

VOID SHEET

TO: License Fee Management Branch

FROM: Region IV

SUBJECT: VOIDED APPLICATION

Control Number: 464682

Applicant: Digital Logging, Inc.

Date Voiced: 4/28/94

Reason for Void: \_\_\_\_\_

Combined this action with renewal  
under m/c # 464700. Renewal  
accomplished.

Billie Genszyski 4/28/94  
signature date

Attachment:  
Official Record Copy of  
Voided Action

FOR LFMB USE ONLY

Final Review of VOID Completed:

- Refund Authorized and processed
- No Refund Due
- Fee Exempt or Fee not Required

Comments: \_\_\_\_\_  
160005 \_\_\_\_\_  
9409190107 94042B \_\_\_\_\_  
PDR ADOCK 03019278 \_\_\_\_\_  
C PDR

Log completed   
Processed by: Rem

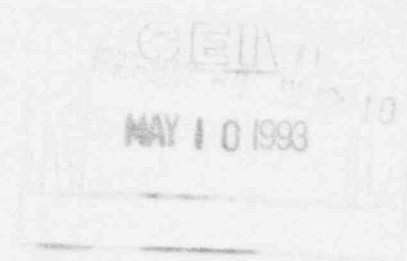
MLY01

(FOR LFMS USE)  
INFORMATION FROM LTS

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM  
AND  
REGIONAL LICENSING SECTIONS

PROGRAM CODE: 03111  
STATUS CODE: 0  
FEE CATEGORY: 5A  
EXP. DATE: 19930630  
FEE COMMENTS: 5A OK FOR TH & UR-9/8  
DECOM FIN ASSUR REQ: N



LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED  
APPLICANT/LICENSEE: DIGITAL LOGGING, INC.  
RECEIVED DATE: 930427  
DOCKET NO.: 3019278  
CONTROL NO.: 464682  
LICENSE NO.: 35-19815-01  
ACTION TYPE: AMENDMENT

2. FEE ATTACHED  
AMOUNT: \$580.00  
CHECK NO.: 14924

3. COMMENTS

SIGNED Billig Muszynski  
DATE 5/29/93

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED )

1. FEE CATEGORY AND AMOUNT: 5A \$580

2. CORRECT FEE PAID.  APPLICATION MAY BE PROCESSED FOR:  
AMENDMENT \_\_\_\_\_  
RENEWAL \_\_\_\_\_  
LICENSE \_\_\_\_\_

3. OTHER \_\_\_\_\_

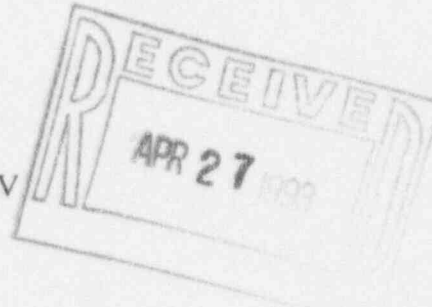
SIGNED OC  
DATE 5-4-93

# **dl** digital logging, inc.

12607 E. 60th St. So  
Tulsa, OK 74146  
(918) 252-5416  
FAX (918) 252-4496

April 20, 1993

U.S. Nuclear Regulatory Commission - Region IV  
Nuclear Materials Licensing Section  
611 Ryan Plaza Drive, Suite 1000  
Arlington, TX 76011  
Attn: Jack Whitten



Re: Amendment request to NRC license no. 35-19815-01.

Dear Mr. Whitten:

Please amend the above numbered radioactive materials license as follows:

Condition 9.

Please include J. (americium - 241 foil) under authorized use in oil and gas well logging, calibration of logging tools, and research and development as defined in 10 CFR part 39.4 (q). Enclosed are the following for your review: Attachment A is a diagram of the logging tool in which the foil will be secured and protected along with a brief description of the assembly process. Attachment B is a description of the 48 micro curie AM-241 foil we purchase from Amersham Corporation.

In order to expedite this process, we are applying for an amendment to our current license instead of waiting to submit this change in our renewal application. Your prompt attention to this request will be greatly appreciated. Our check in the amount of \$580.00 for the amendment fee is enclosed. If any additional information is required, please contact me at the number listed above.

