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REGULATORY GUIDE

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ENVIRONMENTAL TECHNICAL SPECIFICATIONS FOR NUCLEAR POWER PLANTS

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INTRODUCTION

Section 50.50, "Issuance of Licenses and Construction Permits," of 10 CFR Part 50, "Licensing of Production and Utilization Facilities," provides that each operating license for a nuclear power plant issued by the Nuclear Regulatory Commission will contain such conditions and limitations as the Commission deems appropriate and necessary. Certain conditions and limitations corresponding to key parameters of the NEPA environmental review are incorporated into facility operating licenses as environmental technical specifications. The applicant for an operating license proposes environmental technical specifications for its plant; these are reviewed by the NRC staff, modified as necessary, and included as Appendix B of the operating license.* This regulatory guide provides guidance to applicants on the preparation of proposed environmental technical specifications and includes a standard format and an identification of their principal content. Two examples of environmental technical specifications, one for a limiting condition for operation and one for an environmental surveillance program, are provided for illustrative purposes only and are not intended for use as model technical specifications.

On May 5, 1975, the Nuclear Regulatory Commis... published Appendix I, "Numerical Guides For Design Objectives And Limiting Conditions For Operation To Meet The Criterion 'As Low As Practicable' For Radioactive Material In Light-Water-Cooled Nuclear Power Reactor Effluents," to 10 CFR Part 50 in the Federal Register (40 FR 19439) as an effective rule. The numerical guides of Appendix I are a quantitative expression of the meaning of the requirement that radioactive material in effluents released to unrestricted areas from light-water-cooled nuclear power reactors be kept as low as practicable. These numerical guides provide operating flexibility necessary to ensure a dependable source of power and to ensure a positive system of control by limiting conditions for operation to reduce the release of radioactive material should the rates of release actually experienced substantially exceed design objectives.

When the Commission published Appendix I, the NRC staff began developing models and calculational procedures for estimating exposures to individuals that will provide a basis for demonstrating compliance with design objectives. When this work is completed, model technical specifications for radioactive effluents from light-water-cooled nuclear reactors and for radiological environmental monitoring programs will be published as an addendum to this regulatory guide.

Since the purpose of this guide is to supply applicants with information on acceptable methods of complying with the Commission's regulations, conformance with this guide is not required. However, the format and content provided is acceptable to the staff. While environmental technical specifications in a different format will be accepted by the staff for review, the review time for such specifications may be longer. The information in this guide is intended to aid applicants in preparing environmental technical specifications that are consistent with NRC regulations.

Environmental Technical Specifications should include:

1. Definition of key terms used in the specifications that are not defined in applicable regulations or guides or are not generally accepted terminology.
2. Specification of (a) limiting conditions for operation which, if not exceeded, should result in an acceptable environmental impact and (b) monitoring requirements associated with limiting conditions for operation.
3. Specification of the environmental surveillance program necessary to assess the impact of plant operations on the environment. The program should include submission of reports to the NRC:
   a. on a routine basis, and
   b. when an observable effect on certain environmental parameters exceeds a specific level.
4. Specification of special surveillance and study activities.
5. Specification of administrative controls which relate to organization and management, procedures, review and audit, and records and reports which are necessary to ensure the protection of the environment.

In the unlikely event that a conflict should arise between the requirements of the technical specifications of Appendix A of the operating license and those of Appendix B, Appendix A requirements have precedence over those in Appendix B. To avoid such an occurrence to the extent practicable, every effort should be made to (1) ensure the compatibility of Appendix A and Appendix B technical specifications and (2) coordinate changes in either appendix to avoid conflicts and maintain consistency, as discussed in Section 5, "Administrative Controls."

*Technical Specifications imposed on plant operation in the interest of the health and safety of the public are included as Appendix A of the operating license.

STANDARD FORMAT AND PRINCIPAL CONTENT OF ENVIRONMENTAL TECHNICAL SPECIFICATIONS

1 DEFINITIONS

Those terms in the environmental technical specifications which have a unique definition and those terms which have specific application to the site or plant to be licensed should be precisely defined. Examples of terms which fall within these categories include total residual chlorine, blowdown, deicing, drawdown, intake temperature, discharge temperature, ambient temperature, intake velocity, discharge structure, and condenser water box.

2 LIMITING CONDITIONS FOR OPERATION

This section specifies the limiting conditions to be imposed on plant effluents and operating practices which may have an adverse impact upon the environment. Plant discharges and operations which may require a limiting condition for operation should be discussed. The listing of plant discharges and operations in this section is illustrative and not all-inclusive. Peculiarities of the site or the station may require additional limiting conditions for operation (e.g., a limiting condition on noise). In some instances (e.g., reservoir drawdown), items might be inapplicable. The basic objective is to establish a limiting condition for operation for each plant parameter, operation, and discharge that has a potential for adverse environmental impact if not controlled. Where water pollution requirements are specified in NPDES permits or State water quality certifications under section 401 of the Federal Water Pollution Control Act, as amended, limiting conditions for operation would be consistent with those specifications. However, the bases provided for such limiting conditions for operation should be sufficient to demonstrate that no unacceptable environmental impact will occur with operation at these limits.

Each limiting condition for operation should be prepared in the following format:

Objective

The purposes of the limiting condition and the specific conditions it is intended to prevent or protect should be indicated. Systems or parts of the facility or location to which the limit applies should be clearly defined.

Specification

The limiting condition for operation imposed and the proposed corrective actions to be taken when this limit is exceeded should be specified.

Monitoring Requirement

The monitoring program should be clearly defined. A concise description of the monitoring program should include information on the measurement and sampling methods, location of measurement, sampling frequency, accuracy and sensitivity of measurement, the record-keeping procedure, and provisions for monitoring critical parameters in the event the primary monitoring method becomes inoperative.

Bases

The technical, environmental, and operational considerations in developing the specification and the monitoring requirement should be presented.

An example of a limiting condition for operation is appended as Example 1.

2.1 Thermal

Limiting conditions for operation should be placed on power plant heat dissipation systems to ensure that impacts on aquatic ecosystems from thermal stress are controlled within acceptable environmental limits. Thermal stress is controlled by limiting plant operation so that the thermal tolerances of important species are not exceeded with respect to both extreme temperatures and rates of temperature change that preclude physiological acclimation. Temperature tolerances are dependent on ambient temperature and seasonal physiological requirements of species; thus limiting conditions for operation may vary with season. The need for limiting conditions should be considered for all modes of plant operation, including startup, shutdown, and others.

