

DUKE POWER COMPANY  
CORPORATE  
PROCESS CONTROL PROGRAM  
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DUKE POWER COMPANY  
CORPORATE  
PROCESS CONTROL PROGRAM

1.0 INTRODUCTION

1.1 Purpose

The Process Control Program (PCP) is a set of administrative and operational controls used to regulate all areas of the dewatering or solidification of radioactive liquid wastes (liquids or wet solids), and is a Selected Licensee Commitment. The purpose of the PCP is to ensure that the final product of solidification or dewatering meets all Federal and State shipping, transportation and disposal site requirements. It is the responsibility of the utility to ensure that the PCP requirements are met and that the condition of the waste is acceptable upon arrival at the disposal site.

1.2 Manual

This manual outlines Duke Power Company's program for complying the NRC requirements for a Process Control Program for the Oconee, McGuire and Catawba Nuclear Stations.

The Corporate Process Control Program includes the specific requirements that must be met to ensure final solidification or dewatering products meet all federal and state regulations.

The Station Process Control Program includes a list of the station specific operating procedures that implement the requirements of the Corporate PCP and a station specific drawing reference for system interfaces.

As the Nuclear Regulatory Commission further defines their requirements for a PCP and as federal or state regulations change, this manual will be revised by Nuclear Technical Services, Radwaste Processing and Management to incorporate these changes.

1.3 Waste Processing Activities

Waste processing (solidification or dewatering as described below) equipment and services may be provided by Duke Power Company or vendors. Any process used must meet all requirements of the Process Control Program.

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Technical review of all vendor documents and procedures shall be performed by station and corporate Radwaste staffs. Vendor services must be approved by Nuclear Technical Services Manager.

#### 1.3.1 Solidification

Solidification is accomplished by mixing measured amounts of waste, binder and required additives which, after sufficient curing time, produce a solid free-standing monolith. At the end of the curing period, the absence of free liquids is verified either by confirmation that the PCP was followed or by physical testing.

Solidification system ventilation discharge is routed to the plant's Auxiliary Building or Radwaste Facility ventilation system and any decanted liquid is processed as required by the station liquid radwaste systems.

1.3.1.1 A "Mixed waste" is a waste that is both radioactive and hazardous as defined by EPA regulations in 40 CFR261. Solidification of these wastes, as per the Process Control Program, will ensure that the final product meets all waste form requirements applicable to radioactive waste and has been rendered non-hazardous.

#### 1.3.2 Dewatering

Dewatering is accomplished by removing the free-standing liquid (FSL) from "wet solids" (resin slurries, bag or cartridge filter media) such that the final product meets all regulatory and burial site criteria for disposal. The free-standing liquid criteria requires less than 0.5% FSL by waste volume per container or less than 1.0% FSL if a high integrity container (HIC) is used.

Resin liners and portable demineralizers are dewatered using a vacuum pump which takes suction from the vessel through a lateral filter. The water is returned to a station liquid radwaste system and the resin is retained in the vessel by

the lateral filter.

Spent filter media is dewatered by draining or drip drying prior to shipment. Filters may also be dewatered in liners. Absorbent packing material may be placed within the vessel to fill voids and maintain the position of the contents as well as to absorb incidental water or condensation.

Filter backwash slurry may be dewatered by a method similar to resin liner dewatering or it may be solidified.

All wastes to be dewatered are degassed prior to the dewatering process. However all vendor required venting practices should be adhered to. Any waste buried in SEG liners shall be fitted with pressure relief valves.

