U.S. NUCLEAR REGULATORY COMMISSION

July 1982

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 3.52
(Task FP 716-4)

STANDARD FORMAT AND CONTENT FOR THE HEALTH AND SAFETY SECTIONS OF LICENSE RENEWAL APPLICATIONS FOR URANIUM FUEL FABRICATION PLANTS

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

INTRODUCTION

Section 70.33 of 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," specifies that applications for renewal of licenses to possess and use special nuclear material (SNM) in uranium fuel fabrication plants should be filed in accordance with §§ 70.21 and 70.22, which identify the general information required. The "Standard Format and Content for the Health and Safety Sections of Renewal Applications for Uranium Fuel Fabrication Plants" (hereinafter "Standard Format") was prepared to provide more specific guidance for the preparation of renewal applications. The NRC staff suggests the use of this Standard Format for renewal applications to facilitate their efficient preparation by licensees and their timely and uniform review by the NRC staff.

As specified in § 70.33, information contained in previous applications, statements, or reports filed with the Commission under the license may be incorporated by reference, provided such references are clear and specific. The information called for in this regulatory guide that is incorporated by reference to a previous application should be briefly summarized. A timely renewal application must be filed in proper form not less than 30 days prior to expiration of the existing license. However, the NRC suggests that earlier filing is preferable.

The renewal application for the health and safety section of the license consists of two major parts. The first part contains the proposed license conditions that state what performance requirements the applicant is committed to. The second part contains detailed safety information and descriptive information on how the applicant will demonstrate adherence to the conditions of the first part. This format is designed to separate the requirements in Part I (license conditions) from the descriptive information in Part II (demonstration and performance record).

The information in Part I should be written so as to be inspectable or verifiable by the NRC Office of Inspection and Enforcement. The information in Part II, on the other hand, is of major importance to the NRC staff during the review of the license renewal application and should provide the basis for licensing decisions. This Standard Format is acceptable to the NRC staff, but conformance is not required. Renewal applications with different formats will be acceptable to the staff if they provide an adequate basis for the findings required for the issuance of a license.

The following subjects are not covered by this Standard Format: SNM accounting and control, records and inspections, physical protection of plants and materials, safeguards contingency plans, packaging for transport, and transportation of SNM. These items should be part of separate submittals but should be referenced where appropriate. Standard formats and guidance for most of these subjects are found in the following regulatory guides:

4.16 - Measuring, Evaluating, and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Airborne Effluents from Nuclear Fuel Processing and Fabrication Plants

5.45 - Standard Format and Content for the Special Nuclear Material Control and Accounting Section of a Special Nuclear Material License Application (Including That for a Uranium Enrichment Facility)

5.52 - Standard Format and Content for the Physical Protection Section of a License Application (for Facilities Other Than Nuclear Power Plants)

5.55 - Standard Format and Content of Safeguards Contingency Plans for Fuel Cycle Facilities

5.59 - Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance

5.60 - Standard Format and Content of a Licensee Physical Protection Plan for Strategic Special Nuclear Material in Transit

The Environmental Report is submitted by the applicant as a separate report and should be referenced in the introductory section of the renewal application. The analysis results should be summarized where appropriate, and the license conditions pertaining to the environment should be stated in Part I of the renewal application.

As the nuclear industry develops, the Commission's requirements for information needed in its review of applications for licenses to process and use SNM in uranium fuel fabrication plants may change. The contents of this Standard Format will be revised to reflect rule changes. Revisions of the Commission's needs for the information in connection with licensing will be conveyed to the industry and the public in the following principal ways: (1) by revisions to this Standard Format, (2) by the issuance of new or revised regulatory guides, (3) by public announcements, and (4) by direct communications to the applicant from the NRC staff as needed.

Purpose and Applicability

This Standard Format has been prepared to identify the type and quality of information needed in an application for license renewal. It is recognized that the physical size, process scope (chemical or mechanical), and plant capacity all have a bearing on the complexity and level of license application detail. Therefore, this regulatory guide is written to cover a model plant and the actual submittal may be more or less detailed. If additional guidance is required, the applicant is invited to confer with the NRC staff prior to or during the preparation of the application.

In the renewal application, the applicant should analyze the plant in terms of potential hazards and the means, including appropriate margins of safety, employed to protect against these hazards; sufficient information should be included to allow the NRC to perform independent analysis to confirm conclusions reached by the applicant. This analysis should include but is not limited to (1) the site and its relationship to accidents from natural phenomena; (2) operations involving radiation exposures and the application of

the principle of as low as is reasonably achievable (ALARA); (3) nuclear criticality safety; (4) confinement and control of radioactive materials; (5) projected effluent quantities and concentrations and effluent treatment; (6) reliability of the systems essential to safety; (7) prevention and control of fire and explosion and radiological contingency planning; and (8) environmental impact associated with normal operations, abnormal conditions, and accidents.

The renewal application should demonstrate the degree of skill, care, and effort used by the applicant in operating the licensed facility. To this end, the applicant may provide in-depth analyses as supplemental reports incorporated in the application by clear and specific references. Common literature or references that are readily available need not be supplied with the application.

Because of the variety of processes and designs for a uranium fuel fabrication plant, the applicant may wish to append detailed supplemental information not explicitly identified in this guide. The following are examples:

1. A glossary of definitions, unusual terms, or abbreviations used by the applicant,

2. Supplementary information regarding assumed analytical models, calculational methods, or design alternatives used by the applicant with particular emphasis on rationale and detailed examples used to develop the bases for criticality safety, and

3. Reports furnished to the applicant by consultants.

Proprietary Information

Proprietary information must be submitted separately. When submitted, it should be clearly identified and accompanied with the applicant's justifications for requesting its being withheld from public disclosure, as specified by § 2.790, "Public Inspections, Exemptions, Requests for Withholding," of 10 CFR Part 2, "Rules of Practice for Domestic Licensing Proceedings." NRC's staff review of the safety analysis should depend as much as possible on nonproprietary information.

Style and Composition

A table of contents and an index of key items should be included in each volume of the renewal application.

The applicant should strive for clear, concise presentation of the information provided in the application.

Where numerical values are stated, the number of significant figures given should reflect the accuracy or precision to which the number is known. Where appropriate, estimated limits of errors or uncertainty should be given.

Abbreviations should be consistent throughout the application and should be consistent with generally accepted usage. Any abbreviations, symbols, or special terms not in general usage or unique to the proposed plant should be defined when they first appear in the application.

Graphic presentations such as drawings, maps, diagrams, sketches, and tables should be employed where the information may be presented more clearly or conveniently by such means. Due concern should be taken to ensure that all information so presented is legible, that symbols are defined, and that scales are not reduced to the extent that visual aids are necessary to interpret pertinent items of information. These graphic presentations should be located with the section where they are first referenced and should be referred to both by their number and by the page on which they appear.

