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

1. 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 PCP ensures that the final product of solidification or dewatering meets all Federal and State 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 with 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 General Office Chemistry 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.

Technical review of all vendor documents and procedures shall be performed by station and General Office Chemistry staffs. Vendor services must be approved by the Technical Manager, Nuclear Chemistry, and Station Managers, or his designee.

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

1.3.2. Dewatering

Dewatering is accomplished by removing the freestanding 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, approved containers, 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(s).

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.

Filters may be disposed in a filter HIC provided they are dewatered (blown down and/or dried) prior to placement in the HIC. The HIC is then dewatered prior to shipment for incidental water only.

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 Scientific Ecology Group, Inc. (SEG) liners shall be fitted with pressure relief valves.

2. REGULATORY COMPLIANCE

2.1. Regulatory Requirements

The PCP is a requirement of the Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 and Section 6.0, Administrative Controls, of Technical Specifications 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"
- 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-800,"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 Plants"

3. 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.

3.1.2. Technical Review - Technical review shall be performed by general office and station Chemistry 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 Technical Manager, Nuclear Chemistry, and Station Managers, or their designees, 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 (4313-01354-01P-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.

No mixtures of radioactive waste and hazardous waste (mixed waste) as defined by 40CFR261 and S.C. Management Registration 61-79.261 are acceptable for buried in Barnwell. However, a mixed waste which was classified as hazardous solely because it exhibited one or more characteristics defined in 40CFR261 Subpart C but has been treated in a manner such that it no longer exhibits any of the characteristics, will be reviewed on a case-by-case basis for burial acceptance.

A description of the treatment process and results of the analytical tests of the final waste, using the Toxicity Characteristic Leaching Procedure required by 40CFR261.24 shall be submitted to Chem-Nuclear Systems, Inc. for evaluation prior to shipment.

Chem-Nuclear Systems, Inc. may be used to process this type of waste by solidification to render it non-hazardous by binding the characteristic component of the waste by solidification. In addition to the requirements of 40CFR261 all other solidification requirements in this Process Control Program shall be met.

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 granular media, such as bead type ion exchange resin, zeolite and activated carbon (course particle size, GAC 40) and pre-coat media such as Ecodex, Powdex, Epifloc, Solka -floc and/or diatomaceous earth. Other similar media may also be used with Chem-Nuclear's approval. The media shall not contain more than one percent oil by volume.

3.1.5.3. Framatome Technologies has been reviewed and approved to provide solidification services to McGuire, Oconee and Catawba Nuclear Stations for Class A unstable waste as described in Framatome'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. Framatome Technologies may solidify Electrosleeving mixed waste at Oconee Nuclear Station using Portland Type 1 cement.

3.1.5.4. Molten Metals Technologies (MMT) has been reviewed and approved to provide processing (dewatering or solidification) services for ion exchange resin and granular and powdered carbon consistent with the activity limits set forth in

their State of Tennessee Radioactive Materials License. Zeolite material may be accepted for processing with prior approval from MMT.

MMT 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 powdered and bead resin as well as other similar medias.

Physical testing of the MMT 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.

Approved containers that are shipped to MMT for processing need not be dewatered to meet burial site criteria. Only the requirements for transportation set forth in 49CFR173.427 must be satisfied. This basically requires only a rough or single dewatering cycle.

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 certain characteristic mixed wastes, as described in Section 3.1.5.1, may be treated by in-house personnel using this media in compliance with this Process Control Program. Vendor solidification of mixed waste will require approval by Duke Power Company as described in Section 3.1. Solidification of these wastes per the Process Control Program using this media will ensure that the final solidified product will be a non-hazardous free-standing monolith with < 0.5% (or 1% in a HIC) 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 (or additional) containers, must be filed with the EPA Regional Administrator 30 days prior to the treatment activity. Upon station notification, Duke Power Group Environment, Health & Safety / Environmental Protection 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 petroleum based 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. On a case-by-case basis SCDHEC may approve solidification of synthetic oils.

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. Station Environmental Management shall be contacted for guidance on proper storage of mixed wastes.

3.6.4. If applicable, Certificates of Compliance shall be maintained at each station for all waste disposal containers used for interim storage.

3.6.5. Vendor supplied handling and storage procedures shall be maintained at each station.

3.6.6. Each container of waste shall be checked against information given in Step 3.6.4 and 3.6.5 to ensure all chemical compatibility requirements are met.

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.

3.7.1.1. 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.

3.7.1.2. All vendor reports 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

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 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.

3.8. Reviews

3.8.1. Changes to the Corporate Process Control Program shall be reviewed by General Office and Station Chemistry staffs the 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.

3.8.2. General Office Nuclear Chemistry is responsible for the interpretation and implementation of the Process Control Program and shall be notified when any changes, 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.

3.8.3. Changes to the Corporate Process Control Program shall be approved by the Technical Manager, Nuclear Chemistry, and each Station Manager, or their designees, prior to implementation.

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

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

3.8.6. Records shall be maintained documenting the approvals required by Section 3.8. Records shall be maintained for the duration of the plant license plus ten years.

3.8.7. All changes to the PCP and a report of the revisions shall be sent to the Nuclear Safety Review Board (NSRB).

3.9. Audits

3.9.1. The Corporate Process Control Program and station implementing procedures shall be audited under the cognizance of the NSRB at each station and the general office.

4. 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 when solidification is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

4.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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.

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.

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

4.1.3.3.2. The solidified product shall be a free-standing monolith.

4.1.3.3.3. In the case of mixed waste, the solidified product shall be rendered 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 agitative 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 until 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. Process knowledge may be used for hazardous waste characterization with supervisor approval.

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 or approved vendor 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 waste characterization.

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.

4.4.4.1. The test solidification must be repeated for at least every tenth batch of radioactive waste of a given waste type.

4.4.4.2. 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 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.

4.4.7. 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 requirements for product verification are 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 free-

standing 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 for life of plant plus 10 years.

4.7.1.1. Representative sampling documentation.

4.7.1.2. Sample analysis results.

4.7.1.3. Test solidification results and prescribed boundary conditions.

4.7.1.4. Station or vendor solidification procedures.

4.7.1.5. FSL verification, free-standing monolith verification and, if applicable, verification that the solidified mixed waste is non-hazardous.

5. DEWATERING

5.1. Procedure Requirements

5.1.1. Station procedures shall be established to ensure that all requirements for dewatering are met when dewatering is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

5.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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 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 Supervision or Staff for review, as required.

5.2.4. Actual dewatering shall be performed using station procedures when performed by station personnel, 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 life of plant plus 10 years. These records shall include:

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

5.4.1.2. Station or vendor 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. 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. 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 the Technical Manager, Nuclear Chemistry, Station Chemistry Managers', and Station Managers' approvals of all changes to the Station and Corporate Process Control Programs.

3. EXCEPTIONS

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

December 15, 1998

Memorandum For File

SUBJECT: ALL NUCLEAR STATIONS
CORPORATE PROCESS CONTROL PROGRAM
FILE NO.: GS - 760.00

The following is a summary of the changes to the attached Duke Power Company Corporate Process Control Program (PCP). This revision to the Process Control Program, Introduction and Background will be Rev. 2, and the revision to the Corporate PCP will be Rev. 12. This summary lists the section of the PCP changed, followed by an explanation of the change.

PROCESS CONTROL PROGRAM, INTRODUCTION AND BACKGROUND, page I-1,
"4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report."
The change from 'Semiannual' to 'Annual' was made to reflect the Technical Specification revision to the frequency for the Radiological Effluent Report from semiannual to annual. This change was made to the Corporate Process Control Program, Section 3.8.4., in revision 9. The NRC had amended 10CFR50 to reduce the regulatory burden on nuclear licensees in response to a Presidential memorandum requesting that selected Federal agencies review and modify regulations that would eliminate any unnecessary burden of governmental regulations and ensure that the regulated community is not subject to duplicative or inconsistent regulation. The frequency requirements is published in '10CFR50.36a Technical Specifications on effluents from nuclear power reactors.'

1.3. paragraph 2, page 1;
In the second sentence, 'and Station Managers,' was added after 'Chemistry,' for approval requirements to be consistent with section 3.1.3. and 3.8.3.

1.3.2. paragraph 2, page 2;
The phrase 'approved containers' was added to include that 'approved containers,' in addition to resin liners and portable demineralizers may be dewatered. The Molten Metal Technology, Waste Acceptance Criteria, MMT-P-00-001, section 2.7 Packaging; states: "All waste should be packaged in steel or poly containers which are authorized for the transportation of radioactive material in accordance with the U.S. DOT regulations." The

Molten Metal Technology, Waste Acceptance Criteria, Enclosure 1 - Pre Shipment Acceptance Form, contains a listing of container types. The packaging container is also covered by the station Chemistry procedures.

3.1.5.4. paragraph 4, page 5;
The phrase 'Resin liners' was changed to 'Approved containers' to permit the use of approved containers in addition to resin liners. Furthermore, in the second sentence of this paragraph, 40CFR173.425 was changed to 49CFR173.427 to correct a typographical error and incorporate the number sequence change made by the most recent revision to the Code of Federal Regulations, '49CFR173.427 Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).'

3.4.3. In the second sentence, 'ESS' was changed to 'Duke Power Group Environment, Health & Safety / ' to reflect the organization name change.

3.4.4. This sentence was changed to correct a punctuation error.

3.8.7. This section was added to incorporate an administrative requirement to send reports of revisions to the Process Control Program to the Nuclear Safety Review Board (NSRB).

4.1.3. In the second sentence, the 'c' in 'control' was capitalized.

4.1.3.3.3. The incorrect use of the hyphen was deleted from 'of-mixed'.

4.3.1.5. A comma was added before 'ignitability' to indicate a separation between 'TCLP' and 'ignitability'.

4.4.3. The word 'predict' was changed to 'product' to correct this typographical error.

4.6.4. An alteration was made to this sentence to include a grammatical change.

5.2.1.1. A missing quotation mark was added after the word 'parameters'.

5.2.1.2. A missing quotation mark was added before the word 'acceptable' and a single quotation mark was changed to a double quotation mark to be consistent with the usage in 5.2.1.1.

5.2.2. The word 'ill' was changed to 'in' to correct a typographical error in this sentence.

5.2.4. The word 'he' was changed to 'be' to correct a typographical error in this sentence.

For further information on this subject, please contact Robert Martin at 382-3597 or by Lotus Notes ID - RAMARTIN.

Robert A. Martin

Robert A. Martin
Engineer
Nuclear Chemistry

Attachments

DUKE POWER COMPANY

PROCESS CONTROL PROGRAM

INTRODUCTION AND BACKGROUND

Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 requires that the Solid Radwaste System be operated in accordance with a "Process Control Program" for solidification and dewatering such that the final product meets all applicable shipping, transportation and disposal site requirements.

These "Process Control Program" requirements are applicable to liquid or wet solid wastes only. Process Control Program review, audit, procedure, reporting, and record retention requirements are specified in Section 6.0 of Technical Specifications.

While the Selected Licensee Commitments require a "Process Control Program," they do not provide sufficient guidance on the totality of the requirements that must be addressed in an acceptable program. These requirements can be found in several documents developed by the NRC to provide guidance on a "Process Control Program." These documents include:

1. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants"
2. NUREG-0452, "Standard Technical Specifications for Westinghouse PWR's"
3. NUREG-0800, "Standard Review Plan for Solid Waste Management Systems"
4. Branch Technical Position - ETSB 11-3, "Design Guidance of Solid Radioactive Management Systems"
5. Appendix 11.4-A, "Design Guidance for Temporary Onsite Storage of Low Level Radioactive Waste"
6. NRC Review Criteria for Solid Waste Management Systems
7. Site-specific Technical Specifications and Selected Licensee Commitments.

