

## **APPENDIX F**

# **GUIDANCE TO THE U.S. NUCLEAR REGULATORY COMMISSION STAFF ON EFFLUENT DISPOSAL AT LICENSED URANIUM RECOVERY FACILITIES: CONVENTIONAL MILLS**

## **F1.0 BACKGROUND**

U.S. Nuclear Regulatory Commission (NRC)-licensed uranium mill recovery facilities produce liquid wastes (i.e., effluent) that require proper disposal. NRC Office of Nuclear Material Safety and Safeguards policy is presented below.

### **F1.1 Purpose and Applicability**

This appendix presents guidance and discusses the technical and regulatory basis for review and evaluation of applications for the disposal of liquid waste. It is primarily intended to guide NRC staff reviews of site-specific applications for disposal of liquid waste.

### **F1.2 On-Site Evaporation**

Applications for on-site evaporation systems must demonstrate that the proposed disposal facility is designed, operated, and closed in a manner that prevents migration of waste from the evaporation systems to subsurface soil, ground water, or surface water in accordance with 10 CFR Part 40, Appendix A. Applicants must also demonstrate that site-specific ground-water protection standards and monitoring requirements are adequately established to detect any migration of contaminants to the ground water and to implement corrective action to restore ground-water quality if, and when, necessary, as required by the regulations.

If surface impoundments are employed for liquid waste and solid wastes (sludge) that are 11e.(2) byproduct material. Licensees must demonstrate that surface impoundments are designed, operated, and decommissioned in a manner that prevents migration of waste from the surface impoundment to subsurface soil, ground-water, or surface water in accordance with 10 CFR Part 40, Appendix A. Applicants must also demonstrate that monitoring requirements are adequately established to detect any migration of contaminants to the ground-water. Solid waste material must be disposed of in an existing tailings impoundment or 11e.(2) disposal cell in accordance with 10 CFR Part 40, Appendix A, Criterion 2.

If surface impoundments are employed for evaporation, but they are not used for waste disposal, they must comply with the design provisions for surface impoundments [Criterion 5A(1) through Criterion 5A(5)]; measures for ground-water protection programs (Criterion 5E); and seepage control (Criterion 5F) of 10 CFR Part 40, Appendix A. However, if surface impoundments are employed for evaporation and waste disposal, they must comply with the regulatory requirements in 10 CFR Part 40, Appendix A. These include the design provisions for surface impoundments [Criterion 5A(1) through Criterion 5A(5)]; measures for ground-water protection programs (Criterion 5E); and seepage control (Criterion 5F). In addition, evaporation ponds must also meet other generally applicable regulatory provisions in Appendix A, in particular, the site-specific ground-water protection standards and leak detection requirements (Criterion 5B and Criterion 5C); corrective action programs (Criterion 5D); ground-water monitoring requirements (Criterion 7); and closure requirements (Criterion 6).

### **F1.3 Release in Surface Waters**

Process waste water resulting from operations is 11e.(2) byproduct material. The U.S. Environmental Protection Agency (EPA), in accordance with 40 CFR 440.34, does not allow new facilities to discharge process waste water to navigable waters. For release of this waste to surface waters, existing licensees must meet the requirements of 10 CFR 20.1302(b)(2), and should demonstrate that doses are maintained as low as reasonably achievable (ALARA). NRC has no specific requirements for non-radiological constituents, and may adopt the appropriate State limits. Anticipated discharge must be described in enough detail to evaluate environmental impacts. Appropriate State and Federal agency permits should be obtained in accordance with 10 CFR 20.2007.

### **F1.4 Land Applications**

For the land application of process waste water, the applicant must meet the regulatory provisions in 10 CFR 20.2002 and demonstrate that doses are ALARA and within the dose limits in 10 CFR 20.1301. Proposed land application activities should be described in sufficient detail to satisfy the NRC need to assess environmental impacts. This may require analysis to assess the chemical toxicity of radioactive and nonradioactive constituents. Specifically, licensees must provide: (i) a description of the waste, including its physical and chemical properties that are important to risk evaluation; (ii) the proposed manner and conditions of waste disposal; (iii) projected concentrations of radioactive contaminants in the soil; and (iv) projected impacts on ground-water and surface-water quality and on land uses, especially crops and vegetation. In addition, projected exposures and health risks that may be associated with radioactive constituents reaching the food chain must be analyzed to ensure that doses are ALARA. Proposals should include provisions for periodic soil surveys to verify that contaminant levels in the soil do not exceed those projected, and should also include a remediation plan that can be implemented if projected levels are exceeded. Appropriate State and Federal agency permits must be obtained in accordance with 10 CFR 20.2007. The applicant must also comply with NRC regulatory provisions for decommissioning. The applicant should also address whether the proposed land applications methodologies will comply with 10 CFR Part 40, Appendix A, Criterion 6(6), at the time of decommissioning.

### **F1.5 Deep Well Injection**

Proposals for disposal of liquid waste from process water by injection in deep wells must meet the regulatory provisions in 10 CFR 20.2002 and demonstrate that doses are ALARA and within the dose limits in 10 CFR 20.1301. The injection facility should be described in sufficient detail to satisfy the NRC need to assess environmental impacts. Specifically, proposals must include: (i) a description of the waste, including its physical and chemical properties important to risk evaluation; (ii) the proposed manner and conditions of waste disposal; (iii) an analysis and evaluation of pertinent information on the nature of the environment; (iv) information on the nature and location of other potentially affected facilities; and (v) analyses and procedures to ensure that doses are ALARA and within the dose limits in 10 CFR 20.1301.

In addition, pursuant to the provisions of 10 CFR 20.2007, proposals for disposal by injection in deep wells should also meet any other applicable Federal, State, and local government regulations pertaining to deep well injection. Applicants must obtain any necessary permits for this purpose. In particular, proposals must satisfy the EPA regulatory provisions in 40 CFR Part 146: Underground Injection Control (UIC) Program: Criteria and Standards, and applicants must obtain necessary permits from EPA and/or States authorized by EPA to enforce these provisions. In general, applications that satisfy EPA regulations under the UIC Program, which are approved by the EPA or an EPA-authorized State issuing the UIC permit and the applicable provisions of 10 CFR Part 20, will also be approved by the staff. Licensees and applicants disposing of liquid waste from process water by injection in deep wells are further required to comply with NRC regulatory provisions for decommissioning.