Fusion Systems Rulemaking

NOTE: The Nuclear Regulatory Commission (NRC) is making a select portion of the preliminary draft guidance available to the public solely for the purpose of providing information to the public and to provide preparatory material for upcoming public meetings. This language does not represent a final NRC staff position, nor has it been reviewed by NRC management. Therefore, the preliminary draft guidance may undergo significant revision during the rulemaking process. The NRC is not requesting public comments on this preliminary draft guidance, and no stakeholder requests for a comment period will be granted at this stage in the rulemaking process. Following Commission direction to proceed with the proposed rule, the NRC will seek public comment on the proposed rule along with the draft guidance in the Federal Register.

Preliminary Draft NUREG-1556, Volume 22
Consolidated Guidance About Materials Licenses
Program-Specific Guidance About Fusion System Licenses

Table Of Contents

ABSTRACT
FOREWORD
LIST OF FIGURES
LIST OF TABLES
ACKNOWLEDGMENTS
ABBREVIATIONS

1 PURPOSE OF REPORT

2 AGREEMENT STATES
- 2.1 Jurisdiction Determination
- 2.2 Reciprocal Recognition of Specific Licenses

3 MANAGEMENT RESPONSIBILITY
- 3.1 Commitments and Responsibilities
- 3.2 Safety Culture

4 APPLICABLE REGULATIONS

5 HOW TO FILE
- 5.1 Application Preparation
- 5.2 Where to File
- 5.3 Paper Applications
- 5.4 Electronic Applications

6 IDENTIFYING AND PROTECTING SENSITIVE INFORMATION

7 APPLICATION AND LICENSE FEES

8 CONTENTS OF AN APPLICATION
- 8.1 Item 1: License Action Type
- 8.2 Item 2: Name and Mailing Address of Applicant
  - 8.2.1 Notification of Bankruptcy Proceedings
- 8.3 Item 3: Address(es) Where Licensed Material Will Be Used or Possessed
- 8.4 Item 4: Person to Be Contacted about This Application

8.5 Item 5: Radioactive Material
8.5.1 Unsealed and Sealed Byproduct Material
8.5.2 Financial Assurance and Recordkeeping for Decommissioning
8.5.3 Environmental Review
8.6 Item 6: Purpose(s) for Which Licensed Material Will Be Used
8.7 Item 7: Individual(s) Responsible for Radiation Safety Program and Their Training and Experience
8.7.1 Radiation Safety Officer
8.7.2 Individuals Authorized to Handle Licensed Material
8.8 Item 8: Training for Individuals Working in or Frequenting Restricted Areas
8.9 Item 9: Facilities and Equipment
8.9.1 General Description of Facility and Site
8.9.2 Access Control
8.9.3 Shielding
8.9.4 Fire Protection
8.9.5 Radiation Monitors
8.9.6 Tritium Handling System
8.9.7 Breeding Blankets
8.9.8 Heat Removal
8.9.9 Power Failures
8.10 Item 10: Radiation Protection Program
8.10.1 Audit Program
8.10.2 Radiation Monitoring Instruments
8.10.3 Material Control and Accountability
8.10.3.1 Activation Products
8.10.3.2 Tritium Production
8.10.4 Occupational Dose
8.10.4.1 Tritium Bioassay Program
8.10.5 Public Dose
8.10.6 Operating Procedures
8.10.7 Emergency Procedures
8.10.8 Surveys and Leak Tests
8.10.9 Maintenance
8.10.10 Transportation
8.10.11 Minimization of Contamination
8.10.12 Evaluation to Determine Need for Offsite Emergency Plan
8.10.12.1 Accident Scenarios
8.10.12.2 Offsite doses from accident scenarios
8.10.13 Effluent Monitoring
8.10.14 Environmental Surveillance
8.10.15 Security Program
8.11 Item 11: Waste Management
8.12 Item 12: License Fees
8.13 Item 13: Certification

9 LICENSE AMENDMENTS AND RENEWALS
9.1 Timely Notification of Transfer of Control

10 APPLICATIONS FOR EXEMPTIONS

11 TERMINATION OF ACTIVITIES

APPENDICES

APPENDIX A U. S. NUCLEAR REGULATORY COMMISSION FORM 313

APPENDIX B SUGGESTED FORMAT FOR PROVIDING INFORMATION REQUESTED IN ITEMS 5 THROUGH 11 OF NRC FORM 313 FOR A POSSESSION LICENSE