These documents, except for site Technical Specifications and Selected Licensee Commitments, can be found in Section VI of this manual.

A listing of the requirements specified or referenced by each document can be found in Section VII. These requirements can be generally summarized as follows:

1. A PCP shall be used to control all solidification and dewatering activities.
2. A PCP shall assure compliance with applicable federal regulations: 10CFR Parts 20, 50, 61 and 71 and 49 CFR (173-179).
3. A PCP shall be approved by the NRC prior to implementation.
4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report.
5. A PCP shall consist of the processing steps and processing parameters that must be followed to assure satisfactory solidification and/or dewatering products.
6. A PCP shall establish a sampling or testing schedule for verification of solidification.
7. A PCP shall establish a set of records that must be maintained for each solidification and dewatering performed for disposal.

8. A PCP shall specifically address methods for radioactive waste oil disposal.

9. A PCP shall address chemical compatibility of waste and disposal container during interim storage.

10. A PCP shall shall be implemented in station operating procedures.

11. A PCP shall establish a system of technical and management review and approval for all changes to itself or its implementing procedures.

12. A PCP shall establish a system of performance audits for itself and its implementing procedures.

This manual outlines Duke Power Company's program for complying with the NRC requirements for a Process Control Program for the Oconee, McGuire and Catawba Nuclear Stations. The Corporate Process Control Program is the list of the specific requirements that must be met to assure a final solidification or dewatering product meets all federal and state regulations. The Station Process Control Program is a list of the 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 to meet these changes.

SOLIDIFICATION

General System Description

Solidification is accomplished at all Duke Power Nuclear Stations by mixing measured amounts of waste, binder, and required additives and allowing sufficient cure time to ensure a solid free-standing monolith.

A measured amount of waste is transferred from company-owned and controlled containers (e.g., waste storage tanks, tankers, drums) through company- or vendor-supplied isolation valves to the solidification vessel.

Measured amounts of binding agent and additives (as required) are transferred from storage containers through transfer lines to the solidification vessel.

The waste and binder are mixed using company- or vendor-supplied equipment and allowed to cure for a predetermined time. 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.

The solidification system ventilation discharge is routed through company- or vendor-supplied piping to the plant's Auxiliary Building or Radwaste Facility ventilation system prior to discharge to the environment. If the solidification system has filtered ventilation, exhaust need not be routed back to building ventilation.

Any decanted liquids (e.g., excess sluice liquid) are routed back to plant storage tanks through company- or vendor-supplied piping.

Solidification equipment and processing may be provided by vendor, by permanent Duke Power systems, or by portable Duke Power systems. Any process used shall be verified by station and corporate Radwaste staffs as meeting all requirements outlined in the Corporate PCP. Verification and approval by station and corporate Radwaste supervision are required prior to placing any system in service for the purpose of producing solidified waste for disposal as radioactive waste.

DEWATERING

General System Description

Dewatering is accomplished by removing all free liquids from "wet solids" such that the final product meets all regulating and burial site criteria for disposal (i.e., less than 0.5% free standing liquid by waste volume per container or less than 1% free standing liquid if a high integrity container is utilized).

All wastes to be dewatered are degassed prior to the dewatering process. Therefore, special ventilation requirements are not necessary.

Liner Dewatering:

Vendor- or company-supplied liners are used to dewater large volumes of wet solids, usually resin slurries. The wet solids are transferred from company owned and controlled storage containers (e.g., tanks, temporary liners) through company- or vendor supplied isolation valves to the disposal liner. All free liquid is pumped out of the liner and returned to the company storage containers using company or vendor pumps and piping.

Demineralizer Dewatering:

Vendor-supplied portable demineralizers are dewatered by using company or vendor pumps to remove all free liquids from the vessel. The dewatering liquid is returned to company storage containers for sampling prior to reuse or processing.

Filter Dewatering:

Filters are dewatered by draining and drip drying or blowing down prior to shipment. Packing material may be placed within the vessel to maintain position of contents during shipment.

Filter Slurry Dewatering:

Filter backwash slurry may be dewatered similar to resin liner dewatering or solidified.

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Graham T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: R M Wallace

Title: Asc Scientist

Date: 11/16/98

This revision is approved for use at Catawba Nuclear Station.

P.W. Downing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

Catawba Chemistry Manager

Date: 12/3/98

Catawba Station Manager

Date: 12-3-98

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Graham T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: Orlando M. Lewis

Title: Scientist

Date: 11-12-98

This revision is approved for use at McGuire Nuclear Station.

P.W. Downing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

Lance E. Loucks
McGuire Chemistry Manager

Date: 11-13-98

McGuire Station Manager

Date: 11/13/98

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Diahann T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: Charles W. McMillian Jr

Title: Senior Scientist

Date: 11/23/98

This revision is approved for use at Oconee Nuclear Station.

P.W. Downing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

George T. Hamrick
Oconee Chemistry Manager

Date: November 24, 1998

Oconee Station Manager

Date: 11/30/98

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

1. 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 PCP ensures that the final product of solidification or dewatering meets all Federal and State 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 with 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 General Office Chemistry 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.

Technical review of all vendor documents and procedures shall be performed by station and General Office Chemistry staffs. Vendor services must be approved by the Technical Manager, Nuclear Chemistry, and Station Managers, or his designee.

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

1.3.2. Dewatering

Dewatering is accomplished by removing the freestanding 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, approved containers, 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(s).

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.

Filters may be disposed in a filter HIC provided they are dewatered (blown down and/or dried) prior to placement in the HIC. The HIC is then dewatered prior to shipment for incidental water only.

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 Scientific Ecology Group, Inc. (SEG) liners shall be fitted with pressure relief valves.

2. REGULATORY COMPLIANCE

2.1. Regulatory Requirements

The PCP is a requirement of the Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 and Section 6.0, Administrative Controls, of Technical Specifications 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"
- l0CFR7l, "Packaging and Transportation of Radioactive Materials"
- 40CFR, "Protection of Environment"
- 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-800,"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 Plants"

3. 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.

3.1.2. Technical Review - Technical review shall be performed by general office and station Chemistry 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 Technical Manager, Nuclear Chemistry, and Station Managers, or their designees, 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 (4313-01354-01P-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.

No mixtures of radioactive waste and hazardous waste (mixed waste) as defined by 40CFR261 and S.C. Management Registration 61-79.261 are acceptable for buried in Barnwell. However, a mixed waste which was classified as hazardous solely because it exhibited one or more characteristics defined in 40CFR261 Subpart C but has been treated in a manner such that it no longer exhibits any of the characteristics, will be reviewed on a case-by-case basis for burial acceptance.

A description of the treatment process and results of the analytical tests of the final waste, using the Toxicity Characteristic Leaching Procedure required by 40CFR261.24 shall be submitted to Chem-Nuclear Systems, Inc. for evaluation prior to shipment.

Chem-Nuclear Systems, Inc. may be used to process this type of waste by solidification to render it non-hazardous by binding the characteristic component of the waste by solidification. In addition to the requirements of 40CFR261 all other solidification requirements in this Process Control Program shall be met.

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 granular media, such as bead type ion exchange resin, zeolite and activated carbon (course particle size, GAC 40) and pre-coat media such as Ecodex, Powdex, Epifloc, Solka -floc and/or diatomaceous earth. Other similar media may also be used with Chem-Nuclear's approval. The media shall not contain more than one percent oil by volume.

3.1.5.3. Framatome Technologies has been reviewed and approved to provide solidification services to McGuire, Oconee and Catawba Nuclear Stations for Class A unstable waste as described in Framatome'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. Framatome Technologies may solidify Electrosleeving mixed waste at Oconee Nuclear Station using Portland Type 1 cement.

3.1.5.4. Molten Metals Technologies (MMT) has been reviewed and approved to provide processing (dewatering or solidification) services for ion exchange resin and granular and powdered carbon consistent with the activity limits set forth in

their State of Tennessee Radioactive Materials License. Zeolite material may be accepted for processing with prior approval from MMT.

MMT 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 powdered and bead resin as well as other similar medias.

Physical testing of the MMT 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.

Approved containers that are shipped to MMT for processing need not be dewatered to meet burial site criteria. Only the requirements for transportation set forth in 49CFR173.427 must be satisfied. This basically requires only a rough or single dewatering cycle.

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 certain characteristic mixed wastes, as described in Section 3.1.5.1, may be treated by in-house personnel using this media in compliance with this Process Control Program. Vendor solidification of mixed waste will require approval by Duke Power Company as described in Section 3.1. Solidification of these wastes per the Process Control Program using this media will ensure that the final solidified product will be a non-hazardous free-standing monolith with < 0.5% (or 1% in a HIC) 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 (or additional) containers, must be filed with the EPA Regional Administrator 30 days prior to the treatment activity. Upon station notification, Duke Power Group Environment, Health & Safety / Environmental Protection 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 petroleum based 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. On a case-by-case basis SCDHEC may approve solidification of synthetic oils.

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. Station Environmental Management shall be contacted for guidance on proper storage of mixed wastes.

3.6.4. If applicable, Certificates of Compliance shall be maintained at each station for all waste disposal containers used for interim storage.

3.6.5. Vendor supplied handling and storage procedures shall be maintained at each station.

3.6.6. Each container of waste shall be checked against information given in Step 3.6.4 and 3.6.5 to ensure all chemical compatibility requirements are met.

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.

3.7.1.1. 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.

3.7.1.2. All vendor reports 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

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 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.

3.8. Reviews

3.8.1. Changes to the Corporate Process Control Program shall be reviewed by General Office and Station Chemistry staffs the 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.

3.8.2. General Office Nuclear Chemistry is responsible for the interpretation and implementation of the Process Control Program and shall be notified when any changes, 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.

3.8.3. Changes to the Corporate Process Control Program shall be approved by the Technical Manager, Nuclear Chemistry, and each Station Manager, or their designees, prior to implementation.

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

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

3.8.6. Records shall be maintained documenting the approvals required by Section 3.8. Records shall be maintained for the duration of the plant license plus ten years.

3.8.7. All changes to the PCP and a report of the revisions shall be sent to the Nuclear Safety Review Board (NSRB).

3.9. Audits

3.9.1. The Corporate Process Control Program and station implementing procedures shall be audited under the cognizance of the NSRB at each station and the general office.

4. 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 when solidification is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

4.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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.

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.

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

4.1.3.3.2. The solidified product shall be a free-standing monolith.

4.1.3.3.3. In the case of mixed waste, the solidified product shall be rendered 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 agitative 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 until 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. Process knowledge may be used for hazardous waste characterization with supervisor approval.

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 or approved vendor 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 waste characterization.

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.

4.4.4.1. The test solidification must be repeated for at least every tenth batch of radioactive waste of a given waste type.

4.4.4.2. 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 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.

4.4.7. 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 requirements for product verification are 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 free-

standing 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 for life of plant plus 10 years.

4.7.1.1. Representative sampling documentation.

4.7.1.2. Sample analysis results.

4.7.1.3. Test solidification results and prescribed boundary conditions.

4.7.1.4. Station or vendor solidification procedures.

4.7.1.5. FSL verification, free-standing monolith verification and, if applicable, verification that the solidified mixed waste is non-hazardous.

5. DEWATERING

5.1. Procedure Requirements

5.1.1. Station procedures shall be established to ensure that all requirements for dewatering are met when dewatering is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

5.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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 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 Supervision or Staff for review, as required.

