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U.S. NUCLEAR REGULATORY COMMISSION

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 3.5

STANDARD FORMAT AND CONTENT OF LICENSE APPLICATIONS FOR URANIUM MILLS

FOR COMMENT

A. INTRODUCTION

In order to process or refine ores containing by weight 0.05% or more of uranium, after removal from their place of deposit in nature, an NRC Source Material License is required. An applicant for a new license or renewal of an existing license to receive, possess, and use source materials is required to provide detailed information on his proposed facilities, equipment, experience, and procedures. This information is used by the Commission in determining whether the applicant's proposed activities will, among other things, result in undue risk to the health and safety of the public. General guidance for filing an application is approved in § 40.31 of 10 CFR Part 40, "Applications for Specific Licenses." The purpose of this guide is to provide specific guidance on the format and content of an application for a NRC Source Material License authorizing uranium milling activities. The information in this guide is intended to provide instructive guidance and should not be considered a substitute for a careful evaluation of the proposed program by the applicant or for ensuring that the application clearly and adequately describes the radiation safety procedures that will be followed.

Information not specifically discussed in this guide should be included in the application if it is an important part of an applicant's radiation protection program. An incomplete application will result in delay of issuance of a license and may result in denial of a license application.

Information submitted to the Commission may be incorporated into the application by reference. However, each reference should be clear and specific, i.e., the reference should indicate by date, page, and paragraph what information the applicant wishes to reference and how such information is pertinent.

Changes to existing (license) programs require the issuance of an appropriate license amendment. An application for such amendment should describe the proposed changes in detail.

B. FILING AN APPLICATION

An application for a uranium milling license should be filed using Form NRC–2 in accordance with the requirements specified in § 40.31 of 10 CFR Part 40. As required by § 40.31(f) of 10 CFR Part 40, an application for a new license should be filed at least three months prior to commencing construction of the proposed mill. An application for renewal of an existing license should be filed at least thirty days prior to the expiration of the existing license. Applications may be filed with the Director, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Applications may also be filed in person at the Commission's offices at 1717 H Street NW, Washington, D.C. or 7915 Eastern Avenue, Silver Spring, Maryland.

The National Environmental Policy Act of 1969 (83 Stat. 852), implemented by Executive Order 11514 and the Council on Environmental Quality's Guidelines of August 1, 1973 (38 FR 20550), requires that all agencies of the Federal Government prepare detailed environmental statements on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment. The principal objective of the National Environmental Policy Act of 1969 is to build into the

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Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. However, comments on this guide, if received within about two months after its issuance, will be particularly useful in evaluating the need for an early revision.

Comments should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch.

The guides are issued in the following ten broad divisions:

1. Power Reactors
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agency decisionmaking process an appropriate and careful consideration of environmental aspects of proposed actions. Title 10 CFR Part 51, "Licensing and Regulatory Policy and Procedures for Environmental Protection," sets forth the NRC policy and procedures for the preparation and processing of environmental impact statements and related documents pursuant to section 102(2)(C) of the National Environmental Policy Act of 1969 in connection with the Commission's licensing and regulatory activities.

The provisions of 10 CFR Part 51 and § 40.31(f) of 10 CFR Part 40, "Licensing of Source Material," require the submittal of environmental reports by applicants for NRC permits and licenses for certain facilities, including uranium mills. Thus, an application for a uranium milling license must be accompanied by an environmental report.*

C. CONTENTS OF AN APPLICATION

The application should contain the information specified in items 1 through 8 of Form NRC–2. The information required in items 9 through 14 of Form NRC–2 should be incorporated into the various items identified below. Each subject should be treated in sufficient depth to permit the Commission independently to determine whether the applicant's proposed activities will be conducted in accordance with NRC rules and regulations. All pages of the application should be numbered and dated.

1. PROPOSED ACTIVITIES

This section should briefly discuss the overall milling proposal for which a license is requested, including the following: a brief description of the proposed mill and its location; the corporate entities involved; the maximum design throughput of the mill; U_3O_8 content of the ore to be processed; concentrate yield; milling process; tailings management; estimated time schedules for construction and startup; and anticipated lifetime of the mill.

2. SITE CHARACTERISTICS

This section should provide information on the location of the mill and a description of the geographical, demographic, meteorological, hydrological, seismological, and geological characteristics of the site and surrounding vicinity. Sufficient information should be provided to permit an independent evaluation of site characteristics from a safety viewpoint. Applications may reference the pertinent section in the accompanying environmental report, prepared in conformance with NRC Regulatory Guide 3.8.