Physical Specifications

1. Paper Size

   Text pages: 8-1/2 x 11 inches

   Drawings and graphics: 8-1/2 x 11 inches preferred; however, a larger size is acceptable provided the finished copy when folded does not exceed 8-1/2 x 11 inches.

2. Paper Stock and Ink

   Suitable quality in substance, paper color, and ink density for handling and reproduction by microfilming or image-copying equipment.

3. Page Margins

   A margin of no less than 1 inch should be maintained on the top, bottom, and binding side of all pages submitted.

4. Printing

   Composition: text pages should be single spaced.

   Type face and style: should be suitable for reproduction by microfilming or image-copying equipment.

   Reproduction: may be mechanically or photographically reproduced.

5. Binding

   Pages should be punched and assembled in standard 3-hole loose-leaf binders.

6. Page Numbering

   Pages should be numbered with a Roman numeral corresponding to the part followed by a period and a digit for the chapter followed by a hyphen and a sequential number within the chapter, i.e., the third page in Chapter 4 of Part I should be numbered I.4-3. Do not number the entire report sequentially. (Note that, because of the small number of pages in many chapters, this Standard Format is numbered sequentially throughout the document.)

7. Standard Format Reference

   References to this Standard Format should be by part, chapter, and section.

8. Number of Copies

The applicant should submit twelve copies of the renewal application.

Procedures for Updating or Revising Pages

Data and text should be updated or revised by replacing pages. "Pen and ink" or "cut and paste" changes should not be used.

The changed or revised portion on each page should be highlighted by a "change indicator" mark consisting of a bold vertical line drawn in the margin opposite the binding margin. The line should be of the same length as the portion actually changed.

All pages submitted to update, revise, or add pages to the license should show the date of change. The transmittal letter should include an index page that lists the pages to be inserted and the pages to be removed. Where major changes or additions are made, pages for a revised Table of Contents should be provided.

PART I

LICENSE CONDITIONS

Part I contains the proposed license conditions that state what performance requirements the applicant is committed to. These should not contain detailed descriptive material that is more appropriate in Part II.

This part should be written to allow inspection and enforcement of the stated performance requirements.

Chapter 1 STANDARD CONDITIONS AND SPECIAL AUTHORIZATIONS

1.1 Name

The full name of the corporation or other entity should be provided. The State where it is incorporated or organized and the location of the principal office should be indicated.

1.2 Location

Provide the full address and location, including building names and numbers.

1.3 License Number and Period of Time the License is Requested for

Provide applicable license number and the date of request for renewal. The period of time that the license is requested for should be stated.

1.4 Possession Limits

The maximum quantity of SNM of each type to be used under the license should be provided. The chemical and physical form, the enrichment, and, where applicable, the isotopic content should also be provided. All other radioactive materials subject to this license should also be included (material identification, physical form, maximum curie content, etc.).

1.5 Location Where Material Will Be Used

For each type of SNM listed under Section 1.4, indicate the facilities that will be used to perform the authorized activities (see Section 1.7).

1.6 Definitions

Terminology that is not defined in standard references (e.g., ANSI N1.1-1976, "Glossary of Terms in Nuclear Science and Technology,"* or Title 10 of the Code of Federal Regulations) or that is unique to the applicant should be defined in this section.

1.7 Authorized Activities

A summary of all activities and types of processes in which the SNM and other radioactive materials subject to this license are to be used should be given in the license renewal application (the specific details are given in Chapter 16). Activities should be keyed to specific buildings if appropriate.

1.8 Exemptions and Special Authorizations

The requested specific exemptions and special authorizations that will not endanger life or property or the common defense and security should be listed in this section and justified in the appropriate subsequent section (e.g., monitor alarms, release limits, incinerator operation, offsite possession at reactor sites).

*Available from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

Chapter 2 GENERAL ORGANIZATIONAL AND ADMINISTRATIVE REQUIREMENTS

2.1 Licensee's Policy

Indicate the procedures by which the policy with regard to safety of the work place and all license requirements will be implemented. It should also be the policy of all organizational components to keep radiation exposures to employees and the general public as low as is reasonably achievable (ALARA).

2.2 Organizational Responsibilities and Authority

Identify all key positions with safety-related responsibilities and describe their functions. The licensee should provide separate lines of authority for production and safety functions. The lines of responsibility leading to top management should be indicated.

2.3 Safety Review Committees

Provide a list of all safety review committees (e.g., radiation, criticality, ALARA, fire), and indicate the decisionmaking function for each. Include, if applicable, the independent review committee for criticality safety analysis.

For each safety review committee, the purpose, charter of responsibilities, frequency of meeting, audit and inspection responsibilities, frequency of audits, membership, and reporting and recordkeeping requirements should be specified.

2.4 Approval Authority for Personnel Selection

State the management level responsible for personnel selection for all safety-related staff positions and safety review committee membership.

2.5 Personnel Education and Experience Requirements

Provide the education, training, and experience requirements for all safety-related management and staff positions and for safety review committee members.

2.6 Training

State the policy and plans for training of new and old employees in those areas related to safety.

Indicate the steps that will be taken to assure management that operational personnel understand the safety requirements of their work assignments. Define the method for evaluating the understanding of the employees in safety areas. Include the program for retraining previously trained employees.

2.7 Operating Procedures

Provide the essential aspects of the managerial system that will be used to ensure that the operating instructions related to safety will be properly implemented. Include the controls used for (a) procedures related to all activities involving special nuclear material or other radioactive material and

health and safety practices; (b) the administrative practices for establishing, modifying, and implementing such procedures; and (c) the administrative controls for the use of appropriate equipment and facilities for handling special nuclear material and other radioactive material.

Describe the administrative controls that will ensure that, prior to the start of any new or changed activity or any new or changed equipment or facility involving licensed material, an independent safety review is performed and documented.

Indicate, when applicable, the frequency of procedure review and updating. The applicant should declare a commitment to conduct fissile material processing only in accordance with approved written procedures.

2.8 Internal Audits and Inspections

Internal audits are performed to determine if plant operations are conducted in accordance with applicable regulations, license conditions, licensee's policy, and written procedures. These audits should apply to radiation protection, nuclear criticality safety, fire protection, and environmental protection. Audits should be performed according to a written plan. To ensure unbiased and competent audits, qualified personnel separate from the production organization (and without direct responsibility for the function and area being audited) should be used for the audits. For each safety-related procedure, the minimum frequency of audits should be stated.

State the positions (or safety review committee) responsible for performing periodic audits. Provide the distribution for audit reports and state who has the responsibility for followup. Include the followup inspection procedure that will be used, if necessary, to ensure that corrective action is taken. Audit and inspection reports should include recommendations for corrective actions and all such action already taken on recommendations resulting from the previous audit or a prior inspection.

