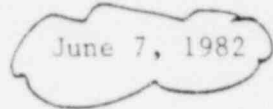




PROCESS CONTROL PROGRAM

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 station.

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 free-standing water. If the material is solid and no free-standing water is present, the drum is capped. If it is not solidified or free-standing 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 free-standing 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 Semi-annual Reports. This information will be in the format outlined in Regulatory Guide 1.21, Revision 1, Table 3.