SPECIAL FORM CHARACTER OF AMERICIUM-241 RADIOACTIVE SEALED SOURCES USED IN TROXLER DEPTH MOISTURE PROBES

by J. Andrew Tompkins, CHP
Off-Site Source Recovery (OSR) Project
Los Alamos National Laboratory
February 8, 2002
OSR-SF-005

The following analysis was performed to ensure by available documentation and engineering analysis that the 100 mCi americium (Am)-241 sealed sources manufactured by five different companies to specifications defined by Troxler Electronic Laboratories, Inc. meet the US Department of Transportation (DOT) requirements for Special Form.

Troxler purchased 100 mCi AmBe sealed sources from five different manufacturers to meet their moisture density gauge production requirements. In 1973, it became a requirement for Troxler to ship these sources as Special Form radioactive material. Troxler obtained a Certificate of Competent Authority (USA/0024/S – see Attachment A) on August 4, 1973 from the US DOT. This certificate was renewed once and expired on March 31, 1980. Sources purchased by Troxler were manufactured to the specification outlined in the certificate prior to and after its issuance (see Troxler drawing, #A-100608, page 3 of Attachment A). The five vendors who manufactured to this specification are listed on the drawing. All sources purchased under the specification of drawing A-100608 were checked upon receipt at Troxler to determine if they met the external dimensional tolerance requirements. Serial numbers were also checked to determine they were unique and within the range specified for this product. Amersham independently tested sealed sources made to drawing #A-100608 as special form material and was granted a Certificate of Approval from Great Britain for their source on July 24, 1981 (GB/149/S – see Attachment B). This certificate has been renewed five times and is currently valid until June 30, 2004.

The Nuclear Regulatory Commission (NRC) Registry of Radioactive Sealed Sources and Devices No. NR-8099-S-802-S reveals that Parkwell Laboratories manufactured their Model AM to the original Troxler drawing. Registry No. NC-646-D-815-S for the Troxler Depth Moisture Probe Model 1255 indicates the capsule numbers for the five sealed source manufacturers that supplied sources for the Troxler gauge. This information is summarized in Table 1. Since all of these sources were made to the same Troxler specification and had the same physical dimensions, were manufactured by nearly identical processes, and received the same quality assurance check upon receipt at Troxler, it is possible to declare that all are special form under the existing testing documentation and the Amersham Certificate of Approval.

Table 1. Capsules of Five Different Manufacturers that Meet the Same Specification.

Manufacturer	Capsule No.	Serial No. Range	CoC	Date
Amersham	X.2105	AM-7000 --	GB/149/S	7/24/81 - present
General Nuclear	GI-NB-HP	AM-001 – 121	USA/0024/S	8/4/73 – 3/31/80
Gamma Industries	GI-NB-HP	AM-122 –999	USA/0024/S	8/4/73 - 3/31/80
Parkwell Laboratories	AM	AM-3001 – 3999		
Monsanto Corporation	N5-22-T	T-1-n-100 n = 100 to 999		

Source Description

The information available on these sealed sources is as follows:

Source OD:	0.500 inches	Inner Capsule OD:	0.445 in.
Source length:	0.500 inches	Inner Capsule Length:	0.425 in.
Source cladding:	304 SS		

Outer Capsule Head thickness (H_t):	0.050 in.	Inner Cap. Head (H_t):	0.195 in.
Outer Capsule Bottom thickness (B_t):	0.025 in.	Inner Cap. Bottom (B_t):	0.025 in.
Outer Capsule Wall thickness (W_t):	0.025 in.	Inner Cap. Wall (W_t):	0.025 in.

Am-241, maximum activity: 100 mCi

External physical dimensions were determined by Troxler Drawing A-100608 (see Attachment A).

Analysis Results

Using the drawing, it was determined that the subject sources were manufactured to a specification that is identical to the Amersham X.2105 capsules, which were manufactured as special form radioactive material and certified under GB/149/S. (See Attachment B).

Conclusions

Historically, special form equivalency documentation submitted to the US DOT for approval has consisted predominantly of comparisons to similar sources of known manufacture. The equivalency determination presented in this document compares the sources in question to the Amersham X.2105 sealed source to which they are identical. Amersham Model X.2105 sealed sources have been demonstrated to comply with special form criteria per GB/149/S.

Therefore, it has been concluded by comparison to similar sources per 49CFR173.469, that the subject sources currently meet special form criteria.

J.A. Tompkins, CHP
OSR Project Engineer

Cy: OSRP File

MATERIALS TRANSPORTATION BUREAU
WASHINGTON, D.C. 20590

IAEA CERTIFICATE OF COMPETENT AUTHORITY

Special Form Radioactive Material Encapsulation

Certificate Number USA/0024/S
(Revision 1)

This certifies that the encapsulated sources as described, when loaded with the authorized radioactive contents, have been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in IAEA1/ and USA2/ regulations for the transport of radioactive materials.

