

VERMONT YANKEE NUCLEAR POWER CORPORATION

PROCESS CONTROL PROGRAM

REV 0

7/20/84

Submitted

B N Leach

Chemistry & Health Physics Supervisor

Approved

J P Pelletier

Plant Manager

Approved

W J Murphy

Vice President & Manager of Operations

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VERMONT YANKEE NUCLEAR POWER CORPORATION

PROCESS CONTROL PROGRAM

Introduction.

The Vermont Yankee Nuclear Power Corporation Process Control Program (PCP) describes the administrative and technical controls on the radioactive waste systems which provide assurances that Vermont Yankee meets federal shipping and burial site requirements.

The PCP describes process parameters, controls, and sampling to ensure compliance with 10 CFR Part 71, 10 CFR Part 61, Department of Transportation, state, and burial site regulation requirements.

1.0 Solidification

Vermont Yankee Nuclear Power Corporation does not routinely solidify liquid waste. If the use of solidification to dispose of any liquid waste is required, it will be done by an outside vendor under the vendor's PCP. This PCP will be reviewed and approved by the plant Health Physicist, and the Chemistry and Health Physics Supervisor prior to implementation. This review is to identify that there is sufficient supporting documentation of the vendor's PCP to give assurance that the final product will meet all requirements for transport and burial, and that sufficient procedural controls exist to assure safe operations.

2.0 Cartridge Filter Elements

Cartridge filter elements will be air dried and compacted as dry active waste. Filters that are too radioactive to be disposed of in this manner will be placed in spent resin liners for disposal.

3.0 Resins

Vermont Yankee for the past eleven years has produced radioactive waste in the form of dewatered resins. The method employed for dewatering is a Bird centrifuge. The resin is then discharged via a hopper into a 165 ft³ or 70 ft³ liner formed to fit into a HN-100, HN-200 or similar cask, whichever is applicable.

Commercial ion exchange resins have a certain moisture content in the form of bound water resulting from the hygroscopic properties of the resin. Beyond this, ion exchange resins can take up free water or surface water which can be removed by centrifuging. The resulting moisture content is expressed in percent of moisture per weight of dry resin.

A number of methods can be used to determine the bound water in ion exchange resins. Oven drying or azeotropic distillation are techniques which are generally used for high polymers. Vermont Yankee used oven drying to determine moisture content in the radioactive spent resins. Graver Water conditioning Company technical manuals were consulted for the moisture content of unused ion exchange resins.

After centrifuging and discharge to the cask liner, a spent resin sample was obtained. The sample was immediately weighed, then oven dried for 12 hours and re-weighed. The moisture content of the centrifuged spent resin was calculated to be 59.6%. The moisture content of the unused mixtures of resins is between 55% and 70%. This shows the spent resins are dewatered such that only bound water remains.

A second method was used to determine if vibration would leach water from the unused resin. A lab centrifuge was set up with resin and resin plus filter aid mixtures. The centrifuge was set for 700 RPM for 30 minutes. No free water was observed in any of the mixtures.

The results of these test showed that the moisture content of centrifuge processed resins was less than or equal to mixtures of unused commercial grade ion exchange resins. At these moisture contents, all the water remains bound even after severe vibration in a centrifuge, therefore it is concluded that Vermont Yankee's centrifuged spent resins do not include any free-standing liquids.

To comply with the statement, "Any liquids present in waste packages shall be non-corrosive with respect to the container", Vermont Yankee tested the pH of various resin mixtures used by the plant in solution with water. The range was found to be 4.2 - 8.4. A solution is not considered corrosive to iron if the pH is greater than 4.0.

A resin sample is taken from each liner prior to shipment. The sample is counted to determine the activity and waste classification. The majority of the resins generated are Class A waste. All Class B or C resins will be disposed of in an approved High Integrity Container (HIC).

4.0 Filter Liners

During refueling outages and at times during normal operation, problems can occur in liquid radwaste processing that require use of a portable decanting filter on the condensate phase separators. A floating suction is used to decant the water and resin into a filter liner. Filtered water is pumped from the liner. When use of the liner is completed, the drain plug is removed and a vacuum pump is attached to dewater the resin in the liner. The liner is dewatered for a minimum of 48 hours and until no more water is viewed from the pump discharge. A resin sample is taken from the liner and counted to determine the activity and waste classification.

5.0 Dry Active Waste (DAW)

All DAW is examined before being compacted. Any liquids or items found that would compromise the integrity of the package are removed and separated as specified by procedure. All waste is compacted into boxes using a box compactor. Containers used for DAW shipments meet the criteria of 49 CFR 173.425a. or b. "No leakage of radioactive material" as specified in 49 CFR 173.425.b.1 will be met provided that no radioactive materials in quantities equal to or exceeding those specified in 49 CFR 173.443 are detected on the external surfaces of the package at any time during shipment.

6.0 Chelating Agents

In order to comply with 10 CFR 20.311b, chelating agents are controlled by the plant chemistry department using procedure AP 0620.

7.0 Explosive Waste

No waste capable of detonation or of explosive decomposition or reaction will be disposed as per 10 CFR 61.56(a)(4).