The bases for establishing limiting conditions for operation on thermal discharges should include information on the species to be protected, the criteria for protection from thermal stress, and the water quality parameters to be controlled.

2.1.1 Maximum ΔT Across the Condenser

Limits on condenser ΔT should be provided when the temperature rise across the condenser can result in unacceptable environmental impact on entrained organisms. Maximum ΔT limits should include protection against unacceptable plankton and larval fish mortalities and gas bubble disease in fish.

2.1.2 Maximum Discharge Temperature

The most effective method for controlling thermal stress to the aquatic environment is by controlling the maximum temperature of the plant effluent at the point of discharge to the receiving water. Limits on maximum temperature of the plant effluent at the point of discharge should be provided.

2.1.3 Maximum Btu/hr

If applicable, or to comply with other regulatory restrictions, the thermal discharge may be limited to an allowable Btu/hr.

2.1.4 Rate of Change of Discharge Temperature

For sites where thermal shock may result in unacceptable environmental impact, limits should be provided to control the rate of temperature change (i.e., °F/hr) of condenser and service water discharges and blowdown from closed cycle systems during normal operation. Limits should be provided for both power increase and power decrease. Generally, the limits should be defined as a function of ambient receiving water temperature or seasonal temperature requirements of the species to be protected.

2.1.5 Heat Treatment of Circulating Water System

Limits should be provided for the magnitude and duration of temperature increase (ΔT) in intake and receiving waters above normal operating levels which result from special uses of heated water, such as heat treatment of the condenser and deicing of water intake structures. Limits may be required to maintain discharge water temperature increases to acceptable levels above ambient or to control fish attraction to the warmed intake structure.

2.2 Hydraulic

2.2.1 Intake Velocity

Maximum limits on intake approach and screen face velocities should be specified where a potential exists for impingement on intake screens of numbers of individuals of important species that may result in an unacceptable impact on the species population or the ecological system. Intake water velocities should be based on swimming speeds and behavioral patterns which influence impingement susceptibility.

2.2.2 Discharge Velocity

Limits on discharge velocity should be established where bottom scouring is a potential problem, where specific discharge velocities are necessary for optimum mixing conditions, or where circulation in the receiving water is affected by the discharge velocity.

2.2.3 Withdrawal and Drawdown Restrictions

Limits on total withdrawal from the water supply should be established where water level or discharge is important for protection of organisms in the station vicinity and in upstream and downstream waters and to prevent undesirable alteration of the circulation of the supply water body. Limits on water drawdown may be needed for lakes and reservoirs that undergo large fluctuations in water level due to hydroelectric or flood control operations or other causes.

2.3 Chemical

Limiting conditions for operation should be established for chemical releases (including biocides) associated with all plant discharge water systems, for other plant-related chemical usages such as equipment cleaning and maintenance, and for the use of herbicides in maintenance of transmission line rights of way and access roads.

The purpose of limits on chemical releases is (1) to protect the local biota from lethal and sublethal effects of exposure to discharged chemicals, (2) to ensure that continued multiple use of the receiving waters by human population is protected, and (3) to control degradation of the quality of the receiving waters.

The bases should include a summary statement of the considerations and justifications used in establishing the limits. The proposed maximum concentrations of chemicals at identified points of release should be compared with the concentrations already existing in the receiving waters. The organisms to be protected and the water quality parameters to be monitored should be identified.

2.3.1 Biocides

Limits should be established for all biocide usage which results in an offsite exposure of biota (including the human population). Effluent concentration limits, expected frequency and duration of use, and estimated total annual usage should be identified. Limits for herbicide usage for maintenance of transmission line rights of way should be established.

2.3.2 Corrosion Inhibitors

Limits similar to those presented in Section 2.3.1 should also be provided for the use of corrosion inhibitors.

When heavy metals are used or their concentrations in station effluents are increased above ambient levels, limits should be provided. These limits might be conditioned according to frequency of use, duration of use, and total annual usage.

2.3.3 Suspended and Total Dissolved Solids

Limits should be provided for the dissolved and suspended solids in the plant effluents. Limits should be stated for either the specific chemicals or for the suspended and total dissolved solids discharged. Limits should be expressed as maximum effluent concentrations and estimates of total annual release. Limits should provide protection against accelerated eutrophication, increased water turbidity, and other reduction in water quality.

2.3.4 pH

Limits should be provided to maintain effluent pH within a range compatible with indigenous aquatic life.

2.3.5 Other Chemicals that Affect Water Quality

Limits should be provided for all other chemical releases that have potential for reducing receiving water quality and causing adverse environmental impact. For example, lower limits on dissolved oxygen and upper limits on oxygen demand in the plant effluent may be appropriate.

2.4 Radioactive Effluents

Limiting conditions for operation should be established for all plant radioactive discharges to keep levels of radioactive material in effluents to unrestricted areas as low as is reasonably achievable. These limiting conditions for operation should be applied to radioactive liquid and gaseous discharges to be within the limits of 10 CFR Part 20 and to comply with the provisions of 10 CFR Part 50.

Surveillance and monitoring programs should be established to provide data on quantities of radioactive material released in liquid and gaseous effluents to ensure that radioactive releases are maintained within the regulatory provisions cited above. These programs should be applied to radioactive liquid and gaseous materials released from the plant to meet General Design Criteria 60 and 64 of Appendix A to 10 CFR Part 50 and, if applicable, the guidelines of 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."

3 ENVIRONMENTAL SURVEILLANCE

The objective of the environmental surveillance program is to determine the nature and extent of changes in the ecosystem that may result from plant operation. The program should cover elements of the ecosystem for which a causal relationship between plant operation and adverse change is established or strongly suspected. The listing of environmental parameters to be monitored in the surveillance program in this section is illustrative and not all-inclusive. Periodic evaluation of the findings of the surveillance program will provide the basis for modification of the program to ensure that the surveillance effort is sufficient and justified when compared to current assessment of the effect that plant operation is having on the environment. Any modification of surveillance programs should be accompanied by submission of a formal change in the environmental technical specifications per Section 5.6.3.

A narrative summary should be provided at the beginning of this section. The summary should describe the overall environmental surveillance program and demonstrate how the program will meet the stated objective.

Each surveillance program element should be presented in a concise narrative manner using the following format:

Objective

Describe the environmental parameters to be investigated and the information the surveillance program will supply.