5.2.4. Actual dewatering shall be performed using station procedures when performed by station personnel, 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 life of plant plus 10 years. These records shall include:

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

5.4.1.2. Station or vendor 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. 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. 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 the Technical Manager, Nuclear Chemistry, Station Chemistry Managers', and Station Managers' approvals of all changes to the Station and Corporate Process Control Programs.

3. EXCEPTIONS

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

December 15, 1998

Memorandum For File

SUBJECT: ALL NUCLEAR STATIONS
CORPORATE PROCESS CONTROL PROGRAM
FILE NO.: GS - 760.00

The following is a summary of the changes to the attached Duke Power Company Corporate Process Control Program (PCP). This revision to the Process Control Program, Introduction and Background will be Rev. 2, and the revision to the Corporate PCP will be Rev. 12. This summary lists the section of the PCP changed, followed by an explanation of the change.

PROCESS CONTROL PROGRAM, INTRODUCTION AND BACKGROUND, page I-1,
"4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report."
The change from 'Semiannual' to 'Annual' was made to reflect the Technical Specification revision to the frequency for the Radiological Effluent Report from semiannual to annual. This change was made to the Corporate Process Control Program, Section 3.8.4., in revision 9. The NRC had amended 10CFR50 to reduce the regulatory burden on nuclear licensees in response to a Presidential memorandum requesting that selected Federal agencies review and modify regulations that would eliminate any unnecessary burden of governmental regulations and ensure that the regulated community is not subject to duplicative or inconsistent regulation. The frequency requirements is published in '10CFR50.36a Technical Specifications on effluents from nuclear power reactors.'

1.3. paragraph 2, page 1;
In the second sentence, 'and Station Managers,' was added after 'Chemistry,' for approval requirements to be consistent with section 3.1.3. and 3.8.3.

1.3.2. paragraph 2, page 2;
The phrase 'approved containers' was added to include that 'approved containers,' in addition to resin liners and portable demineralizers may be dewatered. The Molten Metal Technology, Waste Acceptance Criteria, MMT-P-00-001, section 2.7 Packaging; states: "All waste should be packaged in steel or poly containers which are authorized for the transportation of radioactive material in accordance with the U.S. DOT regulations." The

Molten Metal Technology, Waste Acceptance Criteria, Enclosure 1 - Pre Shipment Acceptance Form, contains a listing of container types. The packaging container is also covered by the station Chemistry procedures.

3.1.5.4. paragraph 4, page 5;
The phrase 'Resin liners' was changed to 'Approved containers' to permit the use of approved containers in addition to resin liners. Furthermore, in the second sentence of this paragraph, 40CFR173.425 was changed to 49CFR173.427 to correct a typographical error and incorporate the number sequence change made by the most recent revision to the Code of Federal Regulations, '49CFR173.427 Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).'

3.4.3. In the second sentence, 'ESS' was changed to 'Duke Power Group Environment, Health & Safety / ' to reflect the organization name change.

3.4.4. This sentence was changed to correct a punctuation error.

3.8.7. This section was added to incorporate an administrative requirement to send reports of revisions to the Process Control Program to the Nuclear Safety Review Board (NSRB).

4.1.3. In the second sentence, the 'c' in 'control' was capitalized.

4.1.3.3.3. The incorrect use of the hyphen was deleted from 'of-mixed'.

4.3.1.5. A comma was added before 'ignitability' to indicate a separation between 'TCLP' and 'ignitability'.

4.4.3. The word 'predict' was changed to 'product' to correct this typographical error.

4.6.4. An alteration was made to this sentence to include a grammatical change.

5.2.1.1. A missing quotation mark was added after the word 'parameters'.

5.2.1.2. A missing quotation mark was added before the word 'acceptable' and a single quotation mark was changed to a double quotation mark to be consistent with the usage in 5.2.1.1.

5.2.2. The word 'ill' was changed to 'in' to correct a typographical error in this sentence.

5.2.4. The word 'he' was changed to 'be' to correct a typographical error in this sentence.

For further information on this subject, please contact Robert Martin at 382-3597 or by Lotus Notes ID - RAMARTIN.

Robert A. Martin
Engineer
Nuclear Chemistry

Attachments

DUKE POWER COMPANY

PROCESS CONTROL PROGRAM

INTRODUCTION AND BACKGROUND

Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 requires that the Solid Radwaste System be operated in accordance with a "Process Control Program" for solidification and dewatering such that the final product meets all applicable shipping, transportation and disposal site requirements.

These "Process Control Program" requirements are applicable to liquid or wet solid wastes only. Process Control Program review, audit, procedure, reporting, and record retention requirements are specified in Section 6.0 of Technical Specifications.

While the Selected Licensee Commitments require a "Process Control Program," they do not provide sufficient guidance on the totality of the requirements that must be addressed in an acceptable program. These requirements can be found in several documents developed by the NRC to provide guidance on a "Process Control Program." These documents include:

1. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants"
2. NUREG-0452, "Standard Technical Specifications for Westinghouse PWR's"
3. NUREG-0800, "Standard Review Plan for Solid Waste Management Systems"
4. Branch Technical Position - ETSB 11-3, "Design Guidance of Solid Radioactive Management Systems"
5. Appendix 11.4-A, "Design Guidance for Temporary Onsite Storage of Low Level Radioactive Waste"
6. NRC Review Criteria for Solid Waste Management Systems
7. Site-specific Technical Specifications and Selected Licensee Commitments.

These documents, except for site Technical Specifications and Selected Licensee Commitments, can be found in Section VI of this manual.

A listing of the requirements specified or referenced by each document can be found in Section VII. These requirements can be generally summarized as follows:

1. A PCP shall be used to control all solidification and dewatering activities.
2. A PCP shall assure compliance with applicable federal regulations: 10CFR Parts 20, 50, 61 and 71 and 49 CFR (173-179).
3. A PCP shall be approved by the NRC prior to implementation.
4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report.
5. A PCP shall consist of the processing steps and processing parameters that must be followed to assure satisfactory solidification and/or dewatering products.
6. A PCP shall establish a sampling or testing schedule for verification of solidification.
7. A PCP shall establish a set of records that must be maintained for each solidification and dewatering performed for disposal.

8. A PCP shall specifically address methods for radioactive waste oil disposal.

9. A PCP shall address chemical compatibility of waste and disposal container during interim storage.

10. A PCP shall shall be implemented in station operating procedures.

11. A PCP shall establish a system of technical and management review and approval for all changes to itself or its implementing procedures.

12. A PCP shall establish a system of performance audits for itself and its implementing procedures.

This manual outlines Duke Power Company's program for complying with the NRC requirements for a Process Control Program for the Oconee, McGuire and Catawba Nuclear Stations. The Corporate Process Control Program is the list of the specific requirements that must be met to assure a final solidification or dewatering product meets all federal and state regulations. The Station Process Control Program is a list of the 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 to meet these changes.

SOLIDIFICATION

General System Description

Solidification is accomplished at all Duke Power Nuclear Stations by mixing measured amounts of waste, binder, and required additives and allowing sufficient cure time to ensure a solid free-standing monolith.

A measured amount of waste is transferred from company-owned and controlled containers (e.g., waste storage tanks, tankers, drums) through company- or vendor-supplied isolation valves to the solidification vessel.

Measured amounts of binding agent and additives (as required) are transferred from storage containers through transfer lines to the solidification vessel.

The waste and binder are mixed using company- or vendor-supplied equipment and allowed to cure for a predetermined time. 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.

The solidification system ventilation discharge is routed through company- or vendor-supplied piping to the plant's Auxiliary Building or Radwaste Facility ventilation system prior to discharge to the environment. If the solidification system has filtered ventilation, exhaust need not be routed back to building ventilation.

Any decanted liquids (e.g., excess sluice liquid) are routed back to plant storage tanks through company- or vendor-supplied piping.

Solidification equipment and processing may be provided by vendor, by permanent Duke Power systems, or by portable Duke Power systems. Any process used shall be verified by station and corporate Radwaste staffs as meeting all requirements outlined in the Corporate PCP. Verification and approval by station and corporate Radwaste supervision are required prior to placing any system in service for the purpose of producing solidified waste for disposal as radioactive waste.

DEWATERING

General System Description

Dewatering is accomplished by removing all free liquids from "wet solids" such that the final product meets all regulating and burial site criteria for disposal (i.e., less than 0.5% free standing liquid by waste volume per container or less than 1% free standing liquid if a high integrity container is utilized).

All wastes to be dewatered are degassed prior to the dewatering process. Therefore, special ventilation requirements are not necessary.

Liner Dewatering:

Vendor- or company-supplied liners are used to dewater large volumes of wet solids, usually resin slurries. The wet solids are transferred from company owned and controlled storage containers (e.g., tanks, temporary liners) through company- or vendor supplied isolation valves to the disposal liner. All free liquid is pumped out of the liner and returned to the company storage containers using company or vendor pumps and piping.

Demineralizer Dewatering:

Vendor-supplied portable demineralizers are dewatered by using company or vendor pumps to remove all free liquids from the vessel. The dewatering liquid is returned to company storage containers for sampling prior to reuse or processing.

Filter Dewatering:

Filters are dewatered by draining and drip drying or blowing down prior to shipment. Packing material may be placed within the vessel to maintain position of contents during shipment.

Filter Slurry Dewatering:

Filter backwash slurry may be dewatered similar to resin liner dewatering or solidified.

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Graham T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: R M Wallace

Title: Asc Scientist

Date: 11/16/98

This revision is approved for use at Catawba Nuclear Station.

P.W. Downing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

Catawba Chemistry Manager

Date: 12/3/98

Catawba Station Manager

Date: 12-3-98

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Graham T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: Orlando M. Lewis

Title: Scientist

Date: 11-12-98

This revision is approved for use at McGuire Nuclear Station.

P.W. Downing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

Lance E. Loucks
McGuire Chemistry Manager

Date: 11-13-98

McGuire Station Manager

Date: 11/13/98

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Graham T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: Charles W. McMahon Jr

Title: Senior Scientist

Date: 11/23/98

This revision is approved for use at Oconee Nuclear Station.

P.W. Downing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

George T. Hamrick
Oconee Chemistry Manager

Date: November 24, 1998

Oconee Station Manager

Date: 11/30/98

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

1. 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 PCP ensures that the final product of solidification or dewatering meets all Federal and State 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 with 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 General Office Chemistry 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.

Technical review of all vendor documents and procedures shall be performed by station and General Office Chemistry staffs. Vendor services must be approved by the Technical Manager, Nuclear Chemistry, and Station Managers, or his designee.

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

1.3.2. Dewatering

Dewatering is accomplished by removing the freestanding 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, approved containers, 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(s).

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.

Filters may be disposed in a filter HIC provided they are dewatered (blown down and/or dried) prior to placement in the HIC. The HIC is then dewatered prior to shipment for incidental water only.

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 Scientific Ecology Group, Inc. (SEG) liners shall be fitted with pressure relief valves.

2. REGULATORY COMPLIANCE

2.1. Regulatory Requirements

The PCP is a requirement of the Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 and Section 6.0, Administrative Controls, of Technical Specifications 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"
- 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-800,"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 Plants"

3. 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.

3.1.2. Technical Review - Technical review shall be performed by general office and station Chemistry 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 Technical Manager, Nuclear Chemistry, and Station Managers, or their designees, 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 (4313-01354-01P-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.

