LIMERICK GENERATING STATION
UNITS 1 AND 2
PHILADELPHIA ELECTRIC COMPANY

SOLID RADWASTE SYSTEM

PROCESS CONTROL PROGRAM

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1.0 PURPOSE

Provide guidance and boundary conditions for preparation of specific procedures for processing, sampling, analysis, packaging and shipment of solid radwaste in accordance with State and Federal Regulatory requirements. | ⚠

2.0 SCOPE

This program is applicable to Limerick Generating Station solid radwaste processing system.

3.0 REFERENCES

3.1 49 CFR Parts 170 through 178

3.2 10 CFR Parts 20, 50, 61 and 71

3.3 Standard Review Plan 11.4, Rev. 2, including Branch Technical Position ETSB 11-3, Rev. 2

3.4 Low Level Waste Licensing Branch Technical Position on Radioactive Waste Classification, Rev. 0 (5/83)

3.5 Low Level Waste Licensing Branch Technical Position on Waste Form, Rev. 0 (5/83).

3.6 Burial Site Criteria for Barnwell S.C., dated 1/14/82. General Criteria for High Integrity Containers (SCDHEC) dated 10/22/80.

3.7 South Carolina Department of Health and Environmental Control Radioactive Material License No. 097, Amendment No. 35. (Barnwell Facility)

3.8 Barnwell Site Disposal Criteria, (Chem. Nuclear) October 1981.

4.0 OPERATING ORGANIZATION

The operating structure of the solid radwaste processing system shall be as outlined in Section 13.1.2 of the FSAR.

5.0 PROCESSING

5.1 Waste Types

5.1.1 Condensate Filter/Demineralizer Sludge

a. The waste product generated by the backwash of the condensate filter demineralizers.

b. Sludge consists of powdered ion exchange resins at varying degrees of exhaustion, fibrous filter media, and small concentrations of various solids and corrosion products.

5.1.2 Waste Sludge

a. The waste product generated by the backwash of the liquid radwaste and fuel pool filters and demineralizers.

b. Sludge consists of powdered ion exchange resins and bead resins at varying degrees of exhaustion, fibrous filter media, and small concentrations of various solids and corrosion products.

5.1.3 Reactor Water Cleanup Filter/Demineralizer Sludge

a. A product of the backwash of the Reactor Water Cleanup filter demineralizers.

b. Sludge consists of powered ion exchange resing at varying degrees of exhaustion, fibrous filter media, and small concentrations of various solids and corrosion products.

5.1.4 Dry Active Waste

Dry wastes consists of air filters, miscellaneous paper, rags, etc., from contaminated areas; contaminated clothing, tools, and equipment parts that cannot be effectively decontaminated; and solid laboratory wastes..

5.2 Process Description

5.2.1 Condensate Sludge

a. A condensate filter-demineralizer backwash consists of approximately 9,000 gallons of slurry with an average of 280 lbs. (dry wt.) spent resins and crud.

b. Backwashes are collected for approxiamtely 4 weeks and settled in one condensate phase separator (per unit). Clarified liquid is decanted until 214 ft^3 of settled sludge is obtained, as annunciated by high level alarms LAH-67-133A/B (233A/B). The total number of backwashes accumulated in one phase separator shall be limited to 17.

c. The settled sludge is allowed to decay for approximately 4 weeks, while backwashes are routed to the alternate phase separator for that Unit.

d. The pahse separator liquid level is adjusted to provide a total tank batch volume of at least 9,500 gallons. Total batch level is monitored using LI-67-108A/B (208A/B).

e. Phase separator contents are recirculated for a minimum of 30 minutes to mix contents of vessel, resulting in a

homogeneous resin slurry of 6% (dry wt.) or less total solids.

f. The solids slurry feed to a centrifuge is controlled at 20-25 gpm by FVC-67-046A/B.

5.2.2 Waste Sludge

a. A backwash from a radwaste or fuel pool filterdemineralizer consists of approximately 1,925 gallons of slurry, with an average of 60 lbs. (dry wt.) spent resins and crud.

b. A backwash from a radwaste demineralizer consists of approximately 1,500 gallons of slurry, with an average of 2125 lbs. (dry wt.) spent resins.

c. Backwashes from radwaste filter-demineralizers, radwaste demineralizers, and fuel pool filter-demineralizers are collected in the waste sludge tank until 12,300 gallons of liquid is accumulated. Total batch level is monitored using LI-66-004 (radwaste control room) or LI-66-005 (local panel).

d. Waste sludge tank contents are recirculated for a minimum of 30 minutes to mix contents of vessel, resulting in a homogeneous resin slurry ranging from 0.5 to 6% (dry wt.) total solids.*

e. The solids slurry feed to a centrifuge is controlled at 20-25 GPM by FVC-67-046A/B.

* During normal operation the waste sludge tank contains only the radwaste and fuel pool filter demineralizer backwashes which result in a 0.5% (dry wt.) total solids concentration. Periodic radwaste demineralizer backwashes will increase the solids level to approximately 3% (dry wt.) for one bed or 6% (dry wt.) for two beds.

