



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30323

SEP 23 1991

Report Nos.: 50-280/91-28 and 50-281/91-28

Licensee: Virginia Electric and Power Company  
Glen Allen, VA 23060

Docket Nos.: 50-280 and 50-281 License Nos.: DPR-32 and DPR-37

Facility Name: Surry 1 and 2

Inspection Conducted: August 27-30, 1991

Inspector: Fred N Wright 9/16/91  
F. N. Wright Date Signed

Approval By: Thomas R Decker 9/16/91  
T. R. Decker Date Signed  
Radiological Effluents and Chemistry Section  
Radiological Protection and Emergency  
Preparedness Branch  
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This special inspection of the licensee's program for transportation of radioactive material was made to review the activities associated with a shipment of radioactive material involved in a transportation accident on August 27, 1991, in Norfolk, Virginia.

Results:

One violation was identified for failure to properly identify the physical form of the radioactive material involved in a transportation accident. The inspector determined that the licensee did not have a program that would require persons knowledgeable of the physical characteristics of complex components or articles to assess and specify the physical form of radioactive material presented to the radioactive material transportation staff for shipment.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*M. Bechman, Radioactive Material Control
- \*W. Benthall, Supervisor, Licensing
- \*M. Biron, Supervisor Radiological Engineering
- \*H. Blake, Superintendent, NSS
- \*W. Cook, Supervisor, Health Physics Operations
- \*D. Erickson, Superintendent, Radiation Protection
- \*B. Garbor, Supervisor, Health Physics
- \*B. Guritney, Superintendent, Maintenance
- \*M. Haddock, Supervisor, Maintenance
- \*D. Hart, Supervisor, Quality Assurance
- \*M. Kansler, Station Manager
- \*M. Olin, Supervisor, Decontamination Services
- \*J. Price, Assistant Station Manager
- \*E. Smith, Manager, Quality Assurance
- \*W. Thornton, Director Health Physics and Chemistry Services

Other licensee personnel contacted during this inspection included engineers, mechanics, technicians, and administrative personnel.

#### Nuclear Regulatory Commission

- \*M. Branch, Senior Resident Inspector

\*Attended Exit Interview

### 2. Transportation Accident Overview

On the morning of August 27, 1991, a contaminated Reactor Coolant Pump Motor (RCPM) and package, being transported on a flatbed trailer from the Surry Power Station to a Westinghouse facility, struck the Jefferson Avenue overpass as the transport vehicle was attempting to enter onto westbound Interstate 64 (I-64) in Newport News, Virginia. The height of the package on the trailer was greater than the clearance of the overpass it entered, causing the package to come in contact with the overpass and fall from the trailer onto the road.

The RCPM had been contaminated with low level radioactive material during its use at the plant and was being transported as Low Specific Activity (LSA) radioactive material. The RCPM was contained in a strong tight container (package) for the transport. The RCPM package was severely damaged and the RCPM was resting on its side in the road, outside it's package. A small amount of radioactive fluids

spilled from the RCPM onto the road surface. The fluid migrated down into the damaged road surface and out to the outside (right) road shoulder. At the shoulder the concrete road surface joined with an asphalt berm. The contaminated fluid reached that joint and traveled along it for a couple of hundred feet, seeping into the fissure as it advanced.

Since the load was oversized and required a permit, the transport vehicle was being escorted by other transport company personnel in vehicles to it's front and rear when the accident occurred at about 09:38 a.m. Both lanes of the east and west roads were blocked for about 3 hours. The east bound lanes were opened about 1:00 p.m. and one lane going west on I-64 was opened for traffic later that afternoon.

Two cranes were moved to the accident site and the motor was lifted from the road and moved onto another trailer for transport back to the Surry site. Since the transport package for the RCPM was destroyed in the accident, the licensee proposed the use of two impermeable Herculon "socks" as strong tight containers for transporting the RCPM back to Surry site. The licensee contacted the Department of Transportation (DOT) about the proposed repackaging plan and was advised that the proposal appeared to be acceptable for meeting the requirements of 49 CFR 173.425(b). On August 28, 1991, the licensee departed the accident scene with the RCPM about 2 a.m. and arrived at the Surry site approximately 4 a.m.

VEPCO volunteered to perform the decontamination of the road and sent considerable equipment as well as numerous personnel to the site to begin the task. Recovery workers included representatives from decontamination, health physics, maintenance, and other Surry staffs. The licensee's personnel began decontamination activities the afternoon of the accident and worked around the clock for about 2 1/2 days until the task was completed in the early hours of August 30, 1991. The Commonwealth of Virginia, Bureau of Radiological Health radiological control personnel released the area as clean (background radiation levels) before sunrise that day. The Commonwealth highway department began repair of the road at sunrise and was able to open all westbound lanes of I-64 later that day. The licensee dispatched sufficient resources and personnel to perform the task effectively and safely.

### 3. Inspection Findings

#### a. Requirements

10 CFR 71.5(a) requires a licensee, who transports any licensed material outside the confines of his plant or other place of use, or delivers any licensed material for transport, except where such transport is subject to the regulations of the U.S. Postal Service, to comply with the applicable requirements of the DOT regulations presented in 49 CFR Parts 170 through 189 insofar as such regulations relate to the packaging of byproduct, source, or special nuclear material, marking and labeling of the packages, loading and storage of packages, placarding of the transportation vehicle, monitoring requirements, accident reporting, and shipping papers.

