NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION

ADMINISTRATIVE PROCEDURE

AP-3.7.1

REVISION 05

UNIT 2 RADWASTE PROCESS CONTROL PROGRAM

Approved By: _____ 5/2/91
M. J. McCormick, Jr. Plant Manager, Unit 2 Date

Effective Date: 5/10/91

NOT TO BE USED AFTER May 1993
SUBJECT TO PERIODIC REVIEW

Procedure Information

4/19/91

The attached procedure is routed for your signature.

Procedure No.: AP-3.7.1	Revision: 5
M J McCormick	

Ownership Department Supervisor: Bryan Buck

The attached procedure has been approved. Please arrange for training as required in accordance with AP-2.0, Section 7.2.1, and assign an effective date.

When assigning an effective date, please add **at least 3 working days** for Procedures Department to process.

If this procedure has an "emergency" status, assign the appropriate effective date and fill out section below. To ensure timely delivery, place procedures in appropriate "Hand Carry" tray located in the various mail rooms.

This procedure cannot be given three (3) working days for processing due to: N/A

Please perform the following before assigning an effective date:

1. Check master copy and make sure that all TCN's are incorporated.
2. Whenever TCN's are incorporated in a procedure make sure that the cover sheet has the statement "This revision supercedes TCN's N/A " and state the TCN numbers.
3. State the system expert: B. Buck
4. State if procedure is upgraded per Site Writers Guide..... ☑ Yes ☐ No
5. State if procedure is safety related..... ☐ Yes ☑ No
6. State if procedure is Tech Spec related..... ☑ Yes ☐ No
7. State if procedure satisfies EQ requirements..... ☐ Yes ☑ No

RECEIVED
MAY 3 1991
PROCEDURES DEPT.

Effective Date: 5-10-91

ODH or Designee

Signature	Printed Name
for R Buck	GEORGE Patterson

Please Return to Procedures

TECHNICAL REVIEW AND CONTROL

EVALUATION OF NEED FOR SAFETY ANALYSIS IN ACCORDANCE WITH 10 CFR 50.59

(Documents that require Plant Manager Approval per Tech Spec 6.8)

For Document No. AP-37.1 Revision No. 05 Date 4/19/91

The Author (A) and five SORC members (Minimum — 3 regular members, 2 alternates) are to respond to each of the questions below.

		No	Yes*
Does the document / revision result in a change to the facility or procedures described in the FSAR?	A	☑	☐
	1	☐	☐
	2	☐	☐
	3	☐	☐
	4	☐	☐
	5	☐	☐
Does the document / revision deviate from compliance to Tech Specs, or is the margin of safety defined in the basis reduced?	A	☑	☐
	1	☐	☐
	2	☐	☐
	3	☐	☐
	4	☐	☐
	5	☐	☐
Does the document / revision increase the probability of occurrence, or the consequences of an accident, or malfunction of equipment important to safety (Class 1) evaluated in the FSAR increased?	A	☑	☐
	1	☐	☐
	2	☐	☐
	3	☐	☐
	4	☐	☐
	5	☐	☐
Does the document / revision create the possibility for an accident or malfunction of a different type than any evaluated in the FSAR?	A	☑	☐
	1	☐	☐
	2	☐	☐
	3	☐	☐
	4	☐	☐
	5	☐	☐

* A "MAYBE" constitutes a "YES" response.

SORC MEMBERS RECOMMENDATIONS TO PLANT MANAGER	1	2	3	4	5
Recommend Nuclear Engineering & Tech Support perform a safety ANALYSIS to present to SORC (noted by a "YES" response to any of the above questions).	☐	☐	☐	☐	☐
Recommend full SORC committee review this Evaluation of Need for Safety Analysis.	☐	☐	☐	☐	☐
Recommend Approval — This document does not involve an unreviewed safety question.	☐	☐	☐	☐	☐

SORC Member Signatures / Date

1 _____ /

2 Approved at SORMT /

3 _____ /

4 _____ /

5 _____ /

SORC Meeting No. (if required) 91-49

UNIT 2

(AP-3.0, Form 1, Rev 0) Page 1 of 2

TECHNICAL REVIEW AND CONTROL
SUMMARY

Document No. AP-3.7.1 **Rev. No.** 05 *** Prd Rev, NC** ☐

Title UNIT 2 RADWASTE PROCESS CONTROL PROGRAM

Author TERRY F. SYRELL **Date** 4/17/91

Description of Changes (Itemize the nature / reason of general changes)

See attached Procedure Development Form

Modification Related Changes? Yes ☐ No ☒ Mod. Control No.:

* If a periodic review with no changes (Prd Rev, NC), use the last published revision number and continue review process.

Intradisciplinary Review (minimum of one person required)

Dept. Name	Title	Signature	Date
RADWASTE OPS	GEN SUPV		4.18.91

Cross Disciplinary Review (if not required, use lines for justification statement)

Dept. Name	Title	Signature	Date
CROSS DISCIPLINARY REVIEW IS NOT REQUIRED BASED ON LIMITED SCOPE OF CHANGES.			
		T.F. SYRELL 4/17/91	

If not in concurrence, do not sign but return document to the author with comments.

Routed to Quality Assurance for review (Req'd for APs, EOPs, and SOPs): Yes ☒ N/R ☐

Q.A. Representative _____ Date 4-22-91 & comments are attached ☐

Q.A. Rep (for Site) _____ Date 4/22/91 & comments ☐

Routed to A.L.A.R.A. for review: Yes ☐ No ☒ If No, reason: Personnel exposure will not be increased, Radiological conditions will not be adversly affected, the amount of Radwaste will not be increas

A.L.A.R.A. Representative N/A Date N/A & comments are attached ☐

A.L.A.R.A. Rep (for Site) N/A Date N/A & comments ☐

>>>>>>>>>>>>>>Route To Author / Unit Supervisor

Safety Analysis Required? No ☑ Yes ☐ (See Attached)

If Yes, Analysis assigned to: Site ☐, or to Engineering ☐, Date:

Review of the subject document has been completed and approval is recommended. ☑
(Approvers shall signify approval on the procedure cover sheet)

Document held for SORC (Meeting No. 91-49 **). Approved, Yes** ☑ **No** ☐.

Ownership Dept. Supv. _____ **Dept.** RADWASTE **Date** 4.18.91

TECHNICAL REVIEW AND CONTROL
REFERENCE DOCUMENTS

The items entered below have been included in the preparation and/or review of the attached reference document and are presented in place of a specific check sheet for the document.

The following persons were consulted about this procedure:

NAME	TITLE	BY
BRIAN BOCK	SUPV. RADWASTE	TFS

Procedure is in compliance with the following Technical Specifications and Bases:

SECTION	AMENDMENT	BY
6.5.2.11	28	TFS
LIMITED SCOPE OF CHANGES, DO NOT AFFECT TECH. SPECS.		
3.11.3	28	TFS

Compliance with: CFR / US-NRC

REGULATORY GUIDE (S)	DATED	BY
LIMITED SCOPE OF CHANGES DO NOT IMPACT CFR REQUIREMENTS		

Compliance with:

ANSI STANDARD (S)	DATED	BY
ANSI/ANS 55.1	1979	TFS

Compliance with: ASME Boiler and Pressure Vessel Code (s)

SECTION	DATE	ADDENDUM	BY
N/A			

Is consistent with the following Station or Site Procedures:

NUMBER	REV	BY
AP-2.0	21	TFS
AI-1.0	3	TFS
NIP-ECA-01	2	TFS

Other Information Sources Consulted

	BY
QATR-1	TFS
1	

Compliance with:

FSAR / USAR REQUIREMENTS	DATED	BY
LIMITED SCOPE OF CHANGES DO NOT AFFECT FSAR/USAR		
REQUIREMENTS		

Procedure Evaluation Forms Closed Out By This Revision

PEF NUMBER	BY
N/A	

PEF NUMBER	BY
N/A	

AUTHOR TERRY F. SYKES **DATE** 4/17/91

REVIEWED BY [signature] **DATE** 4/17/91

COMMENTS

TECHNICAL REVIEW AND CONTROL
REVIEW CHECK LIST
To be prepared by Author

Check List for Document No. AP-3.7.1 Rev. 05 Date 4/17/91

"√" Only boxes that apply	Yes	N/A
All references needed to implement the procedure are clearly identified and available.	☑	☐
The procedure contains adequate equipment lists, precautions and limitations, prerequisites, graphs, diagrams or data sheets as required	☑	☐
Surveillance and Maintenance Procedure utilizes PLANT IMPACT statement associated with approval / permission for use.	☐	☑
As appropriate, procedure addresses use of MARKUPs.	☐	☑
If appropriate, procedure requires use of fire protection measures (ie., burning permits, etc.).	☐	☑
If leads are lifted, jumpers placed or blocks used in the procedure, the PLANT IMPACT statement acknowledges such use.	☐	☑
As appropriate, procedure notifies other affected departments, such as Q.I., Operations, Maintenance, and Rad Protection.	☐	☑
If Technical Specification is exceeded, appropriate action is identified.	☐	☑
The procedure references valve numbers, motor control numbers, power supplies. Instrumentation identification is clear and correct.	☐	☑
When encountered, E.Q. related equipment is identified as such.	☐	☑
Procedure steps are clear and accurate. They are not unnecessarily difficult to implement.	☑	☐
The procedure reflects the latest system or component configuration.	☑	☐
The procedure reflects work as it is to be done at the station.	☑	☐
Procedure removes any jumpers or blocks and restores lifted leads used to effect the work.	☐	☑
"RETURN TO SERVICE" uses double verification and identifies specifics being verified.	☐	☑
For maintenance procedures, "RETURN TO SERVICE" either performs a POST MAINTENANCE TEST or references a required test.	☐	☑
MARKUPs are cleared or surrendered.	☐	☑
"ACCEPTANCE CRITERIA" identifies accomplishment of specific goals.	☐	☑
Technical Specifications, Bases, USAR/FSAR and applicable Regulatory Guides have been reviewed for Compliance	☑	☐

