



U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
OFFICE OF NUCLEAR REACTOR REGULATION

SECTION 15.6.4

RADIOLOGICAL CONSEQUENCES OF MAIN STEAM
LINE FAILURE OUTSIDE CONTAINMENT (BWR)REVIEW RESPONSIBILITIES

Primary - Accident Analysis Branch (AAB)

Secondary - Site Analysis Branch (SAB)
Reactor Systems Branch (RSB)I. AREAS OF REVIEW

The AAB review covers the following areas:

1. The release of primary coolant due to a main steam line failure outside of containment in a boiling water reactor (BWR) plant.
2. The calculation of whole body and thyroid doses at the site boundary due to the releases resulting from these accidents.

The purposes of the review are to calculate the whole body and thyroid doses resulting from a postulated failure of a main steam line outside containment, and to assure that releases due to the failure are adequately limited by the technical specifications on primary coolant activity. The RSB will notify the AAB if this accident is predicted to cause fuel failures. The RSB may also be requested to confirm the assumption of instantaneous reactor coolant release. The SAB provides the reviewer with the accident condition wind speed at the nearest exclusion area boundary.

II. ACCEPTANCE CRITERIA

The plant is considered adequately designed against the radiological consequences of a main steam line failure outside containment, and the primary coolant activity appropriately limited by the technical specifications if calculations show that the resulting doses at the nearest exclusion area boundary are small fractions of the 10 CFR Part 100 exposure guidelines.

III. REVIEW PROCEDURES

The reviewer selects and emphasizes aspects of the areas covered by this review plan as may be appropriate for a particular case. The judgment on areas to be given attention and emphasis in the review is based on an inspection of the material presented to see whether it is similar to that recently reviewed on other plants and whether items of special safety significance are involved.

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to Revision 2 of the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

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The detailed review of the radiological consequences of a main steam line failure outside containment is done at the operating license (OL) stage when system parameters and accident analyses are fully developed. At the construction permit (CP) stage, the review is limited to a brief survey of the pertinent portions of the plant design and the applicant's discussion of the accident to determine that there are no unusual features that would prevent limitation of doses to acceptable levels by appropriate limits on coolant activity concentrations.

The AAB review of main steam line failure accidents at the OL stage consists of the following steps:

1. Review of the applicant's descriptions of the steam line failure accidents.
2. Performance of an independent analysis of the radiological consequences of the failure of the main steam line, using the assumptions of Regulatory Guide 1.5 (Ref. 2). At present, the following conservative assumptions are used to simplify the analysis:
 - a. The mass of reactor coolant released to the environment is 140,000 lbs. The release is assumed to occur instantaneously. (These assumptions are made unless notified otherwise by RSB.)
 - b. The initial fission product concentrations in the primary coolant are those given as the maximum values in the technical specifications. The RSB reviews, on a generic basis, the effect on core thermal margins of a steam line failure in a BWR. If this event is predicted to cause fuel failures, RSB notifies AAB so that the predicted magnitude and extent of fuel failures can be properly considered in the evaluation of the radiological consequences. No decontamination factors, or other reductions in the fission product concentrations are assumed.
3. Determination of the values of meteorological parameters for the dose calculations. The SAB provides the reviewer with the accident condition (5 percentile) wind speed at the nearest exclusion area boundary. The X/Q value for the calculation of the two-hour doses is obtained from Regulatory Guide 1.5 (Ref. 2) and corrected for wind speeds differing from 1 m/sec (inverse ratio).
4. Review of the results of the dose calculations. The resulting doses from these accidents should be small fractions of the 10 CFR Part 100 limits. If this is not the case, the primary coolant concentration limits in the technical specifications should be reduced.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided and that the review and calculations support conclusions of the following type, to be included in the staff's safety evaluation report at the operating license stage:

"The applicant's analysis of a failure of a main steam line has been reviewed, and an independent analysis of this accident has been performed by the staff. The results of

the staff's calculations are presented in Table _____. The technical specifications for the primary coolant activity concentrations limit the consequences of this accident to a small fraction of 10 CFR Part 100 exposure guidelines."

At the construction permit stage, the following paragraph is included in the staff's safety evaluation report:

"On the basis of our experience with the evaluation of steam line failure accidents for boiling water plants of similar design, we have concluded that the consequences of these accidents can be controlled by limiting the permissible primary coolant radioactivity concentrations so that potential offsite doses are small. We will include appropriate limits on the primary coolant activity concentrations in the technical specifications."

V. REFERENCES

1. 10 CFR Part 100, "Reactor Site Criteria."
2. Regulatory Guide 1.5, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors."

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