I. Source Description - The sources described by this certificate are identified as Troxler Electronic/Gamma Industries Model Numbers A-100608 and A-100337, which are Americium/Beryllium sources doubly encapsulated in stainless steel with a total wall thickness of 0.050" and fussion welded closures. The sources are right cylinders 1/2" in diameter and 1/2" high.

Troxler Electronics/Gamma Industries Model Number A-100281, which is a Cesium/Americium/Beryllium source doubly encapsulated in stainless steel with a total wall thickness of 0.50" and a fusion welded closure. The source is a right cylinder about 11/32" in diameter and 9/16" high.

II. Radioactive contents - The authorized radioactive contents of these sources consist of:

A-100608 - Not more than 100 mci Americium-241 as oxide.

A-100337 - Not more than 330 mci Americium-241 as oxide.

A-100281 - Not more than 55 mci of Americium-241 as oxide.

III. This certificate unless renewed expires March 31, 1980.

This certificate is issued in accordance with Marginal C-6.1 of the IAEA Regulations 1/, and in response to the June 8, 1973 and February 23, 1977 petitions by Troxler Electronics Labratories, Inc., Research Triangle Park, North Carolina, and in consideration of the associated information therein.

Certified by:

A. W. Grella, Chief
Technology Division
U. S. Department of Transportation
Office of Hazardous Materials
Operations
Washington, D. C. 20590.

March 11, 1977
(DATE)

1/ "Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials, 1967 Edition", published by the International Atomic Energy (AEA) Vienna, Austria.

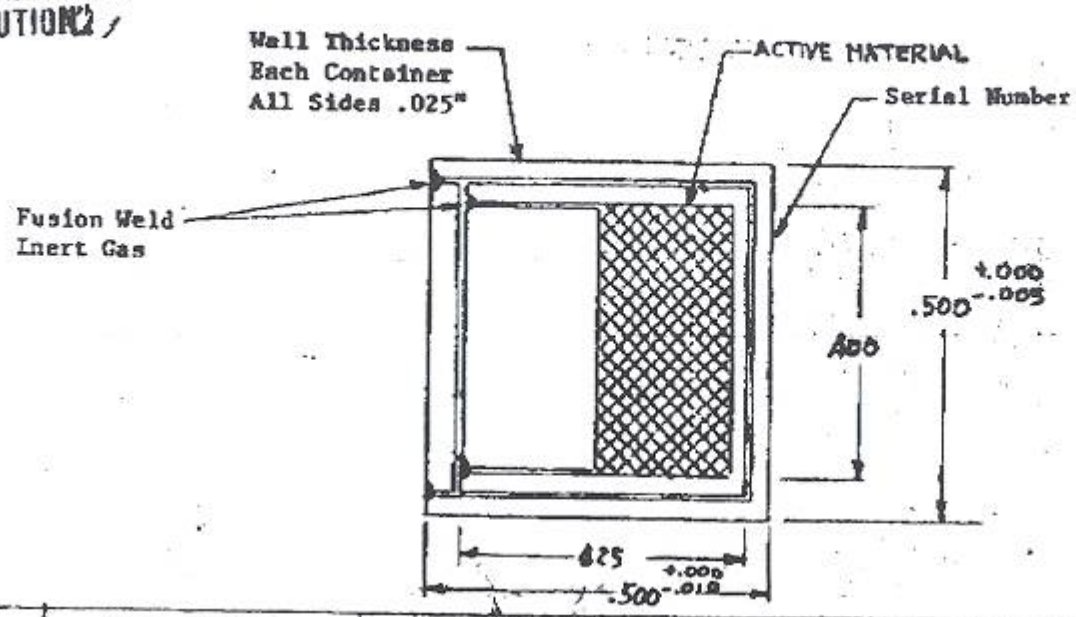
2/ Title 49, Code of Federal Regulations, Part 170-178, USA.

Revision 1 issued to extend expiration date.

"PROPRIETARY INFORMATION
NOT FOR DISTRIBUTION"

WALL THICKNESS
INNER: 0.021-0.019

DWG NO.	A-100608	REV.



VENDOR	SER. ASSIGN	SOURCE NO.	CAPSULE NO.	SFC NO.	DATE	APPROVED
Nuclear Corporation	AM-001 thru 121		GI-NB-HP	USA/0024/S		
l Labs., Inc.	AM-3001 thru 3999		AM			
HAM CORPORATION	AM-7001 thru	AMNV-340	X2105	GB/149/S	7/24/81 to PRESENT	[signature]
o	T-1-100 thru T-999-100		N5-22-T			
ndustries	AM122-999		GI-NB-HP	USA/0024/S		

? Series to be Stated on Individual Purchase Order.