APPENDIX C TYPICAL DUTIES AND RESPONSIBILITIES OF THE RADIATION SAFETY OFFICER

APPENDIX D FACILITIES AND EQUIPMENT CONSIDERATIONS

APPENDIX E SAMPLE AUDIT PROGRAM

APPENDIX F RADIATION-MONITORING, INSTRUMENT SPECIFICATIONS, AND MODEL SURVEY INSTRUMENT AND AIR-SAMPLER CALIBRATION PROGRAM

APPENDIX G METHODOLOGIES FOR DETERMINING DOSES FROM ACCIDENTAL RELEASES

APPENDIX H GENERAL TOPICS FOR SAFE USE OF RADIONUCLIDES AND MODEL EMERGENCY PROCEDURES

APPENDIX I TYPICAL NOTIFICATION AND REPORTING REQUIREMENTS

APPENDIX J RADIATION SAFETY SURVEY TOPICS

APPENDIX K MODEL LEAK TEST PROGRAM AND PROCEDURES

APPENDIX L APPLICABLE U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS

APPENDIX M MODEL WASTE MANAGEMENT PROCEDURES

APPENDIX N RADIATION SAFETY TRAINING

APPENDIX O CHECKLIST FOR REQUESTS TO WITHHOLD PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE (UNDER 10 CFR 2.390)

APPENDIX P SAFETY CULTURE STATEMENT OF POLICY

APPENDIX Q COMMENCEMENT OF CONSTRUCTION AT EXISTING AND PROPOSED BYPRODUCT, SOURCE, AND SPECIAL NUCLEAR MATERIAL FACILITIES

APPENDIX R TRAINING FOR RADIATION SAFETY OFFICERS AND FUSION OPERATORS

APPENDIX S CONSTRUCTION MONITORING AND ACCEPTANCE TESTING

APPENDIX T GUIDANCE FOR DEMONSTRATING THAT UNMONITORED INDIVIDUALS ARE NOT LIKELY TO EXCEED 10 PERCENT OF THE ALLOWABLE OCCUPATIONAL DOSE LIMITS

APPENDIX U GUIDANCE FOR DEMONSTRATING THAT INDIVIDUAL MEMBERS OF THE PUBLIC WILL NOT RECEIVE DOSES EXCEEDING THE ALLOWABLE LIMITS

8.8 ITEM 8: TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

Regulations: 10 CFR 19.12, 10 CFR 30.33

Criteria: Individuals whose assigned duties involve exposure to radiation or radioactive material (from both licensed and unlicensed sources) and in the course of their employment are likely to receive in a year an occupational dose of radiation greater than 1 millisievert (mSv) [100 millirem (mrem)], must receive instruction commensurate with their duties and responsibilities, as required by 10 CFR 19.12, “Instructions to Workers.”

Discussion: Before beginning work with or in the vicinity of licensed material, all individuals who are likely to receive an occupational dose in excess of 1 millisievert (mSv) [100 millirem (mrem)] in a year must receive radiation safety training commensurate with their assigned duties and specific to the licensee’s radiation safety program. Each individual should also receive periodic refresher training at no more than 12-month intervals.

Licensees should not assume that safety instruction has been adequately covered by prior employment or academic training. Site-specific training should be provided for all individuals. Particular attention should be given to persons performing work with radioactive materials that may require special procedures, such as hot cell work, waste processing, and animal handling.

Ancillary personnel (e.g., clerical, housekeeping, security) whose duties may require them to work in the vicinity of radioactive material (whether escorted or not) need to be informed about radiation hazards and the appropriate precautions. The licensee should assess each individual’s involvement with licensed material and cover each applicable subject appropriately.

Training may be in the form of lecture, demonstrations, recorded media, or self-study, and should emphasize practical subjects important to the safe use and possession of licensed material. The guidance in Appendix N of this NUREG may be used to develop a training program. The program should consider both the topics pertinent for each group of workers and the method and frequency of training. The licensee should determine whether the training succeeded in conveying the desired information and adjust the training program as necessary. This assessment may be performed by a written/oral test with pass/fail criteria or observation of the individual in the performance of assigned duties. Remedial training for missed test questions or other areas of apparent weakness should be conducted or additional formal training planned to cover deficient areas.

