TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT

PLANT ADMINISTRATIVE INSTRUCTION

PAI-13.01

PROCESS CONTROL PROGRAM

REVISION 0

QUALITY RELATED

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SPONSORING ORGANIZATION: Radwaste

APPROVED BY: O. E. Hickman DATE: 12/17/98

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REVISION LOG

REVISION OR CHANGE NUMBER	EFFECTIVE DATE	AFFECTED PAGE NUMBER	DESCRIPTION OF REVISION OR CHANGE
0	1-15-99	ALL	This is the initial issue of this PAI. The only change is to section to section 2.4.B. The words WBN site have been removed. The reference section has been updated. No other changes have been made to the PCP under the issue of this PAI. This establishes the PCP as a PAI and removes the PCP from the Technical requirements Manual. This is a nonintent change to the PCP.

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of the Watts Bar Nuclear Plant (WBN) Process Control Program (PCP) is to establish a program which provides reasonable assurance that all radioactive wastes processed at WBN for disposal at a land disposal facility are processed and packaged such that applicable Federal and State regulations and disposal site criteria are satisfied. The PCP contains a general description of the methods for controlling the processing and packaging of radioactive wastes, specific parameters for each method, and the administrative controls and quality assurance required to ensure compliance with applicable regulations and requirements. This PCP is not applicable to wastes transported to an off-site vendor for processing.

1.2 SCOPE

This PCP applies to the processing of wet solid radioactive wastes generated as a result of plant operation and maintenance. This PCP does not apply to the treatment of mixed radioactive and hazardous wastes.

2.0 DETAILS

2.1 WASTE CHARACTERISTICS

A. Waste Streams

1. There are six waste streams that have been identified at WBN. These are primary resins, secondary resins, mobile demineralizer resin, filter elements, oil, and dry active waste (DAW). This PCP is not normally applicable to DAW. Other waste streams may be identified based upon plant operating characteristics.

2. Primary resins are collected in the spent resin storage tank for blending, decay, and storage. Primary resin sources are Chemical and Volume Control System (CVCS) letdown demineralizers, boron recovery demineralizers, and the fuel pool demineralizers.

3. Secondary resins are generated from the condensate polisher demineralizers.

4. Mobile demineralizer resins are fed by several sources including floor drain wastes, equipment drain wastes, laundry and hot shower wastes, and chemical wastes.

5. Filter elements will be accumulated from one or more plant systems. These are CVCS, seal injection, boron recovery, and spent fuel pool clean-up.

6. Oil is contaminated with radioactivity from various areas within the plant, as a result of normal operation and maintenance.

7. The Condensate Demineralizer Waste Evaporator (CDWE) is not part of the Unit 1 license, but may be incorporated into the Unit 2 license application. If the CDWE is to be operated as part of the Unit 2 startup, the PCP shall be revised to incorporate the processing of the CDWE bottoms.

8. DAW is generated within the plant and is not appropriately attributed to the above mentioned waste streams. DAW normally includes paper, plastic, wood, metal, and other such material generated as a result of the operation and maintenance of the plant.

B. Waste Form

Wastes are processed as appropriate to ensure that the minimum physical characteristics required by 10 CFR 61 and disposal site criteria are met. All class B and C waste must be stabilized. This shall be accomplished by placement into a high integrity container (HIC), or by solidification using a process that produces a product which meets the stability requirements of 10 CFR 61, per section 2.2 of this PCP. The vendors topical report shall include documentation of testing which verifies that the HIC or solidified product meets these stability requirements. Additionally, WBN shall comply with Federal and/or State requirements imposed specifically on an approved HIC or solidification product which limit the type and/or radioactive concentration of the waste to be placed in the HIC or solidified product.

C. Waste Classification

Radioactive waste shall be classified as Class A, B, or C in accordance with the requirements of 10 CFR 61, using one or more of the classification methods given in the USNRC's "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification (May 1983)." Waste classification shall be in accordance with approved station procedures.

The following specific requirements shall be incorporated in the program for sampling and analysis for waste classification:

1. Annual analysis shall be performed on representative samples of each waste stream for the nuclides listed in Table 1 and Table 2 of 10 CFR 61.55. For waste streams that are not processed annually, the annual analysis need not be performed until the waste is processed. Isotopic data from other PWR's may be utilized until annual analysis can be performed.

2. The results of these annual analysis shall be used to develop isotopic abundances and scaling factors for difficult to measure nuclides (i.e., beta emitters and transuranics) based on correlations between those nuclides and more easily measured gamma emitters.