[redacted]

5-6-82
E-ECO #1456
7/13/88 SEM

USED ON	TROXLER ELECTRONIC LABORATORIES, INC.			
1255 1257	DRN. BY JWP 5/25/76 ENGR. APP. MAH 6/1/76	Americium-Beryllium SEALED SOURCE (100 mCi)	TOLERANCE SHEET 1 OF 2	SCALE N.T.S.
			A-100608	REV. E

"PROPRIETARY INFORMATION
NOT FOR DISTRIBUTION"

MECHANICAL

1. Active material shall be immobile with respect to a point on the surface of the capsule.
2. Serial numbers must be legibly stamped or engraved on the bottom surface.
3. Capsule nomenclature or other data may be engraved on cylindrical surface.

RADIOLOGICAL

1. Active Material: 100 mCi Am-241 O_2 $\pm$10%
2. Target Material: 10 mg min., 325 MESH Be
3. Neutron Yield: 2.2 to 3.2 x 10^5 neut./sec. min.
4. Capsule and material must meet ANSI and other international specifications for special form material.
5. Leak test and measurement certificate shall be supplied giving removeable activity, source Emission and date of measurement.
6. VENDOR MUST OBTAIN NRC OR AGREEMENT STATE APPROVAL AS REQUIRED FOR U.S. LICENSING AND OBTAIN SPECIAL FORM CERTIFICATION.

USED ON	TROXLER ELECTRONIC LABORATORIES, INC.				
1255 1257 3241-C	DRN. BY JWP	5/25/76	Americium:Beryllium SEALED SOURCE (100 [redacted]	TOLERANCE	
	ENGR.			SHEET 2 OF 2	SCALE N.T.S.
	APP. MAH			A-100608	REV. E

Certificate of Approval of Design for Special Form Radioactive Material

Title: Neutron Source Capsule X.2105	
Drawing and Specification References	
Assembly Drawing: A 61868 Issue G Special Form Drawing List SFDL/149 Issue 2 RSD/CTR/131 Dated 24 July 1981 QA/MS/149/0501 Issue 1 Dated 02 May 2001	
Q.A. Programme Ref: Nycomed Amersham plc & AEA Technology plc IPDQAM	
Radioactive Material	Maximum Activity
Americium 241/Beryllium	74 GBq

THIS IS TO CERTIFY that the Secretary of State for Transport, Local Government and the Regions being, for the purposes of the Regulations of the International Atomic Energy Agency, the Competent Authority of Great Britain in respect of inland surface transport and of the United Kingdom of Great Britain and Northern Ireland in respect of sea and air transport and the Department of the Environment for Northern Ireland being the Competent Authority of Northern Ireland in respect of inland surface transport, have approved the above mentioned Special Form Design. Radioactive material manufactured to the above-mentioned design qualifies as special form radioactive material and as such will meet the requirements of the regulations overleaf.

This Certificate of Approval applies only to the design as set out in the above named drawings and specifications submitted by AEA Technology plc

In the event of any alteration in the design or manufacture of the Special Form Radioactive Material, or in any facts stated in the application for approval, this certificate will cease to have effect unless the Competent Authority is notified of the alteration and the Competent Authority confirms the certificate notwithstanding the alteration.

This Certificate Cancels all Previous Issues and is valid until 30 June 2004

COMPETENT AUTHORITY IDENTIFICATION MARK: GB/149/S-85

UNITED KINGDOM COMPETENT AUTHORITY FOR THE TRANSPORT
20 JUN 2001
OF RADIOACTIVE MATERIALS

Transport Radiological Adviser
Department for Transport,
Local Government and the Regions
76 Marsham Street
London SW1P 4DR

On behalf of the Secretary of State for Transport, Local Government and the Regions and the Department of the the Environment for Northern Ireland

REGULATIONS AND CODES OF PRACTICE GOVERNING THE TRANSPORT OF RADIOACTIVE MATERIALS

INTERNATIONAL
International Atomic Energy Agency (IAEA) Safety Series No 6 Regulations for the Safe Transport of Radioactive Materials 1985 Edition (As Amended 1990).
International Maritime Organisation (IMO). International Maritime Dangerous Goods Code -- Class 7 Radioactive Substances.
International Civil Aviation Organisation (ICAO). Technical Instructions for the Safe Transport of Dangerous Goods by Air.

ROAD
GREAT BRITAIN ONLY. The Radioactive Material (Road Transport)(Great Britain) Regulations 1996 SI No 1350: The Ionising Radiations Regulations 1985 SI No 1333: and Approved Code of Practice.
NORTHERN IRELAND ONLY. The Radioactive Substances (Carriage by Road) Regulations (Northern Ireland) 1983 SR 1983 No 344: The Radioactive Substances (Carriage by Road)(Amendment) Regulations (Northern Ireland) 1986 SR 1986 No 61.
EUROPE ONLY. European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), Class 7.(ed 1999).

