NC DEPARTMENT OF HEALTH AND HUMAN SERVICES

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INFORMATION NOTICE

TO: North Carolina Portable Gauge Licensees, Manufacturers and Service Providers
FROM: David Crowley, Radioactive Materials Branch Manager
DATE: February 28, 2020

SUBJECT: Maintenance of Portable Nuclear Gauge Source Rods (Troxler 3440)

The North Carolina Radioactive Materials Branch (the "Branch") received reports from the United States Nuclear Regulatory Commission (NRC) that suggested possible recurrence of an issue from 1996 regarding Troxler Electronic Laboratories ("Troxler") source rods. The historic issue was detailed by the NRC information notice (IN 96-52) which is referenced here for background. The Branch opened an investigation into any new possible manufacturing concerns; however, evidence suggests these events were tied to long product lifespans and poor routine maintenance procedures.

The Troxler 3440 Portable Moisture Density Gauge has had 10 instances of source rod failures nationally over the past 24 years, and 2 cases in 2019; specifically detachment occurred at the weld which secures the Cs-137 source to the end of the rod. These recent incidents are what prompted the NRC to reach out to the Branch. The Branch holds authority over the Sealed Source and Device Registry (SSDR) certificate for the Troxler 3440 (NC-646-D-130-S), and thus reviews designs, manufacturing practices, and safety concerns for the device. The Branch widened the investigation to look at all of these events for the 3400 series.

During the investigation a couple factors emerged. First, a third party metallurgical analysis of one of the failed source rods indicated it was likely subjected to corrosive environments and normal wear. There were no signs of poor welding techniques or manufacturing practices.

> "In summary, the microstructures, the materials of construction, and hardness data are generally consistent with previously examined new rods indicating that there was no obvious defect with this rod assembly. The current failure was primarily a result of outer diameter pitting and intergranular cracking of the "sensitized" Type 420 stainless steel heat affected zone and is most likely associated with its service environment and normal operation."

Second, the Branch notes that some of the investigated devices were not maintained in accordance with the associated SSDR certificate, missing weld integrity checks. The Troxler 3440 certificate (NC-646-D-130-S) requires that:

> "Servicing: The 3400 series devices require periodic maintenance of two specific gauge components by the gauge user. The scraper ring/sliding block require periodic cleaning and

lubrication, and the source rod bearings require lubrication. The maintenance should be performed according to the manufacturer's instruction located in the operation and instruction manual. In addition, the gauge should be returned every five years for a thorough manufacturer's inspection of the gauge, to include an extensive inspection of the extendable source rod and its pertinent welds. Servicing of the source rod, including but not limited to source replacement, general servicing, repair, and/or disposal, shall be done by the manufacturer."

The Branch concluded that appropriate maintenance must be performed at intervals not to exceed what is published in the SSDR certificate. Doing this should greatly limit risk of device failure while in normal use conditions.

Should you have questions related to this information notice please feel free to contact the Caleb Smith, Sealed Source and Device Reviewer, at (919) 814-2301 or by electronic mail: caleb.smith@dhhs.nc.gov

Reference:
NRC IN 96-52: Cracked Insertion Rods on Troxler Model 3400 Series Portable Moisture Density Gauges