Attachment 5 to AEP:NRC:1093

Proposed Changes to the Process Control Program

in Response to Generic Letter 89-01

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INDIANA MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT

1.0 TITLE: RADIOACTIVE WASTE PROCESS CONTROL PROGRAM

2.0 OBJECTIVE:

2.1 To give instructions for the processing of radioactive waste such that all plant generated radioactive wastes will be in compliance with applicable codes, standards, and processing/burial site criteria prior to shipment.

2.2 This procedure impacts and directs the activities of the Radiation Protection, Operations and Chemistry Departments only, therefore other interfacing Departments reviews are not required for this or further revisions.

3.0 REFERENCES:

3.1 Code of Federal Regulations, Title 10.

3.2 Code of Federal Regulations, Title 49.

3.3 Code of Federal Regulations, Title 40.

3.4 State of South Carolina, Radioactive Materials License #97.

3.5 State of Washington, Radioactive Materials License #WN-I019-02.

3.6 USNRC Technical Position on Waste Form, Revision 0.

3.7 Vendor Radwaste Handling Service Manuals.

3.8 PMI-3150, Packaging and Shipment of Radioactive Materials and Waste.

3.9 FSAR, Chapter 11, Waste Disposal and Radiation Protection Systems.

3.10 D. C. Cook Plant Technical Specifications.

3.11 I.E. Bulletin No. 79-19, Low Level Radioactive Waste Disposal.

3.12 USNRC Generic Letter 89-01.

4.0 DETAILED PROCEDURE

4.1 Responsibilities

4.1.1 Appendix A of this procedure, identifies departmental responsibilities as they pertain to radwaste processing.

4.2 Limitations/Precautions

4.2.1 Cleaning solutions, oil and all other petroleum products shall not be allowed to enter the radioactive waste processing system (i.e., floor drains, open systems, . . .).

4.2.2 Consideration has been given to our waste management program to ensure that actions have been implemented to segregate hazardous wastes as defined by the EPA Regulations, from low level radioactive wastes. Appendix B of this procedure, outlines this mixed waste program.

4.3 Liquid Processing

4.3.1 Plant liquid waste processing equipment is designed to process liquid wastes in the chemical and physical forms which exist in the plant's operating systems.

4.3.2 Administrative procedures shall dictate the plant's operating systems' chemical parameters and sampling requirements to insure that the systems are operated within these parameters.

4.3.3 Liquids which could be detrimental to the waste processing system shall be prevented from entering the liquid waste system.

4.3.4 Liquid wastes will be collected in waste holding tanks in the Auxiliary Building.

4.3.5 The liquid wastes will then be processed via one of two methods;

4.3.5.1 Liquid Radwaste Demineralizer System, or

4.3.5.2 Waste Evaporator System.

4.3.6 Procedures shall be written and maintained for the operation of these systems.

4.3.6.1 Appendix C, gives operating parameters that will be complied with during operation of the Waste Evaporator System.

4.3.7 Both liquid processing systems are designed to reduce the liquid waste's radioactivity to levels acceptable for release to the environment as defined by 10 CFR 20, Appendix B and D.C. Cook Plant Technical Specifications.

4.3.8 Spent radioactive resins produced from operation of the Liquid Radwaste demineralizer System, shall be processed in accordance with Section 4.5 of this procedure.

4.3.9 Waste evaporator bottoms produced from operation of the Waste Evaporator System, shall be processed via one of two methods;

4.3.9.1 Waste evaporator bottoms may be recycled back into the Liquid Waste Processing System, then processed again by the Liquid Radwaste Demineralizer System; or

4.3.9.2 The waste evaporator bottoms may be solidified in accordance with Section 4.4 of this procedure.

4.4 Solidifications

4.4.1 The SOLIDIFICATION process is the process of converting radioactive liquids, resins, and other miscellaneous wastes (i.e. boric acid, sludge, . . .) into an acceptable form for shipping and burial as required by 10 CFR Parts 20, 61, and 71.