Specification

Describe what is to be done. Include essential features such as sampling and measurement techniques; locations, numbers, and frequency of samples and measurements; and methods of data evaluation.

Reporting Requirements

A report level should be established for each measured environmental parameter. If a report level for a parameter cannot be established, justification should be provided.

Report levels are warning notices of impending unacceptable environmental stress. They should be established at a level above the normal fluctuations of a given parameter, but low enough to permit remedial action to be taken before significant or irreversible damage has occurred.

Bases

Present the basis for the program element objective and show its relationship to the overall environmental surveillance program.

Discuss the rationale for selecting sampling locations, sampling frequency, and data evaluation methods, and show how the program element will fulfill the objective.

An example of an environmental surveillance program element is appended as Example 2.

3.1 Nonradiological Surveillance

These program elements should be designed to detect and measure the nonradiological impact of plant operation on environmental systems that (1) are potentially subject to alteration by plant operation and (2) are significant to the quality of animal (including human) and plant life in the power plant environs. Biota that should be surveyed, in most cases, are those identified in Section 2.2 of Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Plants," as "important species." Organization of program elements into abiotic and biotic subdivisions, as shown below, is recommended.

3.1.1 Abiotic

a. Aquatic

(1) **Chemical Discharges.** Monitor the concentration and dispersion of specific chemicals, suspended solids. and total dissolved solids in the receiving waters.

Chemical discharges include all dissolved and particulate materials released by the plant to the receiving waters at concentrations in the effluent above ambient and may include biocides, corrosion inhibitors, heavy metals, corrosion products, and in-plant treatment chemicals.

(2) **Dissolved Gases.** Monitor aqueous concentrations of dissolved gases such as oxygen and nitrogen in the vicinity of the plant.

(3) **Thermal Measurements.** Monitor the thermal characteristics of the receiving waters upstream and downstream of the plant discharge.

(4) **Erosion and Sedimentation.** Monitor erosion and sedimentation processes in the vicinity of the plant.

b. Terrestrial

(1) **Soil Chemistry.** Monitor changes in soil chemistry at facilities with cooling towers, or where existing surface water runoff patterns have been modified.

(2) **Ground Water.** Monitor changes of ground water levels and/or the artesian properties of existing ground water sources at facilities where consumptive use of ground water and other plant-related activities may adversely affect ground water resources in the site environs.

(3) **Other Program Elements.** Monitor unique plant or site features to evaluate potential adverse terrestrial impacts. This activity may include monitoring the effects of herbicides used to maintain transmission line rights of way, measuring noise, monitoring effects of onsite or nearsite solid waste disposal operations, and measuring physical effects of fogging, icing, and drift contaminants from closed-cycle cooling systems.

3.1.2 Biotic

a. Aquatic

(1) **General Ecological Survey.** Determine the effects of plant operation by comparing operational and preoperational values of selected ecological parameters that can adequately gauge changes in the distribution and abundance of species populations identified in baseline studies or control area studies as particularly vulnerable to impact. Key indicator organisms should be identified prior to plant startup. Endangered or threatened species should receive special attention.

(2) **Impingement of Organisms.** Determine the numbers of fish and other organisms that impinge on intake screens. The significance of impingement losses should be evaluated within the context of the findings of the general ecological survey. Indicate the methods used to sample and record the organisms that impinge and are killed at the intake structure. If entrapped organisms are to be returned to the receiving water, investigate their subsequent survival.

(3) **Entrainment of Plankton, Eggs, and Larval Forms.** Determine the species and quantity of important organisms entrained and the effects of entrainment on immediate survival of individuals and long-term survival of the species population in natural waters. The significance of entrainment mortalities should be evaluated within the context of the findings of the general ecological survey and the effects on important species populations. Investigations should be performed seasonally on a diel basis and, where possible, should indicate the contribution of mechanical, thermal, and chemical stresses to the overall effects observed.

b. Terrestrial

(1) **General Ecological Survey.** Determine the effects of plant operation on important vegetation and wildlife, including resident and migratory birds. Such effects may result from drift originating from plant cooling systems, noise, and maintenance of transmission line corridors.

(2) **Other Program Elements.** Evaluate unique site or plant design features to determine potential adverse effects on terrestrial biota. Such effects may include immediate and long-term changes in species abundance, diversity, distribution, and composition.

3.2 Radiological Environmental Monitoring

Radiological environmental monitoring programs should be established to provide data on measurable levels of radiation and radioactive materials in the site environs. Appendix I to 10 CFR Part 50 requires that the relationship between quantities of radioactive material released in effluents during normal operation, including anticipated operational occurrences, and resultant radiation doses to individuals from principal pathways of exposure be evaluated. Monitoring programs are conducted to verify the in-plant controls used for controlling the release of radioactive materials. Surveillance should be established to identify changes in the use of unrestricted areas to provide a basis for modifications in the monitoring programs.

NRC Regulatory Guide 4.1, Rev. 1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants," provides an acceptable basis for the design of programs to monitor levels of radiation and radioactivity in plant environs.

In describing the radiological environmental monitoring program, specify the size and physical characteristics of each sample, the types of radiological analyses to be performed, and the measuring equipment to be used. The determinate error of measurement for specific radionuclides should also be provided.

An acceptable format for summarizing and reporting radioactivity in environmental samples is provided in Table 1. Table 2 provides the elements of a radiological monitoring program. Table 3 is included to indicate acceptable detection capabilities for environmental samples.

The intensive program outlined in Table 2 should be conducted for the first three years of commercial operation (or other period corresponding to a maximum burnup in the initial core cycle). Following this period, program changes may be proposed based on operational experience.

Guidelines for submitting the Annual Environmental Operating Report are given in Section 5.6.1.

Guidelines for submitting nonroutine reports and action to be taken when a radiological environmental report level is exceeded are given in Section 5.6.2.

Acceptable wording for Section 3.2 technical specifications is provided in Appendix 1 of this guide.

4 SPECIAL SURVEILLANCE AND STUDY ACTIVITIES

This section should contain a description of those special surveillance or study activities that (1) are already planned by the applicant or were identified during the NEPA review as being necessary and (2) are not included in Section 3. Examples of the types of activities that might be included in this section are thermal plume mapping, laboratory studies on the thermal or chemical tolerance of important migratory or resident organisms, migratory behavior of important fish species, and other studies which provide information supporting determination of optimum limiting conditions for operation.

