

June 30, 1982

Docket No. 50-245
LS05-82 -06-144

Mr. W. G. Council, Vice President
Nuclear Engineering and Operations
Northeast Nuclear Energy Company
Post Office Box 270
Hartford, Connecticut 06101

Dear Mr. Council:

SUBJECT: SCP REVIEW TOPIC II-4.D, STABILITY OF SLOPES
MILLSTONE NUCLEAR POWER STATION UNIT 1

Enclosed is a copy of our final evaluation report for Systematic Evaluation Program Topic II-4.D, "Stability of Slopes." This assessment compares your site condition, as described in the docket and references, with the criteria currently used by the staff for licensing new facilities. Please inform us if your site condition differs from the licensing basis assumed in our assessment.

Our review of this topic is complete and this evaluation will be a basic input to the integrated assessment for your facility unless you identify changes needed to reflect the existing site condition at your facility. This topic assessment may be revised in the future if NRC criteria relating to this topic are modified before the integrated assessment is completed.

Sincerely,

James Shea, Project Manager
Operating Reactors Branch No. 5
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Enclosure:
As stated

cc w/enclosure:
See next page

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Mr. W. G. Council

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Systematic Evaluation Program Topic Assessment

Topic: II-4.D - Stability of Slopes

Plant Name: Millstone Nuclear Power Plant, Unit 1

Docket Number: 50-245

I. INTRODUCTION

This topic pertains to the stability of all earth and rock slopes, both natural and man-made (cuts, fills, embankments, dams etc), whose failure, under any of the conditions to which they could be exposed during the life of the plant, could adversely affect the safety of the plant. The scope of the geotechnical engineering review embraces the following subjects which are evaluated using data developed by the licensee and information available from all sources: (1) slope characteristics; (2) design criteria and analyses; (3) results of field and laboratory tests; (4) excavation, backfill, and earthwork in slopes; (5) liquefaction potential affecting slopes; and (6) proposed instrumentation and performance monitoring.

The licensee's Safety Assessment Report (SAR) for this topic (reference 1), did not provide sufficient basis or detail to enable us to evaluate the stability of slopes at the Millstone Unit 1 Plant as required by the Systematic Evaluation Program (letter from D. Eisenhut, NRC, to SEP Plant licensees, dated January 14, 1981). Consequently, a member of the geotechnical engineering staff visited the site during May 11 through 14, 1982 and, based on observations at the site and a review of the

licensee's documents listed in Section VII of this report, has prepared the following topic evaluations.

II. REVIEW CRITERIA

The applicable rules and basic acceptance criteria pertinent to the review of this topic are:

1. 10 CFR Part 50, Appendix A

(a) General Design Criterion 1 - "Quality Standards and Records".

This criterion requires that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. It also requires that appropriate records of the design, fabrication, erection, and testing of structures, systems, and components important to safety shall be maintained by or under the control of the nuclear power plant licensee throughout the life of the plant.

(b) General Design Criterion 2 - "Design Bases for Protection

Against Natural Phenomena". This criterion requires that safety-related portions of the system shall be designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods tsunami, and seiches without loss of capability to perform their safety functions.

(c) General Design Criterion 44 - "Cooling Water". This criterion requires that a system shall be provided with the safety function of transferring the combined heat load from structures, systems, and components important to safety to an ultimate heat sink under normal operating and accidental conditions.

2. 10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants"

These criteria describe the nature of the investigation required to obtain the geologic and seismic data necessary to determine site suitability and identify geologic and seismic factors required to be taken into account in the siting and design of nuclear power plants.

3. Regulatory Guides

The following Regulatory Guides provide information, recommendations, and guidance and, in general, describe a basis acceptable to the staff that may be used to implement the requirements of the above described criteria.

(a) Regulatory Guide 1.132, "Site Investigations for Foundations of Nuclear Power Plants". This guide describes programs of site investigations related to geotechnical engineering aspects that would normally meet the needs for evaluating the safety of the site from the standpoint of the performance of foundations and

earthworks under anticipated loading conditions including earthquakes in complying with 10 CFR, Part 100, and 10 CFR, Part 100, Appendix A. It provides general guidance and recommendations for developing site-specific investigation programs as well as specific guidance for conducting subsurface investigations, the spacing and depth of borings, and sampling.