Forms Prepared By TERRY F. SYRELL Date 4/17/91

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION

ADMINISTRATIVE PROCEDURE

AP-3.7.1

REVISION 05

UNIT 2 RADWASTE PROCESS CONTROL PROGRAM

Approved By:
M. J. McCormick, Jr. Plant Manager, Unit 2 — Date 5/2/91

Effective Date: 5/10/91

NOT TO BE USED AFTER May 1993
SUBJECT TO PERIODIC REVIEW

LIST OF EFFECTIVE PAGES

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TABLE OF CONTENTS

1.0 PURPOSE

1.0.1 To describe the methods for processing, packaging and transportation of low-level radioactive waste and provide assurance of complete solidification of various radioactive "wet wastes" in accordance with applicable NRC regulations and guidelines.

1.0.2 To satisfy the Nuclear Regulatory Commission's Low-Level Waste and Uranium Recovery Projects Branch (WMLU) requirement and establish process parameters within which the Werner & Pfleiderer Corporation Volume Reduction System (WPC-VRS) must be operated to ensure complete solidification.

1.0.3 Waste process under this program using asphalt as the media is limited to Class A Waste.

NOTE: Conformance with WMLU requirements provides assurance that the requirements identified in 10CFR61, Sub Part D, Technical Requirements for Land Disposal Facilities and Final Waste Classification and Waste Form Technical Position Papers, which requires that Class A Waste shall be a free standing monolith with < .05 % free standing liquid.

1.1 Applicability

This procedure applies to the Unit 2 Radwaste Process Control Program for solidification and transportation of radioactive waste.

2.0 REFERENCES AND COMMITMENTS

2.1 Licensee Documentation

2.1.1 QATR-1, Quality Assurance Program Topical Report for Nine Mile Point Nuclear Station Operations, Section 17.0, Quality Assurance Records

2.1.2 Unit 2 Technical Specifications:

a. Section 3.11.3-Action a, Solid Radioactive Wastes

b. Section 3.11.3-Action b, Solid Radioactive Wastes

c. Section 4.11.3.a, Solid Radioactive Wastes

d. Section 4.11.3.b, Solid Radioactive Wastes

e. Section 6.5.2.11, Review and Audit, Technical Review and Control Activities

2.1.2 (Cont)

f. Section 6.5.3.8.i, Review and Audit, Safety Review and Audit Board

g. Section 6.9.1.8, Semi-Annual Radioactive Effluent Release Report

h. Section 6.13, Process Control Program

2.2 Standards, Regulations, and Codes

2.2.1 ANSI/ANS 55.1, 1979, American National Standard for Solid Radioactive Waste Processing System for Light Water Cooled Reactor Plants

2.2.2 10CFR20.311, Transfer for Disposal and Manifest

2.2.3 10CFR20.311.d.3, Transfer for Disposal and Manifest

2.2.4 10CFR61, Sub Part D, Technical Requirements for Land Disposal Facilities and Final Waste Classification and Waste Form Technical Position Papers

2.2.5 10CFR61.55, Waste Classification

2.2.6 10CFR61.56, Waste Characteristics

2.2.7 10CFR71, Packaging and Transportation of Radioactive Material

2.2.8 49CFR173.1.b, Transportation

2.2.9 49CFR173.425, Transport Requirements for Low Specific Activity (LSA) Radioactive Materials

2.2.10 NUREG-0123, Standard Radiological Effluent Technical Specifications for Boiling Water Reactors

2.2.11 NUREG-0800,

a. Section 11.2, Standard Review Plan for Liquid Waste Management Systems

b. Section 11.4, Standard Review Plan for Solid Waste Management Systems

2.2.12 Resource Conservation and Recovery Act (RCRA) of 1976 (Ref. Corporate Guide to Hazardous Waste Disposal and Spill Reporting)

2.2.13 Regulatory Guide 1.143, Rev. 0, Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light Water Cooled Nuclear Power Plants

2.3 Policies, Programs, and Procedures

2.3.1 NIP-ECA-01, Deviation Event Report

2.3.2 AP-2.0, Production and Control of Procedures

2.3.3 AP-3.3.1, Site ALARA Program

2.3.4 AP-7.2, Control of Material Storage Areas

2.3.5 AP-9.0, Administration of Training

2.3.6 AP-10.1, Management of Station Records

2.3.7 N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2

2.3.8 N2-OP-41, Asphalt Solidification Operating Procedure

2.3.9 N2-NTP-13, Nuclear Department Training Manual

2.3.10 N2-WHP-1, Required Documents Concerning Packaging and Shipping of Radioactive Wastes

2.3.11 N2-WHP-2, Paperwork for a Radioactive Waste Shipment

2.3.12 N2-WHP-4, Cask Loading Procedure

2.3.13 N2-WHP-8B, Flatbed Loading Procedure

2.3.14 N2-WHP-9, Asphalt Solidification

2.3.15 N2-WHP-9A, Operating Procedure Vendor Solidification

2.3.16 N2-WHP-9B, Process Control LN Cement Solidification

2.3.17 N2-WHP-10A, Process Control Oil/Cement Solidification Procedure

2.3.18 N2-WHP-10B, Cement/Oil Solidification Procedure

2.3.19 N2-WHP-11, Process Control Dry Solid Waste

2.3.20 N2-WHP-12, Solid Dry Waste Collection and Compaction

2.3.21 N2-WHP-14, Solidified Liner Inspection Program

2.3.22 NTP-1, Training and Continued Training of Chemistry and Radiochemistry Technicians

2.3.23 NTP-13, Training and Continued Training of Radwaste Operators

2.3.24 NTP-14, Training and Continued Training of Radiation Protection Technicians

2.3.25 S-RPIP-7.1, Movement and Storage of Radioactive Material on Site

2.3.26 S-RPIP-7.2, Receipt of Radioactive Material

2.3.27 S-RPIP-7.3, Determination of Shipment Type

2.3.28 S-RPIP-7.4, Cask Shipments

2.3.29 S-RPIP-7.5, Van/Flatbed Shipments

2.3.30 S-RPIP-7.6, Activated Materials Shipments

2.3.31 S-RPIP-7.7, Non-Waste Radioactive Shipments

2.3.32 S-RPIP-7.8, Shipping Documents

2.4 Supplemental References

2.4.1 South Carolina Department of Health and Environmental Control, Radioactive Material License 097, as amended

2.4.2 State of Washington Radioactive Material License No. WN-I019-2, as amended

2.4.3 Werner and Pfleiderer Corporation Topical Report No. WPC-VRS-001, November 1976, Rev. 1, May 1978, Appendix B, Solid Content

2.4.4 NRC Special Nuclear Material License No. 12-13536-02, as amended, for Barnwell, SC

2.4.5 NRC Special Nuclear Material License No. 16-19204-01, as amended, for Richland, WA

2.4.6 Nuclear Regulatory Commission Branch Technical Position on Waste Classification and Waste Form, May 1983

2.5 Commitments

Sequence Number	NCTS Number	Description

None

3.0 DEFINITIONS

3.1 Class "A" Waste

Waste usually segregated from other waste classes at the disposal site. The physical form and characteristics shall meet the minimum requirements of 10CFR61.56, Waste Characteristics.

3.2 Class "B" Waste

Waste meeting more rigorous waste form requirements to ensure stability after disposal. Class B waste form shall meet both the minimum and stability requirements of 10CFR61.56, Waste Characteristics.

3.3 Class "C" Waste

Waste meeting Class B standards and requiring additional measures at the disposal facility to prevent inadvertent intrusion.