The description should include a summary of the objective of the activity, the general approach to accomplishing the objective, a schedule of significant milestones, and the schedule for reporting the results to the NRC. In general, special surveillance and study activities should be defined closely with regard to their specific goals and duration.

5 ADMINISTRATIVE CONTROLS

Administrative and management controls established by the applicant to provide continuing protection to the environment and to implement the environmental technical specifications should be described in this section. This section should include the assignment of responsibilities, organizational structure, operating procedures, review and audit functions, and reporting specifications.

5.1 Responsibility

Describe the assignment of management responsibility at both the plant and corporate levels for implementing environmental technical specifications, for ensuring that plant operations are conducted to provide continued protection to the environment, and for coordination of environmental technical specifications with safety technical specifications.

Define the administrative measures for ensuring that the individual or group assigned the responsibility for auditing or otherwise verifying that an activity has been correctly performed is independent of the individual or group directly responsible for performing the specific activity.

The applicant may delegate to other organizations the work of, but not the responsibility for, proposing and executing portions of the environmental technical specifications.

5.2 Organization

Provide organization charts at the plant and corporate levels relative to environmental matters and describe the functioning of the organization with respect to environmental matters.

5.3 Review and Audit

Describe the method for providing independent review and audit of environmental matters and define the review and audit responsibilities and authorities.

As a minimum, the following should require review and audit:

a. Preparation of the proposed environmental technical specifications.

b. Coordination of environmental technical specifications with the safety technical specifications to avoid conflicts and maintain consistency.

c. Proposed changes to the environmental technical specifications and the evaluation of impact resulting from the change.

d. Proposed written procedures (see Section 5.5) and proposed changes thereto which affect the environmental impact of the plant.

e. Proposed changes or modifications to plant systems or equipment to determine the environmental impact of the changes.

f. Results of the environmental monitoring programs prior to their submittal in each Environmental Operating Report (see Section 5.6.1).

g. Investigation of all reported instances of violations of environmental technical specifications. Where investigation indicates, evaluation and formulation of recommendations to prevent recurrence.

5.4 Action To Be Taken If a Limiting Condition for Operation is Exceeded

The following wording is acceptable for this section:

"5.4.1 Remedial action as permitted by the technical specification shall be taken until the condition can be met.

"5.4.2 Exceeding a limiting condition for operation shall be investigated by the independent review and audit authority.

"5.4.3 A report for each occurrence shall be prepared as specified in Section 5.6.2."

5.5 Procedures

The following wording is acceptable for this section:

"5.5.1 Detailed written procedures, including applicable checklists and instructions, shall be prepared and followed for all activities involved in carrying out the environmental technical specifications. Procedures shall include sampling, data recording and storage, instrument calibration, measurements and analyses, and actions to be taken when limits are approached or exceeded. Testing frequency of any alarms shall be included. These frequencies shall be determined from experience with similar instruments in similar environments and from manufacturers' technical manuals.

"Procedures shall be prepared for ensuring the quality of program results, including analytical measurements, which document the program in policy directives, designate a responsible organization or individuals, include purchased services (e.g., contractual lab or other contract services), include audits by licensee personnel, and include systems to identify and correct deficiencies, investigate anomalous or suspect results, and review and evaluate program results and reports.

"5.5.2 Plant standard operating procedures shall include provisions, in addition to the procedures specified in Section 5.5.1, to ensure that all plant systems and components are operated in compliance with the limiting conditions for operations established as part of the environmental technical specifications."

5.6 Plant Reporting Requirements

The following wording is acceptable for this section:

"5.6.1 Routine Reports

a. Annual Environmental Operating Report

"Part A: Nonradiological Report. A report on the environmental surveillance programs for the previous 12 months of operation shall be submitted to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor Regulation) as a separate document within 90 days after January 1 of each year. The period of the first report shall begin with the date of initial criticality. The report shall include summaries, interpretations, and statistical evaluation of the results of the nonradiological environmental surveillance activities (Section 3) and the environmental monitoring programs required by limiting conditions for operation (Section 2) for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous environmental surveillance reports and an assessment of the observed impacts of the plant operation on the environment. If harmful effects or evidence of irreversible damage are detected by the monitoring, the licensee shall provide an analysis of the problem and a proposed course of action to alleviate the problem.

"Part B: Radiological Report. A report on the radiological environmental surveillance programs for the previous 12 months of operation shall be submitted to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor Regulation) as a separate document within 90 days after January 1 of each year. The period of the first report shall begin with the date of initial criticality. The reports shall include summaries, interpretations, and statistical evaluation of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous environmental surveillance reports and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of land use censuses required by the specifications. If harmful effects or evidence of irreversible damage are detected by the monitoring, the licensee shall provide an analysis of the problem and a proposed course of action to alleviate the problem.

"Results of all radiological environmental samples taken shall be summarized and tabulated on an annual basis. [The format of Table 1 should be used.]* In the event that some results are not available within the 90-day period, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

b. Radioactive Effluent Release Report

"A report on the radioactive discharges released from the site during the previous 6 months of operation shall be submitted to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear

*The statement in brackets [ ] is meant for clarification only and is not acceptable wording for this section. Guidance for additional reporting requirements will be developed and included in a revision to this guide.

Reactor Regulation) within 60 days after January 1 and July 1 of each year. The period of the first report shall begin with the date of initial criticality. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the plant as outlined in 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," with data summarized on a quarterly basis following the format of Appendix B thereof.

"The report shall include a summary of the meteorological conditions concurrent with the release of gaseous effluents during each quarter as outlined in Regulatory Guide 1.21, with data summarized on a quarterly basis following the format of Appendix B thereof. Calculated offsite dose to humans resulting from the release of effluents and their subsequent dispersion in the atmosphere shall be reported as recommended in Regulatory Guide 1.21.

"5.6.2 Nonroutine Reports

a. Nonroutine Environmental Operating Reports

"A report shall be submitted in the event that (a) a limiting condition for operation is exceeded (as specified in Section 2, "Limiting Conditions for Operation"), (b) a report level is reached (as specified in Section 3, "Environmental Surveillance"), or (c) an unusual or important event occurs that causes a significant environmental impact, that affects potential environmental impact from plant(s) operation, or that has high public or potential public interest concerning environmental impact from plant(s) operation. Reports shall be submitted under one of the report schedules described below.

