March 25, 2003

Mr. Daniel John Mahoney, President
Freedom Development Co.
8 Arlington Street
Auburn, MA 01501

SUBJECT: MARCH 6, 2003, LETTER TO CHAIRMAN MESERVE REQUESTING INFORMATION ON DECOMMISSIONING WASTE DISPOSAL

Dear Mr. Mahoney:

I am responding to the letter you transmitted by facsimile to Chairman Meserve requesting information on the disposal of radioactive waste from a nuclear power plant undergoing dismantlement. In addition to specific questions about the disposal of radioactive waste, you requested a detailed description of the process for dismantlement and off-site shipment of radioactive waste. I will provide a description of the typical process for the decommissioning of a permanently shutdown nuclear power plant and address your specific questions as part of that explanation.

The decommissioning process begins when the licensee decides to permanently cease operations of the facility. Permanent shutdown may be required because (a) the license has expired; or (b) the U.S Nuclear Regulatory Commission (NRC) has ordered the licensee to cease operations for safety reasons; or (c) the licensee has chosen to shut down prematurely for economic reasons. The licensee may then choose to begin the decommissioning and dismantlement process immediately or may choose to maintain the facility in a safe stable condition and begin active decommissioning and dismantlement at a later date. The licensee has flexibility in deciding how to decommission the site but must ensure compliance with NRC regulations and license specific requirements. Frequently, licensees hire contractors that specialize in decommissioning sites to conduct part or most of the decommissioning. The process for decontamination and dismantlement may vary from site to site. Factors impacting decommissioning include cost, worker exposure, availability of a waste site, and layout and structure of buildings.

As you stated in your letter, much of the facility, including the reactor, tools, equipment, discarded protective clothing, dirt, construction rubble, concrete, or piping become radioactive and/or contaminated during operation of the facility. To complete the decontamination and dismantlement of the facility, these items must be removed from the site and disposed of. Most of these items are classified as low-level radioactive waste (LLW). LLW often contains small amounts of radioactivity dispersed in large amounts of material, but may also have activity levels requiring shielding and remote handling. NRC regulations classify LLW on the basis of

potential hazards, such as the concentrations of short-lived and long-lived radionuclides, in accordance with Title 10 of the Code of Federal Regulations, Section 61.55, “Waste Classification” (10 CFR 61.55). Thus, LLW usually, but not necessarily, includes waste with relatively low concentrations of radionuclides. Although the classification of waste can be complex, Class A waste generally contains lower concentrations of longer half-life radioactive material than Classes B and C wastes.

Most LLW is shipped in packages the U.S. Department of Transportation (DOT) has authorized, although some packages for larger quantities of low-level waste require NRC certification. LLW packages can be loaded onto trucks or trains for shipment to the LLW disposal site. There are regulations governing the radiation level that stipulate limits: (1) on the outer surface of the vehicle that is carrying the radioactive material; (2) at 2 meters (6.6 feet) from the surface of the vehicle; and (3) at the position occupied by the driver of the vehicle. Measurements of the applicable radiation levels are required before a vehicle is allowed to leave the site.

Packaging requirements for shipments of specific radioactive materials are based on a number of factors, including: the material activity; quantity; form (normal or special); specific activity; fissile properties; and other characteristics (physical, chemical, and nuclear properties). For smaller quantities of LLW, one of three types of containers is used, depending on the material activity, or in some cases, the specific activity. These container types are “strong tight containers,” industrial packages, and Type A containers. Safety criteria for these types of containers, which are found in the DOT regulations, increase along with the package categories, from “strong tight” to Type A containers. Type A containers must be able to withstand the normal conditions of transport. The normal conditions of transportation that must be considered include temperature, pressure, vibration, water spray, impact, penetration, and compression tests.

Wastes that contain higher levels of radioactivity are transported in Type B containers. Type B containers must be able to withstand both, normal and accident conditions. The following tests are used to provide reasonable assurance that the containers will withstand serious transportation accidents:

- A 9 meter (30-foot) drop onto a flat, unyielding surface
- A 1 meter (40-inch) drop onto a vertical steel rod (puncture test)
- A 30-minute exposure to a fire of 800°C (1475°F)
- Submersion in 15 meters (50 feet) of water.

The NRC staff must review a container design to verify its resistance to accidents. Applicants must demonstrate to NRC that their design satisfies all applicable requirements. That demonstration may involve comparative evaluations with approved designs, analyses, and partial-scale tests.

Currently, LLW can be disposed of at three active licensed disposal facilities. They are located in Barnwell, South Carolina; Hanford, Washington; and Clive, Utah. All three sites are regulated by the States in which they are located. The site in Utah is restricted to specific types of LLW. The site in Washington State is restricted to waste from the Northwest and Rocky Mountain region. The site in South Carolina accepts LLW from all States. Sites and the surrounding areas are monitored using a system of wells to determine if there is any leakage of radioactivity into the ground water.

LLW is commonly disposed of by burial in near-surface shallow trenches. After they are filled with containers, the trenches are usually covered with a low-permeability cover (such as clay). They are then often covered with a gravel drainage layer and a layer of topsoil. Vegetation is planted on top for erosion control.

I trust that this addresses your questions about the disposal of radioactive LLW from the decommissioning and dismantlement of a nuclear power plant. More information on the decommissioning of nuclear power plants is available in NUREG-1628, “Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Plants,” a copy of which is enclosed. It is also available on-line at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1628/sr1628.pdf. More information on radioactive waste disposal is available in NUREG/BR-0216, “Radioactive Waste: Production, Storage, Disposal,” a copy of which is also enclosed. It is available on-line at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0216/r2/br0216r2.pdf. If you have any further questions on this subject, please contact John B. Hickman, of my staff, at (301) 415-3017.

Sincerely,

/RA/

C. William Reamer, Deputy Director
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures:
NUREG-1628
NUREG/BR-0216

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