No mixtures of radioactive waste and hazardous waste (mixed waste) as defined by 40CFR261 and S.C. Management Registration 61-79.261 are acceptable for buried in Barnwell. However, a mixed waste which was classified as hazardous solely because it exhibited one or more characteristics defined in 40CFR261 Subpart C but has been treated in a manner such that it no longer exhibits any of the characteristics, will be reviewed on a case-by-case basis for burial acceptance.

A description of the treatment process and results of the analytical tests of the final waste, using the Toxicity Characteristic Leaching Procedure required by 40CFR261.24 shall be submitted to Chem-Nuclear Systems, Inc. for evaluation prior to shipment.

Chem-Nuclear Systems, Inc. may be used to process this type of waste by solidification to render it non-hazardous by binding the characteristic component of the waste by solidification. In addition to the requirements of 40CFR261 all other solidification requirements in this Process Control Program shall be met.

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 granular media, such as bead type ion exchange resin, zeolite and activated carbon (course particle size, GAC 40) and pre-coat media such as Ecodex, Powdex, Epifloc, Solka -floc and/or diatomaceous earth. Other similar media may also be used with Chem-Nuclear's approval. The media shall not contain more than one percent oil by volume.

3.1.5.3. Framatome Technologies has been reviewed and approved to provide solidification services to McGuire, Oconee and Catawba Nuclear Stations for Class A unstable waste as described in Framatome'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. Framatome Technologies may solidify Electrosleeving mixed waste at Oconee Nuclear Station using Portland Type 1 cement.

3.1.5.4. Molten Metals Technologies (MMT) has been reviewed and approved to provide processing (dewatering or solidification) services for ion exchange resin and granular and powdered carbon consistent with the activity limits set forth in

their State of Tennessee Radioactive Materials License. Zeolite material may be accepted for processing with prior approval from MMT.

MMT 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 powdered and bead resin as well as other similar medias.

Physical testing of the MMT 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.

Approved containers that are shipped to MMT for processing need not be dewatered to meet burial site criteria. Only the requirements for transportation set forth in 49CFR173.427 must be satisfied. This basically requires only a rough or single dewatering cycle.

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 certain characteristic mixed wastes, as described in Section 3.1.5.1, may be treated by in-house personnel using this media in compliance with this Process Control Program. Vendor solidification of mixed waste will require approval by Duke Power Company as described in Section 3.1. Solidification of these wastes per the Process Control Program using this media will ensure that the final solidified product will be a non-hazardous free-standing monolith with < 0.5% (or 1% in a HIC) 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 (or additional) containers, must be filed with the EPA Regional Administrator 30 days prior to the treatment activity. Upon station notification, Duke Power Group Environment, Health & Safety / Environmental Protection 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 petroleum based 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. On a case-by-case basis SCDHEC may approve solidification of synthetic oils.

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. Station Environmental Management shall be contacted for guidance on proper storage of mixed wastes.

3.6.4. If applicable, Certificates of Compliance shall be maintained at each station for all waste disposal containers used for interim storage.

3.6.5. Vendor supplied handling and storage procedures shall be maintained at each station.

3.6.6. Each container of waste shall be checked against information given in Step 3.6.4 and 3.6.5 to ensure all chemical compatibility requirements are met.

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.

3.7.1.1. 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.

3.7.1.2. All vendor reports 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

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 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.

3.8. Reviews

3.8.1. Changes to the Corporate Process Control Program shall be reviewed by General Office and Station Chemistry staffs the 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.

3.8.2. General Office Nuclear Chemistry is responsible for the interpretation and implementation of the Process Control Program and shall be notified when any changes, 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.

3.8.3. Changes to the Corporate Process Control Program shall be approved by the Technical Manager, Nuclear Chemistry, and each Station Manager, or their designees, prior to implementation.

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

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

3.8.6. Records shall be maintained documenting the approvals required by Section 3.8. Records shall be maintained for the duration of the plant license plus ten years.

3.8.7. All changes to the PCP and a report of the revisions shall be sent to the Nuclear Safety Review Board (NSRB).

3.9. Audits

3.9.1. The Corporate Process Control Program and station implementing procedures shall be audited under the cognizance of the NSRB at each station and the general office.

4. 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 when solidification is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

4.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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.

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.

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

4.1.3.3.2. The solidified product shall be a free-standing monolith.

4.1.3.3.3. In the case of mixed waste, the solidified product shall be rendered 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 agitative 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 until 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. Process knowledge may be used for hazardous waste characterization with supervisor approval.

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 or approved vendor 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 waste characterization.

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.

4.4.4.1. The test solidification must be repeated for at least every tenth batch of radioactive waste of a given waste type.

4.4.4.2. 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 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.

4.4.7. 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 requirements for product verification are 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 free-

standing 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 for life of plant plus 10 years.

4.7.1.1. Representative sampling documentation.

4.7.1.2. Sample analysis results.

4.7.1.3. Test solidification results and prescribed boundary conditions.

4.7.1.4. Station or vendor solidification procedures.

4.7.1.5. FSL verification, free-standing monolith verification and, if applicable, verification that the solidified mixed waste is non-hazardous.

5. DEWATERING

5.1. Procedure Requirements

5.1.1. Station procedures shall be established to ensure that all requirements for dewatering are met when dewatering is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

5.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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 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 Supervision or Staff for review, as required.

5.2.4. Actual dewatering shall be performed using station procedures when performed by station personnel, 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 life of plant plus 10 years. These records shall include:

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

5.4.1.2. Station or vendor 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. 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. 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 the Technical Manager, Nuclear Chemistry, Station Chemistry Managers', and Station Managers' approvals of all changes to the Station and Corporate Process Control Programs.

3. EXCEPTIONS

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

December 15, 1998

Memorandum For File

SUBJECT: ALL NUCLEAR STATIONS
CORPORATE PROCESS CONTROL PROGRAM
FILE NO.: GS - 760.00

The following is a summary of the changes to the attached Duke Power Company Corporate Process Control Program (PCP). This revision to the Process Control Program, Introduction and Background will be Rev. 2, and the revision to the Corporate PCP will be Rev. 12. This summary lists the section of the PCP changed, followed by an explanation of the change.

PROCESS CONTROL PROGRAM, INTRODUCTION AND BACKGROUND, page I-1,
"4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report."
The change from 'Semiannual' to 'Annual' was made to reflect the Technical Specification revision to the frequency for the Radiological Effluent Report from semiannual to annual. This change was made to the Corporate Process Control Program, Section 3.8.4., in revision 9. The NRC had amended 10CFR50 to reduce the regulatory burden on nuclear licensees in response to a Presidential memorandum requesting that selected Federal agencies review and modify regulations that would eliminate any unnecessary burden of governmental regulations and ensure that the regulated community is not subject to duplicative or inconsistent regulation. The frequency requirements is published in '10CFR50.36a Technical Specifications on effluents from nuclear power reactors.'

1.3. paragraph 2, page 1;
In the second sentence, 'and Station Managers,' was added after 'Chemistry,' for approval requirements to be consistent with section 3.1.3. and 3.8.3.

1.3.2. paragraph 2, page 2;
The phrase 'approved containers' was added to include that 'approved containers,' in addition to resin liners and portable demineralizers may be dewatered. The Molten Metal Technology, Waste Acceptance Criteria, MMT-P-00-001, section 2.7 Packaging; states: "All waste should be packaged in steel or poly containers which are authorized for the transportation of radioactive material in accordance with the U.S. DOT regulations." The

Molten Metal Technology, Waste Acceptance Criteria, Enclosure 1 - Pre Shipment Acceptance Form, contains a listing of container types. The packaging container is also covered by the station Chemistry procedures.

3.1.5.4. paragraph 4, page 5;
The phrase 'Resin liners' was changed to 'Approved containers' to permit the use of approved containers in addition to resin liners. Furthermore, in the second sentence of this paragraph, 40CFR173.425 was changed to 49CFR173.427 to correct a typographical error and incorporate the number sequence change made by the most recent revision to the Code of Federal Regulations, '49CFR173.427 Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).'

3.4.3. In the second sentence, 'ESS' was changed to 'Duke Power Group Environment, Health & Safety / ' to reflect the organization name change.

3.4.4. This sentence was changed to correct a punctuation error.

3.8.7. This section was added to incorporate an administrative requirement to send reports of revisions to the Process Control Program to the Nuclear Safety Review Board (NSRB).

4.1.3. In the second sentence, the 'c' in 'control' was capitalized.

4.1.3.3.3. The incorrect use of the hyphen was deleted from 'of-mixed'.

4.3.1.5. A comma was added before 'ignitability' to indicate a separation between 'TCLP' and 'ignitability'.

4.4.3. The word 'predict' was changed to 'product' to correct this typographical error.

4.6.4. An alteration was made to this sentence to include a grammatical change.

5.2.1.1. A missing quotation mark was added after the word 'parameters'.

5.2.1.2. A missing quotation mark was added before the word 'acceptable' and a single quotation mark was changed to a double quotation mark to be consistent with the usage in 5.2.1.1.

5.2.2. The word 'ill' was changed to 'in' to correct a typographical error in this sentence.

5.2.4. The word 'he' was changed to 'be' to correct a typographical error in this sentence.

For further information on this subject, please contact Robert Martin at 382-3597 or by Lotus Notes ID - RAMARTIN.

Robert A. Martin

Robert A. Martin
Engineer
Nuclear Chemistry

Attachments

DUKE POWER COMPANY

PROCESS CONTROL PROGRAM

INTRODUCTION AND BACKGROUND

Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 requires that the Solid Radwaste System be operated in accordance with a "Process Control Program" for solidification and dewatering such that the final product meets all applicable shipping, transportation and disposal site requirements.

These "Process Control Program" requirements are applicable to liquid or wet solid wastes only. Process Control Program review, audit, procedure, reporting, and record retention requirements are specified in Section 6.0 of Technical Specifications.

While the Selected Licensee Commitments require a "Process Control Program," they do not provide sufficient guidance on the totality of the requirements that must be addressed in an acceptable program. These requirements can be found in several documents developed by the NRC to provide guidance on a "Process Control Program." These documents include:

1. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants"
2. NUREG-0452, "Standard Technical Specifications for Westinghouse PWR's"
3. NUREG-0800, "Standard Review Plan for Solid Waste Management Systems"
4. Branch Technical Position - ETSB 11-3, "Design Guidance of Solid Radioactive Management Systems"
5. Appendix 11.4-A, "Design Guidance for Temporary Onsite Storage of Low Level Radioactive Waste"
6. NRC Review Criteria for Solid Waste Management Systems
7. Site-specific Technical Specifications and Selected Licensee Commitments.

These documents, except for site Technical Specifications and Selected Licensee Commitments, can be found in Section VI of this manual.

A listing of the requirements specified or referenced by each document can be found in Section VII. These requirements can be generally summarized as follows:

1. A PCP shall be used to control all solidification and dewatering activities.
2. A PCP shall assure compliance with applicable federal regulations: 10CFR Parts 20, 50, 61 and 71 and 49 CFR (173-179).
3. A PCP shall be approved by the NRC prior to implementation.
4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report.
5. A PCP shall consist of the processing steps and processing parameters that must be followed to assure satisfactory solidification and/or dewatering products.
6. A PCP shall establish a sampling or testing schedule for verification of solidification.
7. A PCP shall establish a set of records that must be maintained for each solidification and dewatering performed for disposal.

8. A PCP shall specifically address methods for radioactive waste oil disposal.

9. A PCP shall address chemical compatibility of waste and disposal container during interim storage.

10. A PCP shall shall be implemented in station operating procedures.

11. A PCP shall establish a system of technical and management review and approval for all changes to itself or its implementing procedures.