"(1) Prompt Report. Those events requiring prompt reports shall be reported within 24 hours by telephone, telegraph, or facsimile transmission to the Director of the NRC Regional Office and within 10 days by a written report to the Director of the Regional NRC Office (with a copy to the Director, Office of Nuclear Reactor Regulation).

"(2) 30-Day Report. Those events not requiring prompt reports shall be reported within 30 days by a written report to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor Regulation).

"The reporting schedule for reports concerning limiting conditions for operation and report levels shall be specified in the licensee's technical specifications. Reports concerning unusual or important events shall be reported on the prompt schedule.

"Written 10-day and 30-day reports and, to the extent possible, the preliminary telephone, telegraph, or facsimile reports shall (a) describe, analyze, and evaluate the occurrence, including extent and magnitude of the impact, (b) describe the cause of the occurrence, and (c) indicate the corrective action (including any significant changes made in procedures) taken to preclude repetition of the occurrence and to prevent similar occurrences involving similar components or systems.

"The significance of an unusual or apparently important event with regard to environmental impact may not be obvious or fully appreciated at the time of occurrence. In such cases, the NRC shall be informed promptly of changes in the licensee's assessment of the significance of the event and a corrected report shall be submitted as expeditiously as possible.

b. Nonroutine Radiological Environmental Operating Reports

"The nonroutine reporting requirements for radiological environmental monitoring are divided into several sections: (1) anomalous measurements and (2) [additional reporting specifications pursuant to Appendix I to 10 CFR Part 50 may be proposed].* The section on anomalous measurements applies to specifications for all nuclear power plants.

"(1) Anomalous Measurement Report. If a confirmed measured level of radioactivity in any environmental medium exceeds ten times the control station value, a written report shall be submitted to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor Regulation) within 10 days after confirmation.** This report shall include an evaluation of any release conditions, environmental factors, or other aspects necessary to explain the anomalous result.

"(2) [*Reporting requirements to be developed.*]*

c. Nonroutine Radioactive Effluent Reports

"If the quantity of radioactive material released in effluents to unrestricted areas during any calendar quarter is such that the resulting radiation exposure exceeds one-half the design objective annual exposure derived pursuant to Appendix I to 10 CFR Part 50, the licensee shall make an investigation to identify the causes of such releases and define and initiate a program of action to reduce such releases to the design objective levels. A written report of these actions shall be submitted to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor

***The statement in brackets [ ] is meant for clarification only and is not acceptable wording for this section. Guidance for additional reporting requirements will be developed and included in a revision to this guide.**

****A confirmatory reanalysis of the original, a duplicate, or a new sample may be desirable, as appropriate. The results of the confirmatory analysis shall be completed at the earliest time consistent with the analysis, but in any case within 30 days.**

Regulation) within 30 days from the end of the quarter during which the release occurred."

'5.6.3 Changes in Environmental Technical Specifications

"a. A report shall be made to the NRC prior to implementation of a change in plant design, in plant operation, or in procedures described in Section 5.5 if the change would have a significant effect on the environment or involves an environmental matter or question not previously reviewed and evaluated by the NRC. The report shall include a description and evaluation of the change and a supporting benefit-cost analysis.

"b. Request for changes in environmental technical specifications shall be submitted to the Director, Division of Reactor Licensing, for review and authorization. The request shall include an evaluation of the environmental impact of the proposed change and a supporting benefit-cost analysis."

5.7 Records Retention

The following wording is acceptable for this section:

"5.7.1 Records and logs relative to the following areas shall be made and retained for the life of the plant:

"a. Records and drawings detailing plant design changes and modifications made to systems and equipment as described in Section 5.6.3.

"b. Records of all data from environmental monitoring, surveillance, and special surveillance and study activities required by these environmental technical specifications.

"5.7.2 All other records and logs relating to the environmental technical specifications shall be retained for five years following logging or recording."

5.8 Special Requirements

Plant-related proposed specifications for which no monitoring or reporting specifications have been proposed in Sections 2 and 3 should be included in this section, if failure to meet such specifications could result in a significant environmental impact. Such proposed specifications should consider, but should not be limited to, the following:

a. Environmentally sensitive design parameters such as intake velocity and discharge velocity.

b. Criteria related to environmentally significant operating practices and procedures such as cooling system operation.

c. Operating requirements for special equipment such as fish barriers.

d. Practices relating to the use of herbicides, erosion control, and landscaping.

Any physical or procedural changes that would affect these specifications should be reported per proposed specifications in Section 5.6.3.a.

IMPLEMENTATION

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

Except in those cases in which the applicant proposes an alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used in the evaluation of submittals for operating license applications docketed after September 1, 1976.

If an applicant wishes to use tnis regulatory guide in developing submittals for applications docketed on or prior to September 1, 1976, the pertinent portions or the application will be evaluated on the basis of this guide.

TABLE 1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility _____ Docket No. _____

Location of Facility _____ Reporting Period _____
(County, State)

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection[a] (LLD)	All Indicator Locations Mean (f)[b] Range[b]	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (f)[b] Range[b]	Control Locations Mean (f)[b] Range[b]	Number of Nonroutine Reported Measurements[c]
Air Particulates (pCi/m^3)	Gross β 416	0.003	0.08 (200/312) (0.05-2.0)	Middletown 5 miles 340°	0.10 (5/52) (0.08-2.0)	0.08 (8/104) (0.05-1.40)	1
	γ–Spec. 32						
	^{137}Cs	0.003	0.05 (4/24) (0.03-0.13)	Smithville 2.5 miles 160°	0.08 (2/4) (0.03-0.13)	<LLD	4
	^{140}Ba	0.003	0.03 (2/24) (0.01-0.08)	Podunk 4.0 miles 270°	0.05 (2/4) (0.01-0.08)	0.02 (1/8)	1
	^{89}Sr 40	0.002	<LLD	–	–	<LLD	0
	^{90}Sr 40	0.0003	<LLD	–	–	<LLD	0
Fish pCi/kg (dry weight)	γ–Spec. 8						
	^{137}Cs	80	<LLD	–	<LLD	90 (1/4)	0
	^{134}Cs	80	<LLD	–	<LLD	<LLD	0
	^{60}Co	80	120 (3/4) (90-200)	River Mile 35 Podunk River	See column 4	<LLD	0

[a] Nominal Lower Limit of Detection (LLD) as defined in HASL-300 (Rev. 8/73), pp. D-08-01, 02, 03.