4.0 RESPONSIBILITIES

4.1 Plant Manager

The Plant Manager shall:

4.1.1 Review and approve changes to the Unit 2 Radwaste Process Control Program in accordance with Unit 2 Technical Specification, Section 6.5.2.11, Review and Audit, Technical Review and Control Activities.

4.1.2 Ensure the Unit 2 Radwaste Process Control Program provides for the health and safety of the general public as it applies to Radwaste Management.

4.2 General Supervisor Radwaste

The General Supervisor Radwaste shall:

4.2.1 Implement the Radwaste Process Control Program.

4.2.2 Interface with the Manager Chemistry on matters concerning radwaste processing and disposal, as required.

4.2.3 Interface with the Manager Radiation Protection on matters concerning radwaste processing and disposal, as required.

4.2.4 Supervise activities related to radwaste collection, processing, packaging, storage, transportation, and disposal.

4.2.5 Review Radwaste Process Control Program implementing procedures to ensure validity of technical content and compliance with applicable Federal and State Regulations, Technical Specifications, Company Policies, and the Station Operating License.

4.2.6 Ensure compliance with Federal and State Regulations governing the transportation and disposal of radioactive material.

4.2.7 Ensure Radwaste Operators complete required training and qualification and maintain proficiency, as required.

4.3 Manager Chemistry

The Manager Chemistry shall:

4.3.1 Interface with the General Supervisor Radwaste on matters concerning radwaste processing and disposal, as required.

4.3.2 Ensure Chemistry Technicians complete required training and qualification and maintain proficiency, as required.

4.3.3 Ensure Chemistry Technicians calculate and determine Waste-to-Asphalt flow rates and contents in accordance with established procedures.

4.4 Manager Radiation Protection

The Manager Radiation Protection shall:

4.4.1 Interface with the General Supervisor Radwaste on matters concerning radwaste processing and disposal, as required.

4.4.2 Ensure Radiation Protection Technicians complete required training and qualification and maintain proficiency, as required.

4.5 Chemistry Technician

Chemistry Technicians shall perform analysis of radioactive waste samples.

4.6 Radiation Protection Technician

Radiation Protection Technicians shall perform radiological controls monitoring on radwaste shipments.

4.7 Radwaste Operator

Radwaste Operators shall perform operations associated with radwaste processing.

5.0 PROCEDURE

5.1 System Description

5.1.1 General

a. The Solid Waste Management System (SWMS), implemented by the procedures identified in the Unit 2 Radwaste Process Control Program Implementing Procedures (Attachment 1) collects, reduces the volume, solidifies, and packages wet and dry types of radioactive waste in preparation for shipment off-site to a licensed burial site.

b. Types of solid waste sources are identified in Solid Waste Sources (Attachment 2).

c. Radwaste Process Control Flowpath (Attachment 3) and System Flow Schematic (Attachment 4) are provided for the Unit 2 SWMS.

d. The Solid Waste Management System accepts dry solid trash which is, when physically possible, compacted with a trash compactor.

e. Bead resins or powdered resins are dewatered in high integrity containers or processed along with evaporator bottoms through the extruder evaporator.

f. When required, Unit 2 will use the services of a vendor to solidify waste.

5.1.2 Extruder/Evaporator

a. The extruder/evaporator is a one-step volume reduction and solidification process.

b. Two screws inside the twin screw extruder/evaporator convey the waste/asphalt mixture along the length, continually shearing and mixing the waste/asphalt.

c. The screw speed can be regulated to control the evaporating capacity and residence time of the waste.

d. The extruder/evaporator discharges a homogeneous mixture of asphalt and waste containing NO free standing water.

e. The solid radwaste system uses the extruder/ evaporator to process waste fed from two inputs; the evaporator bottoms tank or the waste sludge tank. The waste is mixed with asphalt in the extruder. Only one waste feed path can be processed at a time.

5.1.2 (Cont)

f. Operation of the extruder/evaporator is detailed in N2-OP-41, Asphalt Solidification Operating Procedure.

5.1.3 Evaporator Bottoms Tank

a. The evaporator bottoms tank and lines are electrically heat traced to prevent crystallization of waste salts.

b. The contents of the tank are fed to the extruder/evaporator via a transfer pump that supplies redundant metering pumps.

c. The waste flow rate is controlled manually by adjusting the flow rates on the metering pumps.

5.1.4 Waste Sludge Tank

a. The contents of the waste sludge tank are fed to the extruder/evaporator by a separate system from the evaporator bottoms feed system. This system has redundant waste sludge metering pumps.

b. The waste sludge tank is supplied by waste from three sources: the radwaste filters, the floor drain filter, and the spent resin tank.

c. The waste flow rate is controlled manually by adjusting the flow rates on the metering pumps.

d. The waste sludge tank has the ability for decantation. A decant pump takes a suction off the sludge tank and discharges to the spent resin tank.

5.1.5 Asphalt Tank

a. The contents of the asphalt tank is fed to the extruder/evaporator via redundant recirculation pumps, strainers, and metering pumps.

b. The asphalt flow rate is automatically adjusted to yield the proper ratio of asphalt to solids.

c. The asphalt tank and lines are continuously steam heated to keep the asphalt in a liquid state for ease in pumping.

5.1.6 Electric Radwaste Boiler

a. As the waste/asphalt mixture moves through the extruder/evaporator, the mixture is heated by steam from the electric radwaste boiler.

b. The boiler is a skid mounted boiler system which uses electricity for steam production.

c. The boiler is a closed system, therefore, most of the water used for steam is returned to the boiler as condensate via the boiler feedwater system.

d. The boiling vessel is capable of supplying 1400#/hr of steam at 233 psig and 400°F.

e. The steam applied to the extruder is used in six separate heating zones for moisture evaporation.

f. Each zone has a separate temperature controller for optimum operating conditions.

5.1.7 Devolatization Ports

a. Three devolatization ports along the extruder allow for water vapor to separate from the product and enter the three steam domes.

b. A predetermined amount (4 gal.) of demineralized water is used, which dissolves and boils out salt sediment at the devolatization port.

c. The vapors are condensed in the steam domes using turbine building closed loop cooling and drained to the distillate collection system.

5.1.8 Distillate Collection System

a. The distillate collection system is a recirculating system used to continuously filter and cool the condensate from the extruder/evaporator steam domes.

b. The condensate is recirculated from the distillate collection tank through the distillate pumps, roughing filter, and the distillate cooler, then routed back to the collection tank.

c. The level controller maintains collection tank level and system flow.

5.1.9 Ventilation System

a. A forced circulation ventilation system is incorporated into this system.

b. The system consists of a vent hood over the extruder/evaporator turntable, a fan which draws air from the plant ventilation system across the extruder/evaporator turntable, and liner cool down areas.

5.1.10 Liners

a. The extruder/evaporator product empties into 50 cubic feet liners.

b. The liners are placed on the fill station turntable. The operator indexes (turns) the turntable via a control switch, placing a liner under the discharge chute of the extruder/evaporator.

c. The turntable holds three liners. When the liner level reaches a predetermined level, a high level alarm sounds to inform the operator it is time to index the container.

d. Liners are indexed without shutting down the extruder/evaporator. Using control switches, the operator, via a pneumatic carrier, extends a drip pan under the extruder/evaporator discharge chute. The operator then indexes the turntable.

e. Once the new liner is in place under the extruder/evaporator discharge chute, the pneumatically operated carrier is withdrawn.

f. During this withdrawal operation, the drip pan is removed from the carrier by a stationary arm as the carrier retracts past the arm and drops the drip pan into the new liner.

5.1.11 Crane

a. Full liners are removed from the turntable to the cooldown area via a radio controlled/operated crane.

b. After cooldown is completed, the liners are moved by crane to the storage area using a ceiling grid coordinated system for placement of the liner.

c. When the liners are to be shipped, the liners are moved to the capping station and capped just before shipment then loaded for transportation to the burial location.

5.2 Asphalt Volume Reduction System

5.2.1 Radwaste Operators shall ensure proper equipment is available before beginning radwaste processing. Radwaste Operators may process wastes through the extruder/evaporator when the following equipment is operable:

a. Closed circuit television system at the asphalt loading stations

b. Calibrated temperature profile monitoring instrumentation

c. Operational asphalt and waste metering equipment

d. Solid radwaste sampling stations.

5.2.2 Variables Influencing End Product Properties

Radwaste Operators shall control the following variables to ensure the final waste product is a free standing monolith with essentially NO free standing water:

a. Asphalt type

b. Waste chemical species being incorporated into the asphalt matrix/water content

c. Ratio of waste-to-asphalt

d. Process temperature

e. Additional process variables, such as pH, that do NOT affect the ability of the waste product to form a solid free standing monolith upon cooling.