49 CFR 173.425 specifies the transport requirements for LSA radioactive materials. Paragraph (b) of 173.425 specifies the requirements for shipments consigned as exclusive use and Paragraph (b)(1) requires the materials be packaged in strong tight packages so that there will be no leakage of radioactive material under conditions normally incident to transportation.

49 CFR 172.200 specifies the requirements for shipping papers. Paragraph 172.203(d)(ii) requires that the shipment of radioactive material must include a description of the physical and chemical form of the material.

VEPCO Operational Quality Assurance Program Topical Report - VEP 1-5A describes the licensee's commitments to various Regulatory Guides including Regulatory Guide 1.33, Quality Assurance Requirements (Operation), Revision 2, February 1978.

Regulatory Guide 1.33, Appendix A, 1978, requires written procedures for control of radioactivity (for limiting materials released to the environment and limiting personnel exposure).

#### b. RCPM Description

The RCPM had four major coolers, two air and two oil. All of the coolers used site component cooling water (CCW) as a cooling media. The largest cooling system is the upper bearing oil cooler which cools approximately 175 gallons of oil with a heat exchanger holding approximately 10 gallons of CCW. The remaining coolers hold less than 2 gallons of CCW each.

c. RCPM Replacement

The inspector determined that when the CCW lines were disconnected from the RCPM in the Reactor Building containment and at that time those lines and the fluid from the RCPM where these lines are connected were allowed to drain by gravity. However, those CCW system connecting points on the RCPM were not necessarily low points in it's cooling systems. Therefore, simply disconnecting the CCW lines to the RCPM could not drain its cooling system inventory alone. Additionally, the licensee did not block the influent or effluent CCW ports on the RCPM before shipment. Therefore, in positions other than a normal upright position, remaining CCW fluids could flow by gravity out of the coolers. The motor was disconnected from the pump in April of 1991 and moved to the crane building. The RCPM remained there until it was loaded onto the flat bed trailer for shipment.

d. CCW

The licensee had experienced recent problems with their CCW system in that it had become significantly contaminated with reactor coolant system leakage. The inspector learned that the radioactivity of the CCW system in April 1991, was on the order of  $1 \text{ E-03}$  microcuries per milliliter ( $\mu\text{Ci/ml}$ ). A small sample of the radioactive liquid collected at the accident scene was analyzed and indicated approximately  $1 \text{ E-3}$   $\mu\text{Ci/ml}$  of Cs-137. This analysis agreed closely to the radioactivity measured in the CCW system at the time the RCPM was disconnected from the system, indicating that the spilled water's source was CCW from the upper bearing oil cooler heat exchanger.

e. Package

The inspector determined that the licensee had utilized a steel container that fully enclosed the RCPM and that included gaskets at package joints to prevent any release of radioactivity under conditions normally incident to transport. The steel package built for transporting the RCPM met the requirements of a strong tight package as required by the regulations.

f. Shipping Papers and Physical Assessment

The licensee identified the physical and chemical form of radioactivity on the RCPM shipping papers as solid/oxides. However, when the RCPM turned over onto

I-64 a small amount of liquid, estimated to be from 5 to 10 gallons, drained from the motor to contaminate the roadway indicating that the physical form of the radioactive material was both a liquid and solid.

The radiation protection group responsible for preparing radioactive material for transport was unaware that liquids could be internal to the RCPM. The transportation staff used a written procedure to estimate the radioactivity of the RCPM from a combination of radioactive contamination swipes taken from external surfaces and direct radiation measurements. However, the transportation staff did not have a procedure for preparing the RCPM for shipment nor easy access to the RCPM internals. In interviews with licensee personnel the inspector determined that various members of the health physics staff were not aware of the potential for a RCPM to contain water and oil when presented for shipment and therefore did not request information concerning fluids from knowledgeable sources prior to shipping. As a result, the transportation staff was not aware that the RCPM was a mixture of solid and liquid/oxide form at the time of shipment.

The inspector determined that the licensee did not have a system that would require persons knowledgeable of the technical details and conditions of articles presented to the transportation group to assess and determine the physical and chemical form of the radioactive material. Failure to have appropriate controls and procedures to properly determine the physical form of radioactive material in accordance with the requirements of DOT regulations was identified as a violation of the licensee's commitments for having written procedures as specified in the licensee's Topical Report (50-280/91-28-01).

g. Shipper Qualifications

The inspector reviewed the qualifications of the person authorizing the transport of the RCPM involved in the accident and determined that the individual worker was an ANSI qualified health physics technician that had completed the licensee's transportation qualification program and was qualified to authorize the shipment of radioactive materials.

One violation was identified.

## 4. Exit Meeting

The inspection scope and results were summarized on August 30, 1991, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results as listed below. Proprietary information is not contained in this report.

<u>Item Number</u>	<u>Description and Reference</u>
50-280/91-28-01	VIO - Failure to develop and implement procedures and controls to properly assess the physical form of radioactive material offered for transportation (Paragraph 3.f).