



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

SECTION 10.4.2

MAIN CONDENSER EVACUATION SYSTEM

REVIEW RESPONSIBILITIES

Primary - Effluent Treatment Systems Branch (ETSB)

Secondary - None

I. AREAS OF REVIEW

At the construction permit (CP) stage of review, ETSB reviews the information in the applicant's safety analysis report (SAR) in the specific areas that follow. At the operating license (OL) stage of review, the ETSB review consists of confirming the design accepted at the CP stage.

1. The main condenser evacuation system (MCES) generally consists of two subsystems: the "hogging" or startup system which initially establishes main condenser vacuum, and the normal system which maintains condenser vacuum once it has been established. The review of each MCES subsystem includes the design, design objectives, capacity, method of operation, and factors that influence gaseous radioactive material handling, e.g., system interfaces and potential bypass routes. The ETSB review includes the system piping and instrumentation diagrams (P&IDs).
2. The quality group classifications of piping and equipment, and the bases governing the design criteria chosen are reviewed.
3. Design features to preclude the possibility of an explosion if the potential for explosive mixtures exists are reviewed.

Provisions incorporated to sample and monitor radioactive materials in gaseous effluents from the MCES are reviewed in Standard Review Plan (SRP) 11.5.

II. ACCEPTANCE CRITERIA

The applicant's design should meet the following criteria:

1. The MCES capacity should be consistent with the industry guidelines given in Reference 2. Either mechanical vacuum pumps or steam jet air ejectors may be used for hogging (startup) or normal evacuation of the main condenser.

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. 20545.

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2. The components of the system may be designed to Quality Group D as defined in Regulatory Guide 1.26 (Ref. 3) and to a non-seismic design classification.
3. If there is a potential that explosive mixtures may exist, the MCES should be designed to withstand the effects of an explosion or provide redundant instrumentation to detect and annunciate the buildup of potentially explosive mixtures. Instrumentation with automatic alarm and control functions should be provided to continuously monitor concentrations of the appropriate gases in portions of the system having the potential for containing explosive mixtures. The design should include precautions to stop continuous leakage paths, i.e., provisions for liquid seals downstream of rupture discs and for prevention of permanent loss of the liquid seals in the event of an explosion.
4. Provisions to control and monitor releases of radioactivity to the environment from the MCES must conform to General Design Criteria 60 and 64 (Ref. 1).

III. REVIEW PROCEDURES

The reviewer will select and emphasize material from this review plan as may be appropriate for a particular case.

1. In the ETSB review of the MCES, the P&IDs are reviewed to determine the flow paths of gases through the system, including all bypasses, and the points of release of gaseous wastes to the environment or other systems. This information is used in SRP 11.3 to calculate the quantity of radioactive material released annually in gaseous effluents during normal operations, including anticipated operational occurrences. ETSB verifies that water from the mechanical vacuum pumps and condensate from the steam jet air ejectors are classified as radioactive liquids and treated accordingly.
2. ETSB reviews the equipment quality group classifications.
3. If there is a potential that explosive mixtures may exist, ETSB determines whether the applicant has designed the MCES to withstand the effects of such an explosion, or has provided redundant instrumentation to detect, annunciate, and prevent the buildup of potentially explosive mixtures. ETSB will also determine if the applicant's design includes adequate provisions to stop continuous leakage paths after an explosion.

IV. EVALUATION FINDINGS

ETSB verifies that sufficient information has been provided and that the review is adequate to support conclusions of the following type, to be included in the staff's safety evaluation report:

"The main condenser evacuation system includes equipment and instruments to establish and maintain condenser vacuum and to prevent an uncontrolled release of radioactive material to the environment. The scope of our review included the system capability to

transfer radioactive gases to the gaseous waste or ventilation systems, the design provisions incorporated to monitor and control releases of radioactive materials in gaseous effluents in accordance with General Design Criteria 60 and 64 and the quality group classification of equipment and components used to collect gaseous radioactive wastes relative to the guidelines of Regulatory Guide 1.26. We have reviewed the applicant's system descriptions, piping and instrumentation diagrams, and design criteria for the components of the main condenser evacuation system. The basis for acceptance in our review has been conformance of the applicant's designs, design criteria, and design bases for the main condenser evacuation system to the applicable regulations and regulatory guides referenced above, as well as to branch technical positions and industry standards. Based on our evaluation, we find the proposed main condenser evacuation system acceptable."

V. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 60, "Control of Releases of Radioactive Materials to the Environment," and Criterion 64, "Monitoring Radioactivity Releases."
2. "Standards for Steam Surface Condensers," 6th Ed., Heat Exchanger Institute (1970).
3. Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Revision 2.

11/24/75

SRP 10.4.3