2.1 Geography and Demography

2.1.1 Geography

A geographic description of the area in which the mill is located should be provided, including (1) maps showing the location of the site with respect to State, county, and local subdivisions, plus nearby inhabited areas and (2) maps (topographic, if available) showing the mill, mill perimeter, tailings location, exclusion area boundary, company property, abutting and adjacent properties, nearby water bodies, and inhabited areas, plus other relevant details.

2.1.2 Demography

A description of the potentially affected population within a 5-mile radius of the mill should be provided. Current resident population information, based on most recent census data, should be provided as well as the projected population for the anticipated life of the mill. Significant transient or seasonal population variations should be identified and discussed, including bases for assumptions and projections.

2.2 Meteorology

This section should provide a meteorological description of the site and surrounding area. Sufficient information should be included to permit an independent evaluation by the NRC staff of atmospheric diffusion characteristics of the local area. The sources of information and data supplied should be stated and should include (1) diurnal and monthly averages and extremes of temperature and humidity; (2) monthly wind characteristics including speeds and direction, annual joint frequency of wind speed, and direction by stability category; (3) data on precipitation; and (4) frequency of occurrence and effects of storms.

2.3 Hydrology

Sufficient information should be provided to allow an independent review to be made of all hydrologically related design bases, performance requirements, monitoring specifications, and operating procedures important to safety. Identify the sources of the hydrological information, the types of data collected, and the methods and frequency of collection.

2.3.1 Groundwater

Describe the regional and local groundwater aquifers, formations, sources, and sinks. Describe the recharge potential of the immediate plant area, including vertical and horizontal permeabilities of the natural and modified terrain, as well as that of tailing areas. Describe the present and projected regional use; tabulate existing private users within the area influenced by the proposed activities and all local and regional public users (amounts, water levels, loca-

* NRC Regulatory Guide 3.8, "Preparation of Environmental Reports for Uranium Mills," provides specific guidance on the contents of an applicant's environmental report.

tions, and drawdown); indicate gradients and seasonal variations in groundwater levels beneath the site.

2.3.2 Surface Water

Describe the location, size, shape, and other hydrologic characteristics of streams, rivers, lakes, marshes, estuaries, etc., of the environs. Include a description of any upstream and downstream river control structures and downstream water supply users (including location, amount, and purpose, e.g., domestic, agricultural), and provide a map (topographic, if available) showing major hydrologic features of the area.

2.4 Geology and Seismology

Provide the geologic and seismic characteristics of the area and site, the nature of the investigations performed, the results of investigations, conclusions, and identification of information sources. Supplement the written description with tables and legible graphics as appropriate.

2.4.1 Geology

Describe the geologic aspects of the site. The discussion should note the broad features and general characteristics of the site and environs including stratigraphy and structural geology. Describe characteristics of the subsurface soil or rock including the identification and evaluation of zones of deformation that might act as conduits for contaminants.

2.4.2 Seismology

Discuss the seismicity (including history) of the region. Where possible, associate seismic events with tectonic features identified in the geology discussion. Furnish a regional earthquake epicenter map showing site location.

3. MILL PROCESS AND EQUIPMENT

Provide sufficient information in this section on the mill process and operating equipment to permit the independent assessment of the radiological protection factors associated with the proposed milling operations.

3.1 Mill Process

Provide a quantitative flow diagram of the mill process showing the maximum mill throughput per unit time including the anticipated moisture content of the ore and the composition of all flow streams for each major step in the process.

3.2 Mill Equipment

Provide a physical description and the operating characteristics for all major items of mill process equipment. Include a diagram of the mill layout indicating areas and points where dusts, fumes, and gases are generated. The diagram should also show the location of the ventilation, filtration, confinement, and dust collection systems referenced in item 4.1 and the location of radiation monitoring equipment referenced in items 5.5(1) and 5.5(2).

3.3 Instrumentation

Provide a description of all process instrumentation and control systems relevant to safety and all radiation safety sampling and monitoring instrumentation, including their minimum specifications and operating characteristics. Also, describe and identify by make, model number, purpose, and location each radioactive source and/or gauging device used throughout the mill for which a license is required under the provisions of 10 CFR Part 30, "Rules of General Applicability to Licensing of Byproduct Material."* The instrumentation associated with leak testing such sources and/or devices should be identified in this section.

4. WASTE MANAGEMENT SYSTEM

4.1 Gaseous

Provide a description of all ventilation, filtration, confinement, and dust collection systems that are used during mill operations to control gaseous radioactive materials. Include the type, specifications, and locations of such systems, e.g., ore transfer points, crushing, grinding, etc. Include an analysis of the efficiency of the equipment as designed and operated to prevent radiation exposures to employees and to limit such exposures to as low as is reasonably achievable. Also, include a description of mill discharge stacks, including stack heights, types and concentration of effluents discharged, and methods (i.e., scrubbers, filters, etc.) for controlling releases of radioactive materials and for limiting such releases to as low as is reasonably achievable.