4.4.2 The waste to be solidified will be transferred to a container suitable for shipping the waste in compliance with applicable codes and standards.

4.4.3 Prior to starting any solidification process, the waste shall be sampled. The sample results should be within the limits listed in Appendix C, Table 2 to insure proper solidification.

4.4.4 Using these sample results, a solidification method approved by the applicable regulatory authorities shall be chosen.

4.4.5 A test solidification specimen shall be prepared for each container prior to attempting solidification of the liner.

4.4.6 For high activity wastes, it is acceptable to ~~prepare test solidification specimens with~~ non-radioactive samples. These samples should be as close to the actual waste in their physical and chemical properties as possible.

4.4.7 The test solidification will be considered acceptable if;

4.4.7.1 There is no free standing water, and

4.4.7.2 Upon visual inspection, the waste appears that it would hold its shape if removed from the test vessel, and

4.4.7.3 It resists penetration.

4.4.8 An acceptable solidification will ensure < 0.5% free standing water, and "stability" as defined by 10 CFR 61 when required.

4.4.9 If the test solidification fails any one of the criteria listed in Step 4.4.7, it is unacceptable.

4.4.10 If the test solidification specimen is unacceptable, prepare another specimen taking into consideration;

4.4.10.1 Adjusting the pH of the waste.

4.4.10.2 Adjusting the waste to solidification agent ratio.

4.4.11 The waste container will be solidified using the solidification parameters as determined in the acceptable test solidification specimen.

4.4.12 Containers of solidified wastes shall be held a minimum of 24 hours prior to shipment.

4.4.13 The Radwaste Solidification System shall be demonstrated operable at least once per 92 days by one of the following methods:

4.4.13.1 Operating the system, or

4.4.13.2 Verifying the existence of a valid contract for solidification to be performed by a contractor.

4.4.14 If after repeated attempts a waste container cannot be solidified or if the radwaste soldification system cannot be demonstrated to be operable;

4.4.14.1 Declare the system inoperable

4.4.14.2 Suspend all shipments of defectively solidified waste, and

4.4.14.3 Take action to return the system to operability.

4.4.15 With the solid radwaste system inoperable for more than 31 days, prepare and submit to the Commission within 30 days pursuant to Technical Specification 6.9.2 a Special Report which includes the following information:

4.4.15.1 Identification of the inoperable equipment or subsystems and the reason for inoperability.

4.4.15.2 Action(s) taken to restore the inoperable equipment to operable status,

4.4.15.3 A description of the alternative used for SOLIDIFICATION and packaging of radioactive wastes, and

4.4.15.4 Summary description of action(s) taken to prevent a recurrence.

4.4.16 Procedures shall be written and maintained to cover the following topics as a minimum:

4.4.16.1 Test Solidifications.

4.4.16.2 Acceptability of Solidification Test Specimens.

4.4.16.3 Solidification of Containers Containing Radioactive Waste.

4.5 Spent Resins and Sludges

4.5.1 Spent resins and sludges will be transferred to a container suitable for shipping the waste in compliance with applicable codes and standards.

4.5.2 Normally the transfer is accomplished by sluicing the resin/sludge from the Spent Resin Storage Tank, directly from a demineralizer or hoding tank to the shipping container.

4.5.3 The container selected to be used will be selected taking into consideration the volume of resin/sludge to be sluiced, dewatering or solidifying requirements, and stability requirements as defined by 10 CFR 61.

4.5.4 Solidification of spent resins/sludge is acceptable, however, resins will normally be dewatered and sludge will attempt to be dewatered prior to solidification.

4.5.5 Dewatering of spent resins/sludge may be accomplished via one of the following methods;

4.5.5.1 Pumping or draining water from the bottom of a high integrity container using a drain system installed in the high integrity container, or

4.5.5.2 Heat enhanced dewatering, where moisture is driven off by the introduction of warm air into a high integrity container.

4.5.6 In all cases, when high integrity containers are dewatered, they shall be dewatered to < 1.0% free standing water by volume.

