



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

11.5 PROCESS AND EFFLUENT RADIOLOGICAL MONITORING  
INSTRUMENTATION AND SAMPLING SYSTEMS

REVIEW RESPONSIBILITIES

Primary - ~~Effluent Treatment Systems Branch (ETSB)~~Emergency Preparedness and Radiation Protection Branch (PERB)<sup>1</sup>

Secondary - ~~None~~Plant Systems Branch (SPLB)<sup>2</sup>

I. AREAS OF REVIEW

At the construction permit (CP), standard design certification, or combined license (COL) review<sup>3</sup> stage, ~~ETSB~~PERB<sup>4</sup> reviews the information in the applicant's ~~preliminary~~<sup>5</sup> safety analysis report (PSARSAR<sup>6</sup>) in the specific areas that follow. During the operating license (OL) or COL<sup>7</sup> stage of review, ~~ETSB~~PERB<sup>8</sup> review consists of confirming the design accepted at the CP or standard design certification<sup>9</sup> stage and evaluating the adequacy of the applicant's specifications in those areas. The ~~ETSB~~PERB<sup>10</sup> review includes:

1. The design objectives and design criteria for the process and effluent radiological monitoring instrumentation and sampling systems. The review includes the identification of the process and effluent streams to be monitored by radiation detection instrumentation or sampled for separate analyses, the purpose of each instrumented monitoring or sampling function provided, and the parameters to be determined through monitoring instrumentation or sampling and analysis (e.g., gross beta-gamma concentrations, radionuclide distribution, or quantities of specific radionuclides).
2. The system description for the process and effluent radiological monitoring instrumentation and sampling systems. The review includes (a)\* description of radiation

DRAFT Rev. 4 - April 1996

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**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 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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detection instrumentation and related instrumentation and sampling equipment provided, including redundancy (where applicable), range, calibration, sensitivity, alarm/trip setpoints, independence, and diversity of components for normal operations, anticipated operational occurrences, and postulated accidents; (b)\* location of monitors and direct readouts; (c)\* location of sampling points and sampling stations; (d) calculation of radioactivity concentrations to be monitored or sampled for normal operations, anticipated operational occurrences, and postulated accidents; (e) measurements, analyses, or determinations to be made (e.g., gross beta-gamma concentration or measurement of specific radionuclides); (f)\* types and locations of annunciators and alarms and the actions initiated by each; (g) provisions for purging sample lines, input volumes to waste collection systems, and sampling frequency; (h) expected relationships between monitoring instrumentation readouts, sampling analytical results, and plant operations; (i)\* descriptions or procedures for calibration, maintenance, and inspection of monitoring instrumentation; (j) layout drawings, piping and instrumentation diagrams (P&IDs), and process flow diagrams; and (k) monitoring systems and procedures for detection of radioactivity in nonradioactive systems to prevent unmonitored and uncontrolled releases of radioactive material to the environment.<sup>11</sup>

3. The radiological effluent technical specifications (RETS), the Offsite Dose Calculation Manual (ODCM), and the Process Control Program (PCP). The review includes evaluation and development of limiting conditions for operation and their bases, consistent with plant design for the RETS, and procedural details and programmatic controls in the ODCM and PCP.<sup>12</sup>

### Review Interfaces<sup>13</sup>

In addition, ETSBPERB<sup>14</sup> will coordinate other branches' evaluations that interface with the overall review of the process and effluent radiological monitoring instrumentation and sampling systems, as follows:

1. Instrumentation and Control Systems Branch Instrumentation and Controls Branch (HICB)<sup>15</sup> reviews the process and effluent radiological monitors which are required to actuate engineered safety feature (ESF) systems designed to prevent or mitigate consequences of accidents which could result in offsite exposures comparable to the guidelines of 10 CFR Part 100 as part of its primary review responsibility for SRP Standard Review Plan (SRP)<sup>16</sup> Section 7.6.
2. Chemical Engineering Branch Materials and Chemical Engineering Branch (EMCB)<sup>17</sup> reviews provisions for controlling sample leakage, spillage, and radiation exposure during sampling from process waste systems as part of its primary review responsibility for SRP Section 9.3.2.

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\*Final safety analysis report (FSAR) only.

3. ~~The reviews for Technical Specifications and Quality Assurance are coordinated and performed by the Licensing Guidance Branch and the Quality Assurance Branch as part of their primary review responsibility for SRP Sections 16.0 and 17.0, respectively.~~<sup>18</sup>

3. The Technical Specifications Branch (TSB) assists PERB in the review of the RETS, ODCM, and PCP as part of its primary review responsibility for SRP Section 16.0.<sup>19</sup>
4. The Quality Assurance and Maintenance Branch (HQMB) reviews quality assurance aspects of the radiological monitoring instrumentation and sampling systems as part of its primary review responsibility for SRP Section 17.0.<sup>20</sup>

For those areas of review identified above as being reviewed as part of the primary review responsibility of other branches, the acceptance criteria necessary for the review and their methods of application are contained in the referenced SRP section of the corresponding primary branch.

## II. ACCEPTANCE CRITERIA

ETSBPERB<sup>21</sup> acceptance criteria for the process and effluent radiological monitoring instrumentation and sampling systems are based on meeting the relevant requirements of the following regulations:

- A. 10 CFR ~~Part 20, 20.106~~ 20.1302<sup>22</sup> as it relates to radioactivity monitoring of effluents to unrestricted areas.
- B. 10 CFR 50.34a as it relates to design of equipment and procedures used to control releases of radioactive material to the environment within the numerical guidance provided in Appendix I to 10 CFR Part 50.<sup>23</sup>
- C. 10 CFR 50.36a as it relates to operating provisions developed pursuant to 10 CFR 50.34a and equipment installed in the radioactive waste system pursuant to 10 CFR 50.34a to ensure that releases of radioactive materials to unrestricted areas are kept as low as is reasonably achievable (ALARA).<sup>24</sup>
- D. Appendix I to 10 CFR Part 50 as it relates to numerical guides for design objectives to meet the requirements of §§ 50.34a and 50.36a, which specify that radioactive effluents released to unrestricted areas will be kept ALARA.<sup>25</sup>
- E. General Design Criterion 60 (GDC 60)<sup>26</sup> as it relates to the radioactive waste management systems being designed to control release of radioactive materials to the environment.
- F. General Design Criteria 63 (GDC 63) and 64 (GDC 64)<sup>27</sup> as they relate to the radioactive waste management systems being designed to monitor radiation levels and leakage. The requirements specified in 10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34(f)(2)(xxvii) also relate to monitoring radioactive levels for routine operating and accident conditions and are consistent with the requirements specified in GDC 63 and GDC 64.<sup>28</sup>

Specific criteria necessary to meet the relevant requirements of the Commission regulations identified above are:

1. Provisions should be made for the instrumented monitoring or for the sampling and analyses of all normal and potential effluent pathways for release of radioactive materials to the environment, including nonradioactive systems that could become radioactive through interfaces with radioactive systems,<sup>29</sup> to meet ~~General Design Criterion~~ GDC 64. To meet ~~Criterion~~ GDC 64 and the requirements specified in 10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34(f)(2)(xxvii),<sup>30</sup> the design of systems should meet the provisions of Regulatory Guide 1.21 (Position C and Appendix A) (~~Ref. 2~~),<sup>31</sup> Regulatory Guide 1.97 (Position C and Table 1 or Table 2, as applicable) (~~Ref. 3~~),<sup>32</sup> and Regulatory Guide 4.15 (Position C) (~~Ref. 4~~).<sup>33</sup>