[b] Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)

[c] Nonroutine reported measurements are defined in Section 5.6.2.h.

[d] Note: The example data are provided for illustrative purposes only.

TABLE 2

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Samples[a] and Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
AIRBORNE			
Particulates	3 samples from locations (in different sectors) of the highest offsite ground-level concentrations	Continuous sampler operation with sample collection weekly or as required by dust loading, whichever is more frequent	Gross beta radioactivity following filter change,[b] composite (by location) for gamma isotopic[c] and composite Sr-89, -90 analyses *quarterly*
	1 sample from the residence having the highest χ/Q as well as each of 1-3 communities within a 10-mile radius of the facility		
	2 samples from control locations (10-20 miles distant and in the least prevalent wind direction)[d]		
Radioiodine	2 samples from locations (in different sectors) having the highest offsite ground-level concentrations	Continuous sampler operation with canister collection weekly[c,e]	Analyze weekly for I-131
	1 sample from the residence having the highest χ/Q as well as 1 community within a 10-mile radius of the facility		
	1 sample from a control location (10-20 miles distant and in the least prevalent wind direction)		
Soil[f]	Samples from the same locations as for air particulates plus 5 additional locations	Once per 3 years	Gamma isotopic, Sr-90 on collection
DIRECT	2 or more dosimeters to be placed at the same locations as for air particulates, as well as 2 additional control locations (selected on a basis similar to the 2 air sample control locations)	Quarterly	Gamma dose quarterly
	2 or more dosimeters to be placed at each of 3 other locations (different sectors) of highest calculated offsite ground-level dose		

(Continued)

TABLE 2 (Continued)

Exposure Pathway and/or Sample	Number of Samples[a] and Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
WATERBORNE			
Surface[g]	1 sample upstream 1 sample in immediate area of discharge	Composite sample [h,i]	Gamma isotopic analysis monthly. Composite for tritium and Sr-89 -90 analyses quarterly
Ground	1 or 2 samples from sources most likely to be affected [j] 1 sample from ground water source upgradient	Quarterly	Gamma isotopic and tritium analyses quarterly
Drinking	1 sample of each of 1 to 3 supplies obtained within 10 miles of the facility which could be affected by its discharge, or the first supply within 100 miles if none exists within 10 miles	Composite sample [i]	Radioiodine analysis semimonthly. Gross β[b] and gamma isotopic analyses monthly. Composite for tritium and Sr-89, -90 analyses quarterly
AQUATIC			
Sediment & Indicator Organisms [k]	1 sample upstream from discharge point 1 sample in immediate downstream area of discharge point[l] 1 sample at downstream impoundment	Semiannually	Gamma isotopic, Sr-89 (except for sediments), and Sr-90 analyses semiannually
Sediment from Shoreline	1 sample from downstream area with existing or potential recreational value	Semiannually	Gamma isotopic and Sr-90 analyses semiannually
INGESTION			
Milk	1 sample at the offsite dairy farm or individual milk animal at the location having the highest χ/Q 1 sample from milking animals in each of 3 areas where doses are calculated to be greater than 1 mrem per year	Weekly or semimonthly depending on calculated dose[m]	Gamma isotopic and Sr-89, -90 analyses monthly Radioiodine analysis weekly or semimonthly when animals are on pasture[m]

(Continued)

TABLE 2 (Continued)

Exposure Pathway and/or Sample	Number of Samples[a] and Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
INGESTION (Cont.)			
Milk (Cont.)	1 sample from milking animals at a control location (10-20 miles distant and in the least prevalent wind direction)		
Fish and Invertebrates	1 sample of each commercially and recreationally important species in vicinity of discharge point 1 sample of same species in areas not influenced by plant discharge	Semiannually or in season	Gamma isotopic analysis on edible portions
Fruits and Vegetables	1 sample of each principal food product grown near the point having the highest χ/Q and from any area which is irrigated by water in which liquid plant wastes have been discharged 1 sample of green leafy vegetables at private gardens[n] and/or farms in the immediate area of plant 1 sample of each of the same foods grown 10-20 miles distant in the least prevalent wind direction	At time of harvest[n]	Gamma isotopic analysis on edible portion.[n] Radioiodine analysis on green leafy vegetables
Meat and Poultry[o]	1 sample or more of meat, poultry, and eggs from animals fed on crops grown within 10 miles of the facility at the prevailing downwind direction or where drinking water is supplied from a downstream source 1 sample of each of the same foods produced at locations 10-20 miles distant in the least prevalent wind direction 1 sample from major game species in areas where these provide an important source of dietary protein	Semiannually	Gamma isotopic analysis on edible portions

(Continued)

TABLE 2 (Continued)

[a]The number, media, and location of sampling may vary from site to site. It is recognized that, at times, it may not be possible or practical to obtain samples of the media of choice at the most desired location or time. In these instances suitable alternative media and locations may be chosen for the particular pathway in question and submitted for acceptance. Refer to Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants."

[b]Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the mean of control samples for any medium, gamma isotopic analysis should be performed on the individual samples.

[c]Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

[d]The purpose of this sample is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites which provide valid background data may be substituted.

[e]Canisters for the collection of radioiodine in air are subject to channeling. These devices should be carefully checked before operation in the field or several should be mounted in series to prevent loss of iodine.

[f]Any soil sampling and analysis program capable of measuring long-term accumulation of radioactivity, such as presented in HASL-300 or Regulatory Guide 4.5, is acceptable to the staff (HASL-300, *HASL Procedures Manual,* J.H. Harley, Ed., Rev. August 1974).

[g]For facilities not located on a stream, the "upstream sample" should be taken at a distance beyond significant influence of the discharges. The "downstream" sample should be taken in an area beyond the outfall which would allow for mixing and dilution. "Upstream" samples in a tidal area must be taken far enough upstream to be beyond the plant influence and should be above the salt water intrusion.

[h]Generally, salt water is not sampled except when the receiving water is utilized for recreational activities.

[i]Composite samples should be collected with equipment (or equivalent) which is capable of collecting an aliquot at time intervals which are very short (e.g., hourly) relative to the compositing period (e.g., monthly).

[j]Ground water samples should be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.

[k]Aquatic plants and animals to be sampled should be specified as closely as practicable, e.g., attached and floating algae, floating and rooted aquatic plants, migratory and nonmigratory fish, zooplankton, phytoplankton, and shellfish. Nomenclature by common name should be used.