4.5.7 Procedures shall be written and maintained to cover the following topics as a minimum;

4.5.7.1 Transfer of resins to shipping containers.

4.5.7.2 Dewatering of resins/sludge in high integrity containers.

4.5.7.3 Verification of < 1.0% free standing Water in high integrity containers.

4.6 Contaminated Oils

4.6.1 Contaminated oils are burned in the Plant Heating Boiler.

4.6.2 Prior to placing the oil in the Plant Heating Boiler Storage Tank, a quantitative and qualitative radioisotopic analysis is required.

4.6.3 The isotopic analysis and volume of oil is used to determine the total activity to be released via the heating boiler's exhaust.

4.6.4 The activity released shall be within limits delineated in D. C. Cook Plant Technical Specifications.

4.7 Compressible Wastes

4.7.1 Contaminated and potentially contaminated compressible wastes are collected from various areas in the Auxiliary Building, and are normally taken to the Drumming Rooms.

4.7.2 The waste is segregated to remove reusable materials and materials which would be in non-compliance with Federal and Burial Site Regulations, (i.e., liquids, paint, etc. .)

4.7.3 The waste may be processed either of two ways;

4.7.3.1 Compacted in qualified shipping containers for burial, or

4.7.3.2 Packaged and shipped to a contracted radwaste processor for further processing, volume reduction, packaging, and eventual shipment to a burial site.

4.7.4 Procedures shall be written and maintained to cover the following topics as a minimum;

4.7.4.1 Packaging of waste in shipping containers.

4.7.4.2 Documentation of container contents, radiological data, container qualification, and volume.

4.8 Non-Compressible Wastes

4.8.1 Contaminated and potentially contaminated non-compressible wastes are collected from various areas in the Auxiliary Building, and are normally taken to the Drumming Rooms.

4.8.2 The waste is segregated to remove reusable materials and materials which would be in non-compliance with Federal and Burial Site Regulations.

4.8.3 The waste may be handled either of two ways;

4.8.3.1 Packaged in qualified shipping containers for burial, or

4.8.3.2 Packaged and shipped to a contracted radwaste processor for further processing, volume reduction, packaging, and eventual shipment to a burial site.

4.8.4 Procedures shall be written and maintained to cover the following topics as a minimum;

4.8.4.1 Packaging of non-compressible waste in shipping containers.

4.8.4.2 Documentation of container contents, radiological data, container qualification, and volume.

4.9 Waste Filters

4.9.1 Absolute air filters and HEPA filters may be processed as compressible and/or non-compressible wastes.

4.9.2 Filters with an activity of <1.0 μCi/cc of all radioisotopes with a halflife of >5 years, may be handled as compressible or non-compressible wastes.

4.9.3 Filters with an activity of >1.0 μCi/cc of all radioisotopes with a halflife of >5 years, must be stabilized prior to shipment for disposal.

4.9.4 Once changed, the waste filters are normally placed in a drum and stored until they are packaged for shipment.

4.9.5 At the time of final packaging for shipment, the filter shall be verified free of water.

4.9.6 Liquid process filters shall be packaged for shipment only in qualified shipping containers.

4.9.7 The container selected to be used will be selected taking into consideration the volume of filters to be disposed of, dewatering or solidification requirements, and stability requirements as defined by 10CFR61.

4.9.8 Procedures shall be written and maintained to cover the following topics as a minimum;

4.9.8.1 Venting, draining, and changing of liquid process filters.

4.10 Stabilization of Unstable Wastes

4.10.1 Class A waste with a total activity of ≥ 1.0 μCi/cc, and all Class B and C waste must be stabilized in accordance with 10 CFR61 and the applicable burial site criteria.

4.10.2 Stabilization shall be achieved by packaging the waste in approved high integrity containers or by using an approved solidification process.