- a. The gaseous and liquid process streams or effluent release points should be monitored and sampled according to Tables 1 and 2.
- b. For both ~~BWRs and PWRs~~ boiling water reactors (BWRs) and pressurized water reactors (PWRs),<sup>34</sup> liquid wastes and confined volumes of gaseous waste should be sampled batchwise prior to release, in accordance with Regulatory Guide 1.21. Continuous gaseous effluent monitors are not required for open structures, such as PWR turbine buildings or atmospheric vents for liquid waste tanks containing treated or processed liquid waste and located outside of buildings. For liquid and gaseous effluents that cannot be practicably monitored or sampled batchwise, one of the following methods of representative sampling should be provided:
  - (1) A continuous proportioning sampling system with at least two sample collection tanks. The system should be designed to provide a fixed or measured flow ratio of the sample collected to the sampled stream discharge; or, alternatively,
  - (2) A periodic automatic grab sampling system with at least two sample collection tanks. The system should be designed to collect a fixed volume of sample at a rate proportional to the measured flow in the sampled stream discharge.
  - (3) Radioactive materials other than noble gases in gaseous effluents. A continuous sampling system with replaceable particulate filter and radioiodine adsorber. The system should be designed to automatically take samples at a fixed or measured flow ratio of the sample throughput to the sampled stream discharge flow.

For intermittently operating effluent release points, the system should be designed to automatically take samples whenever there is flow in the effluent stream.

For all of the above samples, a periodic analysis frequency for the collected samples should be specified in the ~~technical specifications~~ RETS, ODCM, and/or PCP.<sup>35</sup>

2. Provisions should be made for the instrumented monitoring of, or the periodic or continuous sampling and analysis of, radioactive waste process systems. To meet

Criteria GDC 60 and GDC 63, as they relate to radioactive waste systems and detection of excessive radiation levels and initiation of appropriate safety actions, the design of systems should meet the guidelines of Appendix 11.5-A (this SRP section), Regulatory Guide 1.21 (Position C, as applicable), Regulatory Guide 1.97 (Position C and Table 1 or Table 2, as applicable), and Regulatory Guide 4.15 (Position C).

- a. Provisions should be made to ~~assure~~ ensure<sup>36</sup> representative sampling from radioactive process streams and tank contents. Recirculation pumps for liquid waste tanks (collection or sample test tanks) should be capable of recirculating at a rate of not less than two tank volumes in 8 hours. For gaseous liquid process stream samples, provisions should be made for purging sample lines and for reducing plateout in sample lines. Provisions for gaseous sampling from ducts and stacks should be in agreement with ANSI N13.1-1993.<sup>37</sup> ~~(Ref. 5)~~<sup>38</sup>
  - b. Where practicable, provisions should be made to collect samples from process waste streams at central sample stations to reduce leakage, spillage, and radiation exposures to operating personnel in accordance with SRP Section 9.3.2.
  - c. Provisions should be made to purge and drain sample streams back to the system of origin or to an appropriate waste treatment system.
3. Provisions should be made for administrative and procedural control, for necessary auxiliary or ancillary equipment, ~~and~~ for special features for the instrumented radiological monitoring sampling, and for<sup>39</sup> analysis of process and effluent streams. To meet ~~Criterion GDC 63 and Criterion GDC 64~~ (including the requirements specified in 10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34(f)(2)(xxvii))<sup>40</sup> as they relate to radioactive waste process systems and effluent discharge paths, the design of systems and the implementation of administrative and procedural controls should meet the guidelines of Appendix 11.5-A (this SRP section), Regulatory Guide 1.21 (Position C), and Regulatory Guide 4.15 (Position C).

Instrumentation, sampling, and monitoring provisions should conform to the following:

- a. Sampling frequencies, required analyses, instrument alarm/trip setpoints, calibration and sensitivities, and provisions for preparing composite samples for low-level analyses should be in conformance with Regulatory Guides 1.21 and 4.15. Sampling frequencies and required analyses should be given in the plant ~~technical specifications~~ RETS, ODCM, and/or PCP;<sup>41</sup> these provisions will be reviewed at the OL or COL<sup>42</sup> stage.
- b. Provisions should be made for the necessary instrumentation and facilities to perform gross beta-gamma and gross alpha measurements isotopic analyses, and other routine analyses in conformance with Regulatory Guide 1.21.
- c. Provisions should be made to perform routine instrument calibration, maintenance, and inspections in conformance with guidelines of Regulatory Guide 4.15. The frequencies of such actions should be given in the plant

~~technical specifications~~ RETS, ODCM, and/or PCP.<sup>43</sup> The provisions will be reviewed at the OL or COL<sup>44</sup> stage. Provisions should also be made to replace or decontaminate monitors without opening the process system or losing the capability to isolate the effluent stream.

- d. Isolation valves, dampers, or diversion valves with automatic control features should fail in the closed or safe position. Setpoints for actuation of automatic control features initiating actuation of isolation valves, dampers, or diversion valves should be established in the plant ~~technical specifications~~ RETS, ODCM, and/or PCP.<sup>45</sup> Non-ESF instrumentation provisions for automatic termination or diversion of releases should conform to the design guidance contained in Appendix 11.5-A (this SRP section). ESF instrumentation provisions for automatic termination or diversion of releases are reviewed in SRP Section 7.6 by ~~ICSBHICB~~.<sup>46</sup>

4. Provisions should be made for the instrumented monitoring or sampling and analysis of identified gaseous effluent paths in the event of postulated accident releases. To meet ~~Criterion GDC 64~~ as it relates to potential gaseous effluent paths, the design of systems should meet the provisions of ~~NUREG-0718 and NUREG-0737 (Refs. 9 and 10) (Items H.F.1, Attachments 1 and 2),<sup>47</sup> 10 CFR 50.34(f)(2)(vxii) and 10 CFR 50.34(f)(2)(vxxii),<sup>48</sup> Appendix 11.5-A (this SRP section) (Ref. 11),<sup>49</sup> and Regulatory Guide 1.97 (Position C and Table 1 or Table 2, as applicable) (Ref. 3).~~<sup>50</sup>
5. Provisions should be made for the instrumented monitoring or sampling and analysis of identified liquid effluent paths in the event of a postulated accident. To meet ~~Criterion GDC 64~~ and the requirements specified in 10 CFR 50.34(f)(2)(vxii) and 10 CFR 50.34(f)(2)(vxxii),<sup>51</sup> as it ~~relates~~ they relate<sup>52</sup> to postulated accidents and identified liquid effluent paths, the design of plant liquid waste collection and processing streams should meet the guidelines referenced in SRP Sections 9.3.3 and 11.2 and, in addition, the following conditions should be met:
  - a. Administrative controls and procedures in conformance with subsection II.3 of this SRP section are to be in effect to minimize inadvertent or accidental releases of radioactive liquids; and
  - b. Liquid effluent radiological monitors are to be provided for the automatic termination of releases in the event that effluent setpoints, as provided in subsection II.1 of this SRP section and as established in the plant ~~technical specifications~~ RETS, ODCM, and/or PCP,<sup>53</sup> are exceeded.

