

UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

ENVIRONMENTAL ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION FACILITY OPERATING LICENSE NO. DPR-21 NORTHEAST NUCLEAR ENERGY COMPANY, ET AL. MILLSTONE NUCLEAR POWER STATION, UNIT NO. 1 DOCKET NO. 50-245

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1.0 INTRODUCTION

The United States Nuclear Regulatory Commission (the staff) is considering the issuance of a proposed amendment which would extend the expiration date of the facility operating license for Millstone Unit 1 from May 19, 2006 to October 6, 2010. Millstone Unit 1 is operated by Northeast Nuclear Energy Company, et al. (the licensee) and is located in New London County, Connecticut.

2.0 IDENTIFICATION OF THE PROPOSED ACTION

The currently licensed term for Millstone Unit 1 is 40 years commencing with issuance of the construction permit (May 18, 1966). Accounting for the time that was required for plant construction, this represents an effective operating license term of approximately 36 years. The licensee's application dated December 22, 1986 requests an extension of the expiration date of the operating license to October 6, 2010. Therefore, the 40-year operating term would start with the issuance of the operating license and not the construction permit.

3.0 THE NEED FOR THE PROPOSED ACTION

The granting of the proposed license amendment would allow the licensee to operate Millstone Unit 1 for approximately 4 additional years beyond the currently approved expiration date. Without issuance of the proposed license amendment, Millstone Unit 1 would be shutdown after the currently approved license duration.

4.0 ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

In June 1973, the United States Atomic Energy Commission issued the "Final Environmental Statement Related to Continuation of Construction of Unit 2 and Operation of Units 1 and 2, Millstone Nuclear Power Station" (FES). In a letter dated November 5, 1982 the licensee was requested to review the June 1973 FES to determine what updating of information was necessary to support the conversion of the Provisional Operating License for Millstone Unit 1 to a Full Term Operating License. The licensee responded to this request by letter dated January 11, 1983 with a detailed review and with a copy of the Millstone Unit 3 Environmental Report. Much of the Millstone 3 Environmental Report is equally applicable to Millstone Units 1 and 2.

In a 'etter dated December 17, 1984 the NRC determined that (1) there were no new impacts that differ significantly from those evaluated in the FES, there are no substantial changes in the proposed actions relevant to environmental concerns and there are no significant new circumstances or information relevant to environmental concerns bearing on the license conversion or its impact, and thus, issuance of a supplement to the FES is not required under the National Environmental Policy Act; and (2) the conclusion on page iv, paragraph 7b of the FES as applied to Millstone Unit 1 is still valid. The Full Term Operating License was issued on October 31, 1986.

The staff has reviewed the FES and our December 17, 1984 Environmental Assessment and additional information to determine the environmental impact of operation of Millstone Unit 1 for approximately 4-1/3 additional years.

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4.1 Radiological Impacts

The staff has considered potential radiological impacts for the general public in residence in the vicinity of the Millstone Nuclear Power Station; these impacts include potential accidents and normal radiological exposure to workers at Millstone Unit 1. Finally, the impact on the uranium fuel cycle and the transportation of fuel and waste has been considered. The above impacts are summarized in Sections 4.1.1 through 4.1.4 herein.

In the FES, dated June 1973, the staff evaluated the regional demography for the Millstone site and found the land area within a 50 mile radius, as indicated by the population statistics, to be about 86 percent undeveloped, with 24 percent of this land in public open spaces and agriculture.

The FES predicted a 22 percent increase in population within 50 miles of the site from 1970 to 1980 and a 47 percent increase from 1970 to 1990. Based on the 1980 census data, an actual population increase from 1970 to 1980 was 7 percent and the estimated increase from 1970 to 1990 was 17 percent. The increase in population distribution predicted in the FES was overly conservative. Therefore, the conclusion reached in the FES in 1973 remains unchanged.