5.2.3 Asphalt Type

Radwaste Operators shall:

a. Use an oxidized petroleum-based asphalt, conforming to ASTM-D-312-71, Type III requirements with the following properties:

1. Has a low residual volatile content

2. Has a high molecular weight

3. At room temperature, or ambient conditions, is a free standing monolith

4. Specify Witco Pioneer 221, or an equivalent asphalt

5.2.3 (Cont)

NOTE: Consult Werner and Pfleiderer Corporation if an alternate asphalt material is to be used.

b. Ensure verification of asphalt type is conducted per N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2.

5.2.4 Waste Chemical Species

Radwaste Operators shall ensure:

a. Testing is performed to determine the oil content and physical properties of the waste to be solidified per N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2.

b. Adherence to the Werner and Pfleiderer limit of 1.0% oil and organic contaminants in the waste feed stream for process control.

NOTE: Type and relative quantity (waste-to-asphalt) of waste chemicals being incorporated in the asphalt matrix has a direct influence on the properties of the final product:

1. Encapsulation of inorganic salts and solids typically "stiffen" and harden the waste product.

2. Encapsulation of organic liquids typically softens the waste product.

5.2.5 Waste-to-Asphalt Ratio

Radwaste Operators shall use the following waste-to-asphalt ratios:

NOTE: Optimum values depend on type and quantity of contaminants present.

a. Evaporator Concentrates - 40/60 to 50/50

b. Spent Resins - 45/55 to 50/50

c. Filter Sludge - 40/60 to 50/50

NOTE: When the ratio of waste-to-asphalt is increased above the range specified above, the end product viscosity will increase and may exhibit a grainy texture. This could lead to "pyramiding" of the product in the container, thereby decreasing the container filling efficiency.

5.2.6 Waste-to-Asphalt Flow

a. Radwaste Operators shall set the initial proportion of waste-to-asphalt flow based on Chemistry Department calculations.

b. The Chemistry Department shall determine the solids content of the waste feed by sampling.

c. The Chemistry Department shall:

1. Determine the proper feed control settings in accordance with N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2, for flow rate calculations.

2. Calculate flow rates based on the information supplied in Werner and Pfleiderer Corporation Topical Report No. WPC-VRS-001, November 1976, Rev. 1, May 1978 - Appendix B Solid Content.

d. Radwaste Operators shall visually confirm the proper ratios are being maintained on the Solid Radwaste Control Panel.

1. A closed circuit television camera may be used to view the discharge from the extruder/evaporator.

2. The television monitor located in the control room allows observation of the physical consistency as the product is discharged into the container.

5.2.7 Process Temperature

Radwaste Operators shall:

a. Ensure a proper temperature profile is maintained along the length of the extruder/evaporator to provide adequate evaporative (process) capacity.

b. Ensure free water is NOT discharged from the machine.

5.2.7 (Cont)

NOTES:

1. Low temperature alarms are provided to alert the operator to a low temperature off-normal condition which could lead to the discharge of free water.

2. Low temperature alarms are typically based on a ±10°F deviation from setpoint. The above can be adjusted up to ±25% (±75°F) of the instrument range.

c. Adhere to the following (approximate) temperature profiles:

1. Evaporator Concentrates:

- Zone 1 165°F
- Zone 2 265°F
- Zone 3 300°F
- Zone 4 330°F
- Zone 5/6 375°F
- Zone 7 350°F.

2. Spent Resins, Filter Sludge:

- Zone 1 165°F
- Zone 2 265°F
- Zone 3 285°F
- Zone 4 300°F
- Zone 5/6 285°F
- Zone 7 230°F.

d. Log temperature profiles every two hours during equipment operating run time.

5.2.8 High Integrity Containers (HIC)

The General Supervisor Radwaste shall ensure:

a. High Integrity Containers (HIC) are used for dewatering to satisfy the stability requirements.

5.2.8 (Cont)

b. Each HIC is accompanied by a certificate of compliance.

c. Dewatering procedures based on an NRC approved vendor process control program or "Topical Report" are part of N2-WHP-4, Cask Loading Procedure.

d. Documentation of adherence to procedures are maintained as records.

5.2.9 Contaminated Oils

The General Supervisor Radwaste shall ensure:

a. Contaminated oils are stored in containers at designated areas within the plant.

b. A vendor with an approved process control program acceptable at the selected burial site is used to solidify the oil.

c. N2-WHP-10A, Process Control Oil/Cement Solidification Procedure, is used for operating the portable oil solidification system.

d. N2-WHP-10B, Cement/Oil Solidification Procedure, is used to sample production level.

5.2.10 Temporary Radwaste Processing

The General Supervisor Radwaste shall ensure:

a. The vendor is NRC approved and has demonstrated a commitment to 10CFR61, Sub Part D, Technical Requirements for Land Disposal Facilities and Final Waste Classification and Waste Form Technical Position Papers stability requirements.

b. The vendor has completed Class B and C waste testing or has provided a schedule of completion.

c. The vendor has an approved procedure to process Class A waste (Dewatering, Solidification).

d. Vendor procedures are acceptable if:

1. Vendor procedures are reviewed and approved in accordance with AP-2.0, Production and Control of Procedures.

2. A production sample level process control procedure is implemented.

5.2.10.d (Cont)

3. The vendor is provided samples in accordance with N2-OP-41, Asphalt Solidification Operating Procedure, and N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2.

5.2.11 Dry Active Waste (DAW)

The General Supervisor Radwaste shall ensure:

a. The proper and safe steps are performed to collect and prepare low specific activity (LSA) DAW in accordance with N2-WHP-12, Solid Dry Waste Collection and Compaction.

b. Items most directly influencing the quality of the end product are identified and controlled in accordance with N2-WHP-11, Process Control Dry Solid Waste.

c. DAW is examined for liquids or items that would compromise the integrity of the package or violate the burial site license and/or criteria before compacting is removed or separated.

d. DAW is shipped in containers meeting the transport requirements of 49CFR173.425, Transport Requirements for Low Specific Activity (LSA) Radioactive Materials.

e. Waste precluded from disposal in LSA boxes or drums due to radiation limits is disposed of in liners in accordance with N2-WHP-4, Cask Loading Procedure.

5.2.12 Sampling

Radwaste Operators and the Chemistry Department shall ensure:

a. The evaporator bottoms tank (Tk10) and the waste sludge tank (Tk8) are isolated from further input when preparing to process waste and a batch number is assigned in accordance with the Operator Worksheet (Attachment 5).

b. The evaporator bottoms tank (Tk10) is recirculated to ensure a homogeneous mixture.

c. The waste sludge tank (Tk8) is agitated to ensure a homogeneous mixture.

d. A sample is obtained from the tank(s) to be processed in accordance with N2-OP-41, Asphalt Solidification Operating Procedure and N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2.

5.2.12 (Cont)

e. The sample from the tank(s) to be processed is analyzed and the sample data sheet form in N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2, is completed.

f. The Chemistry Department shall determine the chemical and radionuclide content of each sample.

g. Completion of the Operator Worksheet (Attachment 5).

h. Completion of the Temperature Profile Log (Attachment 6) during processing.

i. After obtaining feed rate data from the Chemistry Department, the given feed rates for introduction into the extruder/evaporator are selected.

j. If batch processing is interrupted, the Radwaste Operator shall isolate the source tank until processing can resume.

5.2.13 Waste Classification

a. The Unit 2 Radwaste Process Control Program assures that wastes determined acceptable for near surface disposal are properly classified.

b. Waste classification is performed consistent with the guidance provided in the Branch Technical Position pertaining to Waste Classification and is based upon the concentration of certain radionuclides in the waste form as given in 10CFR61.55, Waste Classifica- tion, and 10CFR61.56, Waste Characteristics.

NOTE: The methods used by Unit 2 and the frequency for determining the radionuclide concentration of the final waste form are conducted in accordance with N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2.

c. The General Supervisor Radwaste shall ensure:

1. The minimum waste characteristic requirements identified in 10CFR61.56, Waste Characteristics, are satisfied by implementation of applicable S-RPIPs for the packaging and transportation of radioactive material.

2. The radionuclide concentration determination methods and frequency are conducted in accordance with N2-CSP-14, Solid Radwaste Chemical Surveillance at Unit 2.

5.2.13 (Cont)

d. The Manager Chemistry and Manager Radiation Protection shall ensure classification of waste is performed in accordance with S-RPIP-7.3, Determination of Shipment Type.

5.3 Administrative Controls

NOTE: The Manager, Nuclear QA, Operations has the authority to stop work when significant conditions adverse to quality exist and require corrective action.

5.3.1 Quality Assurance (QA) procedures and the Nuclear QA Program require:

a. Ongoing review, monitoring, and audit functions.

b. Performance of audits, under the cognizance of the SRAB, of the Process Control Program and implementing procedures for processing and packaging of radioactive waste at least once every 24 months as required by Unit 2 Technical Specification 6.5.3.8.i, Review and Audit, Safety Review and Audit Board.

c. Compliance with the waste classification and characterization requirements of 10CFR61.55, Waste Classification and 10CFR61.56, Waste Characteristics.

d. Quality Assurance Inspectors performing radwaste inspections have documented training in Department of Transportation and NRC radwaste regulatory requirements.

e. Quality Assurance review of vendor procedures.

f. Quality Assurance review of vendor programs to ensure compliance with 10CFR71, Packaging and Transportation of Radioactive Materials, Quality Assurance requirements.