Sincerely,

A handwritten signature in cursive script that reads "Roger Taylor".

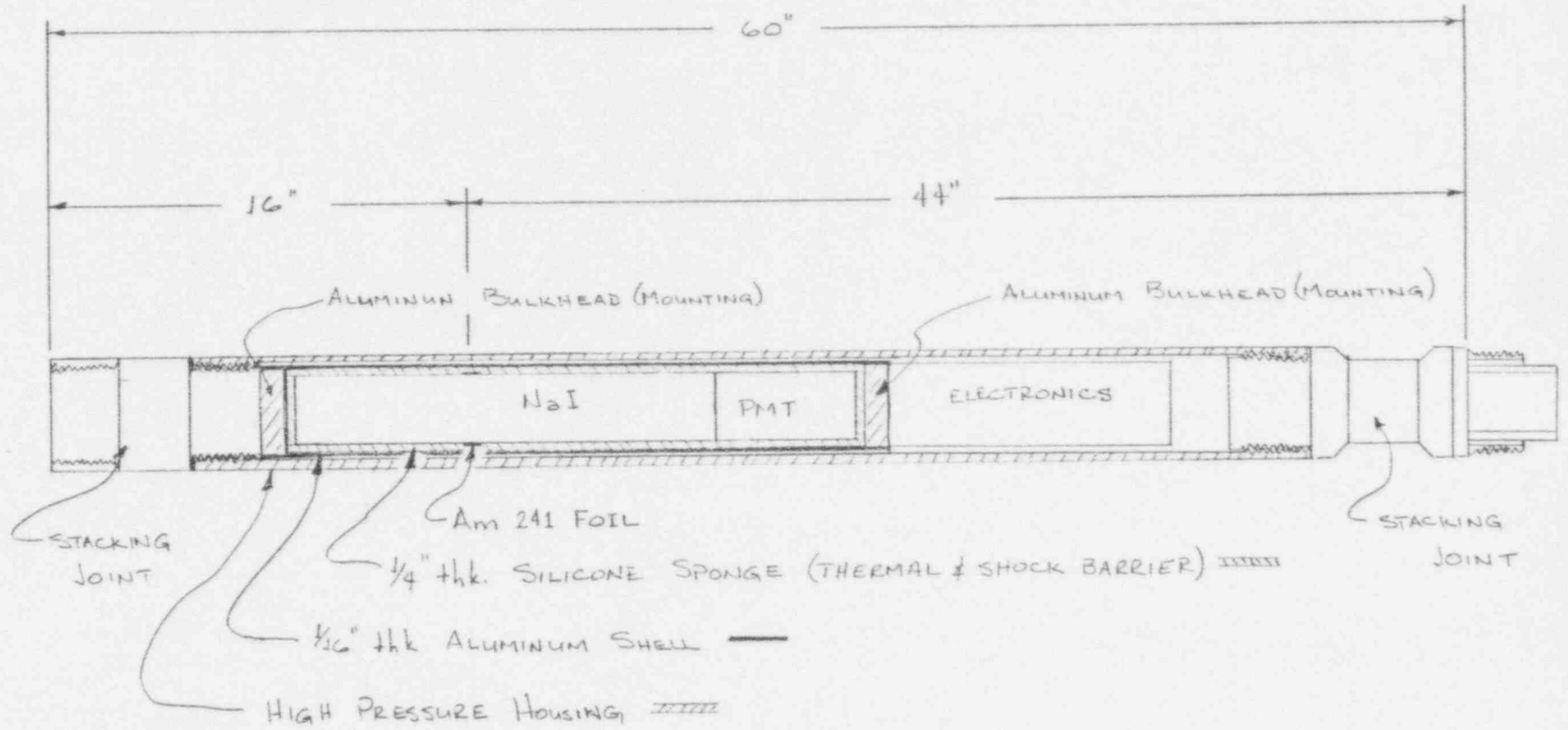
Roger Taylor  
Radiation Safety Officer

RT/dw  
Enclosures

Log	MAY 1 IV
Remitter	
Check No.	14924
Amount	\$580
Fee Category	5A
Type of Fee	amendment
Date Check Rec'd	5-4-93
Date Completed	5-4-93
By:	RC