12. A PCP shall establish a system of performance audits for itself and its implementing procedures.

This manual outlines Duke Power Company's program for complying with the NRC requirements for a Process Control Program for the Oconee, McGuire and Catawba Nuclear Stations. The Corporate Process Control Program is the list of the specific requirements that must be met to assure a final solidification or dewatering product meets all federal and state regulations. The Station Process Control Program is a list of the 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 to meet these changes.

SOLIDIFICATION

General System Description

Solidification is accomplished at all Duke Power Nuclear Stations by mixing measured amounts of waste, binder, and required additives and allowing sufficient cure time to ensure a solid free-standing monolith.

A measured amount of waste is transferred from company-owned and controlled containers (e.g., waste storage tanks, tankers, drums) through company- or vendor-supplied isolation valves to the solidification vessel.

Measured amounts of binding agent and additives (as required) are transferred from storage containers through transfer lines to the solidification vessel.

The waste and binder are mixed using company- or vendor-supplied equipment and allowed to cure for a predetermined time. 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.

The solidification system ventilation discharge is routed through company- or vendor-supplied piping to the plant's Auxiliary Building or Radwaste Facility ventilation system prior to discharge to the environment. If the solidification system has filtered ventilation, exhaust need not be routed back to building ventilation.

Any decanted liquids (e.g., excess sluice liquid) are routed back to plant storage tanks through company- or vendor-supplied piping.

Solidification equipment and processing may be provided by vendor, by permanent Duke Power systems, or by portable Duke Power systems. Any process used shall be verified by station and corporate Radwaste staffs as meeting all requirements outlined in the Corporate PCP. Verification and approval by station and corporate Radwaste supervision are required prior to placing any system in service for the purpose of producing solidified waste for disposal as radioactive waste.

DEWATERING

General System Description

Dewatering is accomplished by removing all free liquids from "wet solids" such that the final product meets all regulating and burial site criteria for disposal (i.e., less than 0.5% free standing liquid by waste volume per container or less than 1% free standing liquid if a high integrity container is utilized).

All wastes to be dewatered are degassed prior to the dewatering process. Therefore, special ventilation requirements are not necessary.

Liner Dewatering:

Vendor- or company-supplied liners are used to dewater large volumes of wet solids, usually resin slurries. The wet solids are transferred from company owned and controlled storage containers (e.g., tanks, temporary liners) through company- or vendor supplied isolation valves to the disposal liner. All free liquid is pumped out of the liner and returned to the company storage containers using company or vendor pumps and piping.

Demineralizer Dewatering:

Vendor-supplied portable demineralizers are dewatered by using company or vendor pumps to remove all free liquids from the vessel. The dewatering liquid is returned to company storage containers for sampling prior to reuse or processing.

Filter Dewatering:

Filters are dewatered by draining and drip drying or blowing down prior to shipment. Packing material may be placed within the vessel to maintain position of contents during shipment.

Filter Slurry Dewatering:

Filter backwash slurry may be dewatered similar to resin liner dewatering or solidified.

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
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Date: 10/13/98

General Office Review

By: Graham T. Johnson

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Date: 10-27-98

Station Review

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Date: 11/16/98

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Date: 11/2/98

Catawba Chemistry Manager

Date: 12/3/98

Catawba Station Manager

Date: 12-3-98

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

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McGuire Station Manager

Date: 11/13/98

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

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

1. 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 PCP ensures that the final product of solidification or dewatering meets all Federal and State 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 with 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 General Office Chemistry 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.

Technical review of all vendor documents and procedures shall be performed by station and General Office Chemistry staffs. Vendor services must be approved by the Technical Manager, Nuclear Chemistry, and Station Managers, or his designee.

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

1.3.2. Dewatering

Dewatering is accomplished by removing the freestanding 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, approved containers, 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(s).

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.

Filters may be disposed in a filter HIC provided they are dewatered (blown down and/or dried) prior to placement in the HIC. The HIC is then dewatered prior to shipment for incidental water only.

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 Scientific Ecology Group, Inc. (SEG) liners shall be fitted with pressure relief valves.

2. REGULATORY COMPLIANCE

2.1. Regulatory Requirements

The PCP is a requirement of the Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 and Section 6.0, Administrative Controls, of Technical Specifications 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"
- 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-800,"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 Plants"

3. 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.

3.1.2. Technical Review - Technical review shall be performed by general office and station Chemistry 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 Technical Manager, Nuclear Chemistry, and Station Managers, or their designees, 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 (4313-01354-01P-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.

No mixtures of radioactive waste and hazardous waste (mixed waste) as defined by 40CFR261 and S.C. Management Registration 61-79.261 are acceptable for buried in Barnwell. However, a mixed waste which was classified as hazardous solely because it exhibited one or more characteristics defined in 40CFR261 Subpart C but has been treated in a manner such that it no longer exhibits any of the characteristics, will be reviewed on a case-by-case basis for burial acceptance.

A description of the treatment process and results of the analytical tests of the final waste, using the Toxicity Characteristic Leaching Procedure required by 40CFR261.24 shall be submitted to Chem-Nuclear Systems, Inc. for evaluation prior to shipment.

Chem-Nuclear Systems, Inc. may be used to process this type of waste by solidification to render it non-hazardous by binding the characteristic component of the waste by solidification. In addition to the requirements of 40CFR261 all other solidification requirements in this Process Control Program shall be met.

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 granular media, such as bead type ion exchange resin, zeolite and activated carbon (course particle size, GAC 40) and pre-coat media such as Ecodex, Powdex, Epifloc, Solka -floc and/or diatomaceous earth. Other similar media may also be used with Chem-Nuclear's approval. The media shall not contain more than one percent oil by volume.

3.1.5.3. Framatome Technologies has been reviewed and approved to provide solidification services to McGuire, Oconee and Catawba Nuclear Stations for Class A unstable waste as described in Framatome'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. Framatome Technologies may solidify Electrosleeving mixed waste at Oconee Nuclear Station using Portland Type 1 cement.

3.1.5.4. Molten Metals Technologies (MMT) has been reviewed and approved to provide processing (dewatering or solidification) services for ion exchange resin and granular and powdered carbon consistent with the activity limits set forth in

their State of Tennessee Radioactive Materials License. Zeolite material may be accepted for processing with prior approval from MMT.

MMT 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 powdered and bead resin as well as other similar medias.

Physical testing of the MMT 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.

Approved containers that are shipped to MMT for processing need not be dewatered to meet burial site criteria. Only the requirements for transportation set forth in 49CFR173.427 must be satisfied. This basically requires only a rough or single dewatering cycle.

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 certain characteristic mixed wastes, as described in Section 3.1.5.1, may be treated by in-house personnel using this media in compliance with this Process Control Program. Vendor solidification of mixed waste will require approval by Duke Power Company as described in Section 3.1. Solidification of these wastes per the Process Control Program using this media will ensure that the final solidified product will be a non-hazardous free-standing monolith with < 0.5% (or 1% in a HIC) 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 (or additional) containers, must be filed with the EPA Regional Administrator 30 days prior to the treatment activity. Upon station notification, Duke Power Group Environment, Health & Safety / Environmental Protection 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 petroleum based 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. On a case-by-case basis SCDHEC may approve solidification of synthetic oils.

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. Station Environmental Management shall be contacted for guidance on proper storage of mixed wastes.

3.6.4. If applicable, Certificates of Compliance shall be maintained at each station for all waste disposal containers used for interim storage.

3.6.5. Vendor supplied handling and storage procedures shall be maintained at each station.

3.6.6. Each container of waste shall be checked against information given in Step 3.6.4 and 3.6.5 to ensure all chemical compatibility requirements are met.

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.

3.7.1.1. 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.

3.7.1.2. All vendor reports 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

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 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.

3.8. Reviews

3.8.1. Changes to the Corporate Process Control Program shall be reviewed by General Office and Station Chemistry staffs the 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.

3.8.2. General Office Nuclear Chemistry is responsible for the interpretation and implementation of the Process Control Program and shall be notified when any changes, 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.

3.8.3. Changes to the Corporate Process Control Program shall be approved by the Technical Manager, Nuclear Chemistry, and each Station Manager, or their designees, prior to implementation.

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

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

3.8.6. Records shall be maintained documenting the approvals required by Section 3.8. Records shall be maintained for the duration of the plant license plus ten years.

3.8.7. All changes to the PCP and a report of the revisions shall be sent to the Nuclear Safety Review Board (NSRB).

3.9. Audits

3.9.1. The Corporate Process Control Program and station implementing procedures shall be audited under the cognizance of the NSRB at each station and the general office.

4. 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 when solidification is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

4.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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.

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.

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

4.1.3.3.2. The solidified product shall be a free-standing monolith.

4.1.3.3.3. In the case of mixed waste, the solidified product shall be rendered 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 agitative 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 until 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. Process knowledge may be used for hazardous waste characterization with supervisor approval.

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 or approved vendor 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 waste characterization.

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.

4.4.4.1. The test solidification must be repeated for at least every tenth batch of radioactive waste of a given waste type.

4.4.4.2. 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 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.

4.4.7. 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 requirements for product verification are 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 free-

standing 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 for life of plant plus 10 years.

4.7.1.1. Representative sampling documentation.

4.7.1.2. Sample analysis results.

4.7.1.3. Test solidification results and prescribed boundary conditions.

4.7.1.4. Station or vendor solidification procedures.

4.7.1.5. FSL verification, free-standing monolith verification and, if applicable, verification that the solidified mixed waste is non-hazardous.

5. DEWATERING

5.1. Procedure Requirements

5.1.1. Station procedures shall be established to ensure that all requirements for dewatering are met when dewatering is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

5.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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 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 Supervision or Staff for review, as required.

5.2.4. Actual dewatering shall be performed using station procedures when performed by station personnel, 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 life of plant plus 10 years. These records shall include:

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

5.4.1.2. Station or vendor 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. 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. 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 the Technical Manager, Nuclear Chemistry, Station Chemistry Managers', and Station Managers' approvals of all changes to the Station and Corporate Process Control Programs.

3. EXCEPTIONS

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

December 15, 1998

Memorandum For File

SUBJECT: ALL NUCLEAR STATIONS
CORPORATE PROCESS CONTROL PROGRAM
FILE NO.: GS - 760.00

The following is a summary of the changes to the attached Duke Power Company Corporate Process Control Program (PCP). This revision to the Process Control Program, Introduction and Background will be Rev. 2, and the revision to the Corporate PCP will be Rev. 12. This summary lists the section of the PCP changed, followed by an explanation of the change.

PROCESS CONTROL PROGRAM, INTRODUCTION AND BACKGROUND, page I-1,
"4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report."
The change from 'Semiannual' to 'Annual' was made to reflect the Technical Specification revision to the frequency for the Radiological Effluent Report from semiannual to annual. This change was made to the Corporate Process Control Program, Section 3.8.4., in revision 9. The NRC had amended 10CFR50 to reduce the regulatory burden on nuclear licensees in response to a Presidential memorandum requesting that selected Federal agencies review and modify regulations that would eliminate any unnecessary burden of governmental regulations and ensure that the regulated community is not subject to duplicative or inconsistent regulation. The frequency requirements is published in '10CFR50.36a Technical Specifications on effluents from nuclear power reactors.'

1.3. paragraph 2, page 1;
In the second sentence, 'and Station Managers,' was added after 'Chemistry,' for approval requirements to be consistent with section 3.1.3. and 3.8.3.