5.3.2 Training Procedures and Training Programs require:

a. Radwaste Operator qualification by completion of the Radwaste Operations Unit 2 Plant Training Program with:

1. An average grade of 80 percent or above.

2. On-the-job training in conjunction with classroom instruction to ensure each radwaste operator maintains an acceptable level of skill and familiarity associated with radwaste controls and operational procedures.

5.3.2.a (Cont)

3. Training in accordance with NTP-13, Training and Continued Training of Radwaste Operators.

b. Training of Radwaste Operators includes, but is NOT limited to, familiarity with the following radwaste components or related systems:

1. Liquid-drains, collection tanks with subsystems, waste and regeneration evaporators, and seal water

2. Solid-Extruder/evaporator and associated support systems

3. LWS-Computer operation and interfaces

4. Waste handling procedures for packaging and shipping of radioactive materials

5. Condensate demineralizer system

6. Spent fuel and phase separators subsystem

7. Steam supplies

c. Chemistry Technicians are trained in accordance with NTP-1, Training and Continued Training of Chemistry and Radiochemistry Technicians.

d. Radiation Protection Technicians are trained in accordance with NTP-14, Training and Continued Training of Radiation Protection Technicians.

e. A formal classroom Radwaste Training Program is scheduled based on the needs of Radwaste Operations personnel.

NOTE: This training may be covered in a continuous cycle or as part of the normal rotating shift schedule.

f. Retraining of Radwaste Operator personnel on an annual basis identifies individual needs for retraining.

1. Personnel demonstrating a significant deficiency in a given area of knowledge and proficiency are placed in a remedial training program as directed by the General Supervisor Radwaste.

5.3.2.f (Cont)

2. Successful completion of the accelerated training program is evaluated by a written and/or oral examination as directed by the General Supervisor Radwaste.

NOTE: The Requalification Training Program covers a fundamental review of system modifications, revisions or changes to procedures, and changes or experiences in the nuclear industry.

g. Training records:

1. Are maintained for audit and inspection purposes.

2. Are considered permanent records.

3. Shall meet the applicable requirements of QATR-1, Quality Assurance Program Topical Report for Nine Mile Point Nuclear Station Operations, Section 17.0, Quality Assurance Records, AP-9.0, Administration of Training, and AP-10.1, Management of Station Records.

5.3.3 Documentation Control and Record Retention

a. Station management shall evaluate QA program audits of waste classification records to satisfy the requirements of 10CFR20.311.d.3, Transfer for Disposal and Manifests.

b. Personnel shall forward changes affecting operating procedures to Nuclear-QA for review in parallel with the NMPC Operations review as required.

c. Site Records Management shall maintain waste management records in accordance with the appropriate administrative procedures.

5.3.4 Licensee-initiated changes to the Unit 2 Radwaste Process Control Program:

a. Are submitted to the Commission by the method and containing the information as required by Technical Specification 6.13, Process Control Program.

b. Become effective upon review and acceptance by the SORC.

5.3.5 The General Supervisor Radwaste shall ensure:

a. Shipping manifests are completed and tracked to satisfy the requirements of 10CFR20.311, Transfer for Disposal and Manifests, in accordance with Waste Handling Procedures.

b. Radwaste Management monitors the status of the manifests in accordance with N2-WHP-2, Paperwork for a Radioactive Waste Shipment.

c. Temporary storage of solid radioactive material awaiting shipment in an area other than a designated area is done in accordance with AP-7.2, Control of Material Storage Areas.

6.0 RECORD REVIEW AND DISPOSITION

Ensure the following records are retained in accordance with AP-10.1, Management of Station Records.

- Operator Worksheets
- Temperature Profile Logs

ATTACHMENT 1
UNIT 2 RADWASTE PROCESS CONTROL PROGRAM
IMPLEMENTING PROCEDURES
(Sheet 1 of 2)

Waste Handling Procedures (WHPs)

N2-WHP-1	Required Documents Concerning Packaging and Shipping of Radioactive Wastes
N2-WHP-2	Paperwork for a Radioactive Waste Shipment
N2-WHP-3	Cask Handling Procedure
N2-WHP-4	Cask Loading Procedure
N2-WHP-6	Van Handling Procedure
N2-WHP-7	Van Loading Procedure
N2-WHP-8A	Flatbed Handling Procedure
N2-WHP-8B	Flatbed Loading Procedure
N2-WHP-9	Asphalt Solidification
N2-WHP-9A	Cement Solidification Procedure
N2-WHP-9B	Process Control LN Cement Solidification
N2-WHP-10A	Process Control Oil/Cement Solidification Procedure
N2-WHP-10B	Cement/Oil Solidification Procedure
N2-WHP-11	Process Control Dry Solid Waste
N2-WHP-12	Solid Dry Waste Collection and Compaction
N2-WHP-14	Solidified Liner Inspection Procedure

Radiation Protection Procedures (S-RPIPs)

S-RPIP-7.1	Movement and Storage of Radioactive Material on Site
S-RPIP-7.2	Receipt of Radioactive Material
S-RPIP-7.3	Determination of Shipment Type
S-RPIP-7.4	Cask Shipments
S-RPIP-7.5	Van/Flatbed Shipments

ATTACHMENT 1
UNIT 2 RADWASTE PROCESS CONTROL PROGRAM
IMPLEMENTING PROCEDURES
(Sheet 2 of 2)

Radiation Protection Procedures (S-RPIPs) (Cont)

S-RPIP-7.6 Activated Materials Shipments

S-RPIP-7.7 Non-Waste Radioactive Shipments

S-RPIP-7.8 Shipping Documents

Chemistry Procedure (CSP)

N2-CSP-14 Solid Radwaste Chemical Surveillance at Unit 2

Quality Assurance Procedures (QAPs)

QAP-10.03 QAD Surveillance Activities for Operations

QAP-10.30 QAD Inspection Activities

QAP-18.10 QAD Audits

Operating Procedures (OPs)

N2-OP-40 Liquid Radwaste Operating Procedures

N2-OP-41 Asphalt Solidification Operating Procedure

Site Administrative Procedure (AP)

AP-10.1 Management of Station Records

AP-3.3 Radiation Protection Program

AP-3.3.2 Radiation Work Permit

AP-3.3.3 Radiation Worker Conduct

Nuclear Division Interfacing Procedure (NIP)

NIP-ECA-01 Deviation Event Report

ATTACHMENT 2
SOLID WASTE SOURCES
(Sheet 1 of 2)

1.0 RADWASTE FILTERS

1.1 Mechanical radwaste filters filter resin and crud (backwash material) from the waste collector sub-system.

1.2 When a filter reaches a pre-determined differential pressure, the filter backwashes the material into the backwash tank, which is then pumped to the spent resin tank.

2.0 RADWASTE DEMINERALIZERS

2.1 The radwaste demineralizers are used as an ionic exchange media for processing high quality water from the waste collector tanks.

2.2 When determined the resin can NO longer be regenerated, the depleted resin is pumped to the spent resin tank.

3.0 CONDENSATE DEMINERALIZER

3.1 The condensate demineralizers remove soluble and insoluble impurities from the condensate water to maintain reactor feedwater purity.

3.2 After it is determined these resins can NO longer be regenerated, the depleted resins are pumped to the spent resin tank.

4.0 FLOOR DRAIN FILTER

4.1 The floor drain filter contributes to solid waste because the filter uses diatomaceous earth to process liquid waste of low quality. Input to the filter is from the floor drain system and the regeneration waste tank.

4.2 When the filter reaches a pre-determined pressure drop the filter backwashes to the waste sludge tank for processing through the extruder/evaporator.

5.0 SPENT FUEL PHASE SEPARATOR

These tanks receive the exhausted powdered filter media (resins) from the fuel pool cleanup system which is subsequently pumped to the spent resin tank.

6.0 RWCU PHASE SEPARATOR

These separator tanks receive exhausted powdered filter media (resins) from the water cleanup system which is subsequently pumped to the spent resin tank.

ATTACHMENT 2
SOLID WASTE SOURCES
(Sheet 2 of 2)

7.0 CONTAMINATED OIL

Oil from sources within Unit 2 that become contaminated are stored in containers to be solidified by a vendor with an approved procedure.

8.0 COMPACTIBLE SOLIDS

8.1 Compactible low level trash is processed and compacted in a hydraulically operated box compactor.

8.2 Shoe covers, trash, contaminated paper from the chemistry lab, and similar materials are included in this category.

9.0 FILTERS AND MISCELLANEOUS ITEMS

Solid items with high dose rates are handled on a case-by-case basis, being disposed of by methods acceptable to the burial site.