- (b) Regulatory Guide 1.138, "Laboratory Investigations of Soils for Engineering Analysis and Design of Nuclear Power Plants". This guide describes laboratory investigations and testing practices acceptable for determining soil and rock properties and characteristics needed for engineering analysis and design for foundations and earthwork for nuclear power plants in complying with 10 CFR, Part 100 and 10 CFR, Part 100, Appendix A.

III. RELATED SAFETY TOPICS AND INTERFACES

Settlement of structures and buried equipment are reviewed under Topic II-4.F. Other interface topics include:

- II-3.C, "Safety-Related Water Supply (Ultimate Heat Sink)";
- III-3.A, "Effects of High Water Level on Structures";
- III-3.C, "In-Service Inspection of Water Control Structures";
- III-6, "Seismic Design Considerations";
- IX-3, "Station Service and Cooling Water Systems",
- XVI, "Technical Specifications".

IV. REVIEW GUIDELINES

In general, the review process was conducted in accordance with the procedures described in the Standard Review Plan (NUREG-0800) Section 2.5.5. The geotechnical engineering aspects of the design and as-constructed condition of slopes were reviewed and compared to current procedures and criteria and the safety significance of any difference was evaluated.

V. TOPIC EVALUATION

The site is located in the town of Waterford, Connecticut, on a peninsula of land that projects into Long Island Sound. The existing ground surface at the site is about 14.5 ft above mean sea level (El +14.5) and slopes gently to a few feet above sea level on the west, south and north borders of the site. The distance from the plant structures to the Sound is only a few hundred feet. The site is relatively flat and there are no significant slopes, except at the water's edge near the intake structure on the west side of the peninsula and near the discharge structure on the east side of the peninsula.

The intake structure is supported on a foundation which has been excavated into rock that is exposed on each side of the structure. An examination of this rock indicated that there is no likelihood of a slope failure in this rock.

The cooling water discharge structure is founded in rock at the west end of an abandoned quarry about 400 ft wide and 1000 ft long that is reportedly deeper than 100 ft. below sea level. Cooling water from Millstone Unit 2 (currently operating) and from Millstone Unit 3 (currently under construction) also discharges into the quarry. Water from the quarry is conducted to Long Island Sound by a channel cut into bedrock at the east end of the quarry, about 1000 ft southeast of the Millstone Unit 1 discharge structure. The channel is not safety-related.

Based on our on-site observations and a review of the licensee's submittals listed in part VII, it is our judgement that there is only a nominal depth of soil covering the bedrock in the vicinity of the discharge structure and any sloughing of this soil could not adversely affect the discharge of water from the plant. The bases for this conclusion are as follows.

- (1) During our site visit we observed rock being excavated from the excavation for Millstone Unit 3 water discharge line excavation, and rock was exposed along the edges of the quarry and around the Millstone Unit 1 and 2 discharge structures.
- (2) The boring logs in the plant area (reference 4) showed that the rock surface slopes upward from about El -25 in the plant area to existing ground surface (about El +10) near the Millstone Unit 1 discharge structure, a distance of about 150 ft from the plant area.

VI. CONCLUSIONS

Based on the visual inspection of the site conducted by the NRC staff on, May 11-14, 1982, and a review of the referenced documents, we concur in the licensee's conclusion that there are no natural or man-made slopes at the site that could be or become unstable such as to affect safety-related structures, systems or components.

VII. REFERENCES

1. Letter from W. Council, Northeast Nuclear Energy Company (NNECO), to D. Crutchfield, NRC, "Millstone Nuclear Power Station, Unit No. 1, SEP Topic II-4.D, Stability of Slopes," August 31, 1981.
2. "Design and Analysis Report, Millstone Nuclear Power Station", docketed November 15, 1965.
3. "Final Safety Analysis Report, Millstone Point Nuclear Power Station", docketed March 14, 1968.
4. Drawing for Millstone Nuclear Power Station, prepared by Ebasco Services Incorporated, New York, dated (generally) 1966 and 1977, provided by NNECO, as follows (25202-series)

10002	Site Plan
10003	Plot Plan
11001 - 11003	Foundation Investigation
11046	Circ. Water System Discharge Structure
11048	Circ. Water System Discharge Channel-Masonry