1.3.2. paragraph 2, page 2;
The phrase 'approved containers' was added to include that 'approved containers,' in addition to resin liners and portable demineralizers may be dewatered. The Molten Metal Technology, Waste Acceptance Criteria, MMT-P-00-001, section 2.7 Packaging; states: "All waste should be packaged in steel or poly containers which are authorized for the transportation of radioactive material in accordance with the U.S. DOT regulations." The

Molten Metal Technology, Waste Acceptance Criteria, Enclosure 1 - Pre Shipment Acceptance Form, contains a listing of container types. The packaging container is also covered by the station Chemistry procedures.

3.1.5.4. paragraph 4, page 5;
The phrase 'Resin liners' was changed to 'Approved containers' to permit the use of approved containers in addition to resin liners. Furthermore, in the second sentence of this paragraph, 40CFR173.425 was changed to 49CFR173.427 to correct a typographical error and incorporate the number sequence change made by the most recent revision to the Code of Federal Regulations, '49CFR173.427 Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).'

3.4.3. In the second sentence, 'ESS' was changed to 'Duke Power Group Environment, Health & Safety / ' to reflect the organization name change.

3.4.4. This sentence was changed to correct a punctuation error.

3.8.7. This section was added to incorporate an administrative requirement to send reports of revisions to the Process Control Program to the Nuclear Safety Review Board (NSRB).

4.1.3. In the second sentence, the 'c' in 'control' was capitalized.

4.1.3.3.3. The incorrect use of the hyphen was deleted from 'of-mixed'.

4.3.1.5. A comma was added before 'ignitability' to indicate a separation between 'TCLP' and 'ignitability'.

4.4.3. The word 'predict' was changed to 'product' to correct this typographical error.

4.6.4. An alteration was made to this sentence to include a grammatical change.

5.2.1.1. A missing quotation mark was added after the word 'parameters'.

5.2.1.2. A missing quotation mark was added before the word 'acceptable' and a single quotation mark was changed to a double quotation mark to be consistent with the usage in 5.2.1.1.

5.2.2. The word 'ill' was changed to 'in' to correct a typographical error in this sentence.

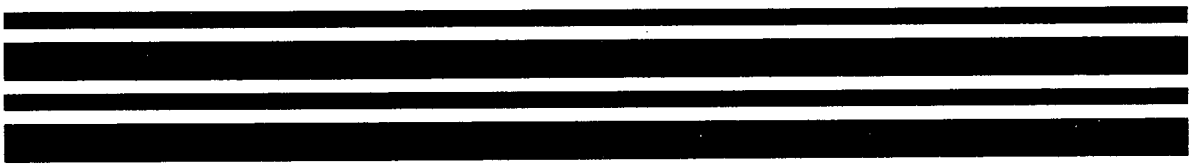
5.2.4. The word 'he' was changed to 'be' to correct a typographical error in this sentence.

For further information on this subject, please contact Robert Martin at 382-3597 or by Lotus Notes ID - RAMARTIN.

Robert A. Martin

Robert A. Martin
Engineer
Nuclear Chemistry

Attachments



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4.6.4. An alteration was made to this sentence to include a grammatical change.

5.2.1.1. A missing quotation mark was added after the word 'parameters'.

December 15, 1998

Memorandum For File

SUBJECT: ALL NUCLEAR STATIONS
CORPORATE PROCESS CONTROL PROGRAM
FILE NO.: GS - 760.00

The following is a summary of the changes to the attached Duke Power Company Corporate Process Control Program (PCP). This revision to the Process Control Program, Introduction and Background will be Rev. 2, and the revision to the Corporate PCP will be Rev. 12. This summary lists the section of the PCP changed, followed by an explanation of the change.

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DUKE POWER COMPANY
STATION
PROCESS CONTROL PROGRAM

1. 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. COMPOSITION

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

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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 the Technical Manager, Nuclear Chemistry, Station Chemistry Managers', and Station Managers' approvals of all changes to the Station and Corporate Process Control Programs.

3. EXCEPTIONS

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

These records shall be maintained for life of plant plus 10 years. These records shall include:

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

5.4.1.2. Station or vendor dewatering procedures (per Step 5.2.4).

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

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 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 Supervision or Staff for review, as required.

5.2.4. Actual dewatering shall be performed using station procedures when performed by station personnel, 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.

standing 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 for life of plant plus 10 years.

4.7.1.1. Representative sampling documentation.

4.7.1.2. Sample analysis results.

4.7.1.3. Test solidification results and prescribed boundary conditions.

4.7.1.4. Station or vendor solidification procedures.

4.7.1.5. FSL verification, free-standing monolith verification and, if applicable, verification that the solidified mixed waste is non-hazardous.

5. DEWATERING

5.1. Procedure Requirements

5.1.1. Station procedures shall be established to ensure that all requirements for dewatering are met when dewatering is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

5.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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".

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 requirements for product verification are 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 free-

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 waste characterization.

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.

4.4.4.1. The test solidification must be repeated for at least every tenth batch of radioactive waste of a given waste type.

4.4.4.2. 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 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.

4.4.7. 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

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. Process knowledge may be used for hazardous waste characterization with supervisor approval.

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 or approved vendor 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.

4.1.3.2. Second: The waste sample must be characterized chemically and physically per Section 4.3.

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.

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

4.1.3.3.2. The solidified product shall be a free-standing monolith.

4.1.3.3.3. In the case of mixed waste, the solidified product shall be rendered 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 agitative 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 until 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.

3.8.2. General Office Nuclear Chemistry is responsible for the interpretation and implementation of the Process Control Program and shall be notified when any changes, 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.

3.8.3. Changes to the Corporate Process Control Program shall be approved by the Technical Manager, Nuclear Chemistry, and each Station Manager, or their designees, prior to implementation.

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

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

3.8.6. Records shall be maintained documenting the approvals required by Section 3.8. Records shall be maintained for the duration of the plant license plus ten years.

3.8.7. All changes to the PCP and a report of the revisions shall be sent to the Nuclear Safety Review Board (NSRB).

3.9. Audits

3.9.1. The Corporate Process Control Program and station implementing procedures shall be audited under the cognizance of the NSRB at each station and the general office.

4. 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 when solidification is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

4.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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.

the waste and its container.

3.6.3. Station Environmental Management shall be contacted for guidance on proper storage of mixed wastes.

3.6.4. If applicable, Certificates of Compliance shall be maintained at each station for all waste disposal containers used for interim storage.

3.6.5. Vendor supplied handling and storage procedures shall be maintained at each station.

3.6.6. Each container of waste shall be checked against information given in Step 3.6.4 and 3.6.5 to ensure all chemical compatibility requirements are met.

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.

3.7.1.1. 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.

3.7.1.2. All vendor reports 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

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 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.

3.8. Reviews

3.8.1. Changes to the Corporate Process Control Program shall be reviewed by General Office and Station Chemistry staffs the 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.

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 certain characteristic mixed wastes, as described in Section 3.1.5.1, may be treated by in-house personnel using this media in compliance with this Process Control Program. Vendor solidification of mixed waste will require approval by Duke Power Company as described in Section 3.1. Solidification of these wastes per the Process Control Program using this media will ensure that the final solidified product will be a non-hazardous free-standing monolith with < 0.5% (or 1% in a HIC) 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 (or additional) containers, must be filed with the EPA Regional Administrator 30 days prior to the treatment activity. Upon station notification, Duke Power Group Environment, Health & Safety / Environmental Protection 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 petroleum based 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. On a case-by-case basis SCDHEC may approve solidification of synthetic oils.

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

their State of Tennessee Radioactive Materials License. Zeolite material may be accepted for processing with prior approval from MMT.

MMT 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 powdered and bead resin as well as other similar medias.

Physical testing of the MMT 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.

Approved containers that are shipped to MMT for processing need not be dewatered to meet burial site criteria. Only the requirements for transportation set forth in 49CFR173.427 must be satisfied. This basically requires only a rough or single dewatering cycle.

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

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 (4313-01354-01P-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.

No mixtures of radioactive waste and hazardous waste (mixed waste) as defined by 40CFR261 and S.C. Management Registration 61-79.261 are acceptable for buried in Barnwell. However, a mixed waste which was classified as hazardous solely because it exhibited one or more characteristics defined in 40CFR261 Subpart C but has been treated in a manner such that it no longer exhibits any of the characteristics, will be reviewed on a case-by-case basis for burial acceptance.

A description of the treatment process and results of the analytical tests of the final waste, using the Toxicity Characteristic Leaching Procedure required by 40CFR261.24 shall be submitted to Chem-Nuclear Systems, Inc. for evaluation prior to shipment.

Chem-Nuclear Systems, Inc. may be used to process this type of waste by solidification to render it non-hazardous by binding the characteristic component of the waste by solidification. In addition to the requirements of 40CFR261 all other solidification requirements in this Process Control Program shall be met.

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 granular media, such as bead type ion exchange resin, zeolite and activated carbon (course particle size, GAC 40) and pre-coat media such as Ecodex, Powdex, Epifloc, Solka -floc and/or diatomaceous earth. Other similar media may also be used with Chem-Nuclear's approval. The media shall not contain more than one percent oil by volume.

3.1.5.3. Framatome Technologies has been reviewed and approved to provide solidification services to McGuire, Oconee and Catawba Nuclear Stations for Class A unstable waste as described in Framatome'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. Framatome Technologies may solidify Electrosleeving mixed waste at Oconee Nuclear Station using Portland Type 1 cement.

3.1.5.4. Molten Metals Technologies (MMT) has been reviewed and approved to provide processing (dewatering or solidification) services for ion exchange resin and granular and powdered carbon consistent with the activity limits set forth in

- 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"
- 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-800,"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 Plants"

3. 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.

3.1.2. Technical Review - Technical review shall be performed by general office and station Chemistry 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 Technical Manager, Nuclear Chemistry, and Station Managers, or their designees, 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

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

1.3.2. Dewatering

Dewatering is accomplished by removing the freestanding 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, approved containers, 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(s).

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.

Filters may be disposed in a filter HIC provided they are dewatered (blown down and/or dried) prior to placement in the HIC. The HIC is then dewatered prior to shipment for incidental water only.

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 Scientific Ecology Group, Inc. (SEG) liners shall be fitted with pressure relief valves.

2. REGULATORY COMPLIANCE

2.1. Regulatory Requirements

The PCP is a requirement of the Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 and Section 6.0, Administrative Controls, of Technical Specifications for all three nuclear stations. The basis for the requirement of a PCP is found in the following documents:

DUKE POWER COMPANY
CORPORATE PROCESS CONTROL PROGRAM

1. 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 PCP ensures that the final product of solidification or dewatering meets all Federal and State 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 with 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 General Office Chemistry 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.

Technical review of all vendor documents and procedures shall be performed by station and General Office Chemistry staffs. Vendor services must be approved by the Technical Manager, Nuclear Chemistry, and Station Managers, or his designee.

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 freestanding monolith. At

DUKE POWER COMPANY
CORPORATE PROCESS CONTROL PROGRAM
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DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Graham T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: Charles R. McMahon Jr

Title: Senior Scientist

Date: 11/23/98

This revision is approved for use at Oconee Nuclear Station.

P.W. Hawsing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

George T. Hamrick
Oconee Chemistry Manager

Date: November 24, 1998

Oconee Station Manager

Date: 11/30/98

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Graham T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: Orlando M. Lewis

Title: Scientist

Date: 11-12-98

This revision is approved for use at McGuire Nuclear Station.