10.0 WASTE EVAPORATOR

10.1 The waste evaporator processes low quality waste from the floor drain collector system and, as an option, waste from the waste discharge tanks.

10.2 The waste evaporator is designed to concentrate the waste to a 25% solid concentration. The concentrates are then discharged to the evaporator bottoms tank for processing through the extruder/evaporator.

11.0 REGENERANT EVAPORATOR

11.1 The regenerant waste evaporator receives regeneration solutions from the condensate demineralizer system and radwaste demineralizer resin regeneration system as well as the radwaste regeneration sump.

11.2 The regenerant waste evaporator is designed to concentrate to a 25% by weight solid concentration of sodium sulfate.

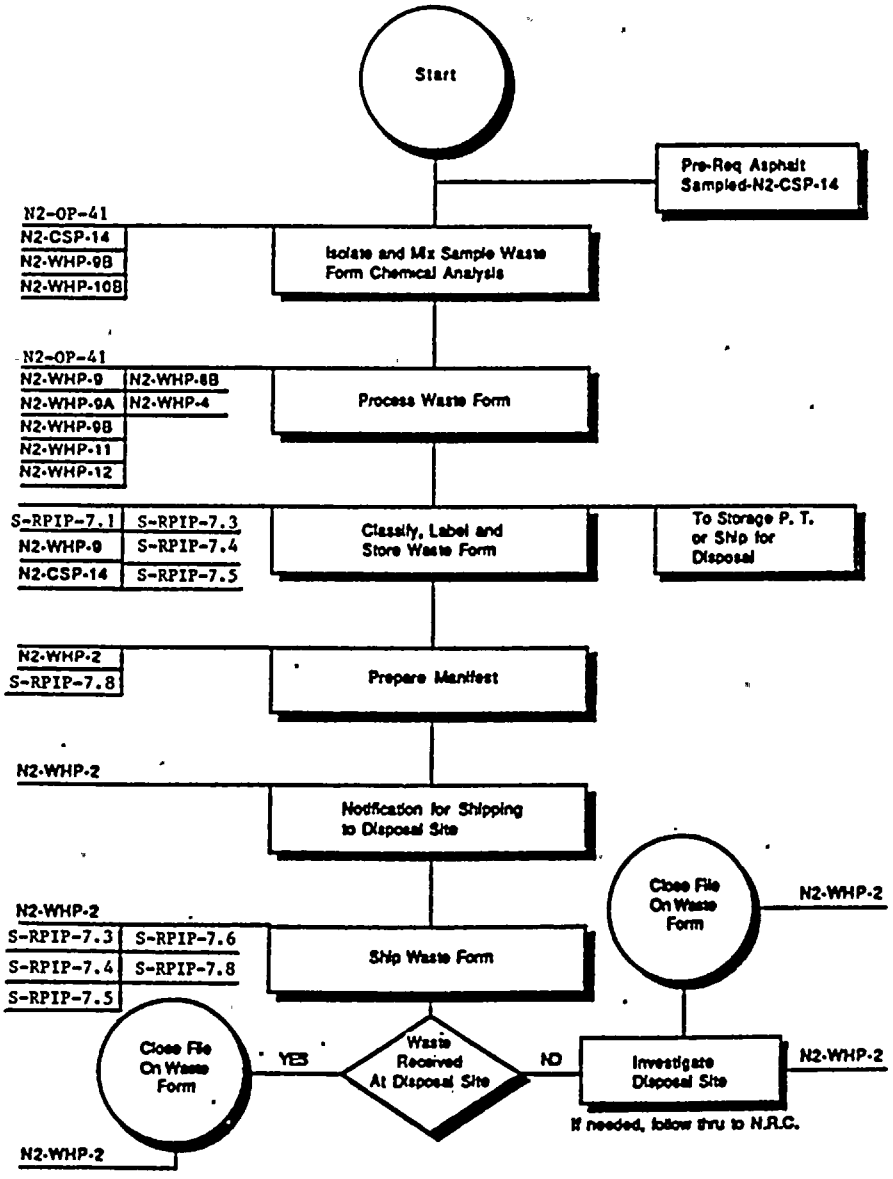
11.3 The concentrates are then discharged to the evaporator bottoms tank to be processed through the extruder/evaporator.

12.0 SPENT RESIN STORAGE TANK

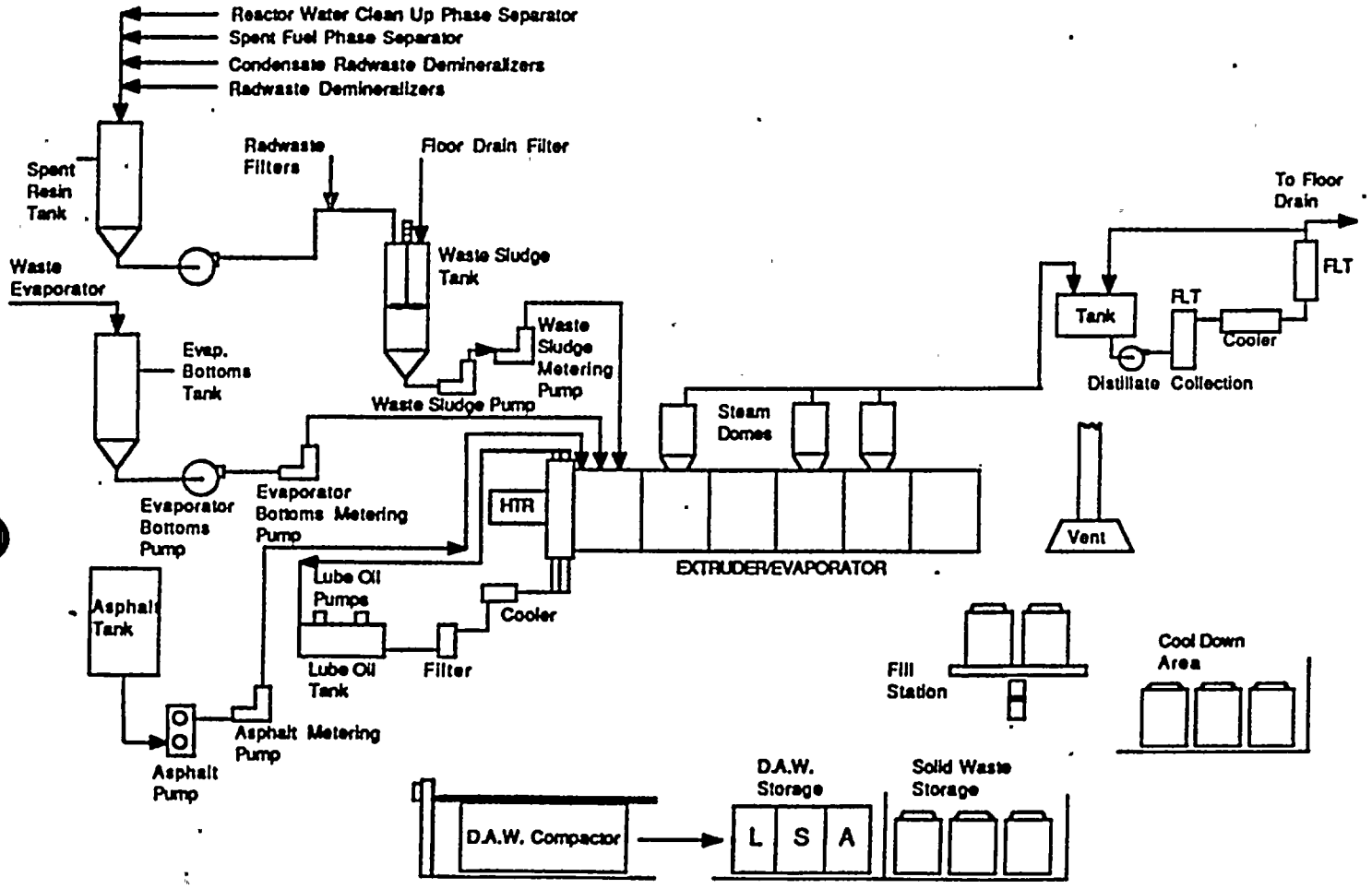
12.1 Exhausted resin from the condensate demineralizer, the radwaste demineralizer, RWCU phase separator, the spent fuel pool phase separator, and the radwaste filter backwash tanks are sluiced to the spent resin storage tank.

12.2 The waste from the spent resin storage tank is pumped to the waste sludge tank for processing through the extruder/evaporator.