## 2.0 REGULATORY COMPLIANCE

### 2.1 Regulatory Requirements

The PCP is a requirement of the Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 for all three nuclear stations. The basis for the requirement of a PCP is found in the following documents:

- 10CFR20, "Standards for Protection Against Radiation"
- 10CFR50, "Domestic Licensing of Production and Utilization Facilities"
- 10CFR61, "Licensing Requirements for Land Disposal of Radioactive Waste"
- 10CFR71, "Packaging and Transportation of Radioactive materials"
- 40CFR, "Protection of Environment"
- 49CFR173-179, "Transportation"
- Licensed radioactive waste burial site criteria
- State hazardous waste regulations

## 2.2 Regulatory Guidance

In order to assure compliance with the above regulations, the NRC has provided guidance in the following documents:

- NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants"
- NUREG-0452, "Standard Technical Specifications for Westinghouse PWR's"
- NUREG-0800, "Standard Review Plan for Solid Waste Management Systems"
- Branch Technical Position - ETSB 11-3, "Design Guidance of Solid Radioactive Waste Management Systems"
- Appendix 11.4-A, "Design Guidance for Temporary onsite storage of Low Level Radioactive Waste"
- NRC Review Criteria for Solid Waste Management Systems
- Regulatory Guide 1.143, "Design guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power"

## 3.0 PROGRAM REQUIREMENTS

### 3.1 Vendor Requirements

- 3.1.1 Topical Report (or equivalent) - Any vendor utilized for solidification or dewatering services by Duke Power Company shall have a Topical Report that is either under NRC review or has NRC approval, or shall supply to Duke Power Company sufficient documentation of the process and results to demonstrate that an acceptable product will be produced using the described solidification or dewatering process.

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- 3.1.2 Technical Review - Technical review shall be performed by corporate and station Radwaste staffs of all vendor documents and procedures to insure they meet the requirements of the Duke Power Company PCP.
- 3.1.3 Corporate Approval - Any vendor solidification or dewatering services utilized by Duke Power Company shall be approved by the Nuclear Technical Services Manager and Station Managers prior to operation.
- 3.1.4 System Interfaces and Design Requirements - The vendor Topical Report or documentation supplied to Duke Power Company shall meet the requirements of section 3.2 and 3.3.
- 3.1.5 Approved Vendors
  - 3.1.5.1 Chem-Nuclear Systems, Inc. has been reviewed and approved to provide solidification services to the Oconee, McGuire, and Catawba Nuclear Stations as described in:

Mobile Cement Solidification System, Topical Report CNSI-2 (4313-01354-0IP-A). Approved waste streams for solidification are : boric acid evaporator concentrates, spent bead resin, spent powdered resin, filters, filter backwash slurry, resin regenerative chemical wastes and sludges. Note that Chem-Nuclear Systems, Inc. is not approved for solidification of any mixed waste streams.
  - 3.1.5.2 Chem-Nuclear Systems, Inc. has been reviewed and approved to provide dewatering services to Oconee, McGuire, and Catawba Nuclear Stations as described in Topical Report CNSI-DW-11118-01. Approved waste streams include Exodex, Powdex, bead and macroreticular resins, diatomaceous earth, celite 454, Fibracel, SW-10 Solka-FLoc, Zeolite, activated carbon and

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mechanical filters.

3.1.5.3 Babcock and Wilcox has been reviewed and approved to provide solidification services to McGuire, Oconee and Catawba Nuclear Stations for Class A unstable waste as described in B&W's supporting documents. However, each drum of solidified product shall be punctured and fully inspected prior to shipment for disposal. Approved waste streams for solidification are: oil, oil and water mixtures, organics, EDTA-based steam generator cleaning solution concentrate, and sludges. The approved binders are Aquaset, Aquaset II, Petroset and Petroset II. Note that Babcock and Wilcox is not approved for solidification of any mixed waste streams.

3.1.5.4 Scientific Ecology Group, Inc. (SEG) has been reviewed and approved to provide liners and a dewatering (under drain) system for use at Oconee, McGuire, and Catawba Nuclear Stations. These liners may be used for secondary generated powdex and bead resin as well as other similar medias.