4 6 4 6 8 2

Diagram of Logging Tool



## DESCRIPTION OF TOOL ASSEMBLY

1. The scintillation detector (NAI crystal) and photo multiplier tube (PMT) are bonded together and a layer of electrical tape covers the assembly.
2. The AM 241 foil is secured to the detector assembly with high temp. 3M scotch brand 92 adhesive.
3. The detector assembly is wrapped with silicone sponge.
4. The detector assembly with silicone sponge is captured in an aluminum shell and an aluminum bulkhead at each end. The bulkheads provide the mechanical mounting for the lower stacking joint at one end and the electronics assembly at the other end.
5. A high pressure housing covers the detector and electronics screwing onto the lower stacking joint. An upper stacking joint is screwed into the housing sealing the sonde and providing electrical connections to other sondes.

Maintenance of the electronics requires only the removal of the upper stacking joint and the pressure housing. If a new PMT or NAI crystal is required then the AM 241 foil will be removed and then installed on a new assembly.



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

February 8, 1982

REGULATORY AFFAIRS  
FEB 11 1982  
RECEIVED

82-07

Amersham Corporation  
2636 S. Clearbrook Drive  
Arlington Heights, IL 60005

Gentlemen:

Based on our review of the prototype tests, the stated ANSI source classification and the quality assurance and control program submitted in your letters of January 11, and 28, 1982, we have concluded that the Amersham AMM Alpha Foil is acceptable for licensing. A copy of the registration certificate is enclosed.

If you should have any questions, please contact me on (301) 427-4240.

Sincerely,

Joseph M. Brown, Jr.  
Material Certification and  
Procedures Branch

Enclosure: As stated



82-07

UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 WASHINGTON, D. C. 20555

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

NO : NR136S208S      DATE: February 8, 1982      PAGE 1 OF 9

SEALED SOURCE TYPE: Amersham AMM Alpha Foil

MODEL: AMM

MANUFACTURER/DISTRIBUTOR: Amersham Corporation  
 2636 S. Clearbrook Drive  
 Arlington Heights, IL 60005

ISOTOPE

Americium-241

MAXIMUM ACTIVITY

Up to 250 uCi/cm<sup>2</sup> foil  
 Up to 4 cm<sup>2</sup> (1 mCi)

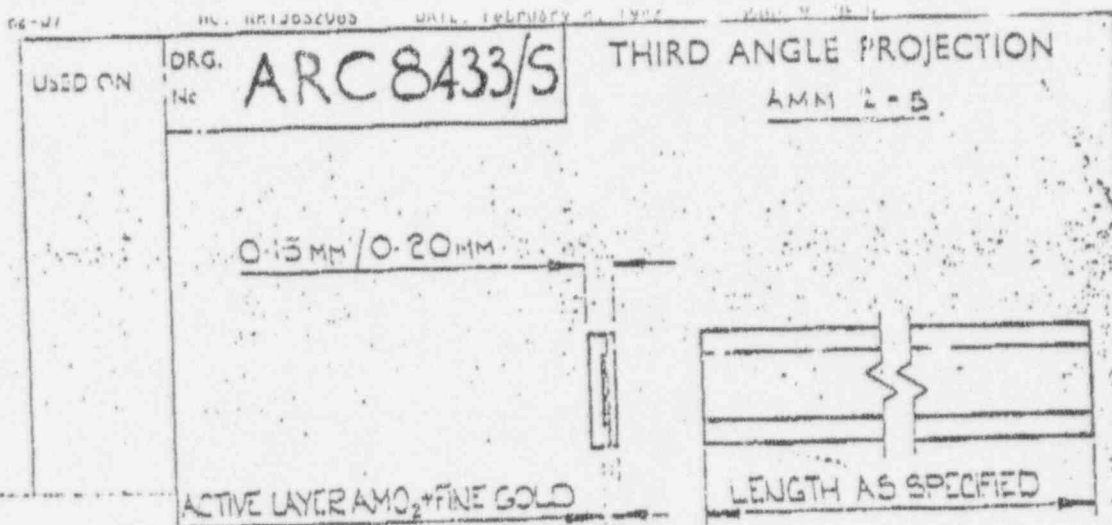
LEAK TEST FREQUENCY: Six Months

PRINCIPAL USE: Alpha particle emitter foil source.