ATTACHMENT 3
PROCESS CONTROL FLOWPATH



ATTACHMENT 4
SYSTEM FLOW SCHEMATIC



ATTACHMENT 5
OPERATOR WORKSHEET
(Sheet 1 of 2)

FIGURE I

Operator Worksheet

a. Batch Number _____ Date_____

A batch is considered (1) A Sampled Sludge TK, or (2) a sampled Evaporator Bottoms Tank with no waste being added to the tank during the processing of that batch.

NOTE: Batch number will consist of; BA (Batch Asphalt), year, and a four-digit successive number, (beginning with 0001).

Ex. BA (Unit) 84 (Year) 0001 (Batch Number)

b. Type of Waste Resin Filter Media_____Concentrate Waste_____

1. Waste Temperature_____°F

2. Rad Level_____

3. Specific Gravity_____

4. pH_____

5. % Oil_____

6. % Solid_____

7. Activity_____ M/Ci/ml_____

c. QA to verify chemistry results and flow settings prior to starting E/E _____ (QA) ___/___/___ (Date)

d. Feed Flow Settings

1. Asphalt feed flow settings_____

2. Waste feed flow settings_____

e. Radioactive materials classification_____

1. Radioactive materials LSA_____

2. Other_____

ATTACHMENT 5
OPERATOR WORKSHEET
(Sheet 2 of 2)

FIGURE I (Cont)

f. Waste container labeled in respect to S-RPIP-7.3 _____

1. Labels with the appropriate data will be supplied to the Radwaste Operator by the Radiation Protection Department/ Chemistry Department.

2. The operator must label container.

g. Radioactive waste classification_____

1. Class A Waste_____

2. Class B Waste_____

3. Class C Waste_____

h. Was container labeled in respect to S-RPIP-7.3 _____

1. The Radwaste Operator will label the container with labels he received from the Radiation Protection Department.

i. Temperature Profile - the radwaste operator must monitor the temperature profile while processing waste. The profile must be logged every 2 hours of operations. In addition, the operator must include liner numbers that were solidified in that batch, and record time it took to fill each container of a particular batch. See a. (Figure II).

NOTE: After completion of the Operator Worksheet and temperature profile log, a copy will be returned to the Radiation Protection Department and the original returned to Radwaste Supervision for permanent records. The radwaste operator will retain a copy in the Radwaste Control Room.

ATTACHMENT 6
TEMPERATURE PROFILE LOG

FIGURE II

a. Temperature Profile Log

Record of Temperature in Degree °F every two hours of Run Time for a particular batch.

TYPE OF WASTE_____ BATCH #_____ START TIME_____

	1	2	3	4	5/6	7	Initials/Time
Bead Resin - Precoat Filtercake w/Powered Resin- Mixed Resin and Filtercake-	200	280	320	350	300	190	
Precoat Filtercake w/Diatomaceous Earth- Evaporator Concentrates Decontamination Waste-	200	280	320	350	350	280	
After 2 Hours							
After 4 Hours							
After 6 Hours							
After 8 Hours							
After 10 Hours							
After 12 Hours							
After 14 Hours							
After 16 Hours							
After 18 Hours							
After 20 Hours							
After 22 Hours							
After 24 Hours							

b. Did temperature profile remain within limits?_____

NOTE: The temperature profile should be monitored constantly but must be logged every second hour of Run Time.

Container Number	Fill Time

ATTACHMENT 7
BARNWELL MANIFEST
(Sheet 1 of 2)

(1) GENERATOR NAME _____
FACILITY _____
ADDRESS _____
CITY _____ STATE _____ ZIP CODE _____
CONTACT _____ PHONE ( ) _____
EMERGENCY RESPONSE CONTACT: _____
PHONE ( ) _____
(2) BILL TO: _____

BARNWELL WASTE MANAGEMENT FACILITY

Operated by CHEM-NUCLEAR SYSTEMS, INC.
PO Box 726, Barnwell, South Carolina 29812
(803) 259-1781
RADIOACTIVE SHIPMENT MANIFEST FORM

(3A) RADIOACTIVE WASTE TRANSPORTATION PERMIT NO. _____

(4) USE THIS NUMBER ON ALL CONTINUATION PAGES _____ SHIPMENT I.D. NUMBER _____ PAGE _____ OF _____

(3B) NUMBER OF GENERATORS _____

(5) CARRIER _____ ADDRESS _____
TELEPHONE _____ SHIPPING DATE _____
SHIPMENT TYPE _____ SHIPMENT SURFACE EXPOSURE _____ mR/hr
CASK IDENTIFICATION NO. _____ USA / /
SHIPMENT NO. _____ LINER TYPE _____
LINER SERIAL NO. _____
DRIVER SIGNATURE _____ DATE _____

(6) TOTAL FOR EACH CLASS		PROPER SHIPPING NAME & HAZARD CLASS (PER 49 CFR 172.101)	I.D. NUMBER	Reportable Quantity
NO. OF PACKAGES	WEIGHT (POUNDS)			
		Radioactive Material, empty packages	UN2908	
		Radioactive Material, fissile, n.o.s. - Radioactive Material	UN2918	
		Radioactive Material, low specific activity n.o.s. - Radioactive Material	UN2912	
		Radioactive Material, n.o.s. - Radioactive Material	UN2982	
		Radioactive Material, limited quantity, n.o.s. - Radioactive Material	UN2910	
		Radioactive Material special form, n.o.s. - Radioactive Material	UN2974	
		Radioactive Material, instruments and articles - Radioactive Material	UN2911	
		Other (Specify)		

(7) SHIPMENT TOTALS

Disposal Volume (ft.³)	Total No. of Packages	ACTIVITY (10CFR20.311) Millicuries					Source (Pounds)
		All Isotopes	Tritium	C-14	Tc-99	I-129	

(8) TOTAL SNM

Isotope	Grams	No Pu Isom
U 233		
U-235		
Total		

(9) MINIMUM WASTE PACKAGE % FILL _____
(10) SOLIDIFICATION AGENT _____
(11) NUMBER AND TYPE OF CONTAINERS _____
(12) WASTE DESCRIPTION _____
(13) PHYSICAL FORM _____
(14) CHEMICAL FORM _____
(15) NAME AND % OF CHELATING AGENT(S) _____
(16A) WASTE FORM CLASS ☐ AU ☐ AS ☐ B ☐ C

(16B) ( ) Yes ( ) No This waste(s) must be disposed in South Carolina Department of Health and Environmental Control Approved Structural Overpack(s) to meet stability requirements.

(17) ( ) Yes ( ) No THIS VEHICLE IS CONSIGNED EXCLUSIVE USE. LOADING AND UNLOADING MUST BE ACCOMPLISHED BY CONSIGNOR OR CONSIGNEE OR HIS DESIGNATED AGENT.

(18) IMPORTANT: "This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Signature _____
Company _____ Date _____

(19) "Certification is hereby made to the South Carolina Department of Health and Environmental Control that this shipment of low level radioactive waste has been inspected in accordance with the requirements of South Carolina Radioactive Material License No. 097 as amended, and the Nuclear Regulatory Commission's License No. 12-13536-01 as amended, and the effective Barnwell Site Disposal Criteria within 48 hours prior to shipment, and further certification is made that the inspection revealed no items of non-compliance with all applicable laws, rules and regulations."

Date _____ Signature _____
Title and Organization _____
Telephone No. ( ) _____

DISPOSAL SITE COPY
Form No. CNS-201
(1-90)
SEE INSTRUCTIONS ON REVERSE SIDE FOR FILLING OUT THIS FORM

CNSI USE ONLY

☐ This material meets all license requirements.
☐ This material was disposed of in accordance with license.
☐ Discrepancy. _____

Date _____
Authorized Signature _____ Title _____

Crane ☐ Forklift ☐
Shielded ☐ Personnel Barrier ☐
Overpack S/N _____
Overpack Lid S/N _____
Other _____

Arrival Date _____ Arrival Survey No. _____
Date/Time Buried _____ H P Initial _____
Trench No. _____ Location Code _____
Waste Class Code _____
Trench No. _____ Location Code _____
Waste Class Code _____
Personnel Exposure _____

BARNWELL WASTE MANAGEMENT FACILITY
Operated by: CHEM-NUCLEAR SYSTEMS, INC.