4.2 Liquids and Solids

1. Where retention systems such as levees, dikes, ponds, etc., are used to prevent the release of liquid or solid wastes containing radioactive material to offsite areas, provide the information specified in the regulatory position of Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills" (applicable information concerning this subject provided in section 2 above need not be repeated here).

* These sources will be authorized in the mill operating license rather than separate NRC byproduct material licenses.

2. If effluents are to be released into waters of the United States, provide a discussion of the status of efforts to obtain a water quality certification under Section 401 and discharge permits under Section 402 of the Federal Water Pollution Control Act, as amended, or submit copies of these items if already issued.

4.3 Contaminated Equipment

Provide a description of the methods for disposing of contaminated waste solids (such as filters, filter presses, obsolete or worn-out equipment) that are generated in the milling process.

5. OPERATIONS

Compliance with the statements, representations, and procedures provided in this section will normally be made a specific condition of the NRC operating license. Thus, the following should be considered as specific commitments on the part of the applicant for conducting mill operations and radiological protection programs. In order to facilitate administration of the license by the licensee and NRC, this section should be complete in itself, insofar as possible, without references to other submittals. Also, the bases for all programs addressed in this section, as well as demonstration of their adequacy, should be provided.

5.1 Corporate Organization and Administrative Procedures

1. Provide a detailed description of the applicant's organization, including authority and responsibility of each level of management and/or supervision in regard to development, review, approval, implementation, and adherence to operating procedures, radiation safety programs, routine and nonroutine maintenance activities, and changes in any of the above.

2. Describe the management control program and administrative procedures to ensure that all activities are conducted in accordance with written operating procedures that are approved and reviewed at specified frequencies by radiation safety staff. This program should provide a method for ensuring that any nonroutine work or maintenance activity, not covered by an effective operating procedure, is conducted in accordance with a special work permit reviewed and approved by the radiation safety staff.

3. Describe the management audit and internal inspection program, including types and scopes of reviews and inspections, frequencies, action levels, and corrective action measures in regard to the foregoing activities. Also identify by management position the individual responsible for each phase of the audit and inspection program.

4. Provide a detailed description of the program for ensuring that employee exposures (both airborne and external radiation) and effluent releases are "as low as is reasonably achievable."

5.2 Qualifications

Provide a description of the minimum qualifications and experience required of personnel to hold positions in the applicant's organization assigned the responsibility for developing, conducting, and administering the radiation safety program for the mill. Also, provide as an appendix the qualifications of the individuals currently holding these positions.

5.3 Training

Provide a description of the employee radiological protection training program addressing the following: content of the initial training or indoctrination, testing, on-the-job training, and extent and frequency of retraining. As an appendix, provide a copy of the written radiological safety instructions provided employees. These instructions should include provisions for personal hygiene including washing, contamination surveying prior to eating or leaving the mill, instructions for wearing personnel monitoring devices and respirators, and instructions for good housekeeping requirements and for cleaning up dust and spills within the mill.

5.4 Security

Provide a description of the method for preventing unauthorized entry to both the mill and the tailings systems.

5.5 Radiation Safety

Provide a description of the radiation safety program that has been developed for determining that occupational radiation exposures and effluent releases will be as low as is reasonably achievable. Include the following:

1. A description of the methods, instrumentation, and equipment for determining exposures of employees to external radiation during normal and nonroutine operations, maintenance, and cleanup activities. Provide the type of surveys conducted, criteria for determining survey locations, frequency of surveys, action levels, management audits, and corrective action requirements. For personnel monitoring devices such as film badges, indicate the number and category of personnel involved in the program and the sensitivity and range of the devices. For survey instruments, provide instrument sensitivities, ranges, and calibration methods (in an appendix) and frequencies.

2. A description of the sampling program that is followed to determine concentrations of airborne radioactive materials (including radon) within the mill during routine and nonroutine operations, maintenance, and cleanup activities. In the description of the sampling program include

a. The criteria for determining sampling locations with respect to process operation and personnel occupancy and

b. The frequency of sampling, type of analysis, sensitivity of overall sampling and analysis, action levels, management audits, corrective action requirements, and instrumentation calibration frequency. Procedures for sample analysis and instrument calibration should be included as an appendix.

3. A description of the procedure followed in determining the intake of radioactive materials, in conformance with § 20.103 of 10 CFR Part 20, for each employee who occupies areas where airborne radioactive materials exist. Include exposures incurred during nonroutine operations, maintenance, and cleanup activities as well as routine activities.

