

STD-P-02-037

Gamma Scanning of Lead Shielding for SEG Casks

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☒ New Procedure
 ☐ Title Change
 ☐ Minor Revision
 ☐ General Revision
 ☐ Rewrite

This procedure supersedes LN Technologies Corp. procedure WM-013.

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1. PURPOSE AND SCOPE

This generic test specification procedure states the minimum requirements for gamma scanning of lead shielding for Scientific Ecology Group, Inc. (SEG) type casks. The fabricator shall submit for approval detailed gamma scanning procedures.

2. APPLICABILITY

This generic procedure is applicable to all radioactive shipment casks or radiation shields fabricated for and procured by SEG.

3. DEFINITIONS

None

4. REFERENCES

4.1 ASNT Recommended Practice No. SNT-TC-1A, 1980 Edition

4.2 AECU 2967, November 1954

5. RESPONSIBILITIES

The Procurement Project Manager shall inspect and approve all vendor submitted gamma scanning procedures against this test specification procedure. SEG Quality Assurance (QA) will witness the procedure.

6. PERSONNEL QUALIFICATIONS

Personnel conducting gamma scanning shall be familiar with the detailed procedures and shall be certified Level II or Level III radiographers in accordance with Reference 4.1.

7. EQUIPMENT

The gamma detector shall be a model E120 Eberline or equivalent with a pancake probe. The gamma source shall be either Ir-192 or Co-60 of sufficient activity in curies to obtain reasonable readings. The source strength will be dependent on the lead and steel thickness being scanned.

8. CALIBRATION

A calibration will be prepared using defect free lead equal to the nominal lead thickness for the specific cask. Steel equal to the nominal specified wall thickness will be placed on either side of the lead. The lead shall be designed so that several 1/8-in. sections of lead can be removed or added to the calibration plate.

The calibration plate will be installed in a fixture in place of the secondary cover as shown in Enclosure 12.1. The source is placed inside the cask at a distance from the plate equal to the inside radius of the cask. The radiation detector is placed on top of the plate and radiation readings are taken with the meter set on the lower scale. The test is then repeated modifying the lead thickness in increments of 0.125 in. plus/minus the nominal lead thickness. At least five points will be measured and a plot of lead thickness vs. detector readout is then plotted. The maximum acceptable reading during the gamma scan shall be 1.1 times the reading obtained from the nominal lead wall thickness or the extrapolated reading for .90% of the nominal lead wall thickness, whichever is less.

9. PROCEDURE

- 9.1 Mark a 4-in. grid system on the cask and record the grid system on paper as a permanent record.
- 9.2 Locate the radiation source along the centerline axis of the cask and position it at the midpoint of the plane of the top row of grid squares.
- 9.3 Take readings at each grid square on the outside of the cask in the plane of the source. The probe will be in contact with the cask surface when the radiation readings are taken.
- 9.4 Lower the source along the centerline axis to the midpoint of the next row of grid squares and repeat step 9.3.
- 9.5 Repeat step 9.4 until the bottom row of grid squares have been monitored.
- 9.6 Position the source along the centerline of the cask at a height equal to one cask radius off of the bottom.
- 9.7 Take and record readings every 12 in. around the bottom circumference of the cask.
- 9.8 Position the source along the centerline of the cask at a height equal to one cask radius from the top of the cask.
- 9.9 Take and record readings every 12 in. around the top circumference of the cask.
- 9.10 Average and record the six highest readings obtained in step 9.7.
- 9.11 Average and record the six highest readings obtained in step 9.9.

10. ACCEPTANCE CRITERIA

- 10.1 The radiation reading at any point on the cask circumference shall not exceed the value determined in Section 8, except as noted in steps 10.2 and 10.3.

- 10.2 The readings obtained in step 9.7 shall not exceed 125% of the average reading calculated in step 9.10, and they shall not exceed 50% of the value determined in Section 8.
- 10.3 The readings obtained in step 9.9 shall not exceed 125% of the average calculated in step 9.11, and they shall not exceed 50% of the value determined in Section 8.

11. DISTRIBUTION

Library (2 copies)
RECO Engineering, Richmond, VA

12. ENCLOSURES

12.1 Gamma Scanning Arrangement

ENCLOSURE 12.1
Gamma Scanning Arrangement

