



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

SECTION 12.2

RADIATION SOURCES

REVIEW RESPONSIBILITIES

Primary - Radiological Assessment Branch (RAB)

Secondary - Effluent Treatment Systems Branch (ETSB)

I. AREAS OF REVIEW

The following areas of the applicant's safety analysis report (SAR) relating to radiation sources are reviewed as related to in-plant radiation protection:

1. CONTAINED SOURCES

The description of the sources of radiation that are the basis for the radiation protection program, as used in the shield design calculations (SAR Chapter 11 contains the description for sources contained in equipment of the radioactive waste management systems). This should include isotopic composition, location in the plant, source strength and source geometry, and the basis for the values (preliminary safety analysis report (PSAR), and update in the final safety analysis report (FSAR). The descriptions should include any required byproduct, source, and special nuclear materials.

2. AIRBORNE RADIOACTIVE MATERIAL SOURCES

The description of the sources of airborne radioactive material considered in the design of the ventilation systems, as used for design of personnel protective measures and for dose assessment. (SAR Chapter 11 contains the description for airborne sources that have to be considered for their contribution to the plant effluent releases, through equipment of the radioactive waste management systems or the plant ventilation system). The descriptions should include a tabulation of the calculated concentration of radioactive material by nuclides expected (based on some failed fuel assumptions as in 1 above) during normal operation and anticipated operational occurrences for equipment cubicles, corridors, and operating areas normally occupied by operating personnel and should include models and parameters for the calculations (PSAR and update in FSAR).

The ETSB will review the description of the sources and the assumptions made by the applicant in calculating the various source terms provided. ETSB will confirm in SRP Section 11.1 that the proper assumptions have been made or that the source values are correct.

 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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II. ACCEPTANCE CRITERIA

The descriptive information in the SAR is considered to be sufficient if it meets the minimum information needs set forth in Section 12.2 of the "Standard Format and Contents of Safety Analysis Reports for Nuclear Power Plants," Revision 2. Specific acceptance criteria for these areas of review are as follows:

All sources of radiation that necessitate designed shielding, special ventilation designs, special storage locations and conditions, traffic or access control considerations, special plans and procedures, monitoring equipment, etc., shall be described to the degree needed for the shielding codes used in the design process, for establishing related facility design features for plans and procedures development, for assessment of occupational radiation exposures, and for equipment specifications. For contained sources, the description should include plan scale drawings of each floor of the plant on which all the sources of significance are shown and identified in a manner that can be easily related to tables containing the pertinent and necessary quantitative source parameters. Their position should be accurately indicated, as well as the approximate size and shape. Airborne sources that are created by leakage, by opening formerly closed containers, by storage of leaking fuel elements, etc., shall be identified by location and magnitude, in a manner useful for designing appropriate ventilation systems and in specifying appropriate monitoring systems. The assumptions made in arriving at quantitative values for these various sources should be specified, either in this section or by reference to Chapter 11 of the SAR. Acceptance criteria for the assumptions and methods used in arriving at source term values are discussed in Chapter 11 and are judged by the ETSB. The tables of quantitative source parameters, which can be placed in Chapter 12 or referenced to Chapter 11, will be acceptable if the accompanying text either in this section or other referenced sections makes it clear how the values are used in a shield design calculation or in a ventilation system design. In addition, the quantities will be acceptable if the reviewer can confirm specific values given in the tables from the assumptions given along with common tables of nuclide decay schemes, gamma ray energies, etc. Specific acceptance criteria for the N-16 shielding source terms are being developed. For byproduct, source, and special nuclear materials, 10 CFR Parts 30, 40 and 70 can be used as guidance.

III. REVIEW PROCEDURES

The information furnished in the SAR is reviewed for completeness in accordance with the "Standard Format and Contents of Safety Analysis Reports for Nuclear Power Plants," Revision 2. The reviewer determines whether source strengths, concentrations of airborne radioactivity, and quantitative source descriptions are consistent with the assumptions made and the methods used by the applicant, primarily through the review performed by ETSB. Locations of the contained sources relative to shield walls, occupied areas, traffic pathways, in-service inspection points, sampling stations, controls, etc., are examined for any potential problems in assuring that occupational radiation exposures (ORE) will be as low as is reasonably achievable (ALARA). Based on the review, RAB may request additional information or request the applicant to reevaluate his analysis for the purpose of modifying those areas which do not meet the acceptance criteria given in Section II.

IV. EVALUATION FINDINGS

The staff's review should verify that adequate and sufficient information is contained in the SAR and amendments to arrive at conclusions of the following type, which are to be included in the staff's Safety Evaluation report. The report will include a summary of the applicant's coverage, the staff's basis for review and acceptance criteria, and the findings of the review. The following is a brief representation of the evaluation findings:

"12.2 Radiation Sources.

"All radioactive sources that form the basis for the radiation protection design of the _____ plant have been reviewed. The review has included contained sources and airborne radioactive material sources and the basis for the quantitative source informations tabulated in this and referenced sections of the SAR. It has included the description of byproduct, source, and special nuclear materials.

"The basis for acceptance in the review has been that all information required has been provided and that the source parameters are consistent with the staff's values. The descriptions and values are appropriate for use in shielding design calculations and for developing a plant radiation protection program. The source locations and physical descriptions have been provided in a manner which permits evaluation of the radiation protection design and procedures.

"It is concluded that all appropriate sources have been considered for the development of the radiation protection design and program."

V. REFERENCES

1. Regulatory Guide 1.70, "Standard Format and Contents of Safety Analysis Reports for Nuclear Power Plants," Revision 2.
2. 10 CFR Part 70, "Special Nuclear Material."
3. 10 CFR Part 40, "Source Material."
4. 10 CFR Part 20, "Byproduct Material."

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SRP 12.3