5.0 REPORTING

5.1 Documentation

5.1.1 Documentation shall be maintained for the following topics;

5.1.1.1 Radiological data associated with each waste package.

5.1.1.2 Package contents.

5.1.1.3 Processed waste effluents released to the environment, (i.e., liquid releases . . .).

5.1.1.4 Solidification data.

5.1.1.5 Dewatering data.

5.1.1.6 Weights and/or volumes of waste packaged.

5.2 ~~An annual~~ effluent report shall be sent to the NRC annually. This report shall include the following information for each type of solid waste shipped off-site during the report period;

5.2.1 Volume (cubic meters),

5.2.2 Total curie quantity (specify whether determined by measurement or estimate),

5.2.3 Principle radionuclides (specify whether determined by measurement or estimate),

5.2.4 Type of waste (e.g., spent resin, compacted dry waste, evaporator bottoms),

5.2.5 Type of container (e.g., LSA, Type A, Type B, Large Quantity),

5.2.6 Solidification agent (e.g., cement).

5.3 An Annual Operating Report shall be sent to the NRC annually. This report shall include the following information regarding major changes to the Solid Rad Waste Treatment Systems initiated by the Plant;

5.3.1 A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR 50.59;

5.3.2 Sufficient detailed information to totally support the reason for the change without benefit of additional or supplemental information;

5.3.3 A detailed description of the equipment, components and processes involved and the interfaces with other plant systems;

5.3.4 An evaluation of the change which shows the predicted quantity of solid waste that differ from those previously predicted in the license application and amendments thereto;

5.3.5 An evaluation of the change which shows the expected maximum exposure to individuals in the unrestricted area and to the general population that differ from those previously estimated in the license application and amendments thereto;

5.3.6 A comparison of the predicted releases of radioactive materials in solid wastes to the actual releases for the period prior to when the changes are to be made;

5.3.7 An estimate of the exposure to plant operating personnel as a result of the change; and

5.3.8 Documentation of the fact that the change was reviewed and found acceptable by the PNSRC.

5.4 For Commission initiated changes to the Solid Rad Waste Treatment System, the applicability of the change to the facility shall be determined by the PNSRC after consideration of the facility design, and the Plant shall provide the Commission with written notification of its determination of applicability including any necessary revisions to reflect facility design.

RESPONSIBILITIES FOR THE PROCESSING OF LIQUID WASTES AND THEIR BY-PRODUCT WASTES

PROCESS	PERFORMED BY	PROCEDURES FOR PROCESS MAINTAINED BY	SUPERVISED AND/OR VERIFIED BY
Operate Rad Waste Evaporator	Operations	Operations	Shift Supervisor/Ass. SS - Operations
Transfer Evaporator Bottoms	Operations	Operations	Shift Supervisor/Ass. SS - Operations
Monitor Chemical and Rad Activity Parameters of Rad Waste Demineralizers	Chemistry	Chemistry	Chemistry Supervisor/ Rad Material Control
Operate Rad Waste Demineralizers	Rad Material Control	Rad Material Control	Rad Material Control
Monitor Rad Activity Parameters of Rad Waste Demineralizers	Chemistry	Chemistry	Chemistry Supervisor/ Rad Material Control
Sluice Rad Waste Demineralizer Resins	Rad Material Control	Rad Material Control	Rad Material Control
Packaging of Rad Waste Demineralizer Resins	Rad Material Control	Rad Material Control	Rad Material Control
Packaging of Waste Evaporator Bottoms	Rad Material Control	Rad Material Control	Rad Material Control
Solidification of Waste Evaporator Bottoms	Rad Material Control	Rad Material Control	Rad Material Control
Test Solidifications	Rad Material Control	Rad Material Control	Rad Material Control
Verification of Test Solidifications	Rad Material Control	Rad Material Control	Rad Material Control
Verification of Solidifications	Rad Material Control	Rad Material Control	Rad Material Control
Determine Curie Content of Packages	Rad Material Control	Rad Material Control	Rad Material Control