8.0 Toxic Waste

No waste capable of generating toxic gases, vapors, or fumes will be disposed as per 10 CFR 61.56(a)(5).

9.0 Pyrophoric Waste

No waste that is pyrophoric will be disposed as per 10 CFR 61.56(a)(6).

10.0 High Integrity Containers

Vermont Yankee Nuclear Power Corporation has contracted with Westinghouse Hittman Nuclear, Inc., to supply approved HICs. South Carolina has approved Hittman's PCP for their HICs. Any HIC Vermont Yankee may choose to use at some future time, will meet all applicable requirements. Included in this package are the approval letters from the State of South Carolina for the Hittman and VY HICs.

11.0 Waste Class Determination

Vermont Yankee Nuclear Power Corporation has correlated results from analyses done on all radwaste streams by SAI, NRC and Teledyne. These correlations have been proceduralized in AP 0504 that will be used to classify all waste. Isotopic analysis is done on all resins, and a dose to curie content calculation is used to determine activity on all DAW shipments.

PROCEDURES WHICH IMPLEMENT THE PCP

1. AP 0504 Shipment and Receipt of Radioactive Materials
2. OP 2511 Radwaste Cask, Drum and Box Handling
3. AP 0021 Maintenance Requests
4. OP 2151 Liquid Radwaste
5. OP 2153 Solid Radwaste
6. OP 4151 Liquid Radwaste Surveillance
7. AP 0620 Chemical Material Control

South Carolina Department of Health and Environmental Control

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2600 Bull Street
Columbia, S.C. 29201

June 17, 1982

Charles W. Mallory
Vice President - Engineering
Hittman Nuclear & Development Corp.
9190 Red Branch Road
Columbia, Maryland 21045

Dear Mr. Mallory:

The Department has approved your high integrity container designs for disposal of specified wastes at the Barnwell site. Please find enclosed the Certificates of Compliance, DHEC-HIC-PL-004 for the RADLOK-55 drum and DHEC-HIC-PL-005 for the RADLOK-100 liner.

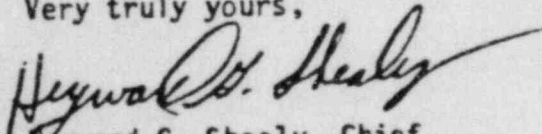
The Certificates specify the uses, restrictions, and limitations of the containers. Variances to these requirements must have Department approval before implementation. It is Hittman's responsibility to assure that container users adhere to these requirements and to inform the Department of who is authorized to use the containers.

The evaluation of these container designs is limited to the containers and the lifting assemblies. Plant specific loading and dewatering procedures, cask handling procedures, and burial site operating procedures were not reviewed for this proposal. Hittman should insure compatibility between the Certificates of Compliance and other requirements.

We request that you continue the performance evaluation of the containers and make appropriate modifications as necessary. It is our understanding that a controlled copy of the Rad Services Manual will be issued to this office so that we will be apprised of the changes as the users are.

If you have any questions, please feel free to contact us.

Very truly yours,


Heyward G. Shealy, Chief
Bureau of Radiological Health

HGC:kn

Enclosures

cc: Mr. Wynn Phillips, HNDC - w/enclosure
Mr. James Purvis, CNSI - w/enclosure

South Carolina Department of Health and Environmental Control

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COMMISSIONER
Robert S. Jackson, M.D.
2600 Bull Street
Columbia, S.C. 29201

May 5, 1983

Mr. Charles W. Mallory
Director, Engineering
Hittman Nuclear & Development Corp.
9151 Rumsey Road
Columbia, Maryland 21045


Dear Mr. Mallory:

We are pleased to advise you that the Department has approved your RADLOK-200 High Integrity container for disposal of radioactive waste at the Barnwell disposal facility.

Enclosed is Certificate of Compliance No. DHEC-HIC-PL-007 which outlines the specific requirements for the manufacturer and use of the container.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,


Virgil R. Autry, Director
Division of Radioactive Material
Licensing and Compliance
Bureau of Radiological Health

VRA:kn

Enclosure

cc: Mr. Richard Sappington
DHEC Inspector

Mr. James Purvis
Chem-Nuclear Systems, Inc.

South Carolina Department of Health and Environmental Control

2600 Bull Street
Columbia, S.C. 29201

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October 6, 1983

Mr. Warren P. Murphy, Vice President
Manager of Operations
Vermont Yankee Nuclear Power Corp.
RD 5, Box 169
Ferry Road
Brattleboro, Vermont 05301

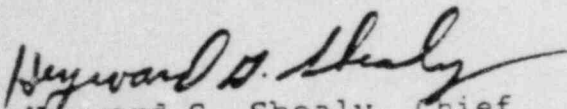
Dear Mr. Murphy:

Enclosed is the Certificate of Compliance No. DHEC-HIC-PI-009, approving the use of your VYNPC Dome-Top High Integrity Container at the Chem-Nuclear Systems burial facility in Barnwell, South Carolina.

