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U.S. ATOMIC ENERGY COMMISSION
REGULATORY GUIDE
DIRECTORATE OF REGULATORY STANDARDS

REGULATORY GUIDE 1.49

POWER LEVELS OF NUCLEAR POWER PLANTS

A. INTRODUCTION

Section 50.34 of 10 CFR Part 50 requires that each application for a construction permit include a summary description and discussion of the facility with special attention to, among other things, the design and operating characteristics at the projected initial power level (proposed licensed power level).

Section 50.34 also requires that the application include an analysis and evaluation of the major structures, systems, and components of the facility which bear significantly on the acceptability of the site, under the site evaluation factors identified in 10 CFR Part 100, at the ultimate power level contemplated by the applicant.

It is the policy of the Atomic Energy Commission to encourage, support, and give priority consideration to activities leading to greater standardization of nuclear power plants. In a statement issued on March 5, 1973, announcing its nuclear plant standardization policy, the Commission stated that the size of all new plants accepted for licensing review (both those proposed for review as standardized plants and those proposed for review in connection with a specific application for a construction permit) would be subject to a maximum * | power limit. [1]

This guide describes acceptable maximum power levels for all nuclear power plants.

[1] The Regulatory staff study referred to in the Commission Policy Statement stated that only applications for light-water reactors would be accepted for review as standardized plants. The Regulatory staff has now determined that applications for standardized plants will *not* be limited to light-water-cooled reactors.

* Lines indicate substantive changes from previous issue.

B. DISCUSSION

The design power levels of nuclear power plants have increased from about 600 megawatts electric in 1965 to slightly above 1300 megawatts electric in 1973. The continual increase in the size of these plants has resulted in many plant design modifications and in a large expenditure of AEC staff review effort to assure the maintenance of a consistent level of safety. These numerous plant design variations, coupled with the rapidly increasing number of applications, have contributed to the steady growth in the required licensing review effort to evaluate such applications. The increase in plant power levels, and the associated design modifications, have made standardization of designs difficult to achieve.

The intent of the AEC policy on plant power levels is also to stabilize the maximum size of nuclear plants until sufficient experience is gained with design, construction, and operation of large plants. The first plants in the 1100-megawatt electric class are now in the startup phase. The Regulatory staff believes that a substantial time period should elapse before maximum licensed core thermal power levels are changed. Accordingly, construction permit applications should not be submitted for plants of core thermal power levels greater than 3800 megawatts before January 1, 1979, at the earliest. The AEC will issue notice of its intent to consider applications at core thermal power levels greater than 3800 megawatts at least two years prior to acceptance of such applications. In determining, subsequent of January 1, 1979, the acceptability of any increase in the maximum licensed power level, the operating history of large plants will be carefully reviewed.

Some of the analyses in support of the proposed licensed power level are made for a slightly higher assumed power level to allow for possible instrument

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errors in determing the power level. The Regulatory staff has determined that a margin of two percent of the licensed power level is adequate for this purpose.

Analyses of the possible offsite radiological consequences of postulated design-basis accidents made to demonstrate acceptability of the site in accordance with 10 CFR Part 100 should be performed for at least 1.02 times the proposed licensed core power level or may, at an applicant's discretion, be made at a somewhat higher power level to account for the margin which may be provided in turbine-generator designs above rated capacity. The Regulatory staff believes that a reasonable maximum allowance for this additional capacity and for instrument error is provided by a limit of 4100 megawatts thermal on ultimate core power level for Part 100-related analyses. The staff will regard such analyses as supporting operation of the facility at a proposed licensed core power level no greater than 3800 megawatts thermal.

C. REGULATORY POSITION

1. The proposed licensed power level of all nuclear power plants for which a construction permit application is filed pursuant to Section 50.34 of 10 CFR Part 50 should be limited to a reactor core power level of 3800 megawatts thermal or less until January 1, 1979, at the earliest.

2. Analyses and evaluation in support of the application should be made at an assumed core power level equal to 1.02 times the proposed licensed power level (with a maximum acceptable value of 1.02 times 3800, or 3876 megawatts thermal) for (a) normal operating conditions, (b) transient conditions anticipated during the life of the facility such as load changes, control rod malfunctions and improper operations, loss of forced coolant flow, loss of load or turbine trip, loss of normal a-c power, primary system depressurization, etc., and (c) accident conditions necessary to evaluate the adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents.

3. Analyses of the possible offsite radiological consequences of postulated design-basis accidents made to demonstrate acceptability of the site in accordance with 10 CFR Part 100 should be performed for an assumed core power level equal to 1.02 times the proposed licensed power level or may, at an applicant's discretion, be made at a higher power level, not to exceed 4100 megawatts thermal. Analyses made at an assumed core power level greater than 1.02 times the proposed licensed power level should be regarded as supporting operation of the facility at a proposed licensed core power level no greater than 3800 megawatts thermal.