[l]Other sampling locations may be required for certain sites. For further guidance see pertinent footnotes in Table 1 of EPA document ORP/SID 72-2, *Environmental Radioactivity Surveillance Guide,* U.S. Environmental Protection Agency, June 1972.

[m]Milk samples should be collected and analyzed weekly in areas where the calculated dose to a child's thyroid exceeds 15 mrem/yr. Sampling and analysis should be semimonthly in areas where the dose is calculated to be $\leq$ 15 mrem/yr. For further guidance on milk-child pathway sampling media, frequency of sampling, method of analysis and locations, the user is referred to Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants," and Regulatory Guide 4.3, "Measurements of Radionuclides in the Environment—Analysis of 1-131 in Milk."

[n]Where access to green leafy vegetables from private gardens is not possible, nonedible plants with similar leaf characteristics from the same vicinity may be substituted. If harvest occurs more than once a year, sampling should be performed during each discrete harvest. If harvest occurs continuously, sampling should be monthly. Attention should be paid to including samples of tuberous and root vegetables.

[o]Sampling of feedstuffs and forage may be substituted for meat and poultry. However, sampling frequency for such media should be monthly.

TABLE 2 (Continued)

Note: In addition to the above guidance for operational monitoring, the following material is supplied for guidance on preoperational programs.

Preoperational Environmental Surveillance Program

A Preoperational Environmental Surveillance Program should be instituted 2 years prior to the institution of plant operation.

The purposes of this program are:

1. To measure background levels and their variations along the anticipated critical pathways in the area surrounding the plant
2. To train personnel
3. To evaluate procedures, equipment, and techniques

The elements (sampling media and type of analysis) of both preoperational and operational programs should be essentially the same. The duration of the preoperational program, for specific media, presented in the following table should be followed:

Duration of Preoperational Sampling Program for Specific Media

6 months	*1 year*	*2 years*
• airborne iodine	• airborne particulates	• direct radiation
• iodine in milk (while animals are in pasture)	• milk (remaining analyses)	• fish and invertebrates
• soil (one set of samples)	• surface water	• fruits and vegetables
	• ground water	• meat and poultry
	• drinking water	• sediment & indicator organisms

TABLE 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

Analysis	Lower Limit of Detection (LLD)[a]					
	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish, Meat, or Poultry (pCi/kg, wet)	Milk (pCi/l)	Vegetation (pCi/kg, wet)	Soil (pCi/kg, dry)
gross beta	2	1×10^{-2}				
^{3}H	330					
^{54}Mn	15		130			
^{59}Fe	30		260			
$^{58,60}Co$	15		130			
^{65}Zn	30		260			
^{89}Sr	10	5×10^{-3}	40	10		
^{90}Sr	2	1×10^{-3}	8	2		150
^{95}Zr-Nb	10					
^{131}I	0.4	7×10^{-2}		0.4	80	
$^{134,137}Cs$	15	1×10^{-2}	130	15	80	150
^{140}Ba-La	15			15		

[a]The nominal lower limit of detection is defined in HASL 300 (Rev. 8/74), pp. D-08-01, 02, 03 at the 95% confidence level. The LLD levels are decay corrected to the end of the total sampling period. The LLD for radionuclides analyzed by gamma spectrometry will vary according to the number of radionuclides encountered in environmental samples. These LLD levels should be used as minimum criteria for objectives for instrumentation and analytical procedure selection.

EXAMPLE 1
EXAMPLE OF A LIMITING CONDITION FOR OPERATION*

2.1.2 Maximum Discharge Temperature

Objective

The purpose of this specification is to control thermal stress to the aquatic ecosystem by limiting the maximum temperature of the condenser cooling water discharge.

Specification

The condenser cooling water discharge temperature shall not exceed 90°F at the control structure in the discharge canal. If the limiting condition of 90°F is exceeded for a period greater than 2 hours, the event shall be reported promptly according to Section 5.6.2.a(1) of these Technical Specifications and the following sequential actions shall be taken to maintain the cooling water discharge temperature at the control structure at or below 90°F:

(1) Full capacity of the station's dilution pumps shall be utilized.

(2) The station's operating power level shall be reduced unless an emergency need exists for the lost power. An emergency need exists when reduction in power would mean cutting off firm customers.

(3) Additional corrective action shall be undertaken to meet the specification as rapidly as possible.

Monitoring Requirement

A mid-depth continuous temperature recorder shall be used at the control structure. Temperatures at the control structure shall be transmitted to the control room, averaged over one minute, and stored by computer. The temperature averaged over one minute shall be visually displayed every minute for monitoring purposes. The accuracy of the system and sensitivity of the temperature sensors shall be 1-3% and 0.1°F, respectively.

A continuous temperature monitoring station located less than 1000 feet from the point of discharge shall be used as a backup system if the primary system fails. By correlation methods, data from this station will be used to approximate the discharge temperature until the primary system is restored. This station shall be manually checked once per 8 hours to verify compliance with technical specifications. The estimated accuracy of using the backup station temperatures and the correlation between backup and discharge-point temperature is 5 to 10%.

Bases**

The 90°F effluent temperature limit is established because most important species of this region cannot tolerate prolonged exposure to temperatures above 90°F. Based on a literature review and laboratory studies of important resident species, 90°F appears to be a maximum temperature that can be chronically tolerated. Discharge temperatures at the control structure are expected to approach 90°F for only a few weeks of the year. Mixing of the discharge and receiving water will limit temperatures which approach 90°F in the receiving water to the immediate discharge area. Since the time duration and spatial extent of temperatures approaching 90°F are expected to be limited to short periods and to a relatively small area of the receiving water, changes detrimental to the aquatic ecosystem structure and function are not anticipated.

The placement of the temperature monitoring instrument at the control structure will give the temperature of the discharge water immediately before mixing with the receiving water. The placement of the temperature sensor at mid-depth in the discharge canal has been shown by temperature measurements at other depths in the canal to be representative of the discharge water entering the receiving stream. The transmission, computer storage, and monitoring program is presently being used at other facilities in the applicant's system and has performed within the limits indicated in the above specification more than 98% of plant operating time.

*This example is provided for illustrative purposes only and it is not intended for use as a model of an environmental technical specification for a limiting condition for operation that is generally applicable to all nuclear power stations.