5.2.3 Reactor Water Cleanup Sludge

a. A RWCU filter-demineralizer backwash consists of approximately 1,100 gallons of slurry with an average of 35 lb. (dry wt.) spent resins.

b. Backwashes are collected from both units and settled in one phase separator and clarified liquid is decanted for approximately 60 days or unil 100 ft^3 of settled sludge is obtained as annunciated by high level alarms LAH-66-020A/B. The total number of backwashes accumulated in one phase separator shall be limited to 65.

c. The settled sludge is allowed to decay for approximately 60 days, while backwashes are routed to the alternate phase separator.

d. The phase separator liquid level is adjusted to provide a total tank batch volume of at least 4500 gallons. Total batch level is monitored using LI-66-021A/B.

e. Phase separator contents are recirculated for a minimum of 30 minutes to mix contents of vessel, resulting in a homogeneous resin slurry of 6% (dry wt.) or less total solids.

f. The solids slurry feed to the centrifuge is controlled at 20-25 GPM by FVC-67-046A/B.

5.2.4 Dry Active Waste

a. Wastes are collected in containers located in appropriate zones throughout the plant, as dictated by the volume of

wastes generated during operation and maintenance. The filled containers are sealed and moved to a controlled-access enclosed area for temporary storage.

b. Compressible wastes are compacted into 55gallon steel drums by a hydraulic press to reduce their volume. Ventilation exhaust is sent to the radwaste enclosure HVAC system.

CAUTION: Items that may result in free water formation should not be compacted.

c. Non-compressible wastes are packaged manually in 55-gallon steel drums or in other suitable shipping containers.

5.3 Dewatering Process Control

5.3.1 The 0.5-6% solids slurries discussed in Section 5.2 shall be fed to a centrifuge at 20-25 GPM. The flow rate will be controlled by FVC-67-046A/B. Actual flow rate can be verified by observing FIC-67-046A/B (local).

5.3.2 A centrifuge pond setting of 3.0* shall be used for resin dewatering. This pond setting shall be maintained for all dewatering operations.

5.3.3 Proper centrifuge operation shall be observed. (Refer to the Sharples Centrifuge instruction manual, 8031-M-73-14-5). Bearing temperatures, equipment vibration, and differential torque are alarmed at levels that may adversely affect dewatering performance.

*Suitability of 3.0 pond setting to be verified or adjusted as required during pre-operational testing.

5.3.4 The design of High Integrity Containers which are used to package dewatered resin shall be reviewed and certified by the appropriate licensing state to assure 10CFR Parts 61 and 71 and applicable DOT requirements are addressed. ⚠

5.4 Product Control

5.4.1 For purposes of establishing correlation factors between the waste classification nuclides (see 10CFR61.55) and nuclides which can be easily measured by gamma spectroscopy, dewatered resin shall be sampled at least on an annual basis to determine an/or verify the specific isotopic content of each waste stream. A detailed sampling and measurement of individual waste classification radionuclides shall also be performed whenever process changes occur that may significantly alter (e.g. by a factor of 10) previously determined correlations of gross radioactivity measurements.

5.4.2 A limited number (e.g. one or two) of samples shall be taken from each batch of dewatered resin for Class B and Class C wastes and applicable isotopes quantified by a gamma spectral analysis.* Non-measured isotopic content shall then be determined by correlation to the measured isotopes based on the annual analysis of 5.4.1.

5.4.3 HIC gorss radioactivity shall be measured and recorded at the completion of each filling operation. These activity measurements may be used to scale the nuclide concentrations for

*If radionuclide distributions are shown to be reasonably consistent between similar batches, consideration may be given to decreasing the frequency of routine measurements.

containers of similar waste batches for which gamma spectroscopy results and correlations are available.

5.4.4 Centrifuged resin shall be sampled at least on an annual basis to verify that the free liquid content of the packaged product is within limits established by applicable regulatory agencies.* Sampling and measurement of free liquid content shall be performed during initial startup, and also whenever process changes occur that may significantly alter system dewatering performance, until compliance with moisture content limits under these conditions can be demonstrated.** ⚠1

5.4.5 Dry active wastes shall be sampled at least on a bi-annual basis to determine and/or verify the isotopic content of the wastes as discussed in 5.4.6.

5.4.6 Gross radioactivity of dry active wastes shall be measured and recorded when each container is filled. The activity measurements shall be correlated with the distribution of radionuclides expected within the wastes, based on periodic sampling discussed in Section 5.4.5.

5.4.7 Each waste shipment shall be accompanied by a shipping manifest giving a physical description of the waste, the volume, the radionuclide identity and quantity, the total

*During pre-operational testing, a correlation between the free liquid content of centrifuged product and free liquid content of the packaged product (after vibration) will be developed.

**Determination of free liquid content shall be a filtration analysis method or equivalent. ⚠1

radioactivity, the principal chemical form and waste class.

5.5 Procedure Control

5.5.1 Processing of solid radioactive waste shall be performed by qualified operating personnel.

5.5.2 Processing of radioactive spent resins shall be performed in accordance with approved operating procedures.

5.5.3 Procedures shall be based on documented test data which demonstrate the ability to achieve acceptable product moisture content as specified by applicable regulatory agencies.

5.5.4 Procedures for processing and containerization of wastes shall ensure that specific burial site requirements are satisfied.

5.5.5 Sufficient documentation shall be maintained to demonstrate compliance of solid radwaste processing with the Process Control Program.

5.5.6 Any changes to the Solid Radwaste Process Control Program shall be approved by the Plant Operations Review Committee (PORC).

6.0 RECORDS

Waste classification records, waste form records, and other records required for the preparation of the semiannual Radioactive Effluent Release Report shall be prepared and retained in accordance with the requirements of 10 CFR 71.

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