2.9 Investigations and Reporting of Off-Normal Occurrences

The licensee should investigate and report to NRC all events that significantly threaten or lessen the effectiveness of the health and safety provisions of the license. The applicant should identify, in a generic manner if possible, all such events to be investigated and reported, including reportable events as compiled in Regulatory Guide 10.1, "Compilation of Reporting Requirements for Persons Subject to NRC Regulations," and as described in 10 CFR Part 21, "Reporting of Defects and Noncompliance," and events that lessen the effectiveness of the health and safety provisions of the license. Appendix B to this guide, "Sample Listing of Trend Analysis Topics," is an example of a list summarizing some events that may lessen the effectiveness of health, safety, and environmental protection that should be monitored and evaluated with respect to any detrimental trends.

Indicate the person(s) responsible for conducting the investigation and documentation of reportable events, and relate this to the organizational responsibilities (see Section 2.2).

2.10 Records

The renewal application should include a description of the system for maintaining records relating to health and safety and their retention times. Such records should include plant alterations or additions, abnormal and off-normal occurrences and events associated with radioactivity releases, criticality analyses, audits and inspections, instrument calibration, ALARA findings, employee training and retraining, personnel exposures, routine radiation surveys, and environmental surveys.

Chapter 3 RADIATION PROTECTION

3.1 Special Administrative Requirements

3.1.1 Radiation Work Permit Procedures

Radiation work permits (RWPs) are issued whenever the activity is not covered by an operating procedure and the radioactivity levels are likely to exceed the limits specified in 10 CFR Part 20. Provide the control system for the issuance and termination of the RWPs. Indicate the method for approval of the work and the method of documentation of the approach used.

3.1.2 ALARA Policy

Provide the procedures and methods of operation that are used to ensure that occupational radiation exposures are as low as reasonably achievable (ALARA). Reference should be made to Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable." Additional useful guidance may be found in Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable."

3.2 Technical Requirements

3.2.1 Access Control

Radiation areas should be posted as required by § 20.203 of 10 CFR Part 20. The areas should be described (step-off pads, change facilities, protective clothing, etc.) and the monitoring program for personnel exiting these controlled areas should be provided.

3.2.2 Ventilation Requirements

Provide the surveillance program of the ventilation systems used to protect the public and plant operating personnel from airborne radioactive materials.

Provide the acceptance inspection and surveillance testing program for the principal filter system (HEPA), for any auxiliary filter-equipped ventilation system, and for any scrubber systems. This program should specify which tests are required, the acceptance criteria, and the frequency of testing.*

---

* For guidance refer to ERDA 76-21, "Nuclear Air Cleaning Handbook," C.A. Bunchsted, J.E. Kahn, and A.B. Fuller, March 1976; and ANSI/ASME N510-1980, "Testing of Nuclear Air Cleaning Systems." ERDA 76-21 is available from the National Technical Information Service, Springfield, Va. 22161. ANSI/ASME N510-1980 is available from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

3.2.3 Instrumentation (Survey, Counting, Criticality Monitors)

State the equipment used in radiation detection (including portable survey, air, and criticality monitors, and air sampling and counting equipment). Include the method and frequency of calibration (for guidance see Regulatory Guide 8.24, "Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication"), alarm set points, and the sensitivity range and operating characteristics where applicable.

3.2.4 Internal and External Exposure

State the performance requirements of the applicant's programs and engineered systems that are provided to protect operating personnel from excessive internal and external exposure. The following programs and systems should be included:

1. Ventilation,
2. Air sampling and analysis,
3. Bioassay,
4. Protective clothing,
5. Respiratory protection,
6. Surface contamination monitoring,
7. Decontamination,
8. Emergency evacuation, and
9. Personnel monitoring (external radiation).

Performance requirements (commitments) such as action levels, corrective action to be taken, release limits, air velocity, alarm points, calibration frequency and accuracy and precision limits should be stated in terms that can be inspected and verified.

Chapter 4 NUCLEAR CRITICALITY SAFETY

4.1 Special Administrative Requirements

The applicant should provide license conditions concerning the double contingency policy. The double contingency policy states that process designs should, in general, incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. Refer to Regulatory Guide 3.4, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors."

The criterion for a management decision to perform nuclear criticality analysis and the position responsible for initiating the request and authorizing the analysis should be in agreement with the license requirements.

Provide the procedure for "Posting of Limits" at each location where fissile material is handled, processed, transported, or stored. Include the information required for labeling fissile material containers.

See Chapter 2 for general administrative requirements.

4.2 Technical Requirements

Provide the license conditions used for the approach to nuclear criticality safety to be used in the design and design changes for the building, systems, equipment or components, and processes in conjunction with fissile material. Appropriate data sources should be referenced such as Regulatory Guides 3.4 and 3.41, "Validation of Calculational Methods for Nuclear Criticality Safety." Special studies should be appended to the renewal application.

Basic assumptions and design conditions that are of particular importance in the safety analysis should be listed in this section. Examples of such assumptions and design conditions are:

1. Minimizing the possibility of the accumulation of fissile materials in locations other than those specifically designed for accumulation.

2. Nuclear safety dependence on the degree of moderation within the process unit and dependence on the degree of moderation between units.

3. Nuclear safety dependence on neutron reflector thickness for the reflector of interest.

4. Nuclear safety dependence on enrichment, concentration, and diluents.

5. Optimum conditions (limiting case) of water moderation and heterogeneity credible for the system.

6. The analytical methods used for criticality safety analysis and the validation of the methods.

7. Safety margins for selected individual units and the justification of these safety margins based on normal and accident conditions such as flooding, multiple batching, and fire.

8. Safe geometry parameters applicable to the licensee's operation.

9. Method of deriving applicable multiplication factors.

10. Criteria used in spacing of pipes, process vessels, transport and process equipment, storage containers, etc.

11. Criteria for the application of fixed poisons (e.g., borosilicate raschig rings).

12. Design basis to ensure structural integrity of safety-related structures, systems, and components.

13. Criteria for preoperation testing of equipment.

14. Criteria used in the choice of fire protection methods.

Chapter 5 ENVIRONMENTAL PROTECTION

5.1 Effluent Control Systems

Action levels for gaseous and liquid effluents should be stated. These action levels should be selected so as to meet defined regulatory limits and the ALARA commitments. The anticipated action should be indicated for each event that could cause action levels to be exceeded. Regulatory Guide 4.16, "Measuring, Evaluating, and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Airborne Effluents from Nuclear Fuel Processing and Fabrication Plants," and Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment," may be used.

State the sampling method, frequency, radioactivity analysis, and action levels and action taken prior to discharge of all radioactive waste streams and the process cooling water. State the approximate volume and rate of discharge and indicate their destinations (e.g., municipal sewerage, local stream, general environment, storage pond).

State the sampling method, its frequency (or whether it is continuous), analysis, action levels and action, lower limits of detection, calibration and standardization of measurements, method of reporting, and responsibility for action taken for all gaseous effluents at their point of discharge.