CUSTOM REVIEW:      YES      X NO

DESCRIPTION

The general construction of foil, identified as model AMM, is typically as shown in the sketch on the following page. The radionuclide, as americium oxide, is uniformly distributed and sintered in a matrix of fine gold at temperatures in excess of 800°C. It is further contained by a hot forging process between layers of gold, gold palladium alloy, or palladium. The laminate is mounted, again by hot forging, onto a supporting substrate of silver, gold, palladium or any combination of those three metals alloyed together. The metal layers, now continuously welded, are extended in area by means of a power rolling mill to give the required active and overall areas. The rolled foil may be subdivided by cutting or punching into various shapes so that the activity is distributed over the whole area of the foil piece. A typical example of foil construction is shown in drawing ARC8433/S (Attachment No. 1). Note, however that according to Amersham, foils are not loaded in accordance with product code AMM 5 and the maximum activity will not exceed 250 uCi/cm<sup>2</sup>.



FACING THICKNESS .0050 mm

GEN  
APR 27 1993

BACK OF FOIL INDICATED  
BY GOLD LINE

	AMM 2	AMM 3	AMM 4	AMM 5
ACTIVITY	160 ncs/cm	240 ncs/cm	40 ncs/cm	500 ncs/cm
OVERALL WIDTH	20.0 mm $\pm 0.5$	20.0 mm $\pm 0.5$	20.0 mm $\pm 0.5$	20.0 mm $\pm 0.5$
ACTIVE WIDTH	12.5 mm $\pm 0.5$	12.5 mm $\pm 0.5$	12.5 mm $\pm 0.5$	12.5 mm $\pm 0.5$
FACE COVERING	GOLD/PALLADIUM ALLOY	GOLD/PALLADIUM ALLOY	GOLD/PALLADIUM ALLOY	GOLD/PALLADIUM ALLOY
BASE METAL	SILVER	SILVER	SILVER	SILVER

JOB No.	FACE COVERING	GOLD/PALLADIUM ALLOY	GOLD/PALLADIUM ALLOY	GOLD/PALLADIUM ALLOY	GOLD/PALLADIUM ALLOY
PROJECT No.	MATERIAL & SPEC	FINISH			
		SURFACE TEXTURE			
DRAWN	REMOVE ALL BURRS	<input checked="" type="checkbox"/> UNLESS STATED			
TCD	DIMS. IN. M.M.	TOLERANCES -- UNLESS STATED	B	22 3/4"	MCC 971
CHKD.	SCALE N.T.S.		A	15/2/71	
APPD.	THE RADIOCHEMICAL CENTRE AMERSHAM BUCKS	CONTRACTOR	ISSUE	DATE	D.O.I. MC
	TITLE AMERICIUM <sup>241</sup> ALPHA EMITTING FOIL	DRG. No.	ARC 8433/S		

NO : NR136S208S

DATE: February 8, 1982

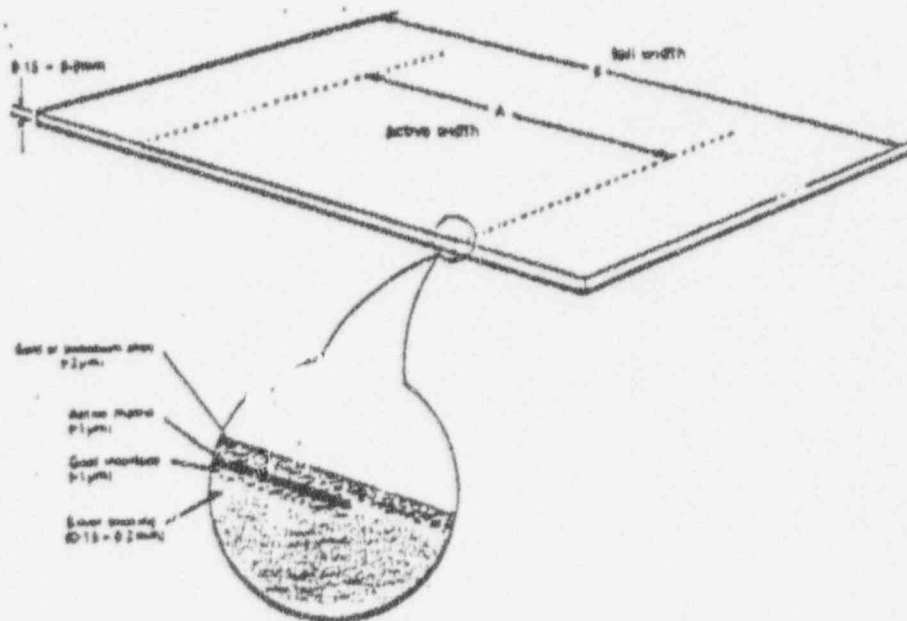
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LABELING