GENERATOR NAME ____________________

CONTINUATION SHEET

USE THIS NUMBER ON ALL CONTINUATION PAGES

SHIPMENT ID NUMBER ____________

PAGE _____ OF _____

(20) ITEM NO	(21) RADIO-NUCLIDE EACH CONTAINER	(22) PERCENT OF ACTIVITY OR mCi OF EACH NUCLIDE	(23) ACTIVITY EACH CONTAINER (mCi)	(24) PHYSICAL FORM	(25) CHEMICAL FORM AND NAME & % OF CHELATING AGENT	(26) WASTE DESCRIPTION	(27) WASTE FORM CLASS	(28) SPECIAL NUCLEAR MATERIAL (grams)	(29) SOURCE MATERIAL (pounds)	DISPOSAL CONTAINER (30) CONTAINER WEIGHT (pounds)	(31) CONTAINER VOLUME (Cu Ft)	(32) CONTAINER TYPE	(33) RADIATION LEVELS CONTAINER SURFACE	(33) RADIATION LEVELS 1 METER	(34) CONTAMINATION CONTAINER SURFACE (DPM/100cm2) Alpha Beta Gamma	(35) FISSILE CLASS	(36) LABELS/ MARKINGS USED
																	Radioactive—
																	Radioactive—
																	Radioactive—
																	Radioactive—
																	Radioactive—
																	Radioactive—
																	Radioactive—
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						PAGE TOTALS											

Form No CNS-201
(5-87)

DISPOSAL SITE COPY

ATTACHMENT 8
US ECOLOGY MANIFEST
(Sheet 1 of 2)

GENERATOR NUMBER

(1) GENERATOR NAME

ADDRESS

CITY STATE ZIP

CONTACT PHONE

USER PERMIT # SHIPMENT #

(2) BILL DISPOSAL CHARGES TO

NAME PURCHASE ORDER #

ADDRESS

CITY STATE ZIP

REV 5/87

RADIOACTIVE WASTE SHIPMENT & DISPOSAL MANIFEST

USEcology Nuclear — US Ecology, Inc. an American Ecology company

EXECUTIVE OFFICE: (502) 426-7160

P.O. BOX 7246 • LOUISVILLE, KENTUCKY 40207

(3) AGENT/BROKER

BROKER'S US ECOLOGY #

ADDRESS

CITY STATE ZIP

CONTACT PHONE

BROKER SHIPMENT # BROKER USER PERMIT #

Broker's Authorized Signature Acknowledging Waste Receipt Date

PAGE 1 OF

(4) CONSIGNED TO US Ecology, Inc

☐ P.O. BOX 638 Hanford Reservation Richland, WA 99352 509 377 2411

☐ P.O. BOX 578 HWY 95, 12 m. — So of Beatty, NV 89003 702 553 2203

USE THIS NO. ON ALL CONTINUATION PAGES → 101323

☐ OTHER

CONTACT

ADDRESS

CITY STATE ZIP

PHONE

(5) CARRIER Shipping Date

CARRIER EPA # (if any)

ADDRESS

CITY STATE ZIP

PHONE

CASK TYPE CASK SURFACE EXPOSURE RATE mR/hr

(6)

TOTAL FOR EACH CLASS		REPORTABLE QUANTITY NAME (if any)	PROPER SHIPPING NAME & HAZARD CLASS (PER 49 CFR 172.101)	ID NUMBER
# OF PACKAGES	WEIGHT (Pounds)			
			Radioactive Material, liquids, n.o.s. — Radioactive Material	UN2918
			Radioactive Material, low specific activity, n.o.s. — Radioactive Material	UN2912
			Radioactive Material, n.o.s. — Radioactive Material	UN2982
			Radioactive Material, limited quantity, n.o.s. — Radioactive Material	UN2910
			Radioactive Material, special form, n.o.s. — Radioactive Material	UN2974
			Radioactive Material, instruments and articles — Radioactive Material	UN2911
			Uranyl Acetate (RQ 5000/2270) — Radioactive Material	NA9180

(7) SHIPMENT TOTALS (DO NOT WRITE IN SHADED AREAS)

VOLUME (cu ft)	TOTAL # OF PACKAGES	SOURCE MATERIAL (kgs)	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	PLUTONIUM	TOTAL

ACTIVITY

ACTIVITY TOTALS. ☐ Curies ☐ Becquerels (10CFR20.311)	TRITIUM	C-14	Tc-99	I-129	ALL ISOTOPES

(8) THIS IS TO CERTIFY THAT THE HEREIN NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED, AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION AND ARE IN COMPLIANCE WITH ALL REQUIREMENTS APPLICABLE AT THE DESIGNATED DISPOSAL SITE, AND THAT THE MATERIALS ARE CLASSIFIED AND DESCRIBED IN ACCORDANCE WITH THE REQUIREMENTS OF 10CFR, PART 61 AND PART 20.311 OR EQUIVALENT STATE REGULATIONS.

Authorized Signature Title Date

TERMS AND CONDITIONS

A. TITLE. Upon inspection and acceptance at the disposal site by US Ecology and all appropriate regulatory authorities, title to the Waste which conforms to Company's representations herein shall thereupon transfer from the Customer and be vested in US Ecology.

B. WASTE PRODUCTS. Customer represents and warrants that data set forth in this Radioactive Waste Shipment & Disposal Manifest is true and correct in all respects and in accordance with all applicable governmental laws, rules, regulations and the designated facility license.

C. INDEMNIFICATION. Customer agrees to indemnify US Ecology, its officers, employees and agents against all loss and liability whatsoever if such loss or liability results from the failure of the Waste to conform in all material respects to the data supplied on the Radioactive Waste Shipment & Disposal Manifest or the shipment fails to meet the standards prescribed by the Department of Transportation or any other governmental agency having jurisdiction over such matters.

FOR USECOLOGY'S USE ONLY

TYPE OF CONTAINER	CONTAINER VOLUME CU FT.	# OF PKGS	CU FT PER CONTAINER TYPE
DRUMS			
OVERPACK			
55	7.50		
30	4.01		
5	0.67		
OTHER			
BOXES			
1st SIZE			
2nd SIZE			
3rd SIZE			
CASK LINERS			
OTHER			
OTHER			
SHIPMENT TOTALS			

LOAD EVALUATION

CHECK ALL THAT APPLY TO THIS LOAD. DESCRIBE INADEQUACIES IN COMMENT SECTION

☐ Manifest Waste Description Inadequate ☐ Bracing Inadequate

☐ Containment or Leakage Detected ☐ Labels, Markings, etc. Inadequate

☐ Unexpected Exposure Rates Detected ☐ Container Integrity Inadequate

☐ No Violations Detected on this Load ☐ Other

DESCRIBE THE EXTENT OF ANY VIOLATION CHECKED ABOVE AND THE REMEDIAL ACTION TAKEN

☐ CHECK HERE IF A SUPPLEMENTAL REPORT IS ATTACHED

BURIAL DATA

CONTAINER SEPARATION

CODES (See back of this copy)

DEPTH IN FEET

Date Received

Date Disposed

Trench No

☐ The material meets licensed limits

☐ The material was disposed of in accordance with license

AUTHORIZED INITIALS

US ECOLOGY INVOICE #

US ECOLOGY CUSTOMER # (Must agree with Agent named in Block 2)

US ECOLOGY INVOICE DATE MO DY YR

DISCREPANCY CODE(S)

BATES #

CONSIGNEE ORIGINAL COPY
(MUST ACCOMPANY WASTE IN TRANSIT)

ATTACHMENT 8
US ECOLOGY MANIFEST
(Sheet 2 of 2)

GENERATOR NO. [ ] [ ]-[ ]-[ ]

USEcology Nuclear US Ecology Inc. an American Ecology Company

CONTINUATION SHEET

REV 5/97

GENERATOR NAME: ____________________

AGENT/BROKER: ____________________

FOR BROKER USE ONLY:
Indicate one category for this page:
☐ This page describes PROCESSED waste
☐ This page describes COLLECTED waste

MANIFEST # __________

PAGE ______ OF ______

(9) Item No	(10) Container Type	(11) [illegible]	(12) [illegible]	(13) [illegible]	(14) WASTE DESCRIPTION (List 3) (See Note #1)	(15) SOLIDIFICATION STABILIZATION MEDIA (List 3) (See Note #2)	(16) Chemical Form/ Chelating Agent (10CFR20.311)	Check Below if < 0.1% Chelating Agent by Weight	(17) Radionuclide (10CFR20.311)	(18) Activity ☐ Curies ☐ Millicuries (10CFR20.311)	(19) Special Nuclear Material (Grams)	(20) Source Material (Kilograms)	(21) Waste Form Class 10CFR 61.56	(22) Stability Class (See Note #3) 10CFR 61.56	Radiation Levels mR/HR (23) Contact Container Surface	(24) Reserved for US Ecology Use Only	(25) Contact Container At 1 Meter	(26) Transport Index	(27) Waste Class	(28) DOT Label 49CFR172.444
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				(29) PAGE TOTALS																

NOTE #1 - Waste description Codes. Choose up to THREE. [illegible]

NOTE #2 - Sorption, Solidification, Stabilization Media Codes. CODE 98 = "NONE REQUIRED" [illegible]

NOTE #3 - NRC Stability Class Code: S - Stable, U - Unstable

CONSIGNEE ORIGINAL COPY
(MUST ACCOMPANY WASTE IN TRANSIT)

* ANY USE OF "OTHER" AS A DESCRIPTION MUST INCLUDE A WRITTEN AND SIGNED EXPLANATION ATTACHED TO THIS MANIFEST.