4. A description of the bioassay program to be conducted to confirm the results derived from the programs identified in items 2 and 3 above. Indicate the number and category of personnel involved in the program, the types and frequencies of bioassays performed, and action level criteria to be applied to bioassay results.

5. A description of the survey program to determine that employees (plus their workclothes or coveralls, etc.) entering clean areas (lunchrooms, offices, etc.) of the mill or leaving the mill site are not contaminated with radioactive materials. Include good housekeeping and cleanup requirements and specifications in mill process areas to control contamination, frequency of surveys of clean areas, survey methods, and minimum sensitivity, range, and calibration frequency of survey equipment. Provide contamination criteria or action levels for clean areas and for the release of materials, equipment, and workclothes to clean areas or from the site. Procedures for instrument calibration should be included as an appendix.

6.* A description of the survey program, methods, and procedures for determining concentrations and quantities of airborne radioactive materials released to the environs and a description of the environmental monitoring program to be conducted plus the technical basis therefor (i.e., a correlation of stack heights, meteorological characteristics, etc.) to determine environmental concentrations.

For both environmental and effluent monitoring, the frequency of sampling and analysis, the types and sensitivity of analysis, action levels and corrective action requirements, and the minimum number and criteria for locating environmental and effluent monitoring stations should be provided. Proposed locations should be indicated on a figure of the mill and surrounding area in an appendix.

7.* A description of the liquid effluent survey program to determine if process effluents are reaching subterranean or surface water supplies. This should include the technical basis therefor, the minimum number of monitoring locations, the criteria for locating sampling stations, the frequency of sampling, and action levels and corrective action requirements. Provide the step-by-step procedure for sample analysis of natural uranium, radium-226, and thorium-230 as an appendix. Also, the proposed monitoring locations should be shown on a figure of the mill and surrounding area in an appendix.

8. A description of the radiation safety program associated with the radioactive sources and gauges identified in section 3.3 above. Include methods and frequencies for leak testing the radioactive source.

9. A description of the interim stabilization procedures (during milling operations) to eliminate the blowing of tailings from the tailings retention system to unrestricted areas and the ore dust from the ore piles should be provided, including the demonstration of the adequacy of these procedures under potential wind and weather conditions at the site location.

10. Provide the minimum performance specifications, such as filtration or scrubber efficiency and air flow, for operating the mill ventilation, filtration, confinement, and dust collection systems throughout the mill and associated laboratories at their reasonably expected best performance and the frequency of tests and inspections to ensure that these specifications are being met.

11. Provide a decommissioning program that includes reclamation of the mill site at the termination of milling activities and the surety arrangements to ensure that sufficient funds are available to complete this decommissioning program.

12. Provide a tailings management and reclamation program addressing the following performance objectives:

a. Reduce direct gamma radiation from the impoundment area to essentially background.

b. Reduce the radon emanation rate from the impoundment area to about twice the emanation rate in the surrounding environs.

c. Eliminate the need for on ongoing monitoring and maintenance program following successful reclamation.

* 40 CFR Chapter 1, Part 190, and Regulatory Guide 4.14, "Measuring, Evaluating, and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Airborne Effluents from Uranium Mills," should be reviewed in connection with this section.

d. Provide surety arrangements to ensure that sufficient funds are available to complete the full reclamation plan.

6. ACCIDENTS

A spectrum of potential mill accidents ranging from trivial to serious should be established by classes of occurrence, and each class of accidents should be appropriately evaluated. The evaluation should include a discussion of measures that have been implemented to prevent accidents and a demonstration of the adequacy of the methods. Emergency plans and training for coping with accidents should also be described. For example, potential accidental fires should be discussed in terms of occurrence, prevention, detection and suppression mechanisms (both manual and automatic), and emergency plans for coping therewith. The adequacy of the program should also be discussed.

7. QUALITY ASSURANCE

The quality assurance program for all phases of the milling project including design, construction, start-up and operation, and the radiation safety program (including the in-plant, effluent, and environmental monitoring programs)* should be defined and discussed. Also discuss the corrective action measures established to ensure that conditions adverse to quality are identified and corrected and that the cause of significant conditions adverse to quality is determined and corrective action taken to preclude repetition.

8. EVALUATION OF ALTERNATIVES

Where the proposed course of action was based on the consideration of various alternatives, the benefit-cost analysis used in arriving at the "as low as is reasonably achievable" concept should be presented, and the rationale for the recommended course of action should be included.

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* The NRC staff is preparing a regulatory guide on quality assurance for radiological effluent and environmental monitoring programs that is scheduled to be published for comment in December 1977.

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