4.1.1 General Public

In the Final Environmental Statement for Millstone Unit 3 (NUREG-1064) dated December 1984, the staff calculated the dose commitment to the population residing around Millstone Unit 1 to assess the impacts on people from radioactive material released as part of the normal operation of the plant. The annual dose commitment was defined to be the dose that would be received over a 50 year period following the intake of radioactivity for 1 year under the conditions that would exist 20 years after the plant began operation. The 20 year period was chosen as representing the midpoint of plant life and was incorporated into the dose model by allowing for buildup of long life radionuclides in the soil. The buildup factor mainly affects the estimated doses for radionuclides with half-lives greater than a few years that are ingested by humans. Table D-6b of the NUREG-1064 lists the estimated doses associated with the normal operations of Millstone Units 1, 2 and 3. These doses are below the annual dose design objectives of 10 CFR 50. Appendix I. Rule Making 50-2. Also, in the Environmental Assessment for Millstone Unit No. 1, dated December 17, 1984, the staff concluded that the installed radwaste treatment systems are capable of maintaining releases of radioactive materials in liquid and gaseous effluents during normal operations, including anticipated operational occurrences, such that individual doses will not exceed the objectives of Appendix I to 10 CFR Part 50. Thus, the staff concludes that doses to members of the public would remain below the dose design objectives of 10 CFR 50, Appendix I and would not be significant.

The staff has assessed the public risks from reactor accidents per year of operation at other reactors of comparable design and power level. In all cases, the estimated risks of early fatalities and latent cancer fatalities per year of reactor operation have been small compared to the risks of many non-reactor type of accidents to which the public is typically exposed, and the natural incidence of fatal cancers. The annual risks associated with reactor accidents did not increase with longer periods of operation of the reactor. If similar risks were estimated for Millstone Unit 1, we could expect a similar conclusion. Further, as stated in FES, dated June 1973, the integrated exposure to the population within a 50-mile radius of Millstone Unit 1 from each postulated accident would be orders of magnitude smaller than that from naturally occurring background radiation, (i.e., about 0.1 Rem/year). When considered with the probability of occurrence, the annual potential radiation exposure from all the postulated accidents is a small fraction of exposure from natural background radiation.

The staff concludes that the proposed additional years of operation would not increase the annual public risk from reactor accidents.

With regard to potential changes in the exclusion area, the low population zone and distance to population centers, these were evaluated for the Millstone site in NUREG-1064, dated December 1984. The site was found to be acceptable for the 40 year operation license for Millstone Unit 3. Since the 40 year operation license for Millstone Unit 3 will go beyond the proposed operating life of Millstone Unit 1, the analysis in NUREG-1064 would also bound the 40 year license for Millstone Unit 1 in regard to low population zone, and distance to population centers.

4.1.2 Uranium Fuel Cycle

In addition to the impacts associated with the operation of the reactor, there are impacts associated with the uranium fuel cycle. The uranium fuel cycle consists of those facilities (e.g., uranium mills, fuel fabrication plants, etc.) that are necessary to support the operation of the reactor. NUREG-1064 described the impacts associated with the uranium fuel cycle. These impacts were based on 30 years of operation of a model light water reactor. The fuel requirements for the model reactor were assumed to be one initial core load and 29 annual refuelings (approximately one-third of the core is replaced during each refueling). In considering the annual fuel requirements for 40 years for a model reactor, fuel use is averaged over a 40 year operation life (one initial core and 39 refuelings of approximately one-third core each). This averaging results in a slight reduction in annual fuel use for 40 years of operation, as compared to the annual fuel requirement averaged over a 30 year operating life. The net result is an approximately 1.5 percent reduction in the annual fuel requirements for the model reactor due to averaging the initial core load over 40 years, instead of 30 years. This small reduction in fuel requirements would not lead to significant changes in the annual impacts associated with the uranium fuel cycle.

The original estimate of uranium fuel cycle impacts attributable to Millstone Unit 1 was based on 30 years of operation assuming one initial core-load and 29 annual refuelings. Operating cycles of approximately 10 months were assumed. However, past operating history and future projections indicate that the cycles have been 15 to 18 months in duration and will be 21 to 23 months in the future. As such, 22 fuel cycles are projected over the current license period. An extension of the license until October 2010 will add, at most, three more cycles. This is five cycles less than the original base assumption. Thus, the values in the original fuel cycle impacts are more conservative than the actual case, even over the extended license period.

4.1.3 Occupational Exposures

The staff has evaluated the licensee's dose assessment for the years 2006 to 2010 (the additional years during which Millstone Unit 1 would operate), and compared it with current Millstone Unit 1 and overall industry occupational dose experience.