3. Calculational methods for determining the total activity in each container shall be developed which utilizes the results from the annual analysis.

4. The classification program shall establish criteria and include provisions for an increased frequency for sampling and analysis required by paragraph 1 above, if the waste stream isotopic content may have changed by a factor of 10.

2.2 PROCESSING OF WET RADIOACTIVE WASTE

A. Processing Methods

Wet radioactive waste processed at WBN shall be processed into a form acceptable for disposal at a licensed facility. Processing shall be performed utilizing vendor supplied equipment operated in accordance with the vendor's PCP and procedures. Any vendor selected to provide services or products used for compliance with 10 CFR 61 stability requirements shall have a topical report addressing 10 CFR 61 requirements under review or approved by the NRC. The topical reports and PCP's of other vendors may be referenced in this PCP even if all vendors are not actively providing service or products at WBN. However, if any vendor is selected whose documents are not referenced, this document shall be revised to reference them.

B. System Qualification Tests

1. Prior to the initial solidification of a given waste stream using a specified process, a test shall be conducted to demonstrate the ability of the process to produce an acceptable waste form over the range of critical parameters identified during the prequalification testing. Bounds for critical parameters and specific operating limits shall be specified in the vendor's PCP.

2. These tests shall be performed on laboratory scale or full scale specimens and shall ensure that the acceptance criteria specified in Section 2.2.E are achieved.

3. The dewatering process shall specify an endpoint for each dewatering evolution so as to assure that the acceptance criteria specified in Section 2.2.E are achieved.

C. Batch Processing

Each batch of waste offered for processing shall be sampled and analyzed, as appropriate, in accordance with site procedures, the vendor's PCP and the topical report that addresses the 10 CFR 61 stability requirements. This sampling shall:

1. Provide the necessary data to estimate curie content and to perform the waste classification analysis.

2. When solidification is involved, sampling shall provide data necessary to:

   a. Ensure that waste stream parameters are within the bounds for critical parameters established in the vendor's PCP and topical report.

   b. Verify the application of preestablished mix ratios.

D. Testing/Inspections

1. Tests are performed on those wastes which are solidified to ensure the adequacy of the solidification agent and/or procedural technique. The vendor's PCP shall be used to verify the solidification of at least one representative test specimen from at least every tenth batch of each type waste being processed.

2. If any test specimen fails to verify solidification, the solidification of the batch under test shall be suspended until such time as additional test specimens can be obtained, alternative solidification parameters can be determined in accordance with the vendor's PCP, and a subsequent test verifies solidification. Solidification of the batch may then be resumed using the alternative solidification parameters determined by the vendor's PCP.

3. If the initial test specimen from a batch fails to verify solidification, the vendor's PCP shall provide for the collection and testing of representative test specimens from each consecutive batch of waste until at least 3 consecutive test specimens demonstrate solidification.

E. Acceptance Criteria

1. All classes of waste shall satisfy the following acceptance criteria:

   a. Liquid wastes shall be solidified.

   b. Solid waste containing liquids shall not contain freestanding liquid in excess of 1% of the internal volume of the container.

2. For wastes which require structural stability, the acceptance criteria are as follows:

   a. The waste shall have structural stability.

   b. Not withstanding the provisions of Section 2.2.E.1, liquid wastes or wastes containing liquid shall be converted into a form in which the freestanding liquid shall not exceed 1% of the internal volume of the container when contained in a HIC, or 0.5% of the volume of the waste for waste processed to a stable form.

F. Corrective Actions

With processing not meeting the above acceptance criteria or otherwise not meeting disposal site, shipping and/or transportation requirements, suspend shipment of inadequately processed waste and correct the PCP, procedures, and/or waste processing equipment as necessary to prevent recurrence. The disposition of inadequately processed wastes will be handled on a case-by-case basis.

2.3 WASTE STREAM PROCESSING METHODS

A. Spent Resins

1. Normally spent resins are processed for disposal by dewatering. The resin is transferred to the liner or HIC where it is processed utilizing vendor supplied services, per Section 2.2.

2. Alternatively, resins may be processed for disposal by solidification. The resins shall be sampled for isotopic content and PCP parameters as defined in the vendor's PCP. The resins are transferred to the vendor's processing skid where they are solidified per Section 2.2.

B. Spent Filter Elements

Spent filter elements are surveyed for dose rate upon removal from the system. The measured dose rate is used to calculate isotopic content using a dose-to-curie conversion and scaling factors per Section 2.1. Based on the isotopic content and waste classification, the appropriate process and container to be used for disposal are determined. Normally, filters are placed in a liner or HIC and dewatered; however, filters may be dried and handled as DAW if conditions allow, or may be encapsulated.