P.W. Downing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

Lance E. Loucks
McGuire Chemistry Manager

Date: 11-13-98

McGuire Station Manager

Date: 11/13/98

DUKE POWER COMPANY
PCP REVISION APPROVAL

Revised PCP Section:

Corporate PCP, Rev. 12
ONS PCP, Rev _____
MNS PCP, Rev. _____
CNS PCP, Rev. _____

This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

Prepared By: Robert A. Martin

Title: Engineer
Nuclear Chemistry

Date: 10/13/98

General Office Review

By: Graham T. Johnson

Title: Scientist

Date: 10-27-98

Station Review

By: R M Wallace

Title: Gsc Scientist

Date: 11/16/98

This revision is approved for use at Catawba Nuclear Station.

P.W. Downing
Technical Manager, Nuclear Chemistry

Date: 11/2/98

Catawba Chemistry Manager

Date: 12/3/98

Catawba Station Manager

Date: 12-3-98

DEWATERING

General System Description

Dewatering is accomplished by removing all free liquids from "wet solids" such that the final product meets all regulating and burial site criteria for disposal (i.e., less than 0.5% free standing liquid by waste volume per container or less than 1% free standing liquid if a high integrity container is utilized).

All wastes to be dewatered are degassed prior to the dewatering process. Therefore, special ventilation requirements are not necessary.

Liner Dewatering:

Vendor- or company-supplied liners are used to dewater large volumes of wet solids, usually resin slurries. The wet solids are transferred from company owned and controlled storage containers (e.g., tanks, temporary liners) through company- or vendor supplied isolation valves to the disposal liner. All free liquid is pumped out of the liner and returned to the company storage containers using company or vendor pumps and piping.

Demineralizer Dewatering:

Vendor-supplied portable demineralizers are dewatered by using company or vendor pumps to remove all free liquids from the vessel. The dewatering liquid is returned to company storage containers for sampling prior to reuse or processing.

Filter Dewatering:

Filters are dewatered by draining and drip drying or blowing down prior to shipment. Packing material may be placed within the vessel to maintain position of contents during shipment.

Filter Slurry Dewatering:

Filter backwash slurry may be dewatered similar to resin liner dewatering or solidified.

8. A PCP shall specifically address methods for radioactive waste oil disposal.

9. A PCP shall address chemical compatibility of waste and disposal container during interim storage.

10. A PCP shall shall be implemented in station operating procedures.

11. A PCP shall establish a system of technical and management review and approval for all changes to itself or its implementing procedures.

12. A PCP shall establish a system of performance audits for itself and its implementing procedures.

This manual outlines Duke Power Company's program for complying with the NRC requirements for a Process Control Program for the Oconee, McGuire and Catawba Nuclear Stations. The Corporate Process Control Program is the list of the specific requirements that must be met to assure a final solidification or dewatering product meets all federal and state regulations. The Station Process Control Program is a list of the 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 to meet these changes.

SOLIDIFICATION

General System Description

Solidification is accomplished at all Duke Power Nuclear Stations by mixing measured amounts of waste, binder, and required additives and allowing sufficient cure time to ensure a solid free-standing monolith.

A measured amount of waste is transferred from company-owned and controlled containers (e.g., waste storage tanks, tankers, drums) through company- or vendor-supplied isolation valves to the solidification vessel.

Measured amounts of binding agent and additives (as required) are transferred from storage containers through transfer lines to the solidification vessel.

The waste and binder are mixed using company- or vendor-supplied equipment and allowed to cure for a predetermined time. 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.

The solidification system ventilation discharge is routed through company- or vendor-supplied piping to the plant's Auxiliary Building or Radwaste Facility ventilation system prior to discharge to the environment. If the solidification system has filtered ventilation, exhaust need not be routed back to building ventilation.

Any decanted liquids (e.g., excess sluice liquid) are routed back to plant storage tanks through company- or vendor-supplied piping.

Solidification equipment and processing may be provided by vendor, by permanent Duke Power systems, or by portable Duke Power systems. Any process used shall be verified by station and corporate Radwaste staffs as meeting all requirements outlined in the Corporate PCP. Verification and approval by station and corporate Radwaste supervision are required prior to placing any system in service for the purpose of producing solidified waste for disposal as radioactive waste.

DUKE POWER COMPANY

PROCESS CONTROL PROGRAM

INTRODUCTION AND BACKGROUND

Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 requires that the Solid Radwaste System be operated in accordance with a "Process Control Program" for solidification and dewatering such that the final product meets all applicable shipping, transportation and disposal site requirements.

These "Process Control Program" requirements are applicable to liquid or wet solid wastes only. Process Control Program review, audit, procedure, reporting, and record retention requirements are specified in Section 6.0 of Technical Specifications.

While the Selected Licensee Commitments require a "Process Control Program," they do not provide sufficient guidance on the totality of the requirements that must be addressed in an acceptable program. These requirements can be found in several documents developed by the NRC to provide guidance on a "Process Control Program." These documents include:

1. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants"
2. NUREG-0452, "Standard Technical Specifications for Westinghouse PWR's"
3. NUREG-0800, "Standard Review Plan for Solid Waste Management Systems"
4. Branch Technical Position - ETSB 11-3, "Design Guidance of Solid Radioactive Management Systems"
5. Appendix 11.4-A, "Design Guidance for Temporary Onsite Storage of Low Level Radioactive Waste"
6. NRC Review Criteria for Solid Waste Management Systems
7. Site-specific Technical Specifications and Selected Licensee Commitments.

These documents, except for site Technical Specifications and Selected Licensee Commitments, can be found in Section VI of this manual.

A listing of the requirements specified or referenced by each document can be found in Section VII. These requirements can be generally summarized as follows:

1. A PCP shall be used to control all solidification and dewatering activities.
2. A PCP shall assure compliance with applicable federal regulations: 10CFR Parts 20, 50, 61 and 71 and 49 CFR (173-179).
3. A PCP shall be approved by the NRC prior to implementation.
4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report.
5. A PCP shall consist of the processing steps and processing parameters that must be followed to assure satisfactory solidification and/or dewatering products.
6. A PCP shall establish a sampling or testing schedule for verification of solidification.
7. A PCP shall establish a set of records that must be maintained for each solidification and dewatering performed for disposal.

5.2.1.2. A missing quotation mark was added before the word 'acceptable' and a single quotation mark was changed to a double quotation mark to be consistent with the usage in 5.2.1.1.

5.2.2. The word 'ill' was changed to 'in' to correct a typographical error in this sentence.

5.2.4. The word 'he' was changed to 'be' to correct a typographical error in this sentence.

For further information on this subject, please contact Robert Martin at 382-3597 or by Lotus Notes ID - RAMARTIN.

Robert A. Martin

Robert A. Martin
Engineer
Nuclear Chemistry

Attachments

Molten Metal Technology, Waste Acceptance Criteria, Enclosure 1 - Pre Shipment Acceptance Form, contains a listing of container types. The packaging container is also covered by the station Chemistry procedures.

3.1.5.4. paragraph 4, page 5;
The phrase 'Resin liners' was changed to 'Approved containers' to permit the use of approved containers in addition to resin liners. Furthermore, in the second sentence of this paragraph, 40CFR173.425 was changed to 49CFR173.427 to correct a typographical error and incorporate the number sequence change made by the most recent revision to the Code of Federal Regulations, '49CFR173.427 Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).'

3.4.3. In the second sentence, 'ESS' was changed to 'Duke Power Group Environment, Health & Safety / ' to reflect the organization name change.

3.4.4. This sentence was changed to correct a punctuation error.

3.8.7. This section was added to incorporate an administrative requirement to send reports of revisions to the Process Control Program to the Nuclear Safety Review Board (NSRB).

4.1.3. In the second sentence, the 'c' in 'control' was capitalized.

4.1.3.3.3. The incorrect use of the hyphen was deleted from 'of-mixed'.

4.3.1.5. A comma was added before 'ignitability' to indicate a separation between 'TCLP' and 'ignitability'.

4.4.3. The word 'predict' was changed to 'product' to correct this typographical error.

4.6.4. An alteration was made to this sentence to include a grammatical change.

5.2.1.1. A missing quotation mark was added after the word 'parameters'.

December 15, 1998

Memorandum For File

SUBJECT: ALL NUCLEAR STATIONS
CORPORATE PROCESS CONTROL PROGRAM
FILE NO.: GS - 760.00

The following is a summary of the changes to the attached Duke Power Company Corporate Process Control Program (PCP). This revision to the Process Control Program, Introduction and Background will be Rev. 2, and the revision to the Corporate PCP will be Rev. 12. This summary lists the section of the PCP changed, followed by an explanation of the change.

PROCESS CONTROL PROGRAM, INTRODUCTION AND BACKGROUND, page I-1,
"4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report."
The change from 'Semiannual' to 'Annual' was made to reflect the Technical Specification revision to the frequency for the Radiological Effluent Report from semiannual to annual. This change was made to the Corporate Process Control Program, Section 3.8.4., in revision 9. The NRC had amended 10CFR50 to reduce the regulatory burden on nuclear licensees in response to a Presidential memorandum requesting that selected Federal agencies review and modify regulations that would eliminate any unnecessary burden of governmental regulations and ensure that the regulated community is not subject to duplicative or inconsistent regulation. The frequency requirements is published in '10CFR50.36a Technical Specifications on effluents from nuclear power reactors.'

1.3. paragraph 2, page 1;
In the second sentence, 'and Station Managers,' was added after 'Chemistry,' for approval requirements to be consistent with section 3.1.3. and 3.8.3.

1.3.2. paragraph 2, page 2;
The phrase 'approved containers' was added to include that 'approved containers,' in addition to resin liners and portable demineralizers may be dewatered. The Molten Metal Technology, Waste Acceptance Criteria, MMT-P-00-001, section 2.7 Packaging; states: "All waste should be packaged in steel or poly containers which are authorized for the transportation of radioactive material in accordance with the U.S. DOT regulations." The

DUKE POWER COMPANY
STATION
PROCESS CONTROL PROGRAM

1. 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. 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 the Technical Manager, Nuclear Chemistry, Station Chemistry Managers', and Station Managers' approvals of all changes to the Station and Corporate Process Control Programs.

3. EXCEPTIONS

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

These records shall be maintained for life of plant plus 10 years. These records shall include:

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

5.4.1.2. Station or vendor dewatering procedures (per Step 5.2.4).

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

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 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 Supervision or Staff for review, as required.

5.2.4. Actual dewatering shall be performed using station procedures when performed by station personnel, 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.

standing 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 for life of plant plus 10 years.

4.7.1.1. Representative sampling documentation.

4.7.1.2. Sample analysis results.

4.7.1.3. Test solidification results and prescribed boundary conditions.

4.7.1.4. Station or vendor solidification procedures.

4.7.1.5. FSL verification, free-standing monolith verification and, if applicable, verification that the solidified mixed waste is non-hazardous.

5. DEWATERING

5.1. Procedure Requirements

5.1.1. Station procedures shall be established to ensure that all requirements for dewatering are met when dewatering is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

5.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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".

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 requirements for product verification are 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 free-

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 waste characterization.

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.

4.4.4.1. The test solidification must be repeated for at least every tenth batch of radioactive waste of a given waste type.

4.4.4.2. 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 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.

4.4.7. 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

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. Process knowledge may be used for hazardous waste characterization with supervisor approval.

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 or approved vendor 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.

4.1.3.2. Second: The waste sample must be characterized chemically and physically per Section 4.3.

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.