RESPONSIBILITIES FOR THE TRANSFER AND PROCESSING OF SPENT RESINS

PROCESS	PERFORMED BY	PROCEDURES FOR PROCESS MAINTAINED BY	SUPERVISED AND/OR VERIFIED BY
Sluice Resin from Plant Demineralizer to SRST	Operations	Operations	S - Operations V - Radiation Prot.
Sluice Resin from Plant Demineralizer to a HIC	Operations	Operations	S - Operations V - Radiation Prot./ Rad Material Control
Sluice Resin from SRST to a HIC	Rad Material Control	Rad Material Control	Rad Material Control
Dewatering Using Installed Drain System	Rad Material Control	Rad Material Control	Rad Material Control
Dewatering Using Heat Enhanced Method	Rad Material Control	Rad Material Control	Rad Material Control
Dewatering Verifications	Rad Material Control	Rad Material Control	Rad Material Control
Sampling of Resin	Rad Material Control	Rad Material Control	Rad Material Control
Quantitative and Qualitative Isotopic Analysis of Waste Resin	Chemistry	Chemistry	Chemistry
Determine Curie Content of the Packages	Rad Material Control	Rad Material Control	Rad Material Control

RESPONSIBILITIES FOR THE PROCESSING OF COMPRESSIBLE AND NON-COMPRESSIBLE WASTES

PROCESS	PERFORMED BY	PROCEDURES FOR PROCESS MAINTAINED BY	SUPERVISED AND/OR VERIFIED BY
Collection and Transfer of Control/RP Waste to Processing Area	Rad Material Control/RP	Rad Material Control/RP	Rad Material
Segregation of Non-Compliance Materials	Rad Material Control	Rad Material Control	Rad Material Control
Compaction of Compressible Waste	Rad Material Control	Rad Material Control	Rad Material Control
Packaging for Shipment to a Processor	Rad Material Control	Rad Material Control	Rad Material Control
Packaging of Non-Compressibles for Burial	Rad Material Control	Rad Material Control	Rad Material Control
Isotopic Analysis of Waste	Chemistry/RP	Chemistry/RP	Chemistry/RP
Determine Curie Content of Package	Rad Material Control	Rad Material Control	Rad Material Control

RESPONSIBILITIES FOR THE PROCESSING OF CONTAMINATED WASTE OIL

PROCESS	PERFORMED BY	PROCEDURES FOR PROCESS MAINTAINED BY	SUPERVISED AND/OR VERIFIED BY
Transfer of Oil to Heating Boiler Storage Tank	Rad Material Control/ Maintenance/ Construction	Rad Material Control	Rad Material Control
Isotopic Analysis of Oil	Chemistry	Chemistry	Chemistry
Activity Released Determination	Rad Material Control	Rad Material Control	Rad Material Control

RESPONSIBILITIES FOR THE PROCESSING OF WASTE FILTERS

PROCESS	PERFORMED BY	PROCEDURES FOR PROCESS MAINTAINED BY	SUPERVISED AND/OR VERIFIED BY
Venting and Draining of Filter Housing	Operations	Operations	Operations
Changeout and Transfer of Filter	RP	RP	RP/ Radiation Protection
Packaging of Filters for Shipment	Rad Material Control	Rad Material Control	Rad Material Control
Isotopic Analysis of Filter	Chemistry/RP	Chemistry/RP	Chemistry/RP
Verification of Filter Drainage	Rad Material Control	Rad Material Control	Rad Material Control
Determine Curie Content of Package	Rad Material Control	Rad Material Control	Rad Material Control

MIXED WASTE PROGRAM

1.0 Purpose

1.1 This program is designed to establish guidelines and procedural requirements which will provide adequate assurance that the plant is in compliance with current restrictions on the burial of low-level radioactive waste mixed with hazardous materials. These requirements are applicable to all radioactive wastes packaged for burial.

2.0 Policy

2.1 All chemicals used within the controlled area of the plant will be utilized in accordance with PMI-2160, which includes restrictions on their disposal.