C. Miscellaneous Wastes

Sludges and other miscellaneous wastes will be collected and handled on a case-by-case basis, and processed per Section 2.2. Oil and, on a case-by-case basis, other acceptable liquid waste will normally be shipped off-site to a licensed incinerator for disposal.

2.4 ADMINISTRATIVE CONTROLS

A. Procedures

Activities associated with the implementation of the requirements of this program shall be conducted in accordance with approved procedures or vendor documents that have been reviewed and approved by WBN.

B. Quality Assurance/Quality Control

Quality assurance assessments are conducted by the Quality Assurance organization, and by the Corporate Radiological Control organization. Assessment findings are reviewed by WBN management. Quality control measures include site review of all radwaste vendor procedures before use and verification, by site personnel, of end points or acceptance criteria in vendor procedures. Quality control of solidification methods is performed through controlled testing of a minimum of one sample from each batch to be solidified. Proportions of solidification agents are established which meet the standards for waste form and free standing liquid criteria.

C. Training

Personnel involved in processing radioactive waste for shipment are trained in site procedures, regulatory requirements, and disposal site criteria applicable to the individuals responsibilities. The retraining of personnel shall be at the frequency specified in site procedures.

D. Licensee Initiated Changes to the PCP

1. Licensee initiated changes to the PCP shall be documented and records of reviews performed shall be retained for the duration of the unit Operating License. This documentation shall contain:

   a. Sufficiently detailed information to support the change(s) and appropriate analyses or evaluations justifying the change(s); and

   b. A determination that the change(s) maintain the overall conformance of the solidified waste product to existing requirements of Federal, State, or other applicable regulations.

   c. Shall be effective after review and acceptance by the Plant Operations Review Committee (PORC) and the approval of the Plant Manager.

2. Licensee initiated changes to the PCP shall be reported to the Commission in the Annual Radioactive Effluent Release Report for the period in which the revision was reviewed by the PORC, in accordance with the WBN Off-site Dose Calculation Manual (ODCM).

E. Major Changes To Liquid Gaseous Radwaste Treatment Systems

Licensee initiated major changes to the Radwaste Treatment Systems (liquid and gaseous) shall be reported to the Commission in the Annual Radioactive Effluent Release Report for the period in which the evaluation was reviewed by the PORC, in accordance with the WBN ODCM.

3.0 RECORDS

None

4.0 DEFINITIONS

Batch - An isolated quantity of waste to be processed having constant physical and chemical characteristics.

Dewatered - Wet solid wastes which have had excess water removed.

Free liquid - Uncombined liquid not bound by the solid matrix of the solid waste mass; capable of flowing.

Homogeneous - Of uniform composition; the waste is uniformly distributed throughout the container.

Liquid waste - Any aqueous or non-aqueous radioactive liquid which requires processing before disposal. This may include oils, chemicals, water, or other liquids unsuitable for inplant cleanup or treatment.

Mixed waste - Low level radioactive wastes containing chemical constituents which are hazardous under 40 CFR 261.

Solidification agent - Material which, when mixed in prescribed proportions with liquid or wet solid wastes, can form a free standing product with no free liquid.

Solidification - The conversion of wet wastes into a solid form that meets shipping and burial site criteria.

Stability - A property of the waste form such that it is able to maintain its structural integrity under the expected disposal conditions; stabilized waste should maintain its gross physical properties and identity over a 300 year period.

5.0 REFERENCES

5.1 Code of Federal Regulations (CFR) Title 10, Parts 20, 61, 71; 10 CFR 20, 10 CFR 61, 10 CFR 71.

5.2 Code of Federal Regulations (CFR) Title 49.

5.3 Watts Bar Nuclear Plant Off-site Dose Calculation Manual

5.4 USNRC Low Level Waste Licensing Branch Technical Position on Radioactive Waste Classification, May 1983

5.5 USNRC Low Level Waste Licensing Branch Technical Position on Radioactive Waste Form, January 1991

5.6 Topical Report CNSI DW-11118-01-P-A for Chem-Nuclear Systems, Inc., Dewatering Control Process Containers

5.7 CNSI, FO-OP-023, Bead Resin/Activated Carbon Dewatering Procedure for CNSI 14-215 or Smaller Liners

5.8 CNSI, FO-OP-19, Polyethylene High Integrity Container Overpack Handling Procedure

5.9 CNSI, FO-AD-002, Operating Guidelines for Use of Polyethylene High Integrity Containers

Source Notes

None.