#### Technical Rationale<sup>54</sup>

The technical rationale for application of these acceptance criteria is discussed in the following paragraphs:<sup>55</sup>

1. 10 CFR 20.1302 specifies, in part, that the licensee shall conduct surveys of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with radioactive dose limits for members of the public.

Section 20.1302 relates to the manner in which compliance with dose limits to individual members of the public will be achieved. The section specifies that surveys of radiation levels are to be taken to demonstrate compliance with the dose limits specified in § 20.1301. These surveys are conducted with the equipment that constitutes the radiological monitoring instrumentation and sampling systems. Additional guidance on measuring, evaluating, and reporting the results of surveys is provided in Regulatory Guide 1.21 and ANSI N13.1-1993.

Meeting the requirements of § 20.1302 provides assurance that radiation doses to members of the public from nuclear power plant effluents will not exceed specified limits.<sup>56</sup>

2. 10 CFR 50.34a specifies that an application for licenses to construct or operate a nuclear power plant shall include a description of the design of equipment installed to maintain control of radioactive materials in plant effluents produced during normal operation, including anticipated operational occurrences.

Section 50.34a relates to SRP Section 11.5 because processes to monitor and survey radioactive materials in liquid and gaseous effluent streams released to the environment provide crucial information for establishing controls over these effluents. Section 50.34a specifies the equipment used to monitor and survey effluents as described in this SRP section. Additional guidance on radioactive waste management systems, structures, and components is provided in Regulatory Guide 1.143.

Meeting the requirements of § 50.34a provides assurance that the level of radiation in effluents from nuclear power plants will not exceed specified limits.<sup>57</sup>

3. 10 CFR 50.36a specifies, in part, that licenses for nuclear power reactors will include technical specifications requiring that operating procedures be developed for the equipment specified in 10 CFR 50.34a.

In accordance with § 50.36a, licenses must include technical specifications for operating procedures related to radiological monitoring and surveillance equipment. Plant technical specifications related to radiological effluents are consolidated in the RETS. Generic Letter 89-01 allows procedural details and programmatic controls included in the RETS to be relocated to the ODCM or PCP. Nonetheless, requirements specified in § 50.36a apply to this SRP section because procedural details are crucial to the successful conduct of monitoring and surveillance.

Meeting the requirements of § 50.36a provides assurance that the level of radiation in effluents from nuclear power plants will not exceed specified limits.<sup>58</sup>

4. 10 CFR Part 50, Appendix I, provides numerical guides for the ALARA criterion for radioactive material in light-water-cooled nuclear power reactors.

10 CFR 50.34a and 10 CFR 50.36a contain provisions designed to ensure that releases of radioactive material from nuclear power reactors to unrestricted areas during normal operation, including anticipated operational occurrences, are kept as low as practicable. Appendix I provides numerical guidance for meeting that requirement.

Meeting the requirements of the ALARA criterion provides assurance that offsite doses to any individual from normal operation and from anticipated operational occurrences will not result in exposures in excess of the numerical guides specified in Section II of Appendix I.<sup>59</sup>

5. Compliance with GDC 60 requires that the nuclear power plant design include mechanisms to control the release of radioactive materials in gaseous and liquid effluents and to handle radioactive solid wastes produced during normal reactor operation, including anticipated operational occurrences.



GDC 60 applies to SRP Section 11.5 because mechanisms to control the release of radioactive effluents must include, among other components, equipment and related operating procedures to provide monitoring, sampling, and surveillance of effluent streams that may contain radioactive materials. Guidance on design of radioactive waste management systems, structures, and components is provided in Regulatory Guide 1.143.

Meeting the requirements of GDC 60 provides assurance that releases of radioactive materials during normal operation and during anticipated operational occurrences will not result in onsite radiation doses that exceed the limits specified in the regulations.<sup>60</sup>

6. Compliance with GDC 63 and GDC 64 requires installation of systems (a) to monitor radioactive waste facilities for excessive radiation levels and (b) to survey radioactive effluent discharge paths and the plant environs for radioactivity released during normal operation, anticipated operational occurrences, and postulated accidents.

GDC 63 and GDC 64 relate directly to SRP Section 11.5 because they focus on monitoring radiation levels within the plant, as well as radiation levels in effluent streams and the plant environs during normal operation, anticipated operational occurrences, and postulated accidents. The requirements specified in 10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34(f)(2)(xxvii) are consistent with the requirements of GDC 64. Regulatory Guide 1.21 provides guidance on radiological monitoring programs for normal operation and anticipated operational occurrences; ANSI N13.1-1993 provides guidance on sampling airborne radioactive materials in nuclear facilities; and Regulatory Guide 4.15 provides guidance on quality assurance program requirements.

Meeting the requirements of GDC 63 and GDC 64 provides assurance that the level of radiation in effluents from nuclear power plants will not exceed specified limits.<sup>61</sup>

### III. REVIEW PROCEDURES

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

1. In the review of the process and effluent radiological monitoring and sampling system, ETSBPERB<sup>62</sup> will compare the listing of process and effluent monitors contained in the SAR with the principal release points identified in SRP Section 11.1 to assure ensure that all major process streams and release pathways are being monitored during normal operation, anticipated operational occurrences, and postulated accidents. In addition, PERB will review monitoring of nonradioactive systems that could become radioactive through interfaces with radioactive systems.<sup>63</sup> The review includes the following:
  - a. The location of probes, detectors, sampling points, and sample stations, and the bases for the selection of these sampling or monitoring points are compared with the general principles for obtaining valid samples of airborne radioactive materials, the methods and materials for gaseous and particulate sampling, and guides for sampling from ducts and stacks contained in ANSI N13.1-1969<sup>64</sup>, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities." (Ref. 5).<sup>65</sup>
  - b. The equipment, piping, and description of sampling methods to assure ensure representative sampling will be compared with the guidelines given in Regulatory Guide 1.21.
  - c. ETSBPERB<sup>66</sup> will independently calculate, on an audit basis, the radiation levels and concentrations in process and effluent streams using the models of NUREG-0016 or NUREG-0017 to verify the expected levels (Refs. 6 and 7).<sup>67</sup>
  - d. ETSBPERB<sup>68</sup> will compare the sampling frequencies, types of analyses required, and monitoring instrument sensitivities and ranges with those recommended in Regulatory Guides 1.21 and 1.97. At the OL or COL<sup>69</sup> stage, ETSBPERB<sup>70</sup> will compare the applicant's monitoring instrumentation specifications and performance criteria with those contained in ANSI N13.10-1974<sup>71</sup> (Ref. 8)<sup>72</sup> and in Appendix 11.5-A (this SRP section).
  - e. In the review of the P&IDs for the liquid and gaseous waste treatment systems, ETSBPERB<sup>73</sup> will verify that release points for radioactive material have provisions for automatic termination of releases in the event they exceed a predetermined level. Instrumentation provisions for automatic termination of releases will be compared with the design guidance contained in Appendix 11.5-A (this SRP section).
  - f. ETSBPERB<sup>74</sup> will review the location of the monitors shown on the P&IDs and the location of readouts, annunciators, and alarms discussed in SAR Chapter 7 to assure ensure that the operator will be advised of system performance and

effluent releases consistent with the release limits specified in the plant's technical specifications RETS.<sup>75</sup>

- g. ETSBPERB<sup>76</sup> will compare the proposed calibration methods and frequency of calibration with the guidelines in Regulatory Guide 1.21 (FSAR) and Regulatory Guide 4.15.
  - h. ETSBPERB<sup>77</sup> will assure ensure that provisions are included in the design for replacing or decontaminating detectors without opening the boundary of the process system or without losing the capability to isolate the system or divert the effluent to a standby treatment system (as appropriate).
  - i. ETSBPERB<sup>78</sup> will review special features, applicable topical reports, and data referenced in the SAR on a case-by-case basis.
2. ETSBPERB and TSB<sup>79</sup> review the technical specifications RETS, ODCM, and PCP<sup>80</sup> proposed by the applicant for process and effluent radiological monitoring and sampling at the OL or COL<sup>81</sup> stage. The reviewer determines that the content and intent of the technical specifications RETS, ODCM, and PCP<sup>82</sup> prepared by the applicant are in agreement with the requirements developed as a result of the staff's review. The review will include the evaluation or development of appropriate limiting conditions for operation and their bases consistent with the plant design.