The average yearly occupational exposure for Millstone Unit 1 over the most recent 5-year period, covering 1983-1987, was 504 person-rems. This is approximately 2/3 the average yearly exposure of 775 person-rems per unit for U.S. BWRs over the same 5-year period. In 1986, the licensee established a new Exposure Reduction Initiative Program. Part of this program involved the establishment of a 3-year average exposure goal for Millstone Unit No. 1 of 470 person-rems/year. The licensee expects the 3-year average exposure for Millstone Unit No. 1 to reach this goal by 1989. The licensee hopes to accomplish this through continued implementation of the as low as is reasonably achievable (ALARA) measures, as well as through the achievement of the shortand long-term exposure reduction initiatives which are also part of this new Exposure Reduction Initiative Program. By reducing the annual occupational exposure at Millstone Unit No. 1 through the use of these ALARA measures, the licensee estimates that the additional dose contribution from operating the extra few years beyond the existing license will be less than 2000 person-rems. This is roughly equivalent to the 4-year dose from a typical U.S. BWR.

Additional occupational exposures will result from decommissioning of Millstone Unit No. 1, although these doses will be incurred with or without the license extension period. Any increases in corrosion product buildup during the period of extension will be compensated for by improved chemistry controls and other ALARA measures to actually lower primary side dose rates with time. Consequently, the extended operating time should have no measurable adverse effect on decommissioning dose requirements.

Spent fuel will be stored in the spent fuel pool (previously evaluated and approved by the staff for radiological environmental consequences) in lieu of shipment offsite until alternate storage facilities are available (i.e., Federal Waste Repository). On May 5, 1988 the licensee submitted information to the NRC describing modifications that it proposes to make to the spent fuel pool to accommodate storage until approximately 1999. These modifications, including their radiological environmental consequences, will be reviewed and the results presented in a separate safety evaluation.

The staff concludes that the licensee's occupational dose assessment is acceptable, and their Radiation Protection Program is adequate to ensure that occupational radiation exposures will be maintained ALARA and in continued compliance with the requirements of 10 CFR Part 20.

4.1.4 Environmental Impacts - Transportation Of Fuel And Waste

The staff has reviewed the environmental impacts attributable to the transportation of fuel and waste to and from the Millstone site including information submitted by the licensee's letter dated June 25, 1987, concerning transportation of nuclear fuel. With respect to the normal conditions of transport and possible accidents in transport, the staff concludes that the environmental impacts are bounded by those identified in Table S-4, "Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor," of 10 CFR Part 51.52. The bases for this conclusion are that: 1) Table S-4 is based on an annual refueling and an assumption of 60 spent-fuel shipments per reactor year. At the present time, the licensee projects a total of 25 fuel cycles for Millstone Unit 1 over a full 40 years of operation. Reducing the number of fuel shipments will reduce the overall impacts related to population exposure and accidents discussed in Table S-4. 2) Table S-4 represents the contribution of such transportation to annual radiation dose per reactor year to exposed transportation workers and to the general public. The licensee projects that spent fuel will not exceed the fuel enrichment and average fuel irradiation levels that are specified in 10 CFR 51.52(a)(2) and (3) as the bases for Table S-4. The radiation levels of transport fuel casks are limited by the Department of Transportation and are not dependent on fuel enrichment and/or irradiation levels. Therefore, the estimated doses to exposed individuals per reactor year will not increase over that specified in Table S-4.

The annual radiation dose to individuals will not be changed by the extended period of operation. Although some integral risk with respect to normal conditions of transportation and possible accidents in transport would be attributed to the additional years of operation, the integral risk would not be significant because the annual risk for such transportation is small. Radioactive waste shipments are expected to remain at about the present level for the remaining life of the plant.

4.2 Non-Radiological Impacts

4.2.1 Environmental Effects

The use of the Millstone site and associated transmission facilities for electrical production was originally considered in the FES. Such impacts are not altered by the proposed extension in that no changes to the facility or its operation are involved. Further, land use surrounding the site remains essentially unchanged. Thus, the balance originally struck between costs and benefits will remain valid throughout the extended period of operation.