Identify the means for the disposal of all solid contaminated equipment and materials.

Designate the positions having responsibility for effluent control and monitoring to ensure compliance with all applicable standards, rules, and license conditions.

5.2 Environmental Monitoring

Provide the radiological environmental monitoring program (which includes air and fallout sampling) for evaluating the airborne radioactivity. State the methods (e.g., thermoluminescence dosimetry) for determining ambient radiation levels for both onsite and offsite locations. In addition, provide the soil, vegetation, and surface- and underground-water sampling program. Identify the location of the sampling stations, including the background station, and the procedures for evaluating and reporting results of this monitoring program.

Provide the nonradiological monitoring program used to meet State and Federal EPA requirements, including sampling of stack gases for major air pollutants (e.g., fluorides, ammonia, NO_x) and ground waters for similar pollutants. Include the procedures for the evaluation and reporting of the results for this monitoring program. The information will be used for writing the environmental impact assessment or the environmental impact statement (EIA or EIS).

Chapter 6 SPECIAL PROCESS COMMITMENTS

In this chapter, report special procedures or actions required for unique processes or operations to ensure radiological safety, nuclear criticality safety, and fire protection (e.g., moderation control, furnace-reducing atmospheres, H_2 explosion prevention).

Special processes may contain proprietary information, which should be submitted separately in accordance with § 2.790 of 10 CFR Part 2. However, proprietary process requirements that have safety-related license conditions should be inspectable without restraint (e.g., process control limits for ammonia diuranate (ADU) conversion, fluidized bed conversion, or direct conversion of UF_6 to UO_2).

Chapter 7 DECOMMISSIONING PLAN

The renewal application should affirm the applicant's commitment to decommission the facility and the site at the end of its operation in a manner that will protect the health and safety of the public. Plans for decontaminating the facility and site so the facility and grounds can be released for unrestricted use should be provided. Details of this plan should be appended to the application. Reference may be made to NUREG/CR-1266, "Technology, Safety and Costs of Decommissioning a Reference Uranium Fuel Fabrication Plant,"* dated May 1980.

The plan should identify and discuss the factors that were considered in planning the decommissioning of the plant in sufficient detail to enable an independent review. The plan should include an estimate of the costs involved and the financial arrangements that have been or will be made to ensure that adequate funds will be available to cover these costs at the time of decommissioning.

*Available from the National Technical Information Service, Springfield, Va. 22161.

Chapter 8 RADIOLOGICAL CONTINGENCY PLAN

The Radiological Contingency Plan should be submitted as a separate document in accordance with NUREG-0762, "Standard Format and Content for Radiological Contingency Plan for Fuel Cycle and Materials Facilities,"* dated July 1981.

*Available from the National Technical Information Service, Springfield, Va. 22161.

PART II

SAFETY DEMONSTRATION

Part II contains detailed health and safety information on how the applicant has demonstrated adherence to the license conditions.

This part should be written to provide a basis for licensing decisions.

Chapter 9 OVERVIEW OF OPERATION

9.1 Corporate Information

Describe the corporate arrangement or organization related to the fuel fabrication activity. Provide the information required by paragraph 70.22(a)(1) of 10 CFR Part 70. If the corporation is made up of two or more existing entities, the relationship and responsibilities of each should be explained.

9.2 Financial Qualification

Provide sufficient information to demonstrate the financial capabilities for operating and decommissioning the plant. A copy of the latest corporate annual report may satisfy this requirement.

9.3 Summary of Operating Objective and Process

Describe in general terms the plant, its function and operation, its process capacity, its feed and products, and the process used.

9.4 Site Description

Provide summary information on the location of the plant and a description of the geographical, demographical, meteorological, hydrological, seismological, and geological characteristics of the site and surrounding vicinity. The objective is to indicate what, if any, site characteristics influenced plant design and mode of operation.

9.5 Location of Buildings On Site

Provide descriptive information on the buildings and other installed features of the plant and their location on the site, including identification of changes or additions.

9.6 Maps and Plot Plans

A map of the site should be included in the application and should be of suitable scale to clearly define the boundary of the site and the distance from significant facility features to the site boundary. The area to be considered as the exclusion area should be clearly delineated if its boundaries are not the same as the boundaries of the plant site. A general location map should also be provided encompassing at least an 80-km (50-mi) radius. Indicate any unusual hazard such as a dam upriver from the plant, failure of which could cause flooding at the plant site. Additional maps and site plots should be provided to present details near the plant and to establish orientation of buildings, streams, ponds, transmission lines, and neighboring structures. The State and county in which the plant is located should be identified. The location of the site relative to prominent natural and man-made features and the distance and direction to the nearest population centers should be stated.

9.7 License History

The original license issue date and subsequent renewal dates should be shown. The renewal request should include a list of all amendments granted since the previous issuance or renewal of license and also any changes in the corporate structure that may affect responsibilities under the license conditions since the previous issuance or renewal of license.

9.8 Changes in Procedures, Facilities, and Equipment

Describe the administrative controls that will ensure that, prior to the start of any new activity (or change in an existing activity) involving licensed material, an independent safety review of the proposed activity is performed and documented. It is advisable to notify the NRC of any plans to modify the licensed facility prior to ground breaking. The administrative procedure should include the following steps:

1. Assurance of Safety Review. Any proposed change in product design, manufacturing procedures, or processing equipment should be reviewed to ensure that applicable license requirements and safety considerations have been evaluated.

2. Responsibility for Requesting Safety Analysis. Indicate responsibility for selecting the proper administrative procedure to make changes in process, equipment, or procedures, e.g., (a) a revised or new radiation safety plan, safety analysis, or criticality safety study, (b) submittal to a safety review committee, or (c) an NRC license amendment.

3. Analysis. The applicant should document the comprehensive evaluation of the proposed change, including potential accidents that may affect radiation and nuclear criticality safety.

4. Review. The management positions responsible for review and approval prior to effecting a change should be identified. The review should be documented.

5. Approval. Implementation of the proposed change should take place only after final approval in writing by the designated management personnel.

6. Verification. Prior to use, an inspection should be made of approved and implemented changes. The position(s) responsible for the inspection should be indicated.

7. Records. Sufficiently detailed records to permit independent review of the analysis and approval should be maintained.

Chapter 10 FACILITY DESCRIPTION

10.1 Plant Layout

Through the use of engineering-type drawings, show the layout of the functional features of the facility. Provide plans and elevations in sufficient detail to identify all features to be discussed in this chapter. Include spatial and equipment identification data directly on the layouts with suitable designations in tabular listings.

10.2 Utilities, Including Emergency Power

Discuss the source and characteristics of the primary electrical system providing normal power to the plant.

Describe the design providing for the emergency power source(s) and the means for ensuring an uninterruptible service to those items requiring it. For each of these latter items, list the location, the equipment, and the systems serviced.