For standard design certification reviews under 10 CFR Part 52, the procedures above should be followed, as modified by the procedures in SRP Section 14.3 (proposed), to verify that the design set forth in the standard safety analysis report, including inspections, tests, analysis, and acceptance criteria (ITAAC), site interface requirements and combined license action items, meet the acceptance criteria given in subsection II. SRP Section 14.3 (proposed) contains procedures for the review of certified design material (CDM) for the standard design, including the site parameters, interface criteria, and ITAAC.<sup>83</sup>

#### IV. EVALUATION FINDINGS

ETSBPERB<sup>84</sup> 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 staff concludes that the process and effluent radiological monitoring instrumentation and sampling systems are acceptable and meet the relevant requirements of 10 CFR Part 20, 20.10620.1302;<sup>85</sup> 10 CFR Part 50, §§ 50.34a, 50.36a, 50.34(f)(2)(xvii), and 50.34(f)(2)(xxvii); Appendix I to 10 CFR Part 50; and<sup>86</sup> General Design Criteria 60, 63, and 64. This conclusion is based on the following:

The process and effluent radiological monitoring and sampling systems include the instrumentation for monitoring and sampling radioactivity, contaminated liquid, gaseous, and solid waste process and effluent streams. Our review included the provisions proposed to sample and monitor all station effluents, including nonradioactive systems that could become radioactive through

interfaces with radioactive systems<sup>87</sup> in accordance with General Design Criterion 64, and the requirements specified in 10 CFR 50.34(f)(2)(vxi) and 10 CFR 50.34(f)(2)(vxxii),<sup>88</sup> the provisions proposed to provide automatic termination of effluent releases and assure ensure control over discharges in accordance with General Design Criterion 60, the provisions proposed for sampling and monitoring plant waste process streams for process control in accordance with General Design Criterion 63, the provisions for conducting sampling and analytical programs in accordance with the guidelines in Regulatory Guides 1.21 and 4.15, and the provisions for sampling and monitoring process and effluent streams during postulated accidents in accordance with the guidelines in Regulatory Guide 1.97. The review included piping and instrument diagrams and process flow diagrams for the liquid, gaseous, and solid radwaste systems, and for ventilation systems, and the location of monitoring points relative to effluent release points as shown on the site plot diagrams.

Based on our review, we have determined that the applicant's designs, design criteria, and design bases for the process and effluent radiological monitoring instrumentation and sampling systems meet the guidelines of Appendix 11.5-A (this SRP section) and industry standards.

For design certification reviews, the findings will also summarize, to the extent that the review is not discussed in other safety evaluation report sections, the staff's evaluation of inspections, tests, analyses, and acceptance criteria (ITAAC), including design acceptance criteria (DAC), site interface requirements, and combined license action items that are relevant to this SRP section.<sup>89</sup>

## V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

This SRP section will be used by the staff when performing safety evaluations of license applications submitted by applicants pursuant to 10 CFR 50 or 10 CFR 52.<sup>90</sup> Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

The provisions of this SRP section apply to reviews of applications docketed six months or more after the date of issuance of this SRP section.<sup>91</sup>

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced Appendix 11.5-A (this SRP section), regulatory guides, and NUREGs.

## VI. REFERENCES

1. ~~10 CFR Part 20, 20.106, "Radioactivity in Effluents to Unrestricted Areas," and 10 CFR Part 50, Appendix A, General Design Criterion 60, "Control of Releases of Radioactive Material to the Environment"; Criterion 63, "Monitoring Fuel and Waste Storage"; and Criterion 64, "Monitoring Radioactivity Releases."~~
1. 10 CFR 20.1302, " Compliance with Dose Limits for Individual Members of the Public."
2. 10 CFR 50.34a, "Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents-Nuclear Power Plants."
3. 10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34(f)(2)(xxvii).
4. 10 CFR 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors."
5. 10 CFR Part 50, Appendix A, General Design Criterion 60, "Control of Releases of Radioactive Materials to the Environment."
6. 10 CFR Part 50, Appendix A, General Design Criterion 63, "Monitoring Fuel and Waste Storage."
7. 10 CFR Part 50, Appendix A, General Design Criterion 64, "Monitoring Radioactivity Releases."
8. 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents."<sup>92</sup>
9. Regulatory Guide 1.21, "Measuring and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants."
10. Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident."
11. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment."
12. ANSI N13.1-~~1969~~1993,<sup>93</sup> "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities," American National Standards Institute (~~1969~~1993)<sup>94</sup>.
13. NUREG-0016, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Boiling Water Reactors" (BWR-GALE Code).
14. NUREG-0017, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents From Pressurized Water Reactors" (PWR-GALE Code).

15. ANSI N13.10-1974,<sup>95</sup> "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents" (1974).
16. NUREG-0737, "Clarification of TMI Action Plan Requirements" (1980).
17. NUREG-0718, "Licensing Requirements for Pending Applications for Construction Permits and Manufacturing Licenses."
18. Standard Review Plan Appendix 11.5-A, "Design Guidance for Radiological Effluent Monitors."
19. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants."

TABLE 1

## Provisions for Monitoring and Sampling Gaseous Streams

No.	Process Systems	Reactor Type	<u>Monitor Provisions</u>			<u>Sample Provisions</u>		
			<u>In Process</u> Cont <sup>i</sup>	<u>In Effluent</u> ACF <sup>j</sup> Cont <sup>i</sup>		<u>In Process</u> Grab <sup>k</sup>	<u>In Effluent</u> Grab <sup>k</sup>	Cont <sup>l</sup>
1.	Waste Gas Holdup System <sup>a</sup>	P&B	NG	NG	(NG)		(NG,H3)	(I)
2.	Condenser Evacuation System <sup>b</sup>	P&B	NG	(NG) <sup>n</sup>	(NG)	I	(NG,H3)	(I)
3.	Vent & Stack Release Point System <sup>c</sup>	P&B	-	-	NG		H3	(I)
4.	Containment Purge Systems <sup>d</sup>	P&B	NG	NG <sup>m</sup>	(NG)	I	(NG,I,H3)	(I)
5.	Auxiliary Building Ventilation System	P&B	-	-	(NG)	I	(NG,H3)	(I)
6.	Fuel Storage Area Ventilation System <sup>e</sup>	P&B	(NG)	NG <sup>m</sup>	(NG)	I	(NG,H3)	(I)
7.	Radwaste Area Vent Systems	P&B	-	-	(NG)	I	(NG,H3)	(I)
8.	Turbine Gland Seal Condenser Vent System	P&B	-	-	(NG)	I	(NG,H3)	(I)
9.	Mech. Vacuum Pump Exhaust (Hogging System)	P&B	-	-	(NG)	I	(NG,H3)	(I)
10.	Evaporator Vent Systems	P&B	-	-	(NG)	I	(NG,H3)	(I)
11.	Pre-Treatment Liquid Radwaste Tank Vent Gas Systems	P&B	-	-	(NG)	(I)	(NG,H3)	(I)
12.	Flash Tank and Steam Generator Blowdown Vent Systems	P	-	-	(NG)	I	(NG,H3)	(I)
13.	Turbine Building Vent Systems	B	-	-	(NG)	I	(NG,H3)	(I)
14.	Pressurizer & Boron Recovery Vent Systems	P	-	-	(NG)	I	(NG,H3)	(I)