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

4.1.3.3.2. The solidified product shall be a free-standing monolith.

4.1.3.3.3. In the case of mixed waste, the solidified product shall be rendered 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 agitative 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 until 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.

3.8.2. General Office Nuclear Chemistry is responsible for the interpretation and implementation of the Process Control Program and shall be notified when any changes, 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.

3.8.3. Changes to the Corporate Process Control Program shall be approved by the Technical Manager, Nuclear Chemistry, and each Station Manager, or their designees, prior to implementation.

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

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

3.8.6. Records shall be maintained documenting the approvals required by Section 3.8. Records shall be maintained for the duration of the plant license plus ten years.

3.8.7. All changes to the PCP and a report of the revisions shall be sent to the Nuclear Safety Review Board (NSRB).

3.9. Audits

3.9.1. The Corporate Process Control Program and station implementing procedures shall be audited under the cognizance of the NSRB at each station and the general office.

4. 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 when solidification is performed by station personnel. Approved vendors may use their own vendor procedures provided the requirements of Section 3.0 are satisfied.

4.1.2. Vendor procedures shall be incorporated into station procedures for internal use. 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.

the waste and its container.

3.6.3. Station Environmental Management shall be contacted for guidance on proper storage of mixed wastes.

3.6.4. If applicable, Certificates of Compliance shall be maintained at each station for all waste disposal containers used for interim storage.

3.6.5. Vendor supplied handling and storage procedures shall be maintained at each station.

3.6.6. Each container of waste shall be checked against information given in Step 3.6.4 and 3.6.5 to ensure all chemical compatibility requirements are met.

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.

3.7.1.1. 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.

3.7.1.2. All vendor reports 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

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 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.

3.8. Reviews

3.8.1. Changes to the Corporate Process Control Program shall be reviewed by General Office and Station Chemistry staffs the 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.

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 certain characteristic mixed wastes, as described in Section 3.1.5.1, may be treated by in-house personnel using this media in compliance with this Process Control Program. Vendor solidification of mixed waste will require approval by Duke Power Company as described in Section 3.1. Solidification of these wastes per the Process Control Program using this media will ensure that the final solidified product will be a non-hazardous free-standing monolith with < 0.5% (or 1% in a HIC) 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 (or additional) containers, must be filed with the EPA Regional Administrator 30 days prior to the treatment activity. Upon station notification, Duke Power Group Environment, Health & Safety / Environmental Protection 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 petroleum based 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. On a case-by-case basis SCDHEC may approve solidification of synthetic oils.

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

their State of Tennessee Radioactive Materials License. Zeolite material may be accepted for processing with prior approval from MMT.

MMT 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 powdered and bead resin as well as other similar medias.

Physical testing of the MMT 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.

Approved containers that are shipped to MMT for processing need not be dewatered to meet burial site criteria. Only the requirements for transportation set forth in 49CFR173.427 must be satisfied. This basically requires only a rough or single dewatering cycle.

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

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 (4313-01354-01P-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.

No mixtures of radioactive waste and hazardous waste (mixed waste) as defined by 40CFR261 and S.C. Management Registration 61-79.261 are acceptable for buried in Barnwell. However, a mixed waste which was classified as hazardous solely because it exhibited one or more characteristics defined in 40CFR261 Subpart C but has been treated in a manner such that it no longer exhibits any of the characteristics, will be reviewed on a case-by-case basis for burial acceptance.

A description of the treatment process and results of the analytical tests of the final waste, using the Toxicity Characteristic Leaching Procedure required by 40CFR261.24 shall be submitted to Chem-Nuclear Systems, Inc. for evaluation prior to shipment.

Chem-Nuclear Systems, Inc. may be used to process this type of waste by solidification to render it non-hazardous by binding the characteristic component of the waste by solidification. In addition to the requirements of 40CFR261 all other solidification requirements in this Process Control Program shall be met.

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 granular media, such as bead type ion exchange resin, zeolite and activated carbon (course particle size, GAC 40) and pre-coat media such as Ecodex, Powdex, Epifloc, Solka -floc and/or diatomaceous earth. Other similar media may also be used with Chem-Nuclear's approval. The media shall not contain more than one percent oil by volume.

3.1.5.3. Framatome Technologies has been reviewed and approved to provide solidification services to McGuire, Oconee and Catawba Nuclear Stations for Class A unstable waste as described in Framatome'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. Framatome Technologies may solidify Electrosleeving mixed waste at Oconee Nuclear Station using Portland Type 1 cement.

3.1.5.4. Molten Metals Technologies (MMT) has been reviewed and approved to provide processing (dewatering or solidification) services for ion exchange resin and granular and powdered carbon consistent with the activity limits set forth in

- 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"
- 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-800,"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 Plants"

3. 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.

3.1.2. Technical Review - Technical review shall be performed by general office and station Chemistry 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 Technical Manager, Nuclear Chemistry, and Station Managers, or their designees, 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

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

1.3.2. Dewatering

Dewatering is accomplished by removing the freestanding 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, approved containers, 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(s).

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.

Filters may be disposed in a filter HIC provided they are dewatered (blown down and/or dried) prior to placement in the HIC. The HIC is then dewatered prior to shipment for incidental water only.

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 Scientific Ecology Group, Inc. (SEG) liners shall be fitted with pressure relief valves.

2. REGULATORY COMPLIANCE

2.1. Regulatory Requirements

The PCP is a requirement of the Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 and Section 6.0, Administrative Controls, of Technical Specifications for all three nuclear stations. The basis for the requirement of a PCP is found in the following documents:

DUKE POWER COMPANY
CORPORATE PROCESS CONTROL PROGRAM

1. 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 PCP ensures that the final product of solidification or dewatering meets all Federal and State 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 with 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 General Office Chemistry 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.

Technical review of all vendor documents and procedures shall be performed by station and General Office Chemistry staffs. Vendor services must be approved by the Technical Manager, Nuclear Chemistry, and Station Managers, or his designee.

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 freestanding monolith. At

DUKE POWER COMPANY
CORPORATE PROCESS CONTROL PROGRAM
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DUKE POWER COMPANY
PCP REVISION APPROVAL

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Corporate PCP; Rev. 12
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This revision has been reviewed against Technical Specifications, and applicable NRC guidance documents and found to be acceptable.

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DEWATERING

General System Description

Dewatering is accomplished by removing all free liquids from "wet solids" such that the final product meets all regulating and burial site criteria for disposal (i.e., less than 0.5% free standing liquid by waste volume per container or less than 1% free standing liquid if a high integrity container is utilized).

All wastes to be dewatered are degassed prior to the dewatering process. Therefore, special ventilation requirements are not necessary.

Liner Dewatering:

Vendor- or company-supplied liners are used to dewater large volumes of wet solids, usually resin slurries. The wet solids are transferred from company owned and controlled storage containers (e.g., tanks, temporary liners) through company- or vendor supplied isolation valves to the disposal liner. All free liquid is pumped out of the liner and returned to the company storage containers using company or vendor pumps and piping.

Demineralizer Dewatering:

Vendor-supplied portable demineralizers are dewatered by using company or vendor pumps to remove all free liquids from the vessel. The dewatering liquid is returned to company storage containers for sampling prior to reuse or processing.

Filter Dewatering:

Filters are dewatered by draining and drip drying or blowing down prior to shipment. Packing material may be placed within the vessel to maintain position of contents during shipment.

Filter Slurry Dewatering:

Filter backwash slurry may be dewatered similar to resin liner dewatering or solidified.

8. A PCP shall specifically address methods for radioactive waste oil disposal.

9. A PCP shall address chemical compatibility of waste and disposal container during interim storage.

10. A PCP shall shall be implemented in station operating procedures.

11. A PCP shall establish a system of technical and management review and approval for all changes to itself or its implementing procedures.

12. A PCP shall establish a system of performance audits for itself and its implementing procedures.

This manual outlines Duke Power Company's program for complying with the NRC requirements for a Process Control Program for the Oconee, McGuire and Catawba Nuclear Stations. The Corporate Process Control Program is the list of the specific requirements that must be met to assure a final solidification or dewatering product meets all federal and state regulations. The Station Process Control Program is a list of the 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 to meet these changes.

SOLIDIFICATION

General System Description

Solidification is accomplished at all Duke Power Nuclear Stations by mixing measured amounts of waste, binder, and required additives and allowing sufficient cure time to ensure a solid free-standing monolith.

A measured amount of waste is transferred from company-owned and controlled containers (e.g., waste storage tanks, tankers, drums) through company- or vendor-supplied isolation valves to the solidification vessel.

Measured amounts of binding agent and additives (as required) are transferred from storage containers through transfer lines to the solidification vessel.

The waste and binder are mixed using company- or vendor-supplied equipment and allowed to cure for a predetermined time. 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.

The solidification system ventilation discharge is routed through company- or vendor-supplied piping to the plant's Auxiliary Building or Radwaste Facility ventilation system prior to discharge to the environment. If the solidification system has filtered ventilation, exhaust need not be routed back to building ventilation.

Any decanted liquids (e.g., excess sluice liquid) are routed back to plant storage tanks through company- or vendor-supplied piping.

Solidification equipment and processing may be provided by vendor, by permanent Duke Power systems, or by portable Duke Power systems. Any process used shall be verified by station and corporate Radwaste staffs as meeting all requirements outlined in the Corporate PCP. Verification and approval by station and corporate Radwaste supervision are required prior to placing any system in service for the purpose of producing solidified waste for disposal as radioactive waste.

DUKE POWER COMPANY

PROCESS CONTROL PROGRAM

INTRODUCTION AND BACKGROUND

Final Safety Analysis Report Chapter 16, Selected Licensee Commitments, Section 11 requires that the Solid Radwaste System be operated in accordance with a "Process Control Program" for solidification and dewatering such that the final product meets all applicable shipping, transportation and disposal site requirements.

These "Process Control Program" requirements are applicable to liquid or wet solid wastes only. Process Control Program review, audit, procedure, reporting, and record retention requirements are specified in Section 6.0 of Technical Specifications.

While the Selected Licensee Commitments require a "Process Control Program," they do not provide sufficient guidance on the totality of the requirements that must be addressed in an acceptable program. These requirements can be found in several documents developed by the NRC to provide guidance on a "Process Control Program." These documents include:

1. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants"
2. NUREG-0452, "Standard Technical Specifications for Westinghouse PWR's"
3. NUREG-0800, "Standard Review Plan for Solid Waste Management Systems"
4. Branch Technical Position - ETSB 11-3, "Design Guidance of Solid Radioactive Management Systems"
5. Appendix 11.4-A, "Design Guidance for Temporary Onsite Storage of Low Level Radioactive Waste"
6. NRC Review Criteria for Solid Waste Management Systems
7. Site-specific Technical Specifications and Selected Licensee Commitments.

These documents, except for site Technical Specifications and Selected Licensee Commitments, can be found in Section VI of this manual.

A listing of the requirements specified or referenced by each document can be found in Section VII. These requirements can be generally summarized as follows:

1. A PCP shall be used to control all solidification and dewatering activities.
2. A PCP shall assure compliance with applicable federal regulations: 10CFR Parts 20, 50, 61 and 71 and 49 CFR (173-179).
3. A PCP shall be approved by the NRC prior to implementation.
4. Changes to the PCP shall be submitted to the NRC in the Annual Radioactive Effluent Report.
5. A PCP shall consist of the processing steps and processing parameters that must be followed to assure satisfactory solidification and/or dewatering products.
6. A PCP shall establish a sampling or testing schedule for verification of solidification.
7. A PCP shall establish a set of records that must be maintained for each solidification and dewatering performed for disposal.