin beds of fissile shale. Bedding is essentially horizontal with occasional cross-bedding and shaly partings.

Prior to construction of the plant foundations, the soil overburden (30 to 40 feet of glacial drift) was removed. The exposed rock surface was observed to be similar to that examined in nearby outcrops. Bedding was horizontal and occasional cross-bedding and shaly partings were evident. A pattern of vertical joints of limited vertical extent was evident in the outcropping rock, particularly along the lake shore side of the excavation. The observed joints continued to depths of from 20 to 30 feet from the top of the rock, but no evidence of movement along the joints was found.

Excavations to various depths were made in the soil to accommodate buried equipment. In any instance when unsuitable material was encountered, that material was fully excavated, replaced with select granular bedding material, and fully compacted. The equipment was then encased in concrete, and back-filled with select material. All excavation, structural placement and backfilling procedures were performed in accordance with specifications which were to ensure that settlement would be minimized. No settlement has been observed in areas where buried equipment was installed in accordance with this procedure in over 10 years of plant operation.

Groundwater level data were submitted as part of SEP Topics II-3.A, II-3.B, II-3.B.1, II-3.C, and III-3.A, by letter from John E. Maier, RG&E, to Dennis M. Crutchfield, NRC, dated May 1, 1981. A design basis ground water level of 250.0 feet msl was specified for the major Ginna structures.



Conclusions

No specific information relative to total and differential settlement is available. However, there has been no evidence of any such settlement since the plant was constructed. Based on an inspection of the plant, coupled with experience showing no observable settlement to date, it can be concluded that, even though settlement analysis as described in SRP Section 2.5.4 has not been documented, the settlement of foundations and buried equipment will not be a safety problem of concern.

References

1. Rochester Gas and Electric Brookwood Nuclear Station Unit 1 (now called R. E. Ginna), PSAR, Volume 1 and Appendix D to Volume 1.
2. Rochester Gas and Electric "Environmental Report," Volume 1, August 1972, Section 2.4 and Appendix A.
3. Rochester Gas and Electric "Final Facility Description and Safety Analysis Report," Volume 1, Chapter 2.
4. Geologic and Geophysical Investigations, Ginna Site, by Dames and Moore.
5. 10CFR Part 100, Appendix A.
6. Standard Review Plan, Section 2.5.4
7. Letter, John E. Maier, RG&E, to Mr. Dennis M. Crutchfield, NRC, SEP Topics II-3.A, II-3.B, II-3.B.1, II-3.C, III-3.A, dated May 1, 1981.

