



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

SECTION 9.3.2

PROCESS SAMPLING SYSTEM

Primary - Effluent Treatment Systems Branch (ETSB)

Secondary - Containment Systems Branch (CSB)
 Auxiliary and Power Conversion Systems Branch (APCSB)I. AREAS OF REVIEW

ETSB reviews the following information in the applicant's safety analysis report (SAR):

1. The design objectives and design criteria for the process sampling system (PSS) are reviewed at the construction permit (CP) stage. During the operating license (OL) stage of review, ETSB review consists of confirming the design accepted at the CP stage and evaluating the adequacy of the applicant's technical specifications in these areas. The review includes identification of the process streams to be sampled and the parameters to be determined through sampling (e.g., gross beta-gamma concentration, boric acid concentration).
2. The system description for the PSS is reviewed at the operating license (OL) stage. The review includes (a) piping and instrumentation diagrams (P&ID's), (b) provisions for obtaining representative samples, (c) location of sampling points and sample stations, and (d) provisions for purging sampling lines.
3. The seismic design and quality group classifications of piping and equipment, and the bases for the classifications chosen are reviewed at the CP stage. At the OL stage, the review includes design and expected temperatures and pressures and materials of construction of components of the system.
4. The isolation provisions for the system and the means provided to limit radioactive releases by limiting reactor coolant losses are reviewed at the CP stage.

Sampling and monitoring systems for radwaste processing systems are reviewed by ETSB under Standard Review Plan (SRP) 11.5. Secondary reviews are performed by the following branches and the results used by ETSB to complete the overall evaluation of the PSS. The CSB, under SRP 6.2.4, reviews the design of isolation provisions of those portions of the PSS that penetrate primary containment. The APCS, under SRP 3.6.1, reviews the design with

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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respect to the effects of externally or internally generated missiles, pipe whip, and jet impingement forces associated with postulated pipe breaks in high energy fluid systems or leakage cracks in moderate energy fluid systems.

II. ACCEPTANCE CRITERIA

1. The applicant's design should be such that the PSS has the capability for sampling all normal process systems and principal components, including provisions for obtaining samples from at least the following points:

a. For a pressurized water reactor (PWR):

- Reactor primary coolant.
- Refueling (borated) water storage tank.
- ECCS core flooding tank.
- Concentrated boric acid storage tank.
- Boric acid mix tank.
- Boron injection tank.
- Chemical additive tank.
- Spent fuel pool.
- Secondary coolant.
- Pressurizer tank.
- ✓ Steam generator blowdown (if applicable).

b. For a boiling water reactor (BWR):

- Reactor coolant.
- Standby liquid control system tank.

The required tests and test frequencies should be given in the plant technical specifications.

2. ETSB will use the following guidelines for determining the acceptability of the system functional design:

- a. Provisions should be made to assure representative samples from liquid process streams and tanks. For tanks, provisions should be made to sample the bulk volume of the tank and to avoid sampling from low points or from potential sediment traps. For process stream samples, sample points should be located in turbulent flow zones. Provisions should be made for purging sample lines and for reducing plateout or precipitation in sample lines (e.g., heat tracing). Provisions for sampling should be in accordance with the guidelines in Regulatory Guide 1.21, paragraph C.6.
- b. Provisions should be made to assure representative samples from gaseous process streams and tanks in accordance with ANSI N13.1-1969.

- c. Locations of sampling points should be described in the SAR at the OL stage and should be shown on P&IDs describing the system to be sampled.
 - d. Provisions should be made for purging sampling lines and for reducing plateout in sample lines.
 - e. Provisions should be made to purge and drain sample streams back to the system of origin or to an appropriate waste treatment system.
 - f. Isolation valves should fail in the closed position.
 - g. Passive flow restrictions to limit reactor coolant loss from a rupture of the sample line should be provided.
3. The seismic design and quality group classification of sampling lines and components should conform to the classification of the system to which each sampling line and component is connected (e.g., a sampling line connected to a Quality Group A and seismic Category I system should be designed to Quality Group A and seismic Category I classification) as described in Regulatory Guides 1.26 and 1.29. Components and piping downstream of the second isolation valve can be designed to Quality Group D and non-seismic Category 1 requirements.

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 review of the process sampling system, ETSB compares the list of process sampling points contained in the SAR with the sampling points identified in Section II, 1, above, to assure that the required process sampling points have been provided.
2. ETSB compares the capability of the system to obtain representative samples of process fluids and the locations of sampling points with the guidelines for obtaining representative samples of fluids contained in paragraph C.6 of Regulatory Guide 1.21 and with the principles for obtaining representative samples of gases contained in ANSI N13.1-1969.
3. ETSB compares the seismic design and quality group classifications of the PSS to the classifications of the fluid systems to which the sampling system is connected.
4. ETSB reviews the technical specifications for process sampling to determine that the content and intent of the technical specifications are in agreement with the requirements developed as a result of the staff's review.
5. ETSB verifies that provisions have been made to limit the potential for reactor coolant loss from the rupture of a sample line.

IV. EVALUATION FINDINGS

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

"The process sampling system includes piping, valves, heat exchangers, and other components associated with the system from the point of sample withdrawal from a fluid system up to the analyzing station, sampling station, or local sampling point. Our review included the provisions proposed to sample all principal fluid process streams associated with plant operation and the applicant's proposed design. The review has included descriptive information for the process sampling system and the location of sampling points, as shown on piping and instrumentation diagrams.

"The basis for acceptance in our review has been conformance of the applicant's design for the process sampling system to applicable regulations and guides, as well as to branch technical positions and industry standards. Based on our evaluation, we find the proposed system to be acceptable."

V. REFERENCES

1. Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1.
2. Regulatory Guide 1.26, "Quality Group Classifications and Standards For Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Revision 2.
3. Regulatory Guide 1.29, "Seismic Design Classification," Revision 1.
4. ANSI N13.1-1969, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities," American National Standards Institute (1969).

SRP 9.3.3