The person conducting the training should be a qualified individual (e.g., a person who meets the qualifications for RSO [radiation safety officer] or AU [authorized user] on the license and is familiar with the licensee’s program).

Response from Applicant: Submit a description of the radiation safety training program, including topics covered, groups of workers, assessment of training, qualifications of instructors, and the method and frequency of training.

8.10.7 EMERGENCY PROCEDURES

Regulations: 10 CFR 20.1101, 10 CFR 20.1801, 10 CFR 20.1802, 10 CFR 20 Subpart J, 10 CFR 20.2201, 10 CFR 20.2202, 10 CFR 20.2203, 10 CFR 30.32(k)(2), 10 CFR 30.50

Criteria: The licensee must have and follow emergency or abnormal event procedures appropriate for items listed in 10 CFR [*Code of Federal Regulations*]. Emergency procedures should include notifying the NRC during and after emergencies and abnormal events.

Discussion: Emergency or abnormal event procedures must be developed, maintained, and implemented to ensure that radiation doses received by occupational workers and members of the public during emergencies or abnormal events are ALARA [as low as reasonably achievable]. Copies of emergency procedures should be provided to all fusion energy system operators. In addition, the licensee must post current copies of emergency procedures applicable to licensed activities at each site. If posting of procedures is not practicable, the licensee may post a notice that describes the documents and states where they may be examined.

Accidents and emergencies can happen during any operation with radionuclides, including their transportation, use, production processes, transfer, and disposal. Such incidents can result in contamination or release of material to the environment, and unintended radiation exposure to workers and members of the public. In addition, such incidents as loss or theft of licensed material, sabotage, fires, and floods can jeopardize the safety of personnel and members of the public. It may therefore be necessary to develop written procedures to minimize, as much as possible, the impact of these incidents on personnel, members of the public, and the environment. Applicants who plan to possess quantities of material in excess of the applicable amounts listed in 10 CFR 30.72, Schedule C, may also be required to submit an "Emergency Response Plan for Responding to a Release" see Section 8.10.12 for more information.

Applicants should establish written procedures to handle events ranging from a minor spill to a major accident that may require intervention by outside emergency response personnel. Written procedures should be included for specific accident scenarios such as spills or releases outside a containment enclosure, malfunction of air supply or exhaust systems, personnel overexposures, unauthorized entry, and natural phenomena. These procedures should include provisions for immediate response, afterhours notification, handling of each type of emergency, equipment, and the appropriate roles of users and the radiation safety staff. Except for minor spills or releases of radioactivity that can be controlled and cleaned up by the user, the licensee staff should have a clear understanding of their limitations in an emergency, along with step-by-step instructions and clear guidelines for whom to contact.

The procedures should clearly identify telephone numbers of the RSO or other individuals who can provide assistance, including the manufacturer (or distributor) and State and local agencies. The procedures should include actions to be taken immediately after discovering the emergency or abnormal event. Emergency procedures should also include notifying the NRC when any event specified in Appendix I of this NUREG occurs. Licensees that possess an aggregated Category 1 or Category 2 quantity of radioactive material must be able to monitor and immediately detect, assess, and respond to any actual or attempted unauthorized entries into security zones and coordinate, to the extent practicable, with local law enforcement authorities for responding to threats to the licensee’s facility.

Licensees should have a sufficient number of appropriate and calibrated survey instruments readily available. All equipment should be periodically inspected for proper operation and replenished as necessary.

The level of detail should be sufficient to demonstrate that regulatory requirements have been addressed. Appendix H of this NUREG includes model emergency procedures. Applicants may adopt these procedures or develop their own, incorporating the safety features included in these model procedures.

Response from Applicant: The applicant should state that emergency procedures will be developed and documented before production of licensed material. In addition, the applicant should state that emergency procedures will be implemented and maintained.

The applicant should submit a statement that "Procedures will be revised only if:

(1) the changes are reviewed and approved by the licensee management and the RSO in writing, (2) the licensee staff is provided training in the revised procedures prior to implementation, (3) the changes are in compliance with NRC regulations and the license, and (4) the changes do not degrade the effectiveness of the program."

ADAMS Accession No. ML23258A172