This approval is contingent and does not constitute a final determination by the Department. These containers will be subjected to evaluation and assessed for their integrity to meet all specified conditions and criteria. Should the evaluation determine that additional requirements are necessary, appropriate modifications shall be made before their continued use. The certificate is subject to revocation if warranted.

Should you have any questions, please do not hesitate to contact Mr. Virgil R. Autry.

Very truly yours,


Hayward G. Shealy, Chief
Bureau of Radiological Health

HGS:kn

Enclosure

cc: Mr. James E. Purvis w/enclosure
Mr. Richard Sappington w/enclosure

RECEIVED

OCT 14 1983

VERMONT YANKEE

South Carolina Department of
Health and Environmental Control
Bureau of Radiological Health

CERTIFICATE OF COMPLIANCE

High Integrity Container

CERTIFICATE NO.: DHEC-HIC-PL-009 (This number shall be imprinted on
all containers for which this
Certificate is applicable)

ISSUED TO: Vermont Yankee Nuclear Power Corporation
Brattleboro, Vermont

1. Application:

This certificate is applicable to containers specified below
for use at Chem-Nuclear Systems, Inc. burial facility at
Barnwell, South Carolina for containment and disposal of
low-level radioactive waste as specified in South Carolina
Radioactive Material License No. 097.

2. General Design:

The design, materials, manufacture and use of the containers shall
conform to the specification and analysis which has received
approval of the Department including the latest revision of:

A. VYNPC Specifications for High Integrity Containers for Vermont
Yankee Nuclear Power Station, No. 1105-001, Rev. 2.

B. VYNPC Specification for Prototype Testing of a High Integrity
Container for Vermont Yankee Nuclear Power Station, No.
1105-002, Rev. 1.

C. VYNPC Drawings:

- (1) High Integrity Container, Vermont Yankee, Figure 2.2
- (2) Lifting Arrangement, Vermont Yankee HIC, Figure 2.3
- (3) Vermont Yankee Closure, Drawing # C0785

3. Applicable Approved Containers:

This Certificate shall apply to the Vermont Yankee Nuclear Power
Corporation Dome-Top High Integrity Container having an internal
volume of 137 cubic feet.

4. Quality Assurance:

The containers shall be manufactured, stored and used in accordance with:

- (a) Snyder Industries, Inc. Quality Assurance Manual.
- (b) VYNPC Specification No. 1105-001, Rev. 2, Section 2.3, Design and Fabrication.
- (c) VYNPC Specification No. 1105-001, Rev. 2, Section 3.2, Production Run Testing and Inspection.
- (d) Snyder Industries, Inc. Standard Operating Procedures for Vermont Yankee High Integrity Containers, QAP, QA-SOP-001.
- (e) VYNPC Procedure No. O.P. 2511, Rev. 9, Radwaste Cask, Drum and Box Handling.
- (f) VYNPC Procedure No. A.P. 0801, Rev. 11, Receipt, Inspection and Shipment of Material and Equipment.
- (g) VYNPC Procedure No. A.P. 0504, Rev. 8, Shipment and Receipt of Radioactive Materials.

5. User Requirements:

Use of this container shall be in accordance with the latest revision of the following:

- A. VYNPC Procedure No. O.P. 2511, Rev. 9, Radwaste Cask, Drum and Box Handling.
- B. VYNPC Procedure No. A.P. 0801, Rev. 11, Receipt, Inspection and Shipment of Material and Equipment.

6. Specific Limitations:

The following specific limitations for the container described and identified in the Certificate shall apply and be strictly adhered to:

- A. Free Standing Liquid: Any free standing liquid must be non-corrosive and less than one-percent (1%) by waste volume.
- B. Radiation: The specific activity of dewatered resins shall not exceed 350 uCi/cc of isotopes having greater than five year half-lives. Other waste forms shall not exceed 1.0×10^8 rads (β, γ) maximum integrated dose to the container.

- C. Chemicals: Organic solvents, petrochemicals, concentrated acid and other chemicals specified in VYNPC Procedure for Radwaste Cask, Drum and Box Handling No. O.P. 2511, Rev. 9, Appendix D, Table 1 are not allowed to be introduced into the container, nor the container subjected to these materials.
- D. Thermal: The container must not be exposed to temperatures from the contents or surroundings above 130°F or below -35°F..
- E. Ultraviolet: The containers shall not be stored in such a way as to cause exposure to sunlight or other ultraviolet radiation to exceed fourteen (14) months.
- F. Weight: The weight of the container contents must not exceed 6000 pounds.
- G. Waste such as mechanical or cartridge filters, scrap or other sharp objects placed in the container shall not cause internal damage to the container nor shift about during transportation and handling. All voids shall be filled.

Any modifications or changes of the container design, materials or usage are subject to prior approval by the Department.

This approval is contingent and does not constitute a final determination by the Department. These containers will be subjected to evaluation and assessed for their integrity to meet all specified conditions and criteria. Should the evaluation determine that additional requirements are necessary, appropriate modifications shall be made before their continued use. This Certificate is subject to revocation if warranted.

For the South Carolina Department
of Health and Environmental Control

Issue Date 10-10-83

By: _____

Heyward G. Shealy
Heyward G. Shealy, Chief
Bureau of Radiological Health