Present the general design features that make possible the restart sequence on emergency power. Also describe the general procedure for subsequent reestablishment of normal load service.

Present the design basis for supplying the compressed air needs of the plant and the air for protective masks and clothing. Describe the air systems, components, location, and operating characteristics.

Discuss the primary source of the water supply, alternative sources, storage facilities, and plant supply loops. Itemize design considerations to demonstrate a continuity of water supply. Also itemize by service (potable, process, and fire control) the quantities of water used under normal and abnormal conditions.

Discuss the effects of loss of water supply source, failure of main supply pump(s) or supply loops, and power failure.

10.3 Heating, Ventilation, and Air Conditioning

Describe the heating, ventilation, and air conditioning systems that are in support of the main process and confinement features. Emphasis should be placed on provisions for coping with unscheduled occurrences in a manner that will preclude an unsafe condition.

Describe in detail the design operating features for performance of the ventilation-filtration systems to show that there will be sufficient backup, excess capacity, repair and replacement capability, and structural integrity to ensure controlled continuous airflow in all credible circumstances to minimize the release of radioactive material. Emphasize the design features to ensure confinement of radioactive particulates under conditions of power failure, adverse natural phenomena, breakdown of equipment, fire and explosion, improper flow of air, contamination spills, and loss of filter integrity.

10.4 Waste Handling

10.4.1 Liquid Wastes

Describe how all liquid wastes are generated and enter liquid treatment systems. Include such items as laboratory wastes, liquid spills, and cleanup solutions. A statement should be made as part of the design objectives concerning the inventory levels expected, provisions for interim and long-term storage, and identification of those streams that are processed to achieve volume reduction or solidification. Relate the discussion on process and equipment to the radioactivity level.

Describe the design objectives for the system under discussion. Identify, in particular, criteria that include backup and special features to ensure that the waste will be safely contained.

Provide a description of the equipment and systems installed. Accompany the description with appropriate engineering drawings to show locations of equipment and flow paths. Describe safety-related features, systems, or special handling techniques included in the systems to ensure the safety of the operation.

10.4.2 Solid Wastes

List and characterize all solid wastes that are produced as a result of plant operation. Describe the systems used to treat, package, and contain these solid wastes.

Describe the following:

1. The methods and the equipment selected for minimizing the generation of solid wastes and for the safe management of the solid waste that is generated.

2. The equipment and associated features that are used for volume reduction, containment or packaging, storage, and disposal.

3. The procedures associated with operation of the equipment, including performance tests, process limits, and means for monitoring and controlling these limits.

4. The physical, chemical, and thermal characteristics of the solid wastes, including an estimate of concentrations and volumes generated.

5. The means for packaging the solid wastes.

For solid wastes of the type to be retained on site, show in detail the containment methods used. Discuss corrosion aspects and monitoring of the containment. Describe how these wastes will be handled at the time the plant is decommissioned.

10.5 Chemical Systems

Describe the major components and operating characteristics of facilities used for nonradioactive chemical operations. Where hazardous chemicals or materials are involved, discuss the provisions that mitigate or prevent accidents. Itemize the chemicals and materials that are used; list their quantities and where they are used and codify them with respect to hazard.

10.6 Fire Protection

List the codes and standards considered and used for the design of the buildings and the fire protection systems, including published standards of the National Fire Protection Association. Provide evidence of the adequacy of the fire protection program for the facility through nuclear liability and property insurance coverage and inspection reports.*

State the qualifications of the fire protection engineer (or consultant) who was responsible for the design of the fire protection system. Describe the design and selection of equipment, inspection and testing of the physical aspects of the system, development of the fire protection program, and the fire-fighting training for the operating plant. Include the personnel responsible for inspecting and maintaining the fire protection equipment. Describe the procedures for storage of combustibles and combustible contaminated waste.

---

* It is recommended that the latest edition of the "International Guidelines for Fire Protection at Nuclear Installations," prepared by an international working party representing over 20 nuclear risk insurance pools and associations worldwide, be used. This document is available from the British Insurance Committee (Atomic Energy), Aldermary House, Queen Street, London, EC4N 1TH.

Chapter 11 ORGANIZATION AND PERSONNEL

The plan for the safe operation of the facility should be described. Sufficient detail should be provided to indicate how the applicant intends to conduct all operations to ensure that a technically competent staff will be maintained to provide continued implementation of administration and operating procedures and programs that relate to health and safety.

11.1 Organizational Responsibilities

The managerial responsibilities relative to the health and safety aspects of the facility should be described.

11.2 Organization Charts

Provide a comprehensive description of the organizational arrangement of the plant showing the title of each position, personnel occupying each position, and the flow of responsibility as depicted by an organizational chart (including the Safety Review Committee(s)).

11.3 Organizational Procedures

Describe the management policy, instructions, job descriptions, and procedures defining organizational responsibilities and authorities. Describe the responsibilities of the various management personnel and organizational units in the preparation, review, and approval of written instructions for plant operation. Describe the audit areas, responsible individuals, and the frequency of audits that will be performed in accordance with a written review and audit program.

11.4 Functions of Key Personnel

Describe the functions, responsibilities, and authorities of key personnel positions, including a discussion of specific succession to responsibility for overall operation of the plant in the event of absences, incapacitation, or other emergencies.

11.5 Education and Experience of Key Personnel

The qualifications of the key personnel assigned to the managerial and technical positions described should be presented in resumé form. The resumés should identify individuals by position and title and, as a minimum, should describe the formal education, training, and experience of the individuals.

11.6 Training

Describe the training program for new and old employees and for reinstruction when changes are made to processes involving nuclear materials, radiation protection procedures, nuclear criticality safety controls, fire protection,

or emergency procedures. Specialized training for radiation protection and nuclear criticality safety should be commensurate with the extent of the employee's contact with nuclear materials.

The proposed training program should include, as appropriate, plant operational safety, ALARA practices, instrumentation and control, methods of dealing with process malfunctions, fire protection, contamination control, decontamination procedures, and emergency procedures. General subjects such as nature and source of radiation, interactions of radiation and matter, biological effects of radiation, use of monitoring equipment, and principles of nuclear criticality should also be included.

Chapter 12 RADIATION PROTECTION PROCEDURES AND EQUIPMENT

12.1 Procedures

Describe the method and plans for conducting radiation surveys and the plans that have been developed for ensuring that occupational radiation exposure will be ALARA. Describe the physical and administrative measures for controlling access to and occupancy time in radiation areas. Describe the methods for monitoring and the actions taken to control personnel exposures and equipment and surface contamination. Indicate whether, and if so how, the guidance in the following regulatory guides will be followed:

8.4 - Direct-Reading and Indirect-Reading Pocket Dosimeters
8.7 - Occupational Radiation Exposure Records Systems
8.9 - Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program
8.10 - Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable

If the complete guidance of a guide is not followed, describe the specific alternative approaches to be used.

