October 5, 1998

FOR: The Commissioners

FROM: L. Joseph Callan /s/
Executive Director for Operations

SUBJECT: SEAMAN NUCLEAR'S APPLICATION FOR A LICENSE TO DISTRIBUTE PORTABLE MOISTURE DENSITY GAUGES TO GENERAL LICENSEES

PURPOSE:

The staff wishes to alert the Commission to its intent to issue a license that may establish a significant precedent. Specifically, Seaman Nuclear Corporation has requested a license to distribute portable moisture density gauges to persons generally licensed in accordance with 10 CFR 31.5. Seaman Nuclear anticipates sales of its device to approximate 500 units annually. However, approval of the application could set a precedent, assuming an industry shift to general licensing for this type of device, that may add up to 5000 portable gauges, containing cesium-137 and americium-241/ beryllium, to the generally licensed device population. Effectively, this would add a significant number of devices to the registration program established in response to SECY-97-273, "Improving NRC's Control Over, and Licensees' Accountability For, Generally and Specifically Licensed Devices," date April 13, 1998, since the quantities of cesium-137 and americium-241/ beryllium meet the levels specified for registration.

BACKGROUND:

Portable moisture density gauges are designed for use in industries, such as construction and civil engineering, to measure moisture content and density of soils, asphalt, and concrete. They are typically used by engineers and technicians at field construction sites. There are approximately 5000 gauges of this type currently in use in the United States. For over 30 years their use has been authorized only under specific licenses issued by the U.S. Nuclear Regulatory Commission (NRC) or an Agreement State. Issuance of such licenses has been a matter of operational practice, as opposed to regulatory restrictions disallowing use of these devices under a general license.

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A typical gauge contains two sealed sources -- a 1.48-gigabecquerel (40-millicurie) americium-241/beryllium source used for backscatter measurement, and a 0.37-gigabecquerel (10-millicurie) cesium-137 source used for direct transmission measurement. For most designs, the backscatter source and its accompanying detector remain in the device during use. Also, for most designs, the direct transmission source is inserted, via a source rod, beneath the surface to be measured, through a punched access hole.

Since portable moisture density gauges are used under specific licenses issued by NRC or an Agreement State, the users are required to comply with 10 CFR Parts 19 and 20, or Agreement State equivalents. This requires, in part, that the licensees implement a radiation safety program, that licensees secure the devices from unauthorized removal or access, and that users be trained in the proper use of the gauges and the applicable regulations. NRC and Agreement States ensure the gauges are used safely and in accordance with the appropriate regulations, through inspections that are performed on a periodic basis (usually a 5-year frequency).

There are currently three major distributors of portable moisture density gauges in the United States. Seaman Nuclear is an NRC licensee. The other two -- Troxler Electronic Laboratories, Inc., and Boart Longyear Company (CPN Products) -- are both located in Agreement States.

DISCUSSION:

Seaman Nuclear's application requests a license to distribute portable moisture density gauges to general licensees. NRC and Agreement States have issued licenses authorizing distribution of other types of portable gauges to general licensees, including static-elimination devices, gas chromatographs, and movable density gauges that contain cesium-137.

The design of the Seaman Nuclear gauge is typical of portable moisture density gauges, with one important exception. The major difference is that the direct transmission source remains within the gauge during use and is rotated to an open (unshielded) position to obtain a measurement. An optional detector probe may be attached to the device and lowered into a punched hole in the surface for a transmission measurement.

The staff has completed its evaluation of Seaman Nuclear's application and has determined that the requirements established in 10 CFR 32.51 have been met, including a robust metal label securely affixed to the device. Specifically, Seaman Nuclear has demonstrated that even under heavy use conditions, the doses to individuals under normal handling and storage operations would not likely exceed 3 mSv (300 mrem). This dose estimate is based on dosimetry reports from persons using similar devices under specific licenses. The acceptance criteria specified in 10 CFR 32.51(a)(2)(ii) is that under ordinary conditions of handling, storage, and use, it should be unlikely that any person will receive, in one year, a dose in excess of 5 mSv (500 mrem). Seaman has also demonstrated that under accident conditions, it is unlikely that any person would receive an external radiation dose in excess of 150 mSv (15 rem). This analysis demonstrates compliance with the accident criteria specified in 10 CFR 32.51(a)(2)(iii). Based on the design of the device (e.g., source remains in device, the handle operates the source shutter mechanism, use of tamper-resistant hardware), it is extremely unlikely that even after loss or theft of the device an individual would receive a dose of 3 mSv (300 mrem).

Data in the Nuclear Materials Events Database indicates that the probability of loss or theft of these types of devices is generally higher than the probability of loss for other specific or general licensed devices. Therefore, to address any concerns about general licensees maintaining accountability of

the devices, Seaman Nuclear has committed to implementing a program to periodically (at least annually) contact its customers to verify that they can still account for their devices. The program would include having users respond to Seaman Nuclear by sending copies of the most recent leak test certificate. Seaman Nuclear would notify NRC about persons who do not respond or cannot account for their devices. In addition, the device has a metal label, riveted to the base of the device, that bears the radiation symbol, the words "Caution - Radioactive Material," and other information concerning use and licensing of the device. If lost or stolen, this durable labeling will inform persons that handle the device that it contains radioactive material.

The staff notes that, as part of its response to SECY-97-273, dated April 13, 1998, NRC will implement a registration program for certain devices, and the portable moisture density gauges, if used by general licensees, would be subject to the registration program. However, Seaman Nuclear's program would serve as an accountability program in the interim.

The staff notes that the possession and use of these devices under a general license, with either Seaman Nuclear or NRC implementing an accountability program, would reduce the regulatory burden on both NRC and licensees while improving accountability of the devices. Currently, specific licensees are subject to pre-approval of their specific licenses, initial and periodic onsite inspections, and application and annual fees. Under the general license, there would be no pre-approval of licenses nor routine onsite inspections. The annual accountability program (implemented by either Seaman Nuclear or NRC) would provide more frequent contact than the 5 year on-site inspections at lower costs to both NRC and licensees. The accountability program would provide an annual comparison of general licensees' inventories against an independent inventory (maintained by Seaman Nuclear or NRC). Initially, the general licensees would not be subject to application or annual fees. However, as directed in SECY-97-273, dated April 13, 1998, the issue of fees for registration will be considered as part of the rulemaking effort. The staff expects registration fees to be less than current fees for the same category of specific licensees.

The staff has completed its review of Seaman Nuclear's application and plans to issue a distribution license to Seaman Nuclear no earlier than 10 days after the date of this paper. In addition, prior to issuing the license, NRC will discuss the reasons for issuing the license with the States of North Carolina and California, the States where Troxler Electronic Laboratories, Inc., and Boart Longyear Company, respectively, are located. This paper informs the Commission of the staff's actions.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

L. Joseph Callan
Executive Director for Operation

Even though this action may add approximately 5000 portable gauges containing cesium-137 and americium-241/beryllium to the generally licensed device population, the staff believes that action is warranted since:

1. Seaman Nuclear has demonstrated that the gauge meets the requirements established in 10 CFR 32.51.

2. Seaman Nuclear has committed to implement an annual accountability for all customers.

3. These gauges will be captured under the registration program that will be established in response to SECY-97-273.