RAIL
GREAT BRITAIN ONLY. The Packaging, Labelling and Carriage of Radioactive Material by Rail Regulations (RAMRail) 1996 (SI 1996 No 2090): Approved Requirements for the packaging, labelling and carriage of radioactive material by rail 1996 Edition. The Carriage of Dangerous Goods (Classification, Packaging and Labelling) and Use of Transportable Pressure Receptacles Regulations (CDGCPL) 1996 (SI 1996 No 2092). The Carriage of Dangerous Goods (Amendment) Regulations 1999 (SI 1999 No 303).
EUROPE ONLY. Convention concerning the International carriage by rail (COTIF), Appendix B, Uniform Rules concerning the International Carriage of Goods by Rail (CIM), Annex 1, Regulations concerning the International carriage of dangerous goods by rail (RID), Class 7.(ed 1999).

SEA
British registered ships. All other ships whilst in United Kingdom territorial waters. The Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997 SI No 2367: Merchant Shipping Notice No M 1620, "The Carriage of Dangerous Goods and Marine Pollutants in Packaged Form on Ships".

PORT: UK ONLY.

AIR
UK ONLY. The Air Navigation (No 2) Order 1995 SI No 1970: The Air Navigation (Dangerous Goods) Regulations 1994 SI No 3187 and Amendments 1996 SI No 3100 and 1998 SI No 2536. International Civil Aviation Organisation (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air.

NOTES

1. Attention is drawn to the labelling and marking requirements of Section IV of the 1985 Edition of the IAEA Regulations, one provision of which is that the outside of each package shall be clearly and durably marked with the Competent Authority's Package Design Identification Mark.

2. Any questions relating to this Certificate should be addressed to:--

The Transport Radiological Adviser,
Department of Transport, Local Government and the Regions,
Great Minster House
76 Marsham Street, London SW1P 4DR.
Telephone 020 7944 5795.
Fax 020 7944 2187.

3. This Certificate does not relieve the consignor from compliance with any requirements of this Government or any other Government of any country through or into which the package may be transported.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NC-646-D-815-S **DATE:** July 15, 1999 **PAGE:** 1 of 7

DEVICE TYPE: Depth Moisture Probe

MODEL: 1255 (Old 104A/S-5A Shield), 1257 (Old 105A/S-6A Shield)

MANUFACTURER/DISTRIBUTOR:

Troxler Electronic Laboratories, Inc.
3008 Cornwallis Road
P.O. Box 12057
Research Triangle Park, NC 27709

SEALED SOURCE DESIGNATION:	ISOTOPE:	MAXIMUM ACTIVITY:
Monsanto Corporation Capsule Number N5-22-T	Am-241:Be	100 millicuries
General Nuclear Corporation Capsule Number GI-NB-HP Special Form Certificate No. USA/0024/S	Am-241:Be	100 millicuries
Gamma Industries Capsule Number GI-NB-HP Special Form Certificate No. USA/0024/S	Am-241:Be	100 millicuries
Parkwell Laboratories Capsule Number AM	Am-241:Be	100 millicuries
Radio Chemical Centre (Amersham) Capsule Number X2105 Special Form Certificate No. GB/149/S	Am-241:Be	100 millicuries

LEAK TEST FREQUENCY: 6 Months

PRINCIPAL USE: (G) Portable Moisture Density Gauges

CUSTOM DEVICE: _____ YES ___X___ NO

DEVICE TYPE: Depth Moisture Probe (Models 1255 & 1257)

DESCRIPTION:

The probe and shield constitute a portable device used to measure the moisture content of soil and other media at various depths. The 1255 and 1257 models utilize a neutron source for moisture measurement by means of thermalization of fast neutrons by hydrogen in the soil, primarily in the form of water. The source is located on the radial axis of the detector tube. A detector in the probe detects the thermal neutrons. The thermal neutron count rate is measured over a specified time period by a scaler or ratemeter connected to the probe. The measured count rate can be converted to a moisture content by means of a calibration table provided by the manufacturer.

To operate the device, an access tube is driven into the test media to be measured. The shielded probe assembly is placed over the access tube thereby releasing the cam locks. The probe can then be lowered into the access tube via the cable, once the cable clamp is released. The cable clamp can be tightened to hold the probe at the desired depth.

DETAILS OF CONSTRUCTION:

The probe tip assembly consists of a 100 millicurie (mCi) americium-241:beryllium (Am-241:Be) neutron source neutron detector, which is located in the lower 2.5" to 3" of the probe, a threaded aluminum source cup, a polyethylene source holder/shield, and a cylindrical machined brass housing. The source resides in the brass housing which contains polyethylene. The polyethylene as been machined to accept the source and a threaded aluminum source cup. The probe tip assembly is threaded to the end of the probe such that the source is fixed directly beneath the end of a boron trifluoride (BF_3) counter. A top-end cap with a quick-connect cable connector is threaded to the opposite end of the probe.