12.2 Posting and Labeling

Describe the posting and labeling program to comply with § 20.203 of 10 CFR Part 20. Work stations and fuel storage locations should be posted with nuclear criticality safety limits and include at a minimum the following information:

1. Type and form of material permitted,
2. Allowable quantity (number of containers, pieces, weight, or volume),
3. Restrictions on presence of moderators, if required, and
4. Spacing of fissile units, if required.

The marking or label on the containers should include type of material; form; enrichment; gross, net, and tare weights; fissile material weight by isotope; and licensee's identification number.

12.3 Personnel Monitoring

Describe the personnel monitoring program to comply with § 20.202 of 10 CFR Part 20. Indicate what types of personnel monitoring equipment such as direct-reading dosimeters, alarming dosimeters, and personnel dose rate meters are used to provide early evaluation of doses to individuals and the assignment of those doses to specific operations. The type, range, sensitivity, and accuracy of the personnel dosimeters should be provided. In areas where an accidental criticality is possible, the type of dosimeter that will be used should be indicated. Describe how the dosimeter readers are routinely tested for accuracy if the personnel dosimeters are read by the licensee. The frequency of reading personnel dosimeters and the recording of the radiation dose to all individuals for whom personnel monitoring is required should be specified. Describe how dosimetry results are used as a guide to operational planning.

12.4 Surveys

Describe the routine radiation survey program as well as the special surveys taken for planning and preparing maintenance operations to ensure that occupational exposures are ALARA. Describe the bases for these activities using surveys to obtain information with respect to radiation, contamination, airborne radioactive material, and mechanical difficulties that might be encountered while performing the surveys.

12.5 Reports and Records

Reports should conform to reporting commitments as per Section 2.9 in Part I.

Describe the records that will be maintained and the required retention times. The records should include principal maintenance, alterations or additions made, abnormal occurrences and events associated with radioactivity releases, criticality analyses, audits and inspections, instrument calibration, ALARA findings, employee training and retraining, personnel exposure, routine and special radiation surveys, and environmental surveys.

12.6 Instruments

Provide the criteria for selection of portable and laboratory technical equipment and instrumentation for:

1. Performing radiation and contamination surveys,
2. Sampling airborne radioactivity, and
3. Monitoring area radiation.

Describe the selection of instrumentation and other equipment and the quantities of such equipment provided for normal plant operations to meet the anticipated needs of the plant during normal operations and during major outages that may require supplemental workers and extensive work in radiation areas.

Describe the instrument storage, calibration, and maintenance facilities. Also describe the health physics facilities and laboratory facilities for radioactivity analyses.

12.7 Protective Clothing

Describe the protective clothing available for operating personnel for normal, maintenance, and accident conditions.*

12.8 Administrative Control Levels

Describe the administrative action levels and alarm setpoints, frequency of measurements, and action to be taken for the following radiation protection monitoring programs:

---

* Refer to the National Institute of Occupational Safety and Health's (NIOSH) "Certified Personnel Protective Equipment List." This is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

1. Occupational exposure (internal and external),
2. Airborne activity (area and stack or vent monitors),
3. Liquid activity (effluent monitors),
4. Surface contamination (work areas, release of equipment or packages, skin contamination).

12.9 Respiratory Protection

To limit the inhalation of airborne radioactive materials, an acceptable respiratory protection program should be provided.

Describe the respiratory protective equipment, including a respirator fitting program, if applicable, that satisfies the guidance of Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," and NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials."*

*Available from the National Technical Information Service, Springfield, Va. 22161.

Chapter 13 OCCUPATIONAL RADIATION EXPOSURES

13.1 Occupational Exposure Analysis

Evaluate the quarterly and annual individual occupational exposures (external and internal) for at least the past 2 years. In addition, analyze the weekly and quarterly averaged air concentration levels at work locations for at least the past 2 years.

As an appendix or addendum to the application, provide an analysis of occupational exposures (external and internal) covering at least the past 2 years of plant operation for each plant area and type of operation performed. The analysis should identify the sources and locations where most exposures occurred as related to job categories and work activities. Any trends in exposures that can be identified should be discussed. Abnormal occurrences should be reviewed and categorized by such aspects as frequency, operations being performed, and the magnitude of the resulting exposure. The analysis of internal exposures should consider air sampling data, as well as bioassay data (including in vivo counting). The analysis should conclude with a description of any steps or measures taken to reduce employee exposure, the effectiveness of these measures, and any additional actions planned.

13.2 Measures Taken To Implement ALARA

The ALARA process pertaining to radiation workers should be stated. If an ALARA committee exists, its activities should be described. The committee's membership and frequency of meetings combined with its total work scope should be stated. The procedures for performing the required audits and inspections for radiation and the administrative procedures for review of all new activities or changes in existing activities should be described.

The method by which the ALARA philosophy is implemented and assured to management should be stated. Refer to Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable." Additional useful guidance may be found in Regulatory Guide 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable."

A periodic report summarizing employee exposures and effluent release data should be made to senior management.

13.3 Bioassay Program

The bioassay program to detect and monitor any significant deposition of radioactive material in the body should be described. Regulatory Guides 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program," and 8.11, "Applications of Bioassay for Uranium," may be used as guidance on topics such as determining (1) whether bioassay procedures are necessary, (2) which bioassay techniques to use and how often, (3) who should participate, (4) the action to be taken as based on bioassay results, (5) the particular results that should initiate such action, and (6) diagnostic evaluation. Any deviation from Regulatory Guides 8.9 and 8.11 should be justified.

13.4 Air Sampling Program

Describe the air sampling and analysis program for monitoring the concentrations of radioactivity in working areas to detect the presence of unsafe concentrations. Action levels and actions to be taken if these levels are exceeded should be specified, including the action level to shut down operations (refer to Regulatory Guide 8.24). Supply a list of types and numbers of instruments used for measuring radioactivity in air systems. Air sampling instruments should include work-area samplers, continuous air monitors, and lapel air samplers.

13.5 Surface Contamination

Identify the controlled and uncontrolled areas where the potential spread of contamination is possible. Include step-off pads, change facilities, protective clothing provided, survey meter locations, etc. Surface contamination surveys, allowable limits (fixed and removable), and action levels for immediate cleanup or delayed cleanup should be specified for clean (uncontrolled) areas, intermediate areas (e.g., change rooms), and controlled areas. The frequency of surface contamination surveys in each area should be stated (see Regulatory Guide 8.24). A list of types and numbers of instruments used for determining radiation should be supplied.

Guidance on the release of equipment and packages from the plant site is given in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material,"* dated November 1976.

The personnel contamination control and radiation level survey programs, including survey frequency, instruments used (type, range, sensitivity, and accuracy), action levels, and action to be taken, should be described.

The policy on the use of protective clothing should be included.