TABLE 2

## Provisions for Monitoring and Sampling Liquid Streams

No.	Process Systems	Reactor Type	<u>Monitor Provisions</u>			<u>Sample Provisions</u>		
			<u>In Process</u>		<u>In Effluent</u>	<u>In Process</u>		<u>In Effluent</u>
			Cont <sup>i</sup>	ACF <sup>i</sup>	Cont <sup>i</sup>	Grab <sup>k</sup>	Grab <sup>k</sup>	Cont <sup>l</sup>
1.	Liquid Radwaste (Batch) Effluent System	P&B	(R)	R	R	S&A	S&A,H3	_
2.	Liquid Radwaste (Continuous) Effluent System	P&B	R	R	R	_	S&A,H3	S&A
3.	Service Water System	P&B	_	_	(R)	_	S&A,H3	S&A
4.	Component Cooling Water System <sup>f</sup>	P&B	(R)	(R <sup>m</sup> )	(R)	S&A	S&A,H3	(S&A)
5.	Spent Fuel Pool Treatment System <sup>g</sup>	P&B	(R)	(R)	(R)	S&A	(S&A,H3)	(S&A)
6.	Equipment & Floor Drain Collection and Treatment Systems <sup>h</sup>	P&B	_	(R)	(R)	_	(S&A,H3)	(S&A)
7.	Phase Separator Decant & Holding Basin Systems	P&B	_	(R)	(R)	_	(S&A,H3)	(S&A)
8.	Chemical & Regeneration Solution Waste Systems	P&B	_	(R)	(R)	_	(S&A,H3)	(S&A)
9.	Laboratory & Sample System Waste Systems	P&B	_	(R)	(R)	S&A	(S&A,H3)	(S&A)
10.	Laundry & Decontamination Waste Systems	P&B	_	(R)	(R)	_	(S&A,H3)	(S&A)
11.	Resin Slurry, Solidification & Baling Drain Systems	P&B	(R)	-	(R)	_	(S&A,H3)	(S&A)
12.	Radwaste Liquid Tanks (outside the buildings)	P&B	_	_	(R)	S&A	(S&A,H3)	_
13.	Storm & Underdrain Water System	P&B	_	_	_	_	(S&A,H3)	(S&A)
14.	Tanks and Sumps Inside Reactor Building	P&B	_	(R)	(R)	_	(S&A,H3)	(S&A)
15.	Boron Recovery System Liquid Effluent	P	_	(R)	(R)	_	(S&A,H3)	(S&A)
16.	Steam Generator Blowdown (Batch) Liquid Effluent System	P	(R)	R	R	S&A	(S&A,H3)	(S&A)
17.	Steam Generator Blowdown (Continuous) Liquid Effluent System	P	(R)	R	R	_	(S&A,H3)	(S&A)
18.	Secondary Coolant Treatment Waste & Turbine Building Drain Systems	P	_	(R)	(R)	_	(S&A,H3)	(S&A)
19.	Ultrasonic Resin Cleanup Waste Systems	B	_	(R)	(R)	_	(S&A,H3)	(S&A)



No.	Process Systems	Reactor Type	<u>Monitor Provisions</u>			<u>Sample Provisions</u>		
			<u>In Process</u> Cont <sup>i</sup>	<u>In Effluent</u> ACF <sup>j</sup>	<u>In Effluent</u> Cont <sup>i</sup>	<u>In Process</u> Grab <sup>k</sup>	<u>In Effluent</u> Grab <sup>k</sup>	<u>In Effluent</u> Cont <sup>l</sup>
20.	Non-Contaminated Waste Water & PWR Turbine Building Clean Drain System	P&B	-	-	-	-	(S&A,H3)	(S&A)

## Notes for Table 1 and Table 2

- a - for example, offgas storage tank systems, cover gas decay systems, chilled charcoal adsorption systems, offgas cryogenic units, and delay pipes.
- b - for example, main condenser steam jet air ejector systems and mechanical vacuum pump systems.
- c - for example, free standing stacks, roof vents, building vents, exhausters, process vents, ventilation vents.
- d - for example, containment relief systems, containment normal purge, containment low volume purge, containment leak testing systems, drywell purge, cleanup purges.
- e - includes spent fuel pool and refueling pool ventilation systems, if separate from the fuel storage area ventilation system.
- f - also called closed cooling water systems and component cooling loop systems.
- g - includes refueling pool cleanup systems.
- h - includes suppression tanks, reactor drain tanks, equipment and drain sumps collecting leakage, drainage, sampling, and condensate.
- i - continuous radiation monitor.
- j - automatic control feature. For example, the continuous liquid effluent radiation monitor (see note m, below) should be equipped to alarm at a setpoint established in the technical specifications and should automatically terminate effluents in the discharge line by closing an isolation valve (see II.3.d).
- k - sample point should be available to obtain grab samples for laboratory analyses as indicated by notations.
- l - continuous sampler (see II.1.b).
- m - the automatic control feature may be alternatively provided by a process continuous radiation monitor, located at a point upstream of the systems' effluent continuous radiation monitor.
- n - for BWRs only.
- p - Typical system names applicable to pressurized water reactors.
- B - Typical system names applicable to boiling water reactors.

- NG - Noble gas radioactivity.
- I - Iodine radioactivity, radioactivity of other radionuclides in particulate form, and alpha emitters.
- H3 - Tritium.
- R - Gross radioactivity (beta radiation, gamma radiation, or total beta plus gamma).
- S&A - Sampling and analysis of radionuclides, to include gross radioactivity, identification and concentration of principal radionuclides and concentration of alpha emitters.
- ( ) - Provisions indicated within parentheses are required only for systems not monitored, sampled, or analyzed (as indicated) prior to release by downstream provisions.

APPENDIX 11.5-A DESIGN GUIDANCE FOR RADIOLOGICAL EFFLUENT MONITORS PROVIDING SIGNALS FOR INITIATING TERMINATION OF FLOW OR OTHER MODIFICATION OF EFFLUENT STREAM PROPERTIES

A. Background

The primary design function of a radiological effluent monitor is the detection and measurement of radioactive materials released in gaseous or liquid effluent streams of light-water-cooled nuclear power reactors. An additional design function of some monitors is that of providing a signal to automatically terminate or otherwise modify the effluent stream. Examples are the termination of exhaust airflow by closure of containment ventilation or purge isolation valves and diversion of building ventilation exhaust streams from an untreated discharge path to an alternative treatment system, such as a standby gas treatment system for a BWR plant.