Foils themselves are not permanently marked. However, storage or shipping containers into which the sources are placed are labeled in accordance with the requirements of Section 20.203 (f) of 10 CFR Part 20.

DIAGRAM

Americium-241 alpha foil

CONDITIONS OF NORMAL USE

The material is intended for use as an alpha particle emitter in ionization chambers and related devices. It will be used in general industrial and military environments which have been granted a specific approval by a licensing authority. The sources may be expected to remain in use for periods of up to 15 years.

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DATE: February 8, 1982

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PROTOTYPE TESTINGA. ANSI Tests

The source material has been tested according to the requirements outlined in the U.S. Department of Commerce American National Standards Classification ANSI N542-1977 and according to the requirements of the International Organization for Standardization Report ISO 2919. Sources up to 460  $\mu\text{Ci}/\text{cm}^2$  containing 2.3 mCi on 5  $\text{cm}^2$  have been tested to level C64344.

- B. A great deal of additional testing on closely related products has been completed and is documented in the technical report number 379 dated September, 1975 and entitled, "Integrity Testing of Alpha Foil Used in Ionization Chamber Smoke Detectors," which was submitted in support of this registration. A summary of that testing information follows:

- Special Form Testing: The product has been approved as Special Form material by the United Kingdom Department of the Environment.
- Exposure to Sulphur Dioxide: Two batches of five samples with activities of up to 75  $\mu\text{Ci}$  at 200  $\mu\text{Ci}/\text{cm}^2$  were submitted to high humidity atmospheres containing 1 percent sulphur dioxide for a period of 16 days. Wipe tests on the foil surface after testing produced results of between 3 nCi and 28 nCi from each sample. Immersion testing led to the removal of between 1 nCi and 15 nCi from each source.

A second test was performed in which two batches of ten samples with similar activities to the above program were submitted to an atmosphere maintained at 45°C with high humidity and high sulphur dioxide and hydrogen sulphide concentration for two periods of eight days. Wipe and immersion test results following this procedure are shown below.

Test 1 (1%  $\text{SO}_2$ )

<u>Source Activity</u> (at 200 $\mu\text{Ci}/\text{cm}^2$ )	<u>Wipe Test</u> nCi	<u>Immersion Test</u> nCi
25 $\mu\text{Ci}$	3.19	1.55
25 $\mu\text{Ci}$	27.65	15.07
25 $\mu\text{Ci}$	9.84	9.53
25 $\mu\text{Ci}$	8.55	6.50
25 $\mu\text{Ci}$	24.36	14.20
75 $\mu\text{Ci}$	12.91	5.29
75 $\mu\text{Ci}$	9.04	5.35
75 $\mu\text{Ci}$	4.56	4.59
75 $\mu\text{Ci}$	22.66	7.38
75 $\mu\text{Ci}$	9.86	3.95

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DATE: February 8, 1982

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Test 2 (SO<sub>2</sub> and H<sub>2</sub>S at 45°C)

<u>Source Activity</u> (at 200 $\mu\text{Ci}/\text{cm}^2$ )	<u>Wipe Test</u> nCi	<u>Immersion Test</u> nCi
25 $\mu\text{Ci}$	1.13	0.42
25 $\mu\text{Ci}$	0.55	0.30
25 $\mu\text{Ci}$	3.73	3.45
25 $\mu\text{Ci}$	15.84	7.33
25 $\mu\text{Ci}$	2.93	4.81
25 $\mu\text{Ci}$	8.93	0.10
25 $\mu\text{Ci}$	3.32	0.61
25 $\mu\text{Ci}$	6.02	0.84
25 $\mu\text{Ci}$	7.02	0.50
25 $\mu\text{Ci}$	15.76	0.08
75 $\mu\text{Ci}$	4.57	16.20
75 $\mu\text{Ci}$	22.37	7.85
75 $\mu\text{Ci}$	0.49	1.02
75 $\mu\text{Ci}$	104.74	14.82
75 $\mu\text{Ci}$	0.70	0.56
75 $\mu\text{Ci}$	4.53	0.11
75 $\mu\text{Ci}$	14.65	0.15
75 $\mu\text{Ci}$	2.3	0.12
75 $\mu\text{Ci}$	7.29	0.24
75 $\mu\text{Ci}$	5.64	0.46