13.6 Shipping and Receiving

Describe methods for contamination control associated with receipt, storage, handling, and shipping of containers of fissile materials. The following regulatory guides may be used for guidance:

- 5.57 - Shipping and Receiving Control of Strategic Special Nuclear Material
- 7.3 - Procedures for Picking Up and Receiving Packages of Radioactive Material
- 7.4 - Leakage Tests on Packages for Shipment of Radioactive Materials
- 8.24 - Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication

*Available from the Nuclear Regulatory Commission, Division of Fuel Cycle and Material Safety, Uranium Fuel Licensing Branch, Washington, D.C. 20555.

Chapter 14 ENVIRONMENTAL SAFETY - RADIOLOGICAL AND NONRADIOLOGICAL

Using radiation measurements obtained from the environmental monitoring program (including sampling and analysis of river water, surface water, air, soil, and vegetation and the determination of gamma dose levels at points around the plant) during at least the past 2 years, determine the maximum annual dose equivalent to the whole body and to any other organ of any member of the public.

Summarize the nonradiological environmental impacts of gaseous and liquid effluents from the plant during the past 2 years of normal operation. Report the nonradiological gaseous and liquid concentration and release rates at the plant site boundary for the past 2 years. Reference should be made to the environmental report.

Chapter 15 NUCLEAR CRITICALITY SAFETY

15.1 Administrative and Technical Procedures

Administrative and technical procedures to ensure nuclear criticality safety in the fabrication, storage, and movement of SNM should be described in detail. Describe administrative practices such as establishing the responsibilities for nuclear criticality safety; providing qualified personnel; and establishing written criteria and procedures, process analysis, materials and operational controls, operational reviews, emergency procedures, audits and inspections, reports, acceptable data sources, and validation techniques.

15.2 Preferred Approach to Design

The preferred approach to design should be specified in this section. If the approach is other than the use of equipment of safe geometry, provide information that justifies its use. The design approach should include designs that minimize the possibility of accumulating fissile materials in inaccessible locations, make nuclear safety independent of the degree of moderation within a unit and the degree of interspersed water moderation between units, and make nuclear safety independent of neutron reflector thickness.

15.3 Basic Assumptions

The basic nuclear criticality safety analysis assumptions should be stated in the application. Some examples are maximum credible fissile material density, the optimum (limiting case) conditions of water moderation and heterogeneity credible for the system, the enrichment, and unit limits based on full reflection if such reflection is credible under normal or accident conditions. The use of less than equivalent full water reflection and the method of analysis to determine the equivalent water reflector thickness should be justified. If a more effective reflector than water is present (e.g., concrete) it should be considered in the analysis.

Safety margins for the individual units should be specified (e.g., safety factors for large units, dimensions for small units). Safe unit geometry and safe unit spacing will differ from plant to plant, process to process, and SNM content of materials in process. For this reason, the applicant should provide tables of the maximum safe parameters for individual units of the plant and the criteria for spacing between units in an array.

For the convenience of the applicant, criticality safety design methods acceptable to the NRC staff are provided in Appendix A to this guide.

15.4 Analytical Methods and Validation References

Describe and demonstrate the use of the validation of the analytical methods used and their applicability to the systems being analyzed.

15.5 Data Sources

The sources or references for the applicable data should be specified.

15.6 Fixed Poisons

In the event that borosilicate glass raschig rings are used as a primary or secondary means of criticality control, describe how they are used and maintained. (In this connection, guidance is provided in Regulatory Guide 3.1, "Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material.") Alternative poison material may be used if safety justification is provided. Justification includes the determination of the initial and continuing presence and effectiveness of the poison material.

15.7 Structural Integrity Policy and Review Requirements

Show that the structural integrity for single units and arrays is ensured by providing adequate margins of safety for all credible accident conditions and that the engineering design is reviewed by a qualified person to ensure an adequate margin of safety under all normal and abnormal conditions.

15.8 Special Controls

Any other special controls used to ensure nuclear safety such as zoning for fire protection should also be described.

Chapter 16 PROCESS DESCRIPTION AND SAFETY ANALYSES

16.1 Process Steps and Flowsheet

Describe in detail the process equipment and associated controls. Include in this description ancillary activities if pertinent to the main process, i.e., preparation of reactants, offgas handling, volume reduction of wastes, decontamination, and scrap recycling.

In support of the description, supply flowsheets showing the process, materials, and instrumentation. Provide identification of the process and effluent streams in sufficient detail to permit an independent review to ensure a safe operation. That should include activities, compositions, properties, sample points, and identification of primary control points. Justify the conclusions relevant to safety and environmental effects.

16.2 Safety Analysis of Each Step

Provide a safety analysis of each step of the process. The applicability of all methods of analysis specified in Part I should be demonstrated.

16.3 Safety Features of Each Step

Describe all safety-related features, systems, or special handling techniques included in the system for the safety of the operation under both normal and abnormal conditions. Include the limit(s) selected for a commitment of action. Provide a summary description of the principal design guidance, procedures, and special techniques used to preclude criticality in all steps of the process. Describe the location of criticality detectors. Provide a summary description of the principal chemical and fire hazards and the approaches used to preclude accidents.

Chapter 17 ACCIDENT ANALYSES

Summarize the types of accidents considered and their impact on the environment. Make appropriate reference to the Environmental Report.

APPENDIX A

SAFETY MARGINS AND INTERACTION CRITERIA

For the convenience of the applicant, criticality safety design methods acceptable to the NRC staff, including maximum safe parameters for individual units and criteria for spacing between units in an array, are provided in this appendix.

1. SAFETY MARGINS

The following are acceptable margins of safety for individual units: when double-batching is possible, mass limits should be held to no more than 0.45 of the minimum critical mass based on spherical geometry; when double-batching is not possible, the mass should be limited to no more than 0.75 of the critical mass. Mass limits should be based on experimental data or on calculations performed by a method that has been validated for the type of system being analyzed. Acceptable geometry margins of safety for large single units are 90 percent of the minimum critical cylinder diameter, 85 percent of the minimum critical slab thickness, and 75 percent of the minimum critical sphere volume. Maximum safe dimensions must be specified for small units.

Safe cylinder diameters, slab thicknesses, unit masses, and volumes may be tabulated in the application as a function of moderation, enrichment, reflection, etc. The specific values tabulated should meet the above criteria or may correspond to a unit k_{eff} that provides an adequate margin of safety under specified normal and credible abnormal conditions. The evaluated multiplication factor under normal and credible abnormal conditions must be equal to or less than an established maximum safe allowable multiplication factor (k_a), i.e.,

$$k_s \leq k_a$$

where

k_s = the evaluated multiplication factor, including any necessary allowance for statistical uncertainties.