The probe is stored within a cylindrical, polyethylene-filled brass shield, approximately 5.5" in diameter by 20" in length. The probe is held within the shield by two tapered cam locks on the bottom, and a cable clamp at the top. The cable clamp is positioned within a hollow knob which is threaded to the top of the shield. The probe may be removed from the shield by releasing the cable clamp, depressing the cam locks, and lowering it out from the bottom.

The model 1255 probe, identical to the model 104A with S-5A shield, is 1.865" in diameter by 13.25" in length and the model 1257 probe, identical to the model 105A with S-6A shield, is 1.5" in diameter by 14.25" in length.

LABELING:

The model 1255/1257 are labeled in accordance with 15A NCAC 11 .1626. The labels contain the radiation symbol, isotope, activity, model number, serial number, name of distributor, the words "CAUTION-RADIOACTIVE MATERIAL."

DEVICE TYPE: Depth Moisture Probe (Models 1255 & 1257)

DIAGRAMS:

See Attachment A for the model 1255/1257 source and label locations.

CONDITIONS OF NORMAL USE:

The model 1255/1257 gauges were designed to be used by trained personnel to measure moisture content of soils, aggregates or other similar materials at varying depths. The measurement must always be made with the probe being lowered into the medium through a casing.

The device is designed for the following environments:

Operating temperature	-10°C to 70°C ambient
Pressure	Atmospheric
Vibration	Ranges from zero to mild
Corrosion	Ranges from zero to corrosive
Fire	+1370°C (to melt the stainless steel source capsule)

EXTERNAL RADIATION LEVELS:

See Attachment B for the model 1255/1257 external radiation levels.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- Troxler Model 1255 and 1257 depth moisture gauges are no longer being manufactured or distributed. This Sealed Source And Device Registration is to inactivate Certificate No. NC-646-D-104-U.
- The device shall only be used by specific licensees of the NRC or Agreement States.
- The device shall be leak tested by the user following the instructions in the operation instructions at intervals not to exceed six months using techniques capable of detecting the presence of 0.005 microcurie of removable contamination. Please note, Troxler maintains a customer leak test service.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

DEVICE TYPE: Depth Moisture Probe (Models 1255 & 1257)

- The device shall be operated in accordance with the written operating and safety instructions provided in the device manual. The licensee is not authorized to remove the source from the gauge unless specifically authorized by his license.
- Personnel dosimetry should be worn whenever operating or transporting the gauge.
- If transported, the gauge should be transported in the model C-100975 DOT Type A transport case.
- See Attachment C, "Operating and Emergency Procedures For Troxler Depth Moisture Probes Lowered To Depths Greater Than Three Feet Below The Surface," for licensing information.
- REVIEWER NOTE: The manufacturer/distributor will accept these gauges for disposal; no other services are provided.
- REVIEWER NOTE: The license reviewer should impose license restrictions on the assembly and disassembly of these devices commensurate with the applicant's experience and operating procedures, to include requiring the use of remote handling tools, requiring the use of a survey meter, and mandating that the licensee wear personnel dosimetry. The probes are designed for easy disassembly for conversion to surface moisture gauges (model 1205 and 1207).
- REVIEWER NOTE: This registration sheet and the information contained within the references shall not be changed without the written consent of the North Carolina Division of Radiation Protection, Radioactive Materials Section.

REFERENCES:

The following supporting documents are hereby incorporated by reference into this SS&D registry document:

1. Sealed Source & Device Registry Certificate No. NC-646-D-104-U originally issued December 8, 1970;
2. All information and engineering drawings submitted by Troxler in support of this inactivation;
3. Depth Moisture Gauges Instruction Manual; and
4. Letters with attachment(s) dated February 19, 1998, and June 03, 1998 signed by Stephen A. Browne, Corporate Radiation Safety Officer, Troxler Electronic Laboratories, Inc.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

DEVICE TYPE: Depth Moisture Probe

ISSUING AGENCY:

This Sealed Source & Device registry certificate is hereby amended July 15, 1999.

Principal Reviewer:

J. Marion Eaddy, III, Health Physicist

Date: 15 Jul 99

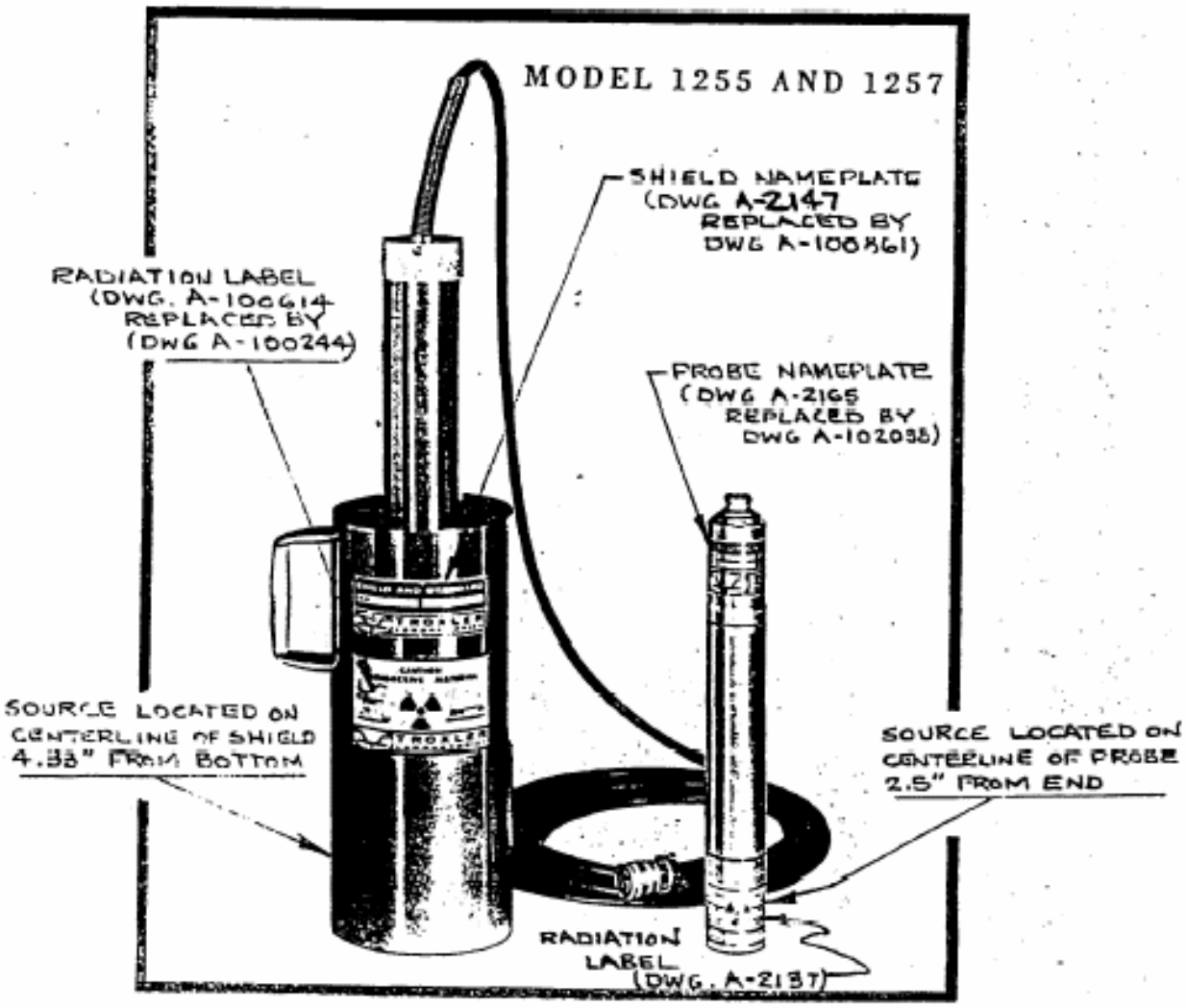
Concurrence Reviewer:

Gerald A. Speight, Health Physicist

Date: 7-16-99

Attachment A: 1255 and 1257 Gauge Source and Label Locations

TROXLER LABORATORIES



Depth Moisture Gauge

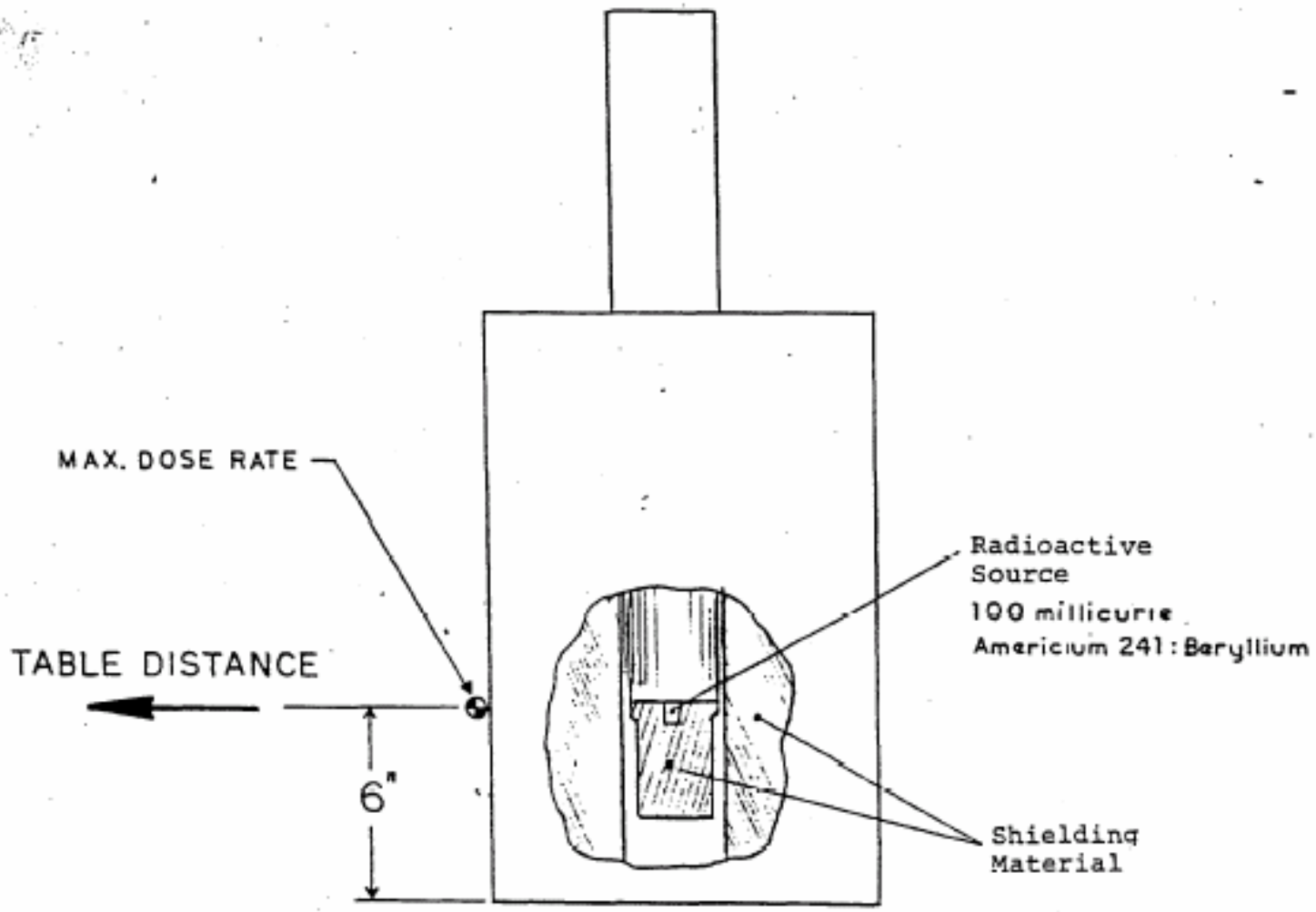
OCT 25 1995

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NC-646-D-815-S **DATE:** June 1, 1998

DEVICE TYPE: Depth Moisture Probe

Attachment B: Radiation Profile for 1255 and 1257 Gauge



DOSE RATE IN mREM PER HOUR			
DISTANCE	NEUTRON	GAMMA	TOTAL
SURFACE	35	1	36
2.0 in	11.7	0.3	12
6.0	3.5	0.1	3.6
12.0	1.2	—	1.2
18.0	0.6	—	0.6
36.0	0.2	—	0.2

Gamma dose measured with calibrated ionization chamber. Neutron dose calculated per Title 10 CFR.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

NO: NR-8099-S-802-S **DATE:** APR 17 1998

SOURCE TYPE: Density and Moisture Gauge Source

MODEL: AM

MANUFACTURER/DISTRIBUTOR: Parkwell Laboratories, Inc.
429 North High Street
Croton, OH 43013

ISOTOPE: Americium-241

MAXIMUM ACTIVITY: 300 millicuries (11.1 GBq)

LEAK TEST FREQUENCY: 6 Months

PRINCIPAL USE: (H) General Neutron Source Applications

CUSTOM SOURCE: _____ YES ___X___ NO

SOURCE TYPE: Density and Moisture Gauge Source

DESCRIPTION:

The Model AM is a 304 stainless steel, fusion welded, double encapsulated source containing a maximum of 300 millicuries of americium as an oxide. The wall thickness of both the inner and outer capsule is 0.025 inch (0.64 mm). Be and AmO_2 in powder form are pressed together into the inner capsule using a stainless steel plug under a 1000 pound (453.6 kg) load to consolidate the active material. The plug is then fusion welded into the primary capsule. The finished source is a 0.5 inch (12.7 mm) cube and has a neutron yield of about 7.5×10^5 neutrons per second.

LABELING:

The serial and model numbers of the source are stamped or engraved on the outer capsule of the source.

DIAGRAM:

See attachment 1.

PROTOTYPE TESTING:

The following is a description of tests performed on prototype sources:

1. A dummy source was sectioned and etched, to determine the depth of penetration of the weld. The welds in both the inner and outer capsules had greater penetration than the 0.025 inch (0.64 mm) wall thickness.