Depending on plant design and onsite meteorology, such an action may be necessary to mitigate the consequences of a design basis accident (DBA). The need for such mitigation is determined by calculating offsite doses that would result from the DBA. In other plant designs, radiological effluent monitors are used to actuate systems to modify or terminate releases for other purposes, e.g., to terminate releases due to anticipated operational occurrences to ~~assure~~ ensure that offsite doses are maintained within the limits specified in the plant ~~technical specifications~~ radiological effluent technical specifications (RETS).<sup>96</sup>

The design and quality assurance criteria applied to the design, procurement, installation, testing, and operation of radiological effluent monitors installed in light-water-cooled nuclear power reactors should provide assurance that the monitors will perform all of their design functions.

If the DBA analysis noted above shows that the actuation of an engineered safety feature (ESF) system is required to mitigate the consequences of a DBA, and that a signal from a radiological effluent monitor is necessary to actuate the ESF system, then the monitor should be designed and qualified to the design and quality assurance criteria applicable to the ESF system. Conversely, if an automatically functioning device or system is used to reduce radioactive releases to ~~assure~~ ensure maintaining offsite doses within the limits of the plant ~~technical specifications~~ RETS<sup>97</sup> (i.e., not for the purpose of mitigating the consequences of a DBA), then a monitor providing the actuation signal should be designed and qualified to criteria consistent with those of the actuated system.

This appendix does not establish, nor does it change in any manner, the design and quality assurance criteria established elsewhere for ESF or ESF-related systems or monitors.

The design guidance set forth in this appendix provides reasonable assurance that monitors used to provide initiation signals for actuation of systems to control the release of radioactive materials in effluents, but not required to mitigate the consequences of a DBA, are designed, constructed, installed, tested, and maintained on a level commensurate with their intended function.

This appendix sets forth minimum requirements and is not intended to prohibit the implementation of equivalent design codes, standards, or quality assurance measures other than those indicated herein.

## B. Definitions

Radiological Effluent Monitor: A device which removes a representative sample from the effluent stream, detects and quantitatively measures the radioactive materials present in the sample, discharges the sampled medium back to the effluent stream, and transmits the measurement data to a central point.

Monitoring System: A system consisting of one or more remote monitors; a centrally located cabinet or console where data from the monitors is received, recorded, and displayed; and the necessary interconnecting cables, power supplies, pumps, motors, alarms, recorders, display panels, relays, and other auxiliary components.

## C. Design Guidance

Design and quality assurance criteria for radiological effluent monitors should be consistent with the design and quality assurance criteria applicable to the systems which are actuated by a signal from the monitors.

Monitors providing signals for the actuation of engineered safety feature (ESF) systems should be designed and qualified to the design and quality assurance criteria applicable to ESF systems. Criteria for ESF-related monitors are found in the appropriate sections of the Standard Review Plans under ~~Section Chapter~~<sup>98</sup> 7. This position does not affect or modify existing criteria for ESF-related systems.

Monitors providing signals for the actuation of non-ESF systems should be designed and qualified to the design and quality assurance criteria applicable to the actuated system or to the criteria shown in Table I, below.

## D. Implementation

The purpose of this section is to provide information to applicants and licensees regarding the staff's plans for utilizing this appendix.

Except in those cases in which the applicant proposes an alternate method for complying with specified portions of the Commission's regulations, the criteria described herein will be used in the evaluation of applications for construction permits, operating licenses, standard design certifications, and combined licenses. ~~docketed after July 1, 1979, as follows:~~

- ~~(1) Preliminary Design Approval (PDA) application reviews and Preliminary Duplicate Design Approval (PDDA) application reviews.~~
- ~~(2) Final Design Approval, Type 2 (FDA-2), application reviews and Final Duplicate Design Approval, Type 2 (PDDA-2), application reviews. Final Design Approval, Type 1~~

(FDA-1), or Final Duplicate Design Approval, Type 1 (FDA-1) applications docketed after July 1, 1979, should conform to the criteria of the corresponding PDA or PDDA applications, respectively.

- (3) Manufacturing License (ML) application reviews.
- (4) Construction Permit (CP) application reviews, except that portions of CP applications docketed after July 1, 1979, which reference standard designs (i.e., PDAs, FDA-1s, FDA-2s, PDDAs, FDDA-1s, FDDA-2s, or MLs) and replicate plant applications docketed after July 1, 1979, should conform to the criteria of the referenced design.
- (5) Operating License (OL) applications should conform to the criteria of the corresponding CP applications.<sup>99</sup>

These criteria do not apply to operating plants.

If an applicant wishes to use this guidance in developing submittals for applications docketed on or before July 1, 1979, the pertinent portions of the application will be evaluated on the basis of this Standard Review Plan section.<sup>100</sup>

TABLE I

DESIGN GUIDANCE FOR RADIOLOGICAL EFFLUENT MONITORS  
(INSTRUMENTATION INSTALLED IN LIGHT-WATER-COOLED NUCLEAR POWER PLANTS)

Category	Design Criteria	Quality Assurance Criteria
Effluent Radiological Monitoring Instrumentation providing a signal for the actuation of a system used to reduce releases of radioactive materials in effluents within limits specified in plant technical specifications radiological effluent technical specifications. <sup>101</sup> (Not required to initiate actuation for an ESF system.)	<p><u>Review:</u> Reviewed Under Standard Review Plan Section 11.5</p> <p><u>Reviewed by:</u> Effluent Treatment Systems Branch (ETSB)Emergency Preparedness and Radiation Protection Branch (PERB)<sup>102</sup></p> <p><u>Criteria:</u> Manufacturer's Standard per ANSI N13.10-1974<sup>104</sup></p>	<p><u>Review:</u> Reviewed under Standard Review Plan Section 11.5</p> <p><u>Reviewed by:</u> Effluent Treatment Systems Branch (ETSB)Emergency Preparedness and Radiation Protection Branch (PERB)<sup>103</sup></p> <p><u>Criteria:</u> Quality Assurance set forth in Regulatory Guide 1.143, Section IV. (Ref. 12)<sup>105</sup></p>

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Item numbers in the following table correspond to superscript numbers in the redline/strikeout copy of the draft SRP section.

Item	Source	Description
1.	Current PRB name and abbreviation	Changed PRB to Emergency Preparedness and Radiation Protection Branch (PERB).
2.	Current SRB name and abbreviation	Changed SRB to Plant Systems Branch (SPLB).
3.	SRP-UDP format item	Added reference to standard design certification and combined license reviews.
4.	Current PRB abbreviation	Changed PRB to PERB.
5.	Editorial	Deleted the word "preliminary" so that reference to the safety analysis report is generically applicable to all types of review.
6.	Editorial	Changed acronym "PSAR" to "SAR" so the reference is generically applicable to all types of review.
7.	SRP-UDP format item	Added reference to COL reviews.
8.	Current PRB abbreviation	Changed PRB to PERB.
9.	SRP-UDP format item	Added reference to standard design certification review.
10.	Current PRB abbreviation	Changed PRB to PERB.
11.	Integrated Impact No. 627	Added monitoring systems and procedures for detecting radioactivity in nonradioactive systems to AREAS OF REVIEW.
12.	Integrated Impact No. 563	Added consideration of RETS, ODCM, and PCP to AREAS OF REVIEW for OL and COL reviews.
13.	SRP-UDP format item	Added "Review Interfaces" to AREAS OF REVIEW and used numbered paragraphs to describe how PERB coordinates the review of the radiological monitoring instrumentation and sampling system by other branches.
14.	Current PRB abbreviation	Changed PRB to PERB.
15.	Current review branch name and abbreviation	Changed review branch to Instrumentation and Controls Branch (HICB) for SRP Section 7.6.
16.	Editorial	Defined "SRP" as "Standard Review Plan."
17.	Current review branch name and abbreviation	Changed review branch to Materials and Chemical Engineering Branch (EMCB) for SRP Section 9.3.2.
18.	Editorial	Deleted paragraph 3. The contents of paragraph 3 have been subdivided into two paragraphs.