Since the SEG dewatering process has not been certified with media that is specifically representative of Duke Power generated waste, physical testing has been performed (e.g. core sampling, moisture retention capacity, collection of final water) to ensure that burial site free-standing water criteria is met prior to shipment to SEG. SEG ensures that no water is added back to the waste during handling and processing (drying, grinding, compaction). Radwaste Processing and Management maintains controlled copies of all applicable SEG procedures.

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Physical testing of the SEG liners can be accomplished using the final dewatering and dewatering verification systems which collect any water in the bottom of the liner beneath the under drain or inside the main dewatering tube after the last dewatering cycle is complete. This system shall be included with each SEG liner.

Ensuring that the liners meet burial site criteria when they leave a Duke Power nuclear station also allows the liner to go directly to the burial site if the liner is not able to be processed for volume reduction at SEG. It is also a prudent practice since the waste generator has ultimate responsibility and liability for its waste.

- 3.1.6 10 CFR 61 Compliance - All vendors supplying solidification services must meet the requirements of section 3.7.
- 3.1.7 Mixed Waste - All vendors supplying solidification services must meet the requirements of section 3.4.

### 3.2 System Interfaces

- 3.2.1 The vendor topical report or documentation supplied to Duke Power Company shall include a detailed system description of all vendor interfaces with plant equipment. Drawings or diagrams shall be included detailing all solidification and dewatering system interfaces with plant radwaste systems and equipment.
- 3.2.2 Duke Power Company permanent or portable solidification or dewatering systems shall have a detailed system description of all interfaces with plant equipment. Drawings or diagrams shall be included detailing all solidification and dewatering system interfaces with plant radwaste systems and equipment.



Note: This information may be included as part of a Topical Report furnished by the equipment manufacturer or supplier or as part of the station specific Final Safety Analysis Report.

### 3.3 System Design Requirements

- 3.3.1 The vendor topical report or documentation supplied to the Company shall include a statement that the design, construction, operation and quality assurance provisions are in accordance with NRC ETSB Branch Technical Position 11-3 and Regulatory Guide 1.143.
- 3.3.2 Duke Power Company permanent or portable solidification and dewatering systems shall meet the design, construction, operation and quality assurance provisions of NRC ETSB Branch Technical Position 11-3 and Regulatory Guide 1.143.

### 3.4 Mixed Waste

- 3.4.1 Some wastes that are both radioactive and hazardous (mixed waste) may be solidified within the requirements stated in the Corporate and Station Process Control Programs. Solidification of these specific mixed wastes shall result in non-hazardous, free-standing monoliths that meet all applicable Federal, State, and local regulations and licensed disposal site criteria.
- 3.4.2 Envirostone solidification compound, manufactured by U.S. Gypsum, has been approved by Chem-Nuclear Systems, Inc. and Duke Power Company for solidification of specific class A unstable wastes that are hazardous as defined by the Environmental Protection Agency (EPA), South Carolina Department of Health and Environmental Control (SCDHEC), and the North Carolina Department of Human Resources (NCDHR). Solidification of these mixed wastes with Envirostone is approved only if solidification is performed by station

personnel using the applicable station Process Control Program. Vendor solidification of these mixed wastes with Envirostone will require approval by Duke Power Company as described in Section 2.1. Solidification of these wastes as per the corporate and station Process Control Programs will ensure that the final solidified product will be a non-hazardous free-standing monolith with <0.5% free-standing water.

3.4.3 In compliance with 40CFR268.7 (a)(4), a written Processing Waste Analysis Plan for those radioactive, hazardous wastes (mixed wastes) that will be treated in 90-day containers, will be filed with the EPA Regional Administrator 30 days prior to the treatment activity, with delivery verified GSD Environmental Protection upon station notification, will develop the Waste Analysis Plan and file it with the EPA Region IV Administrator.

3.4.4 For mixed waste solidification disposal site approval is required prior to shipment.

### 3.5 Waste Oil

3.5.1 Incidental levels of waste oil (less than 1% by volume) may be solidified and shipped to the Barnwell, S.C. burial site for disposal per the requirements of sections 3.0 and 4.0 of this Process Control Program.