3.0 Definitions

3.1 Mixed Waste - Mixed low-level radioactive and hazardous waste (mixed waste) is waste that satisfies the definition of low-level radioactive waste (LLW) in the Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPAA) and contains hazardous waste that either (1) is listed as a hazardous waste in Subpart D of 40 CFR Part 261 or (2) causes the LLW to exhibit any of the hazardous waste characteristics identified in Subpart C of 40 CFR Part 261.

3.2 Hazardous Characteristics - The four characteristics that a waste may exhibit that result in it being classified as a hazardous waste are: ignitability (Part 261.21); corrosivity (Part 261.22); reactivity (Part 261.23); and EP toxicity (Part 261.24).

4.0 Identification of Mixed Waste

4.1 Determine which waste streams have the potential for containing mixed waste. This determination should be done by applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.

4.2 Determine whether the radioactive waste contains any hazardous wastes specifically listed in Subpart D of 40 CFR Part 261, from PMI-2160, Chemical Permits.

4.3 Determine whether the radioactive waste contains hazardous waste that causes the waste to exhibit any of the hazardous waste characteristics identified in Subpart C of 40 CFR 261 by collecting representative samples for testing.

4.4 Samples shall be processed into their normal form for transportation and burial. For example, sludges are solidified for burial so the sample should be solidified prior to testing. The parameters used to solidify the sample should be the same as would be used for full scale processing.

4.5 Have the final waste form samples analyzed for a particular hazardous chemical if one has been identified in 4.3, or for the hazardous characteristics of 4.4.

4.6 If the analysis results in the waste not being classified as a mixed waste it may be disposed under normal plant procedures.

4.7 If the analysis results in the waste being classified as a mixed waste it should be held on site until such time that an appropriate disposal facility is available, unless approved per Section 6.0.

5.0 Sampling Frequency

5.1 As a minimum, samples of radwaste resin, evaporator concentrates and sludges, if available, should be collected annually and sent offsite for RCRA Waste Characterization.

6.0 Exceptions

6.1 The Barnwell burial site (licensee: Chem. Nuclear) may receive waste that has been treated by acceptable methods to render it non-hazardous and therefore not subject to the jurisdiction of the Resources Conservation and Recovery Act (RCRA). Waste which may contain discreet quantities of hazardous or toxic materials may be evaluated for disposal by Chem-Nuclear and such evaluations provided to the South Carolina Department of Health and Environmental Control (DHEC) for consideration of approval.

PARAMETERS FOR THE OPERATION OF THE WASTE EVAPORATOR SYSTEM

The limit of volume reduction for the Waste Evaporator System is dependent on the concentration of various chemical and radiochemical parameters.

The boron concentration should be kept within the limits listed in Table 1, to prevent crystallization of boron in the evaporator package. If the boron concentration increases above this limit, sodium hydroxide should be added to maintain an acceptable pH and to convert the boric acid to a more soluble form.

The concentration of chlorides should be kept below the limit listed in Table 1. Chlorides must be controlled to prevent corrosion of the evaporator's internal components.

The gross ßγ activity of the evaporator bottoms should be kept below the limit listed in Table 1. The activity is maintained, to insure that the evaporator bottoms may be solidified and shipped in compliance with applicable regulations.

Samples will be taken periodically by the Chemistry Section during waste evaporator operation to monitor these chemical and radiochemical parameters.

Prior to attempting solidification of waste evaporator bottoms, the bottoms should be sampled and found to be within the limits listed in Table 2.

TABLE 1

Boron Concentration	- ≤ 25,000 ppm
pH	- 7.4 - 9.2
Gross ßγ Total	- < 0.2 µCi/cc
Chlorides	- ≤ 10,000 ppm

TABLE 2

Boron Concentration	- 0 - 40,000 ppm
pH	- 7.4 - 9.2 or > 11.5
*Radionuclides with A < 0.05	- 1.0E-4 µCi/gm
*Radionuclides with A > 0.05 and < 1.0	- 5.0E-3 µCi/gm
*Radionuclides with A > 1.0	- 3.0E-1 µCi/gm
Chlorides	- 0 - 10,000 ppm

*A defined in 10 CFR 71, Appendix A.