The maximum allowable multiplication factor should be calculated from the expression:

$$k_a = k_c - \Delta k_u - \Delta k_m$$

where

k_c = the value of k_{eff} that results from the calculation of benchmark experiments using a particular calculational method. The value represents a combination of theoretical techniques and numerical data.

Δk_u = the uncertainty in the benchmark experiments, including random and systematic errors (bias) within the range of parameters encountered in the equipment design.

Δk_m = the value required to ensure an acceptable margin of subcriticality. In the absence of information that justifies a smaller margin of safety, a value of 0.05 should be assumed for Δk_m in equipment design.

2. INTERACTION CRITERIA

Desirable spacing criteria include:

a. The closest approach of one individually subcritical unit to another should be limited by mechanical means or by clearly delineated criticality zones.

b. The array analysis should allow for double-batching of a single position in the most limiting array position (or positions) credible.

c. The array analysis should account for interunit moderation unless it can be shown that moderation is not credible.

d. The array analysis should include a conservative allowance for spatial tolerance in unit positions.

e. Mixed array criteria should be used where applicable (e.g., solutions and solids).

The licensee should identify the criteria to be used in spacing. Acceptable criteria for the spacing of process equipment and stored units include the following:

a. Validated KENO calculations should yield a maximum k_{eff} of 0.95 at the 95 percent confidence level.

b. The maximum safe surface density should be limited to 25 percent of the critical surface density of a fully water-reflected uniform slab of the appropriate composition when each unit in the array has a maximum quantity of fuel that is no more than 30 percent of critical for a bare assembly, based on container geometry, fuel composition, and the degree of water moderation of interest.

c. The nuclear criticality safety criteria for arrays may be based on the application of the solid angle method. The method of analysis should be demonstrated applicable to the system being analyzed.

d. In the application of the density analog method, safety factors of 2 should be used for the maximum allowable number of units. Factors for reflection and moderation must also be applied.

APPENDIX B

SAMPLE LISTING OF TREND ANALYSIS TOPICS

1. Higher personnel exposures than expected.

2. Higher concentrations of airborne concentrations in plant areas than expected.

3. Radioactive contamination in areas and on equipment not normally contaminated.

4. Unauthorized entry into work areas.

5. Unapproved storage or use of nuclear materials.

6. Unauthorized disposal of nuclear materials.

7. Failure of required radiation measurement instrumentation to operate properly.

8. Failure of protective respiratory equipment to work properly.

9. Failure of effluent filters to meet specifications.

10. Significant lapse of failure of the double contingency criterion for nuclear criticality safety such as:

    a. Accidental double-batching;
    b. Unauthorized transfer of SNM from a safe to unsafe geometry;
    c. Accidental distortion of safe geometry equipment approaching an unsafe configuration (includes corrosion);
    d. Detection of unexpected accumulations of SNM;
    e. Failure of racks or shelving for SNM;
    f. Receipt of new material out of specifications (too much moderation in "dry powder," too high enrichment);
    g. Unexpected loss of effectiveness of poisons (dissolution, distortion);
    h. Unexpected moderation in moderation-controlled units and systems; or
    i. Installation and use of unauthorized equipment for SNM.

VALUE/IMPACT STATEMENT

1. PROPOSED ACTION

1.1 Description

10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," specifies the information to be supplied in applications for licenses to possess and use special nuclear material in uranium fuel fabrication plants. However, Part 70 does not specify the format for presentation of the required information. The proposed action would provide format and content guidance in the preparation of applications for license renewal for uranium fuel fabrication plants.

1.2 Need for Proposed Action

At the present time, there is no published guidance that defines the format and the detailed information needed in the application for a license renewal. The NRC Office of Inspector and Auditor reviewed the license renewal process for fuel fabrication facilities in a January 1978 report to the Commissioners. It concluded that the staff should pursue the development of applicable guides, foremost of which is this standard format and content guide.

At present there are 14 licenses in effect that require renewal from time to time. The NRC licensing staff expects in the foreseeable future more renewal applications than first license applications. Hence, this guide for renewal of a license application was prepared first.

1.3 Value/Impact of Proposed Action

1.3.1 NRC Operation

The proposed action should identify the type of information needed and the desired presentation format to facilitate orderly NRC staff review of license renewal applications for uranium fuel fabrication plants. The staff review effort should be reduced because the license applications should be more closely in compliance with the intent of the regulations. Considerable time on the part of the Office of Inspection and Enforcement may be saved because the license conditions should be more complete and inspectable and should therefore require less time for the resolution of findings.

1.3.2 Other Government Agencies

Other government agencies are not involved in this proposed action; therefore there is no value/impact on other agencies.

1.3.3 Industry

The proposed action should expedite the licensing process, which should reduce licensing delays and costs. Since the standard format and content should specify all the regulatory licensing requirements, less time and effort should be required for the resolution of comments.

1.3.4 Public

The proposed action should improve public understanding by providing information regarding the NRC licensing process. There could be a cost reduction to the public as taxpayers and consumers because of the improved efficiency of the licensing process and the subsequent inspection process that NRC must perform at licensed fuel fabrication plants.

1.4 Decision on Proposed Action

Format and content guidance should be furnished for the preparation of applications for license renewal for uranium fuel fabrication plants.

2. TECHNICAL APPROACH

2.1 Technical Alternatives

a. Conduct licensing reviews on an individual case basis using existing or modified procedures.

b. Provide additional guidance in the form of a standard format and content guide for the preparation of license applications.

2.2 Discussion and Comparison of Technical Alternatives

The proposed action should result in license applications that contain more complete information and the data required for licensing. This should help to ensure thoroughness and improve the efficiency of the NRC staff review.

3. PROCEDURAL APPROACH

Several methods of making public the proposed guidance were considered and evaluated. As a result, a regulatory guide was selected as the best alternative for the proposed action because it was considered the most effective and efficient method of accomplishing the needed guidance.

4. STATUTORY CONSIDERATIONS

4.1 NRC Authority

NRC authority for issuance of this guide derives from the Atomic Energy Act of 1954, as amended, through those portions of the Commission's regulations in Title 10 of the Code of Federal Regulations cited in the introduction to the guide.

4.2 Need for NEPA Assessment

The proposed action is not a major action significantly affecting the quality of the human environment as defined by paragraph 51.5(a)(10) of 10 CFR Part 51 and does not require an environmental impact statement.

5. RELATIONSHIP TO OTHER EXISTING OR PROPOSED REGULATIONS OR POLICIES

The proposed regulatory guide has to be consonant with future standard formats of new license applications for uranium fuel fabrication plants (in contrast to renewals). It will serve as a basis for developing standard review plans for license renewal applications.

6. SUMMARY AND CONCLUSIONS

A regulatory guide should be prepared for the standard format and content of the health and safety section of license renewal applications for uranium fuel fabrication plants.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

119406002001 1 QP
US NRC REGION I
R J BORES
631 PARK AVENUE
REGION I
KING OF PRUSSIA PA 19406