3.5.2 If volumes greater than 1% are to be solidified a special oil-specific procedure which includes the requirements of Section 4.0 and the disposal site criteria of another burial site shall be used.

### 3.6 Interim Storage

3.6.1 Station procedures shall be established to ensure that all of the following interim storage requirements are met.

3.6.2 Any processed (i.e., solidified or dewatered) radioactive waste that is stored for an

interim period in a disposal container shall be packaged such that there is no interaction between the waste and its container.

- 3.6.3 If applicable, certificates of Compliance shall be maintained at each station for all waste disposal containers used for interim storage.
- 3.6.4 Vendor supplied handling and storage procedures shall be maintained at each station.
- 3.6.5 Each container of waste shall be checked against information given in Steps 3.6.3 and 3.6.4 to ensure all chemical compatibility requirements are met.
- 3.6.6 Station Chemistry supervision shall review the information in Step 3.6.5 and shall certify chemical compatibility and authorize storage.
- 3.6.7 Records shall be maintained by Duke Power Company for each container. These records shall be maintained for six (6) years (per the Administrative Policy Manual). These records shall include:
  - 3.6.7.1 Chemical compatibility certification (per Step 3.6.6).
  - 3.6.7.2 Station Chemistry supervision authorization to store waste (per Step 3.6.6).

### 3.7 10CFR61 COMPLIANCE

- 3.7.1 Waste Form - The vendor(s) described in Section 3.1.5 for solidification or dewatering shall have a NRC approved report documenting compliance with waste form requirements in the final product, or shall supply Duke Power sufficient documentation to demonstrate waste form compliance.
  - 3.7.1.2 Any vendor providing High Integrity Containers (HIC's) to Duke Power Company shall have a NRC approved report documenting compliance with

waste form requirements, or shall supply Duke Power Company sufficient documentation to demonstrate waste form compliance.

3.7.1.3 All vendor reports (per Step 3.7.1 and 3.7.1.2) shall contain a statement that the final product conforms to the appropriate waste form for either Class A, B, or C waste.

3.7.2 Waste Classification - Station procedures shall be established to ensure that the following requirements are met.

3.7.2.1 Each container of processed (i.e., solidified or dewatered) waste shall be classified as either Class A, B, or C waste using the Duke Power Company "10 CFR Part 61 Waste Classification and Waste Form Implementation Program".

3.7.2.2 Each container of processed waste shall be certified per the documents referenced in Section 2.2 to the appropriate waste form for either Class A, B or C waste. Also, each container of processed mixed waste shall be certified to be non-hazardous.

3.7.2.3 Records shall be maintained for each container of processed waste to ensure compliance with the requirements of Steps 3.7.2.1 and 3.7.2.2. These records shall be maintained for six (6) years (per the Administrative Policy Manual).

### 3.8 Transportation

3.8.1 All shipping casks used to transport processed waste for burial shall have a NRC issued Certificate of Compliance.

3.8.2 Station procedures shall be established to ensure all requirements of the Certificate of

Compliance are met.

NOTE: Vendor procedures shall be incorporated into station procedures prior to use.

3.8.3 Station procedures shall be established to ensure all applicable Federal and State shipping regulations and burial site criteria are met for each container of processed waste.

3.8.4 Records shall be maintained for each container and shipment of processed waste. These records shall be maintained for six (6) years (per the Administrative Policy Manual). These records shall include:

3.8.4.1 Documentation of a valid certificate of compliance for each cask (per Step 3.8.1). Maintain for six (6) years.

3.8.4.2 Documentation that all requirements of the Certificate of Compliance were met (per Step 3.8.2). Maintain for six (6) years.

3.8.4.3 Documentation that all shipping regulations were met (per Step 3.8.3). Maintain for life of plant.

### 3.9 Reviews

3.9.1 Changes to the Corporate Process Control Program shall be reviewed by the Radwaste Processing and Management staff and each station's Radwaste staff prior to implementation. Proposed revisions shall be reviewed against Technical Specifications, all applicable NRC guidance, and all applicable hazardous waste management regulations to ensure all requirements of a Process Control Program have been addressed. Review documents shall include documents listed in Section 2.0.