2. Prototype sources were heated to 180°C (356°F) for two hours without any failures as demonstrated by helium pressurization bubble tests.

3. Prototype sources were subjected to 300 psi (2.1 MPa) water pressure for four periods of 15 minutes each without any failures as demonstrated by helium pressurization bubble tests.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

SOURCE TYPE: Density and Moisture Gauge Source

EXTERNAL RADIATION LEVELS:

The manufacturer reported a minimum neutron yield of 7.5×10^5 neutrons/sec.

QUALITY ASSURANCE AND CONTROL:

Each source was checked for leakage by wipe and helium pressurization tests of 100 psi (0.69 MPa) for 15 minutes.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The source shall only be used by specific licensees of NRC or Agreement States.
- The source shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination.
- Handling, storage, use, transfer, and disposal: To be determined by the licensing authority.
- This registration sheet and the information contained within the references shall not be changed without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

The AM Density and Moisture Gauge source was originally approved for licensing purposes by the Atomic Energy Commission (AEC) on September 16, 1970. This source is no longer manufactured and distributed by Parkwell Laboratories. The company is out of business.

There is insufficient information on file for this source to have performed a complete safety evaluation. Therefore, this registration certificate has been transferred to inactive status without further review based on the original review and approval issued by the AEC.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

SOURCE TYPE: Density and Moisture Gauge Source

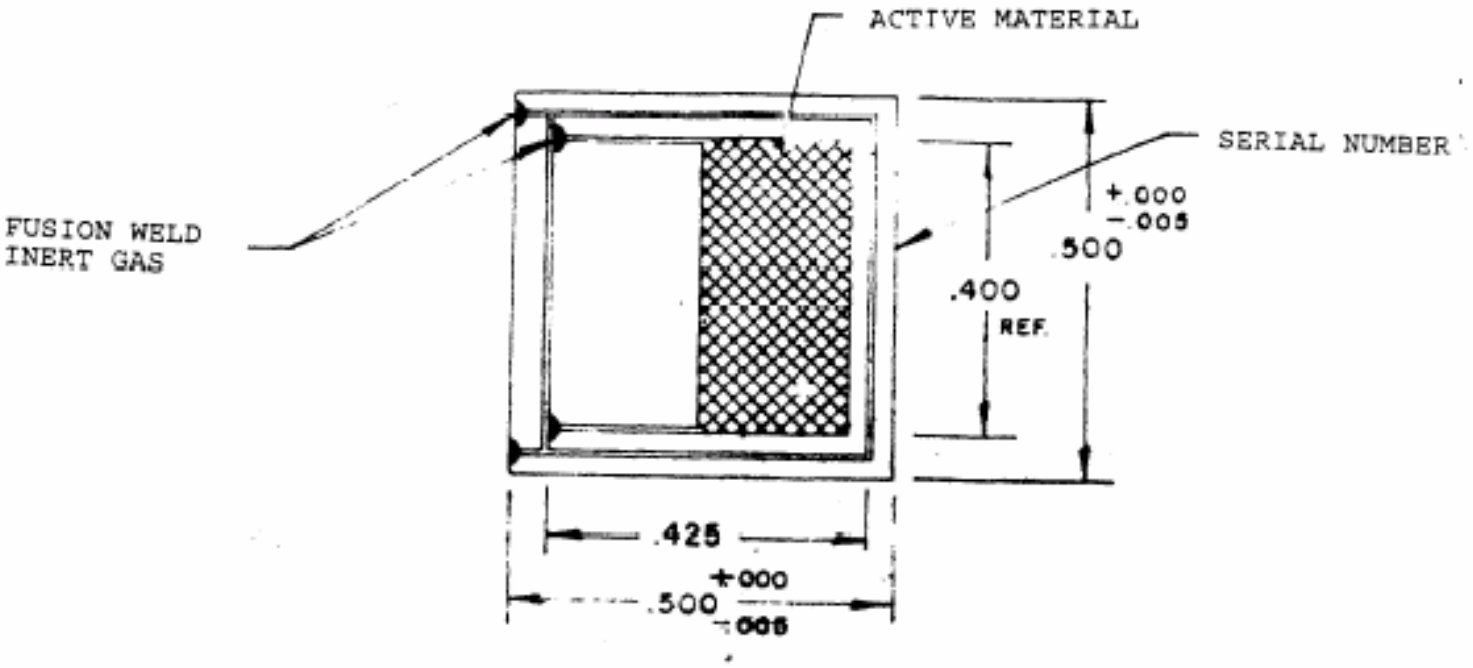
REFERENCES:

The following supporting document for the Model AM Density and Moisture gauge source is hereby incorporated by reference and is made a part of this registry document.

- Parkwell Laboratories' letter dated August 26, 1970.

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

NO.: NR-8099-S-802-S DATE: APR 17 1998 ATTACHMENT 1