Oconee Unit 1 Tech Specs

3.9 RADIOACTIVE EFFLUENTS

Applicability

Applies to disposal of radioactive liquid, and gaseous wastes from the station.

Objective

To define the conditions for release of radioactive liquid waste to the Keowee Hydro dam tailrace and radioactive gases to the unit vent to assure that any radioactive material released is kept as low as practicable and, in any event, is within the limits of 10 CFR 20.

Specification

3.9.1 General

Equipment installed in the radioactive waste systems shall be maintained and used to assure that except under unusual conditions, releases of radioactive materials in effluents will be kept at small fractions of the limits specified in 20.106 of 10 CFR 20. The Licensee is permitted the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power under unusual operating conditions which may temporarily result in releases higher than such small fractions, but still within the limits specified in 20.106 of 10 CFR 20. It is expected that using this operational flexibility under unusual operating conditions the Licensee will exert his best efforts to keep levels of radioactive material in effluents as low as practicable.

3.9.2 Liquid Wastes

3.9.2.1 Operating procedures shall be developed and used, and equipment which has been installed to maintain control over radioactive materials in liquid effluents produced during normal reactor operations, including expected occurrences, shall be maintained and used to keep levels of radioactive material in effluents released to unrestricted areas as low as practicable. Inputs to the low activity waste tank may be released directly to the Keowee tailrace without further processing than the filtration system so long as the effluents contain only trace quantities of radioactive material.

3.9.2.2 Prior to release to the Keowee Hydro tailrace, two independent samples of liquid wastes shall be analyzed to determine gross beta-gamma and/or isotopic activity concentrations.

3.9.2.3 Radioactive liquid waste shall be continuously monitored for flow and gross radioactivity concentration during release.

3.9.2.4 Wherein practicable, radioactive waste releases shall be coordinated with normal operation of the Keowee Hydro Station.

3.9.2.5. The release of radioactive liquid effluents shall be such that the concentration of radionuclides during discharge to the Keowee Hydro tailrace (based on a minimum dilution flow of 30 CFS or the available flow from the Keowee Hydro Station if operating) does not exceed the limits of 20.106 of 10 CFR 20, Appendix B. for unrestricted areas.

3.9.2.6. Under unusual conditions when waste treatment equipment is inoperable, liquid waste shall be held up for decay for the maximum period practicable prior to release and every reasonable effort shall be made to return any such disabled equipment to its operable conditions before releases are made.

3.9.2.7. If the limits of Specification 3.9.2.5 cannot be met, radioactive liquid effluents shall not be released.

3.9.2.8. The continuous water sampler in the Keowee River near the site boundary shall be operable during discharge of liquid waste to the Keowee Hydro dam tailrace. If it is inoperable and the waste cannot be held up any longer, grab samples shall be taken in the Keowee River where the continuous sampler is located in order to determine the concentrations of radioactivity in the river during the batch discharge operation. Refer to Table 4.11-1 for sample frequency and analysis requirements.

3.9.3 Gaseous Wastes

3.9.3.1. The annual average release rates of gaseous and airborne particulate wastes shall be limited in accordance with the following equation:

$$[4.61 \times 10^{-6} \text{ sec/m}^3 \times \sum_i Q_i/(MPC)_i] \leq 1.0$$

where Q_i is the annual release rate in Ci/sec of any radionuclide in the gaseous wastes mixtures; (MPC)i is the permissible concentration for unrestricted areas in units of Ci/m^3 ($\mu Ci/cc = Ci/m^3$) for any radionuclide taken from Appendix B, Column 1, Table II of 10 CFR 20; and 4.61×10^{-6} sec/m^3 is the long term atmospheric dispersion factor (X/Q), at the exclusion area boundary of 1609 meters for a ground level release.

3.9.3.2. For purpose of calculating permissible releases by the formula in 3.9.3.1, MPC for halogens and particulates with half-lives longer than eight days shall be reduced by a factor of 700 from their listed values in 10 CFR 20, Appendix B, Column 1, Table II.

3.9.3.3. During release of radioactive gaseous wastes from the gaseous waste disposal system to the unit vent, the following conditions shall be met:

a. The gaseous radioactivity monitor, iodine monitor, and the particulate monitor in the unit vent shall be operable.

b. The waste gases and particulates shall be passed through the high efficiency particulate filters and charcoal filters provided (except as noted in 3.9.3.9)

3.9.3.4 Purging of the reactor building shall be governed by the following conditions:

a. Reactor building purge shall be through the high efficiency particulate filters and charcoal filters until the activity concentration is below the occupational limit inside the reactor building, at which time bypass may be initiated.

b. Reactor building purge shall be through the high efficiency particulate filters and charcoal filters whenever irradiated fuel is being handled or any objects are being handled over irradiated fuel in the Reactor Building.

c. The limits of 3.9.3.4a and 3.9.3.4.b shall be met or the containment shall not be purged.

3.9.3.5 During power operation, whenever the air ejector off-gas monitor is inoperable, grab samples shall be taken from the air ejector discharge and analyzed for gross radioactivity daily.

3.9.3.6 Potentially highly radioactive gaseous waste from the gaseous waste disposal system and vent headers of unit components shall be provided a minimum holdup of thirty days (except as noted in 3.9.3.7) when the release of the gaseous waste would exceed 1% of 10CFR20 limits as determined by the following equation: 19.

$$[4.61 \times 10^{-6} \text{ sec/m}^3 \times \quad Q1/(MPC)_1] \leq 0.01$$

3.9.3.7. Under unusual conditions, gaseous waste may be discharged from the waste gas header directly to the unit vent for a period not to exceed seven days if the holdup system equipment is not available and the releases meet Specification 3.9.3.1 and 3.9.3.3. Every reasonable effort shall be made to re-establish the availability of the holdup system equipment.