3.9.2 Radwaste Processing and Management is responsible for the interpretation and implementation of the Process Control Program and shall be notified when any changes,

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deviations or questions concerning the interpretation of a requirement in the solidification or dewatering of a radioactive waste is encountered which may affect the Process Control Program.

3.9.3 Changes to the Corporate Process Control Program shall be approved by the Nuclear Technical Services Manager and each Station Manager prior to implementation.

3.9.4 Each Station Manager shall document that any changes to the Corporate Process Control Program have been reviewed and approved (per Steps 3.9.1 - 3.9.3).

3.9.5 The Nuclear Safety Review Board shall review the activities of the Station Manager detailed in Step 3.9.4.

3.9.6 A record of the review (per Step 3.9.5) shall be sent to the Senior Vice President, Nuclear Generation and Executive Vice President, Power Generation within fourteen (14) days following completion of the review.

3.9.7 All changes to the Corporate PCP shall be sent to the NRC in each station's Semi-annual Radioactive Effluent Report for the period in which the changes were implemented.

3.9.8 Changes to all implementing procedures shall be reviewed by station Radwaste staffs and approved by the Chemistry Manager, prior to implementation to ensure that they do not conflict with the Corporate Process Control Program.

3.9.9 Records shall be maintained documenting the approvals required by Section 3.9. Records shall be maintained for six (6) years (per the Administrative Policy Manual).

### 3.10 Audits

3.10.1 The Corporate Process Control Program and station implementing procedures shall be audited at least once per twenty-four months

at each station.

- 3.10.2 This audit shall be performed under the cognizance of the NSRB.
- 3.10.3 Audit reports shall be forwarded to the Site Vice President, and the Nuclear Safety Review Board.
- 3.10.4 Audit reports shall be forwarded to the Senior Vice President, Nuclear Generation, Executive Vice President, Power Generation and to the management positions responsible for the areas audited within 30 days of completion of the audit.

#### 4.0 SOLIDIFICATION

##### 4.1 Overview of Station Procedure Requirements

- 4.1.1 Station procedures shall be established to ensure that all requirements for solidification are met. Specific requirements are defined in Sections 4.2 - 4.7.
- 4.1.2 Vendor procedures shall be incorporated into station procedures. Vendor format may be retained as a station procedure enclosure if desired or the procedure may be rewritten into DPC format.
- 4.1.3 Overview of the solidification process - The solidification shall be performed per station procedures in a controlled and quality fashion which ensures that all applicable Selected Licensee Commitments and disposal site criteria are met. The following solidification process sequence has been established per the Process Control Program and must be adhered to.
  - 4.1.3.1 First: A representative sample of the waste to be solidified must be obtained per section 4.2.
  - 4.1.3.2 Second: The waste sample must be characterized chemically and physically per section 4.3.

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4.1.3.3 Third: A bench scale test solidification must be performed per section 4.4, to establish boundary conditions for the applicable process parameters. These boundary conditions will then be used in the full scale solidification. The solidified product (both test and full scale) must meet the following acceptance criteria.

4.1.3.3.a The solidified product shall contain less than 0.5% freestanding liquid (FSL) by waste volume or less than 1.0% if a High Integrity Container (HIC) is used.

4.1.3.3.b The solidified product shall be a free-standing monolith.

4.1.3.3.c In the case of mixed waste, the solidified product shall be non-hazardous.

4.1.3.4 Fourth: Full scale solidification and subsequent verification shall be performed per Section 4.5.

## 4.2 Representative Waste Sampling

4.2.1 A "representative" sample of the waste to be solidified must be obtained per the following steps.

4.2.1.1 The contents of the container to be sampled shall be recirculated a minimum of three volume turnovers or adequately mixed to achieve a homogeneous mixture.