To date, no significant impacts have been found due to thermal or chemical discharges or from the withdrawal of cooling water from Long Island Sound. The Connecticut Department of Environmental Protection administers the National Pollutant Discharge Elimination System (NPDES) permit and has set forth conditions and limits expressly designed to protect indigenous fish, shellfish and wildlife. No alternation of those conditions would occur as a result of the extended period of operation.

4.2.2 Economic Impacts

The proposed extension would produce some economic benefits. First, an approximate 4-year extension of the operating life of the facility would lower nominal revenue requirements by over \$1.4 billion, or more than \$144 million in present worth terms (to January 1987). The principal reason for

such savings is that the New England region prefers base-load capacity as a replacement for Millstone Unit 1 upon its retirement. Therefore, extending the unit's life would delay the timing of such replacement capacity by the length of the extension period. The estimated costs of a 4-year extension are far lower than the costs associated with delaying an equivalent amount of new base-load capacity.

Additional economic effects not considered in this estimate include continued contribution to the local property tax base, the effect of payroll and other expenditures for goods and services on communities surrounding the facility, and the benefit from the continued use of an existing generating site, which defers the need to site a new facility on a new location.

4.2.3 Plant Design Change

Many modifications and design changes have taken place at Millstone Unit 1 since the FES was issued. Those that are safety related or important to safety or require a change to the Facility Operating License or Technical Specifications are submitted to the NRC for review and approval prior to implementation in accordance with 10 CFR Part 50. This review and approval process includes a determination of both radiological and non-radiological environmental effects of the proposed change. Changes that are determined to be outside the scope of those listed above may be implemented by the licensee without prior NRC approval; however, the licensee must have first completed a safety analysis with respect to the proposed change and retain a copy of this analysis on site for NRC inspection and audit. A description of the changes including a summary of the associated safety analysis is then submitted to the NRC as part of the licensee's Annual Report. A complete detailed description of the changes and their impact on plant operations and procedures is also included where applicable in required annual updates of the Final Safety Analysis Report (FSAR). Both the Annual Report and FSAR updates are reviewed by the staff to verify that the licensee has correctly determined that these changes did not require prior NRC review and approval. In general, these changes improve plant reliability and do not adversely impact the environment. All changes are conducted in accordance with approved procedures, current license requirements and Technical Specifications and the current NPDES permit. While it is recognized that the requested license extension will require further routine design changes and modifications similar in nature to those already conducted, it is not anticipated that these would have any adverse affect on the environment.

5.0 ALTERNATIVES TO THE PROPOSED ACTION

The principal alternative to issuance of the proposed extension would be to dery the application. In this case. Millstone Unit 1 would shut down upon expiration of the present operating license.

In Chapter XI of the June 1973 FES, a cost-benefit analysis is presented for Millstone Unit 1. Included in the analysis is comparison among various options for producing an equivalent electrical power capacity. Even considering significant changes in the economics of the alternatives, operation of Millstone Unit 1 in its present plant configuration for an additional 4 years would only require incremental yearly costs. These costs would be substantially less than the purchase of replacement power or the installation of new electrical generating capacity. Moreover, the overall cost per year of the facility would decrease since the large initial capital outlay would be averaged over a greater number of years. In summary, the cost-benefit advantage of Millstone Unit 1 compared to alternative electrical power generating capacity improves with the extended plant lifetime.

6.0 ALTERNATIVE USE OF RESOURCES

This action does not involve the use of resources not previously considered in connection with the June 1973 FES.

7.0 AGENCIES AND PERSONS CONSULTED

The Commission's staff reviewed the licensee's request and did not consult other agencies or persons.

8.0 BASIS AND CONCLUSIONS FOR NOT PREPARING AN ENVIRONMENTAL IMPACT STATEMENT

The Commission has determined not to prepare an environmental impact statement for the proposed action. The staff has reviewed the proposed license amendment relative to the requirements set forth in 10 CFR Part 51. Based on this assessment, the staff concludes that there are no significant radiological or non-radiological impacts associated with the proposed action and will not change any conclusions reached by the Commission in the FES. Therefore, pursuant to 10 CFR 51.31, an environmental impact statement need not be prepared for this action. Based upon this environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment.