3. All automatic containment isolation valves are operable or de-activated in the isolated position.

4. All blind flanges and manways are closed.

P.A Purge - Purging - Purge or Purging is the controlled process of discharging air or gas from a confinement to establish temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.

P.B Process Control Program - The Process Control Program outlines the solidification of radioactive waste from liquid systems. It does not substitute for station operating procedures, but provides a general description of equipment, controls, and practices to be considered during waste solidification to assure solid wastes.

Q. Rated Power - Rated power refers to operation at a reactor power of 2381 megawatts thermal. This is also termed 100% power and is the maximum power level authorized by the operating license. Rated steam flow, rated coolant flow, rated neutron flux, and rated nuclear system pressure refer to the values of these parameters when the reactor is at rated power. Design power, the power to which the safety analysis applies, is 104.4% of rated power (105% of rated steam flow), which corresponds to 2486 megawatts thermal.

R. Reactor Power Operation - Reactor power operation is any operation with the mode switch in the "Startup/Hot Standby" or "Run" position with the reactor critical and above 1% rated power.

S. Reactor Vessel Pressure - Unless otherwise indicated, reactor vessel pressures listed in the Technical Specifications are those measured by the reactor vessel steam space detectors.

T. Refueling Outage - Refueling outage is the period of time between the shutdown of the unit prior to a refueling and the startup of the plant after that refueling.

U. Safety Limits - The safety limits are limits within which the reasonable maintenance of the fuel cladding integrity and the reactor coolant system integrity are assured. Violation of such a limit is cause for unit shutdown and review by the Nuclear Regulatory Commission before resumption of unit operation. Operation beyond such a limit may not in itself result in serious consequences but it indicates an operational deficiency subject to regulatory review.

V. Secondary Containment Integrity - Secondary containment integrity means that the reactor building is intact and the following conditions are met:

1. At least one door in each access opening is closed.

2. The standby gas treatment system is operable.

3. All automatic ventilation system isolation valves are operable or secured in the isolated position.

W. Shutdown - The reactor is in a shutdown condition when the mode switch is in the "Shutdown" or "Refuel" position.

1. Hot Shutdown means conditions as above with reactor coolant temperature greater than 212°F.

2. Cold Shutdown means conditions as above with reactor coolant temperature equal to or less than 212°F and the reactor vessel vented.

TABLE 3.21.F.1 (CONTINUED)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Sample Stations	Sampling and Collection Frequency	Type and Frequency of Analysis
4. Ingestion			
a. Milk (Nearest Producer)	At least one location	At least once per 15 days during Peak Pasture Period[a]; at least once per 31 days at other times.	Gamma isotopic[b] and I-131 analysis of each sample.
b. Milk (Other Producers)	At least 2 locations	At least once per 92 days.	Gamma isotopic[b] and I-131 analysis of each sample.
c. Fish	At least 2 locations	Two times per year (once in the summer and once in the fall). Attempt to include the following: 1. Bottom feeding species 2. Middle-Top feeding species	Gamma isotopic[b] analysis on edible portions.
d. Food Products	Samples of three different kinds of broad leaf vegetation grown nearest each of two different offsite locations of highest predicted annual average ground-level D/Q if milk sampling is not performed.	Monthly when available.	Gamma isotopic[b] and I-131 analysis.
	One sample of each of the similar broad leaf vegetation grown 15-30 km distant in the least prevalent wind direction if milk sampling is not performed.	Monthly when available.	Gamma isotopic[b] and I-131 analysis.

NOTES FOR TABLE 3.21.F.1

a. DELETED

b. Ge(Li) gamma isotopic analysis refers to high resolution Ge(Li) gamma spectrum analysis as follows: the sample is scanned for gamma-ray activity. If no activity is found for a selected nuclide, the detection sensitivity for that nuclide will be calculated using the counting time, detector efficiency, gamma energy, geometry, and detector background appropriate to the particular sample in question. The following nineteen (19) nuclides shall be analyzed for routinely:

Be-7	Ru-103	Ce-144
K-40	Ru-106	Ra-226
Mn-54	I-131	Th-228
Fe-59	Cs-134	
Co-58	Cs-137	
Co-60	BaLa-140	
Zn-65	Ce-141	
Zr-95		
Nb-95		

Any radionuclide detected, i.e., having a measured concentration greater than the LLD, whether or not it is one of the 19 nuclides listed above, shall be regarded as present in the sample.

c. Thermoluminescent Dosimeters (TLD) is a single phosphore. Two or more phosphores in one package are considered to be two or more dosimeters.

d. Peak Pasture Period is June 1 through September 30 of each year.

6.6 Environmental Qualification

A. By no later than June 30, 1982 all safety-related electrical equipment in the facility shall be qualified in accordance with the provisions of: Division of Operating Reactors "Guidelines for Evaluating Environmental Qualification of Class IE Electrical Equipment in Operating Reactors" (DOR Guidelines); or, NUREG-0588 "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment", December 1979. Copies of these documents are attached to Order for Modification of License DPR-46 dated October 24, 1980.

B. By no later than December 1, 1980, complete and auditible records must be available and maintained at a central location which describe the environmental qualification method used for all safety-related electrical equipment in sufficient detail to document the degree of compliance with the DOR Guidelines or NUREG-0588. Thereafter, such records should be updated and maintained current as equipment is replaced, further tested, or otherwise further qualified.

6.7 Systems Integrity Monitoring Program

A program shall be established to reduce leakage from systems outside the primary containment that would or could contain highly radioactive fluids during a serious accident to as low as practical levels. This program shall include provisions establishing preventive maintenance and periodic visual inspection requirements, and leak testing requirements for each system at a frequency not to exceed refueling cycle intervals.

6.8 Iodine Monitoring Program

A program shall be established to ensure that capability to accurately determine the airborne iodine concentration in vital areas under accident conditions. This program shall include training of personnel, procedures for monitoring and provisions for maintenance of sampling and analysis equipment.

6.9 Process Control Program (PCP)

6.9.1 The PCP shall be a manual detailing the program of sampling, analysis and formulation determination by which SOLIDIFICATION of radioactive waste from liquid systems is assured consistent with Specification 3.21.E and the surveillance requirements of these Technical Specifications.

6.9.2 District Initiated Changes

A. Shall be submitted to the Commission by inclusion in the Semiannual Radioactive Material Release Report for the period in which the change(s) was made effective and shall contain:

1. Sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information;

2. A determination that the change did not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes; and

3. Documentation of the fact that the change has been reviewed and found acceptable by the SORC.

B. Shall become effective upon review and acceptance by the SORC.

PROCESS CONTROL PROGRAM

FOR

Cooper Nuclear Station

June 7, 1982

PROCESS CONTROL PROGRAM

INTRODUCTION

This Process Control Program outlines the solidification of radioactive waste from liquid systems at Cooper Nuclear Station. It is not intended to be a substitute for station operating procedures, but to provide a general description of equipment, controls, and practices to be considered during waste solidification. Station operating procedures will provide detailed instructions as to the actual operation during the solidification process.

CLASSIFICATION OF TERMS

This Process Control Program Document describes the process used to solidify wet wastes. Wet wastes are those wastes produced from the liquid radwaste treatment system. These wastes may be typically described as spent resins (bead and powdex), filter material, waste sludges, and evaporator concentrates. The solidification of these wastes as defined is the conversion of radioactive wastes from liquid systems to a solid, which is as uniformly distributed as reasonably achievable, with definite volume and shape, bounded by a stable surface of distinct outline on all sides. The solidification of the wastes mentioned above is achieved with equipment installed at CNS and this equipment operated in accordance with CNS operating procedures. Those wastes which progress through the process system, fill, mix, and capping stations will normally meet the solidification criteria. Those wastes that deviate from the normal operation, needing special technique, such as hand-mixing, material injection by manipulator or hand, etc., will be as uniformly distributed as reasonably achievable. Keeping exposures ALARA and physical makeup of the material to be solidified will be the governing considerations in determining what is reasonably achievable.

The radwaste solidification process will be operated on a batch basis. A batch will consist of all the resulting continuous drums processed from the contents of a single source. An example would be the sludge from a condensate phase separator solidified in a continuous drumming operation until the phase separator is empty or the batch is terminated.

Radioactive wastes from liquid systems processed on a batch basis for solidification will normally be, but not limited to, the condensate phase separators, reactor water cleanup phase separators, waste sludge tank, spent resin tank, or concentrated waste tank.

OPERATION

Wastes to be solidified will normally be from the condensate or reactor water cleanup phase separators, waste sludge tank, or spent resin tank. These wastes are routed through the centrifuge units. After dewatering in the centrifuge, wastes then enter a storage hopper. Wastes at this step will vary from a fairly dry granular consistency to a wet putty-like consistency depending upon the source material; filtered sludges, filter material, resins, etc. Department of Transportation 17H specification 55-gallon drums containing cement are then transferred under the hopper and filled with wastes. The drum then progresses to the mixing section.

The in-drum mixer mixes the cement and waste materials. Water is then added to the mixture in quantities to ensure solidification. Because of the varying degree of wetness from one batch to the next, periodic visual inspection of the first few drums is necessary to determine the correct amount of water needed. After the amount of water to achieve solidification has been determined, it may be added automatically by the mixing program.

After mixing has been achieved, radiation levels of each drum is taken. The drum is then transferred to the drum storage lines.

The drumming operation will be continuous, centrifuging, and drumming until the source, phase separators, or tanks are emptied or the batch terminated.

After at least 24 hours, the drums are taken from the storage line to the capping station. Here the drum is visually inspected for freestanding water. If the material is solid and no freestanding water is present, the drum is capped. If it is not solidified or freestanding water is present, cement may have to be added or the drum is put back on the storage line to cure. After capping, the drum is washed to remove contamination. The capped drum is then taken to the storage line. Prior to shipment, the drums will be taken to the smear station and checked for contamination levels.

The third or fourth drum of each batch will be sampled prior to the mixing station. This sample is considered representative of that batch. The sample is taken to the Radiochemistry Laboratory for analysis.

PARAMETERS AND TESTING

Two cubic feet of cement will be added to each 55-gallon 17H specification drum. It has been demonstrated that this volume of cement with the remaining drum volume being powdex resins, powdex filter material, sludges, etc., and water will achieve solidification.

After the material to be solidified has been added to the drum, a sample of this material, considered to be representative of that batch, will be taken. This sample will be analyzed for pH. It has been demonstrated that, if the material to be solidified has a pH value within the range of 2 to 13, the solidification process will not be affected. This sample is also isotopically analyzed to determine isotope distribution. By comparing this isotopic distribution and radiation readings on each drum, the total concentration of the radionuclides present can be determined, also any carry-over from the previous batch or changes in the amount of solidified material may be taken into account.

Because of the variation in water content of the material after being centrifuged (dry to paste-like consistency), varying amounts of water will be added during the mixing stage. The first few drums will provide a basis for determining the correct amount of water to be added to each drum of the batch. This will be done visually and with mixer torque indications. Once the amount of water needed for solidification has been determined, this amount of water will be added to each drum by the automatic mixing sequence controls.

At least 24 hours after mixing and prior to capping, each drum is visually inspected. This provides assurance that no freestanding water is present and that the radwaste material has been solidified.

REPORTS

The volume and curie content of wet wastes solidified at Cooper Nuclear Station will be documented in the Station Semiannual Reports. This information will be in the format outlined in Regulatory Guide 1.21, Revision 1, Table 3.