NOTE: Adequately mixed shall be defined as mixing via a g i t a t i v e or recirculative flow which exceeds a specified



minimum rate which has been documented to provide a representative sample for the vessel.

- 4.2.1.2 During the recirculation and sampling period, the vessel shall not be placed in a transfer mode nor shall additional waste be received.
- 4.2.1.3 Vessel level readings or input isolation shall be documented at the time of mixing initiation, sampling, and process initiation.
- 4.2.1.4 Recirculation or mixing time must be uninterrupted from initiation until completion of sample collection.

#### 4.3 Characterization of Waste Sample

- 4.3.1 Sample analyses such as the following shall be performed as outlined in site-specific procedures for the applicable waste form and solidification media to be used.
  - 4.3.1.1 Waste pH.
  - 4.3.1.2 Waste density.
  - 4.3.1.3 Waste boron concentration.
  - 4.3.1.4 Waste oil content.
  - 4.3.1.5 Hazardous characteristics of mixed waste sample before solidification, for example, TCLP (Toxicity Characteristic Leaching Procedure) ignitability, reactivity, corrosivity, and listed hazardous waste constituents.

#### 4.4 Test Solidification

- 4.4.1 A laboratory scale test solidification shall be performed to establish boundary conditions for all solidification process parameters. This is to ensure the success of the actual full-scale solidification.

4.4.1.1 "Process parameters" shall be defined as, "those conditions critical to ensure complete solidification and, if applicable, to ensure that the final solidified product is non-hazardous".

4.4.1.2 "Boundary conditions" shall be defined as, "acceptable numerical values for process parameters as established by a test solidification".

4.4.2 Process parameters and boundary conditions (or a method by which to establish them) are usually given in vendor procedures which have already been certified for a given radioactive waste type. For mixed waste however, Duke Power Company personnel must develop procedures for each specific mixed waste type. Process parameters should include any of the following.

4.4.2.1 Waste form.

4.4.2.2 Waste to solidification agent ratio.

4.4.2.3 Amount of each solidification additive.

4.4.2.4 Waste pH.

4.4.2.5 Waste boron concentration.

4.4.2.6 Waste density.

4.4.2.7 Waste oil content.

4.4.2.8 Mixer speed.

4.4.2.9 Mixing time.

4.4.2.10 Curing time.

4.4.2.11 Specific activity.

4.4.2.12 Pre-solidification hazardous properties, for example, TCLP, ignitability, reactivity,

corrosivity, listed hazardous waste constituents.

- 4.4.3 Physical testing and laboratory analysis, as described in Section 4.6 shall be performed on the test solidification product to verify that there is less than 0.5% FSL (or less than 1.0% FSL if a HIC is to be used) and that the product is a free-standing monolith. In addition, any mixed waste must be rendered non-hazardous.
- 4.4.4 A representative waste sample shall be taken and the test solidification repeated for each radioactive waste type to verify the solidification process.
  - 4.4.3.1 The test solidification must be repeated for at least every tenth batch of radioactive waste of a given waste type.
  - 4.4.3.2 For mixed wastes, a representative waste sample shall be taken and the test solidification repeated for every batch of each waste type to verify solidification.
- 4.4.5 For mixed waste, if feasible and representative of the actual waste, a full scale test solidification of a non-radioactive waste sample should be performed prior to the first full scale solidification. This full scale test solidification should be performed within the boundary conditions identified for the actual mixed waste type (reference steps 4.4.1. and 4.4.2). The solidified product will be cut away from the drum and examined for free-standing water. It will also be verified to be a free-standing monolith. The purpose of this non-radioactive full scale test solidification is to help ensure the success of the full scale solidification of the actual mixed waste type. Full scale verification of these process parameters is prudent given the negative impact of a faulty mixed waste solidification (e.g. could require that Duke Power Company obtain an EPA hazardous waste storage permit). If a full

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scale test solidification of a non-radioactive waste sample is not feasible and representative of the actual mixed waste, verification of the process parameter development results will be accomplished by performing physical testing and laboratory analysis on the first vessel of a solidified mixed waste type before performing additional full scale solidifications, as required by Section 4.6.