3.9.3.8. Under unusual conditions, gaseous radioactive waste from the gaseous waste disposal system can be released to the unit vent without passing through the HEPA and charcoal filters if the filter system is inoperable. This mode of release may not exceed a seven-day period, and the release rate must be within the limits of Specification 3.9.3.1 and 3.9.3.3a.

3.9.3.9. Under unusual conditions, when the filter system is inoperable, gaseous wastes shall be held up for the maximum period practicable prior to release. Every reasonable effort shall be made to return inoperable filters to the operable condition before releases to the environment are made.

3.9.3.10 The maximum activity to be contained in one gas holdup tank shall be limited to 17,200 Ci/$\bar{E}$. $\bar{E}$ will be assumed to be the same as the $\bar{E}$ of the noble gases in the reactor coolant system as determined in accordance with Table 4.1-3 of Specification 4.1.2.

3.9.3.11 Gaseous waste releases shall be restricted so as to yield concentrations in the area of the temporary construction workers' quarters in the east-southeast section of the exclusion area that are no greater than that which could exist at the normal 1609 meter exclusion area boundary.

Bases

Waste processing equipment shall be maintained and used in accordance with 10CFR50.36a and administrative procedures developed in accordance with 10CFR50.34a to assure that releases of radioactivity will be maintained as low as practicable with the intent to be less than 1% of the limits of 10CFR20 Appendix B Table 2 Column II after dilution with the total hydro flow occurring during discharge of liquid radioactive waste. Provision is made for flexibility of operation compatible with health and safety to be sure that the public is provided a dependable source of power. Even under unusual operating conditions, which may temporarily result in releases higher than usual, the limits of 10CFR20 will still be maintained. It is not intended that this waste be continually reprocessed. Such reprocessing would be the prerogative of the licensee.

Unusual operations, as used in these specifications, are those conditions existing when not all processing equipment is operable.

A. Liquid Wastes

Radioactive liquid wastes will be collected in waste storage tanks. Treatment of liquid wastes for recovery of the water by evaporation and/or ion exchange and disposal of concentrated evaporator bottoms and spent resin as solid wastes will be performed to maintain quantities of radioactive materials released as low as practicable. Contents of the low activity waste tank and the condensate test tank will be mixed and sampled for analysis to determine the resulting concentration upon dilution.

The minimum dilution flow without Keowee Hydro Station operation is 30 cfs and will be periodically verified. It is intended where practicable, to coordinate radioactive liquid waste releases with the operation of the Keowee Hydro Station to provide dilution flows greater than 30 cfs. However, calculations to determine batch discharge rates will be made on the basis of a 30 cfs dilution flow or the available flow from the Keowee Hydro Station if operating.

Inputs to the low activity waste tank are expected to contain only trace quantities of radioactivity and consequently may be released directly to the Keowee tailrace without further processing than the filters associated with the tank. In the event that significant activity, on the order of 2×10^{-8} μCi/ml, is found in the low activity waste tank, the contents will be processed either by evaporators and/or demineralizers. High activity wastes drain to either the miscellaneous waste holdup tank or the high activity waste tank.

The specification regarding returning inoperable equipment to the operable condition is intended to preclude unnecessary delays in recovering from unusual operating conditions in conformance with 10 CFR 50.36a.

B. Gaseous Wastes

Radioactive gases will be those resulting from the fission process and neutron activation. These gases will be collected in the waste gas tanks from the various liquid storage tanks associated with the reactor. Gaseous wastes in the reactor building atmosphere are released by purging to the unit vent. Any gaseous wastes in the Auxiliary Building atmosphere will be released through the ventilation system to the unit vent which is monitored.

Temporary construction quarters are located inside the exclusion area. During the period of time that these quarters are in use, administrative procedures will limit releases of gaseous waste in this sector of the exclusion area in accordance with appropriate meteorological restrictions. In addition to this, these quarters will be monitored to assure that the administrative procedures are effective and that the dose limits prescribed by regulations are not exceeded.

The long term atmospheric dilution factor (X/Q) at the exclusion area boundary of 1609 meters for a ground release as used in this specification incorporates results from SF_6 (sulfur hexafluoride) gas tracer experiments (see Oconee FSAR Appendix 2A) and includes a 0.53 dilution factor for inversion occurrences at low wind speeds.

The (X/Q) value to be used under Gaseous Wastes in Specification 3.9, is 4.61×10^{-6}.

High concentrations of airborne radioactivity are not expected in the containment unless the reactor has significant failed fuel and/or there is significant uncollected primary coolant leakage in the containment. In order to reduce the amount of radioactivity which would be purged to the atmosphere, the containment air will be exhausted

through high efficiency particulate and charcoal filters until continuous occupancy occupational exposure limits are attained in the containment. After these limits are attained, the maximum concentration of radioactivity at the site boundary would be approximately 0.12% of 10 CFR 20 Limits for unrestricted areas assuming the restrictive atmosphere diffusion factor applied to the accident analysis (1.16×10^{-4} sec/m). However, containment purging would normally be timed to coincide with better atmospheric dispersion conditions. It is considered reasonable to allow by-passing of the purge filters under these conditions since with small concentrations of radioactivity little, if any, discernable health benefit would be achieved by using the filters while the useful life of the filters would be consumed. In addition, it is anticipated that the containment will be purged only on a periodic basis when personnel are required in the containment.