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Item	Source	Description
19.	Integrated Impact No. 563	Added consideration of RETS, ODCM, and PCP to "Review Interfaces" in AREAS OF REVIEW for TSB assistance to PERB in review of SRP Section 16.0.
20.	Current review branch abbreviation	Changed to reflect HQMB responsibility for SRP Section 17.0.
21.	Current PRB abbreviation	Changed PRB to PERB.
22.	Integrated Impact No. 562	Replaced reference to 10 CFR 20.106 with the updated reference to § 20.1302. Corrected citation format for the Code of Federal Regulations (global change for this section).
23.	Integrated Impact No. 629	Added requirements specified in 10 CFR 50.34a to ACCEPTANCE CRITERIA.
24.	Integrated Impact No. 563	Added requirements specified in 10 CFR 50.36a to ACCEPTANCE CRITERIA.
25.	Integrated Impact No. 629	Added numerical guidance provided in Appendix I to 10 CFR Part 50 to ACCEPTANCE CRITERIA.
26.	Editorial	Provided "GDC 60" as an initialism for "General Design Criterion 60" (global change for this section).
27.	Editorial	Provided "GDC 63" and "GDC 64" as initialisms for "General Design Criteria 63 and 64," respectively (global change for this section).
28.	SRP-UDP format item	Added reference to 10 CFR 50.34(f)(2)(vxi) and 10 CFR 50.34(f)(2)(vxxii) to support the requirements of GDC 63 and GDC 64.
29.	Integrated Impact No. 627	Added reference to nonradioactive systems that could become radioactive through interfaces with radioactive systems.
30.	SRP-UDP format item	Added reference to 10 CFR 50.34(f)(2)(vxi) and 10 CFR 50.34(f)(2)(vxxii).
31.	SRP-UDP format item	Deleted (Ref. 2).
32.	SRP-UDP format item	Deleted (Ref. 3).
33.	SRP-UDP format item	Deleted (Ref. 4).
34.	Editorial	Defined "BWRs and PWRs" as boiling water reactors and pressurized water reactors, respectively.
35.	Integrated Impact No. 563	Replaced reference to "technical specifications" with RETS, ODCM, and/or PCP.
36.	Editorial	Changed "assure" to "ensure" (global change for this section).
37.	Integrated Impact No. 716	Updated citation of ANSI N13.1 to ANSI N13.1-1993.



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Item	Source	Description
38.	SRP-UDP format item	Deleted (Ref. 5).
39.	Editorial	Deleted "and" and added "for" to improve clarity.
40.	SRP-UDP format item	Added reference to 10 CFR 50.34(f)(2)(vii) and 10 CFR 50.34(f)(2)(viii).
41.	Integrated Impact No. 563	Replaced reference to "technical specifications" with RETS, ODCM, and/or PCP.
42.	SRP-UDP format item	Added reference to combined license review.
43.	Integrated Impact No. 563	Replaced reference to "technical specifications" with RETS, ODCM, and/or PCP.
44.	SRP-UDP format item	Added reference to combined license review.
45.	Integrated Impact No. 563	Replaced reference to "technical specifications" with RETS, ODCM, and/or PCP.
46.	Current PRB abbreviation	Changed PRB to HICB.
47.	SRP-UDP format item	Deleted reference to NUREGs 0718 and 0737 since the relevant requirements are now in 10 CFR 50.34(f)(2)(vii) and 10 CFR 50.34(f)(2)(viii).
48.	SRP-UDP format item	Added reference to 10 CFR 50.34(f)(2)(vii) and 10 CFR 50.34(f)(2)(viii).
49.	SRP-UDP format item	Deleted (Ref. 11).
50.	SRP-UDP format item	Deleted (Ref. 3).
51.	SRP-UDP format item	Added reference to 10 CFR 50.34(f)(2)(vii) and 10 CFR 50.34(f)(2)(viii).
52.	Editorial	Revised tense.
53.	Integrated Impact No. 563	Replaced reference to "technical specifications" with RETS, ODCM, and/or PCP.
54.	SRP-UDP format item	Added "Technical Rationale" to ACCEPTANCE CRITERIA and used numbered paragraphs to describe the bases for referencing the GDC and regulations.
55.	SRP-UDP format item	Added lead-in sentence for "Technical Rationale."
56.	SRP-UDP format item	Added technical rationale for 10 CFR 20.1302.
57.	SRP-UDP format item	Added technical rationale for 10 CFR 50.34a.
58.	SRP-UDP format item	Added technical rationale for 10 CFR 50.36a.
59.	SRP-UDP format item	Added technical rationale for 10 CFR Part 50, Appendix I.
60.	SRP-UDP format item	Added technical rationale for GDC 60.

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Item	Source	Description
61.	SRP-UDP format item	Added technical rationale for GDC 63 and GDC 64.
62.	Current PRB abbreviation	Changed PRB to PERB.
63.	Integrated Impact No. 627	Added monitoring systems and procedures for detecting radioactivity in nonradioactive systems to REVIEW PROCEDURES.
64.	Integrated Impact No. 716	Updated citation of ANSI N13.1-1969 to ANSI N13.1-1993.
65.	SRP-UDP format item	Deleted (Ref. 5).
66.	Current PRB abbreviation	Changed PRB to PERB.
67.	SRP-UDP format item	Deleted (Refs. 6 and 7).
68.	Current PRB abbreviation	Changed PRB to PERB.
69.	SRP-UDP format item	Added reference to COL reviews.
70.	Current PRB abbreviation	Changed PRB to PERB.
71.	Integrated Impact No. 628	The reference to ANSI N13.10-1974 needs to be updated to ANSI/IEEE N42.18-80(R91), provided a comparison of the two versions supports updating the citation.
72.	SRP-UDP format item	Deleted (Ref. 8).
73.	Current PRB abbreviation	Changed PRB to PERB.
74.	Current PRB abbreviation	Changed PRB to PERB.
75.	Integrated Impact No. 563	Replaced reference to "technical specifications" with "RETS."
76.	Current PRB abbreviation	Changed PRB to PERB.
77.	Current PRB abbreviation	Changed PRB to PERB.
78.	Current PRB abbreviation	Changed PRB to PERB.
79.	Current PRB abbreviation	Changed PRB to PERB and noted that TSB participates in review of RETS, ODCM, and PCP.
80.	Integrated Impact No. 563	Replaced reference to "technical specifications" with RETS, ODCM, and PCP.
81.	SRP-UDP format item	Added reference to COL reviews.
82.	Integrated Impact No. 563	Changed PRB to PERB and noted that TSB participates in review of RETS, ODCM, and PCP.
83.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard paragraph to address application of Review Procedures in design certification reviews.
84.	Current PRB abbreviation	Changed PRB to PERB.