- 4.4.6 The vendor shall submit sample analysis, test solidification results and prescribed boundary conditions to Station Chemistry supervision for review and authorization to initiate full scale waste solidification. Note that station personnel will usually perform solidifications of mixed waste. In these cases, the responsible station personnel shall submit the above information to Station Chemistry supervision.

4.4.6.1 Difficulties and/or disagreements between vendor and station personnel should be resolved through direct interaction between vendor and station. Radwaste Processing and Management should be contacted if resolution cannot be reached at the station. 1

- 4.4.7 Solidification for disposal shall not be performed unless the test solidification is acceptable per step 4.4.3.

- 4.4.8 If any test solidification fails to meet the acceptance criteria set forth in step 4.4.3, additional representative samples from the current waste batch must be obtained and additional test solidifications performed until alternate solidification parameters are determined and solidification verified.

4.4.8.1 A "batch" shall be defined as an isolated quantity of waste to be processed having essentially consistent physical and chemical characteristics.

- 4.4.9 If the initial test solidification fails, representative sampling from each consecutive batch of the same type of waste and test solidifications must be performed using the alternate solidification parameters until at least 3 consecutive solidifications are achieved per step 4.4.3.
- 4.4.10 Ensure that the specific activity will not exceed the packaging limits of the disposal container.

#### 4.5 Full Scale Solidification

- 4.5.1 Actual full scale solidification shall be performed using station procedures which ensure that the solidification system is operated within the established boundary conditions.
- 4.5.2 Solidifications that are performed in drums must use new drums (not reconditioned) that meet the requirements of 49CFR.

#### 4.6 Product Verification

- 4.6.1 Product verification shall be performed to ensure the absence of free-standing liquid, that the waste is a free-standing monolith and that mixed waste has been rendered non-hazardous.
- 4.6.2 Confirmation that the Process Control Program was followed may serve as verification of the final solidified product.
  - 4.6.2.1 For mixed waste, physical testing and laboratory analysis are required, as a minimum, for the first vessel of each solidified waste type even if the PCP is followed.
- 4.6.3 If the Process Control Program was not followed or if any unusual condition existed during processing, product verification for each vessel shall require physical

testing/laboratory analysis.

4.6.4 Physical testing and laboratory analysis for product verification is described below:

4.6.4.1 The absence of FSL shall be determined by physical testing. This testing shall consist of visual inspection, probe penetrant testing and puncturing the bottom of the vessel. A vessel shall have less than 0.5% FSL by waste volume. If a High Integrity Container (HIC) is utilized, the vessel shall have less than 1.0% FSL.

4.6.4.2 Physical testing shall be utilized to determine if a solidified waste is a freestanding monolith. This testing shall consist of a visual inspection.

4.6.4.3 Laboratory analysis using approved EPA methods shall be performed to determine if a solidified mixed waste has been rendered non-hazardous. Note that the solidified mixed waste need only be analyzed for those hazardous properties it exhibited prior to solidification or those that may have been introduced by the solidification process.

4.6.5 Any solidification vessel that does not pass the tests specified in Section 4.6 shall not be shipped to a burial site until reprocessing or repackaging has resulted in an acceptable product. In addition, any solidified mixed waste that passes these tests shall still not be shipped to a burial site until the site has given approval.

4.7 Document Retention

4.7.1 Records shall be maintained by Duke Power company on each vessel of solidified waste. The following records shall be maintained for six (6) years (per the Administrative Policy

Manual).