**The bases should be supported by reference to appropriate published documents and data held by the licensee.

EXAMPLE 2
EXAMPLE OF AN ENVIRONMENTAL SURVEILLANCE PROGRAM ELEMENT*

3.1.2.a.(2) Impingement of Organisms

Objective

The objective of the monitoring program is to determine the number, size, weight, and species of aquatic organisms impinged and killed on the vertical traveling screens and in trash baskets.

Specification

The number, size, weight, and species of organisms impinged and removed from the intake water body and collected in the circulating water trash baskets shall be determined. A sample shall consist of all organisms removed from the intake water body and collected in the trash baskets as the result of one hour of continuous operation of the traveling screens in all intake bays through which water is being pumped. Organisms impinged and entrapped prior to the one-hour cycle shall not be considered part of the sample. Four samples shall be taken each 24-hour period with 5 hours elapsed between successive samplings. The time of initiation of each sample period shall be the same each day. For each sample, all species shall be identified and all individuals in each species shall be counted. Size and weight measurements shall be taken in a manner consistent with fishery practice for all species by one of the following criteria:

(1) Individual organisms of one species numbering less than 100 per sample: all individuals shall be sized and weighed.

(2) Individual organisms of one species numbering more than 100 per sample: a subsample of 100 individuals or 25% of the total individuals of that species, whichever is more, shall be sized and weighed. The subsample shall be taken in a manner to avoid bias in size, weight, or physical condition of the organisms in the subsample.

For each organism sized and weighed, a determination shall be made as to whether the organism is alive or dead, based on the following criteria:

(1) An organism is dead if operation of the breathing apparatus has ceased.

(2) An organism shall be considered dead if it has obvious injuries, has lost its equilibrium, is behaving in a stunned or other abnormal manner, or is unlikely to survive.

Reporting Requirement

A prompt report to the NRC according to Section 5.6.2.a(1) of these Technical Specifications is required if any of the following conditions exist:

(1) The number of individuals of all species of finfish combined exceeds 50 per sample in each of four consecutive samples.

(2) The number of salmonids exceeds 10 per sample in each of four consecutive samples.

(3) The number of crabs exceeds 20 per sample in each of four consecutive samples.

Bases**

The magnitude of loss and the potential impact to the ecosystem in the environs of the power plant resulting from impingement and death of aquatic organisms on the traveling screens is not precisely known or determinable on theoretical bases alone. Sampling of organisms collected in the trash baskets will ensure that the majority of organisms killed in the intake structure will be identified and enumerated. This information when combined with results from the environmental surveillance program in the intake/receiving water will provide the empirical basis on which to judge the impact of the plant operation.

The report levels for total finfish, salmonids, and crabs are based on the results of population dynamics studies performed in the river supplying cooling water to the plant. Based on these and other population modeling studies to date, loss by impingement at or below the report levels should not result in an unacceptable impact to these organisms and the ecosystem.

Based on existing data, rates of impingement are expected to be less than the reporting levels. Impingement at rates exceeding the report levels for periods up to several days does not imply irreversible unacceptable impacts on the fishery, but indicates a sufficient change from normal rates to warrant reevaluation of plant operating limits designed to protect the fishery. Studies of the river ecosystem indicate that continued loss of organisms at rates exceeding report levels may not be compatible with maintaining the existing species composition or population density of the fishery.

*This example is provided for illustrative purposes only and is not intended for use as a model of an environmental technical specification for an environmental surveillance program that is generally applicable to all nuclear power stations.

**The bases should be supported by reference to appropriate published documents and data held by the licensee.

APPENDIX 1

ACCEPTABLE WORDING FOR SECTION 3.2, "RADIOLOGICAL ENVIRONMENTAL MONITORING," TECHNICAL SPECIFICATIONS

3.2 Radiological Environmental Monitoring

3.2.1 Monitoring Requirements

Objective

An environmental radiological monitoring program is conducted to verify projected or anticipated radioactivity concentrations and related public exposures.

Specifications

A. Environmental samples shall be collected and analyzed according to [Applicant's]* Table 3.2.1.a [Format and content for Table 3.2.1.a recommended by the staff is provided in Table 2 of this guide] at the location shown in Figure 3.2.1. [Figure should consist of a map of suitable scale to show all indicator sample locations, i.e., those within 10 miles.]*

B. Analytical techniques used shall be such that the detection capabilities in [Applicant's]* Table 3.2.1.b are achieved [selected detection capabilites recommended by the staff are presented in Table 3 of this guide].*

C. A census of gardens producing fresh leafy vegetables for human consumption (e.g., lettuce, spinach, etc.) shall be conducted near the end of the growing season to determine their location with respect to the site. This census is limited to gardens having an area of 500 square feet or more and shall be conducted under the following conditions:

1. Within a 1-mile radius of the plant site, enumeration by a door-to-door or equivalent counting technique.

2. If no milk-producing animals are located in the vicinity of the site, as determined by Specification D below, the census described in item 1. above shall be extended to a distance of 5 miles from the site.

If this census indicates the existence of a garden at a location yielding a calculated thyroid dose greater than that from the previously sampled garden, the new location shall replace the garden previously having the maximum iodine concentration. Also, any location from which fresh leafy vegetables can no longer be obtained may be dropped from the surveillance program after notifying the NRC in writing that such vegetables are no longer grown at that location.

D. A census of animals producing milk for human consumption shall be conducted at the beginning and at the middle of the grazing season to determine their location and number with respect to the site. The census shall be conducted under the following conditions:

1. Within a 1-mile radius from the plant site or within the 15 mrem/yr isodose line,† whichever is larger, enumeration by a door-to-door or equivalent counting technique.

2. Within a 5-mile radius for cows and a 15-mile radius for goats, enumeration by using referenced information from county agricultural agents or other reliable sources.

If it is learned from this census that animals are present at a location which yields a calculated thyroid dose greater than from previously sampled animals, the new location shall be added to the surveillance program as soon as practicable. The sampling location having the lowest calculated dose may then be dropped from the surveillance program at the end of the grazing season during which the census was conducted. Also, any location from which milk can no longer be obtained may be dropped from the surveillance program after notifying the NRC in writing that milk-producing animals are no longer present at that location.

E. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability or to malfunction of automatic sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be described in the annual report.

Reporting Requirement

[Specification of reporting requirements should be per Section 5.6.1.a and 5.6.2.b of this guide.]*

*Statement in brackets [] is meant for clarification only and should not be included in the Technical Specifications.

†Dose should be calculated using models and assumptions presented in Regulatory Guide 1.42.