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Item	Source	Description
85.	Integrated Impact No. 562	Replaced reference to 10 CFR 20.106 with updated reference § 20.1302.
86.	Integrated Impact No. 563 Integrated Impact No. 629	Added reference to 10 CFR Part 50 §§ 50.34a, 50.36a, 50.34(f)(2)(xvii), 50.34(f)(2)(xxvii), and Appendix I.
87.	Integrated Impact No. 627	Added monitoring systems and procedures for detecting radioactivity in nonradioactive systems to EVALUATION FINDINGS.
88.	SRP-UDP format item	Added reference to 10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34(f)(2)(xxvii).
89.	SRP-UDP Format Item, Implement 10 CFR 52 Related Changes	To address design certification reviews a new paragraph was added to the end of the Evaluation Findings. This paragraph addresses design certification specific items including ITAAC, DAC, site interface requirements, and combined license action items.
90.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard sentence to address application of the SRP section to reviews of applications filed under 10 CFR Part 52, as well as Part 50.
91.	SRP-UDP Guidance	Added standard paragraph to indicate applicability of this section to reviews of future applications.
92.	Editorial Integrated Impact No. 562 Integrated Impact No. 563 Integrated Impact No. 629	Revised and renumbered organization of REFERENCES, adding 10 CFR 20.1302, 10 CFR 50.34a, 10 CFR 50.34(f)(2)(xvii), 10 CFR 50.34(f)(2)(xxvii), 10 CFR 50.36a, and Appendix I.
93.	Integrated Impact No. 716	Updated citation of ANSI N13.1-1969 to ANSI N13.1-1993.
94.	Integrated Impact No. 716	Updated citation of ANSI N13.1-1969 to ANSI N13.1-1993.
95.	Integrated Impact No. 628	The reference to ANSI N13.10-1974 needs to be updated to ANSI/IEEE N42.18-80(R91), provided a comparison of the two versions supports updating the citation.
96.	Integrated Impact No. 563	Replaced reference to "technical specifications" with "RETS."
97.	Integrated Impact No. 563	Replaced reference to "technical specifications" with "RETS."
98.	Editorial	Changed "appropriate Standard Review Plans under Section 7" to "appropriate sections of the Standard Review Plan under Chapter 7" to cite the SRP accurately.

**SRP Draft Section 11.5**  
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
99.	SRP-UDP format item	Revised references to various types of licensing actions to conform to current versions of 10 CFR Parts 50 and 52.
100.	SRP-UDP format item	Deleted reference to applications docketed on or before July 1, 1979, as no longer relevant.
101.	Integrated Impact No. 563	Replaced reference to "technical specifications" with "RETS."
102.	Current PRB name and abbreviation	Changed PRB to Emergency Preparedness and Radiation Protection Branch (PERB).
103.	Integrated Impact No. 628	The reference to ANSI N13.10-1974 needs to be updated to ANSI/IEEE N42.18-80(R91), provided a comparison of the two versions supports updating the citation.
104.	Current PRB name and abbreviation	Changed PRB to Emergency Preparedness and Radiation Protection Branch (PERB).
105.	SRP-UDP format item	Deleted (Ref. 12)

**SRP Draft Section 11.5**  
Attachment B - Cross Reference of Integrated Impacts

<b>Integrated Impact No.</b>	<b>Issue</b>	<b>SRP Subsections Affected</b>
562	Revise SRP Section 11.5 to replace 10 CFR Part 20 citations with those for revised sections of 10 CFR Part 20.	Subsection II, ACCEPTANCE CRITERIA, first paragraph, subsection A  Subsection IV, EVALUATION FINDINGS, first paragraph  Subsection VI, REFERENCES, Reference 1

**SRP Draft Section 11.5**  
Attachment B - Cross Reference of Integrated Impacts

<b>Integrated Impact No.</b>	<b>Issue</b>	<b>SRP Subsections Affected</b>
563	Revise SRP Section 11.5 to address requirements of 10 CFR 50.36a and include review of Offsite Dose Calculation Manual and Process Control Program.	<p>Subsection I, AREAS OF REVIEW, first paragraph, subsection 3</p> <p>Subsection I, AREAS OF REVIEW, Review Interfaces, subsection 3</p> <p>Subsection II, ACCEPTANCE CRITERIA, first paragraph, subsection C</p> <p>Subsection II, ACCEPTANCE CRITERIA, second paragraph, subsection 1.b</p> <p>Subsection II, ACCEPTANCE CRITERIA, second paragraph, subsection 3.a</p> <p>Subsection II, ACCEPTANCE CRITERIA, second paragraph, subsection 3.c</p> <p>Subsection II, ACCEPTANCE CRITERIA, second paragraph, subsection 3.d</p> <p>Subsection II, ACCEPTANCE CRITERIA, second paragraph, subsection 5.b</p> <p>Subsection III, REVIEW PROCEDURES, first paragraph, subsection 1.f</p> <p>Subsection III, REVIEW PROCEDURES, first paragraph, subsection 2</p> <p>Subsection III, REVIEW PROCEDURES, first paragraph, subsection 2</p> <p>Subsection IV, EVALUATION FINDINGS, first paragraph</p> <p>Subsection VI, REFERENCES, reference 4</p> <p>Appendix 11.5-A, subsection A, Background, second paragraph</p> <p>Appendix 11.5-A, subsection A, Background, fourth paragraph</p> <p>Appendix 11.5-A, Table I</p>

**SRP Draft Section 11.5**  
Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
627	Revise SRP Section 11.5 to address adequacy of monitoring systems to detect contamination in nonradioactive systems and to prevent uncontrolled and unmonitored releases.	<p>Subsection I, AREAS OF REVIEW, first paragraph, subsection 2</p> <p>Subsection II, ACCEPTANCE CRITERIA, second paragraph, subsection 1</p> <p>Subsection III, REVIEW PROCEDURES, first paragraph, subsection 1</p> <p>Subsection IV, EVALUATION FINDINGS, first paragraph</p>
628	Replace citation of ANSI N13.10-74 with ANSI/IEEE N42.18-80(R91) after completion of a side-by-side comparison and approval by the NRC staff.	<p>Subsection III, REVIEW PROCEDURES, first paragraph, subsection 1.d</p> <p>Subsection VI, REFERENCES, Reference 15</p> <p>Appendix 11.5-A, Table I</p>
629	Revise SRP Section 11.5 to address requirements of 10 CFR 50.34a and 10 CFR Part 50, Appendix I.	<p>Subsection II, ACCEPTANCE CRITERIA, first paragraph, subsection B</p> <p>Subsection II, ACCEPTANCE CRITERIA, first paragraph, subsection D</p> <p>Subsection IV, EVALUATION FINDINGS, first paragraph</p> <p>Subsection VI, REFERENCES, Reference 2</p> <p>Subsection VI, REFERENCES, Reference 8</p>
716	Revise SRP Section 11.5 to cite the version of ANSI N13.1-1969 that was reaffirmed in 1993.	<p>Subsection II, ACCEPTANCE CRITERIA, second paragraph, subsection 2.a</p> <p>Subsection III, REVIEW PROCEDURES, first paragraph, subsection 1.a</p> <p>Subsection VI, REFERENCES, Reference 12</p> <p>Subsection VI, REFERENCES, Reference 12</p>