- 4.7.1.1 Representative sampling documentation (per step 4.2.1).
- 4.7.1.2 Sample analysis results (per Section 4.3).
- 4.7.1.3 Test solidification results and prescribed boundary conditions (per Section 4.4).
- 4.7.1.4 Station solidification procedures (per step 4.5.1).
- 4.7.1.5 FSL verification, free-standing monolith verification and, if applicable, verification that the solidified mixed waste is non-hazardous (per Section 4.6).

## 5.0 DEWATERING

### 5.1 Procedure Requirements

- 5.1.1 Station procedures shall be established to ensure that all dewatering requirements are met.
- 5.1.2 Vendor procedures shall be incorporated into station procedures. Vendor format may be retained as an enclosure to a station procedure or the procedure may be rewritten into DPC format.

### 5.2 Processing Requirements

- 5.2.1 Boundary conditions shall be established for all process parameters.
  - 5.2.1.1 "Process parameters shall be defined as, "those conditions critical to ensure complete dewatering".
  - 5.2.1.2 "Boundary conditions" shall be defined as, acceptable numerical values of process parameters".
- 5.2.2 Process parameters shall be identified in

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site-specific procedures. Typical parameters are:

5.2.2.1 Waste form.

5.2.2.2 Settling time.

5.2.2.3 Drain (or pump) time.

5.2.2.4 Drying time.

5.2.2.5 Specific activity

5.2.3 Sample analysis and boundary conditions shall be submitted to the Station Radwaste General Supervisor or Staff for review, as required.

5.2.3.1 For filter dewatering, data shall be submitted to the Station Radwaste General Supervisor or Staff.

5.2.4 Actual dewatering shall be performed using station procedures which ensure that the equipment is operated within the established boundary conditions.

### 5.3 Product Verification

5.3.1 The absence of free-standing liquids (FSL) shall be verified for each vessel of dewatered waste prior to disposal. Verification shall be performed by either confirmation that the Process Control Program was followed or by physical testing.

5.3.2 Physical testing of the final dewatered product to verify the absence of the free-standing liquid may be performed as follows.

5.3.2.1 The bottom of the vessel may be punctured and any free liquids collected and measured.

5.3.3 Physical testing shall be required for each vessel if the Process Control Program was not followed or if any off-normal condition



existed during processing.

5.3.4 A vessel shall have less than 0.5% free-standing liquids by waste volume or less than 1.0% free-standing liquids if a high Integrity Container (HIC) is used.

5.3.5 Any dewatered vessel containing excess free liquids, as defined in Step 5.3.4 shall not be shipped to a burial site until reprocessing or repackaging has resulted in an acceptable product.

#### 5.4 Document Retention

5.4.1 Records shall be maintained by Duke Power Company on each vessel of dewatered waste. These records shall be maintained for six (6) years (per the Administrative Policy Manual). These records shall include:

5.4.1.1 Sample analysis and boundary conditions (per step 5.2.2).

5.4.1.2 Station dewatering procedures (per step 5.2.4).

5.4.1.3 Free-standing liquid verification (per section 5.3).

DUKE POWER COMPANY  
STATION  
PROCESS CONTROL PROGRAM

1.0 PURPOSE

The purpose of the Duke Power Company Station Process Control Program shall be to ensure all requirements of the DPC Corporate Process Control Program have been met for each container of solidified radioactive or mixed waste and dewatered radioactive waste which is shipped to a licensed burial facility.

2.0 COMPOSITION

2.1 The Duke Power Company Station Process Control Program shall consist of:

2.1.1 The Duke Power company Corporate Process Control Program.

2.1.2 A list of all station-specific procedures that implement the requirements of the Corporate Process Control Program.

2.1.3 Diagrams, drawings or drawing numbers showing all interfaces between plant radwaste systems and solidification and dewatering equipment.

2.1.4 Documentation of Nuclear Technical Services Manager, Station Chemistry Managers', and Station Managers' approval of all changes to the Station and Corporate Process Control Programs.

3.0 EXCEPTIONS

3.1 Each Station's exceptions to the Corporate PCP shall be documented in the Station's PCP.