It can be seen that in most cases these severe corrosion tests lead to removable contamination of less than 0.1 percent and in all cases to less than 1 percent.

Exposure to Salt Spray: Batches of 10 sample sources at 200  $\mu\text{Ci}/\text{cm}^2$  containing either 25  $\mu\text{Ci}$  or 75  $\mu\text{Ci}$  were submitted to an environment in which they were sprayed intermittently with artificial sea water. After a period of 16 days wipe and immersion testing was performed as detailed below. The conclusion drawn from this experiment was that integrity of the sources was virtually unimpaired.

82-07

NO : NR136S2085

DATE: February 8, 1982

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<u>Source Activity</u> (at 200 uCi/cm <sup>2</sup> )	<u>Wipe Test</u> nCi	<u>Immersion Test</u> nCi
10 samples at 25 uCi	0.26-3.13	0.002-0.28
10 samples at 75 uCi	0.17-4.13	0.01-0.42

- Immersion in Simulated Body Fluid: A batch of ten sources each containing 75 uCi at 200 uCi/cm<sup>2</sup> was subjected to immersion in 0.1N hydrochloric acid at 37.5°C for four hours. The amount of activity leached out was measured and the sources wipe and immersion tested. The body fluid test was repeated on the same sources after a period of 17 days and in every case the amount of activity leached out was considerably reduced.

<u>Source Activity</u> (at 200 uCi/cm <sup>2</sup> )	<u>Wipe Test</u> (nCi)	<u>Immersion Test</u> (nCi)	<u>Activity in HCl</u> <u>After First</u> <u>Immersion (nCi)</u>	<u>Activity in HCl</u> <u>After Second</u> <u>Immersion (nCi)</u>
10 Sources at 75 uCi each	0.58-0.43	0.06-0.10	118-209	27-44

The greatest amount of activity seen to leach from any source during either test was 0.25 percent of the content.

- Abrasion Testing: Samples of radioactive foil loaded at 100 uCi/cm<sup>2</sup> were exposed to abrasion by silicon carbide particles until considerable contamination became evident and the conclusion was reached that the degree of abrasion to be expected in a normal working environment would lead to considerably less than 5 nCi of contamination based on a wipe or an immersion test.
- Elevated Temperature Test: As part of the test procedure involved in assessing the sources to the criteria outlined in ANSI N542-1977, samples to sources containing 2.3 mCi in 5 cm<sup>2</sup> have passed wipe and immersion tests at the 5 nCi level after being held at a temperature of 800°C for one hour. However, further testing at even higher temperatures has been conducted to determine the likely effects of exposure to the conditions

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DATE: February 8, 1982

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Samples from each foil are tested by autoradiography to ensure that the active area is within positional and dimensional specifications. Each foil is checked at various points on its surface by collimated gamma counting to determine whether the radioisotope is distributed uniformly within the foil. Also, alpha emission and spectra are measured to ensure that the face thickness on the foil is uniform and within specified tolerances.

#### LIMITATIONS AND/OR OTHER CONDITIONS OF USE

- This source shall be distributed only to specific licensees of the NRC or Agreement States.
- Handling, Storage, Use, Transfer and Disposal: To be determined by the licensing authority.
- This source shall not be subjected to environmental or other conditions of use which exceed the American National Standard Institute (ANSI N542-1977) classification of 77C64344.
- Leak Testing: The most accessible surface of the foil source other than the face of the foil shall be leak tested at six month intervals using techniques capable of detecting 0.005 microcurie of removable alpha contamination.

#### SAFETY SUMMARY EVALUATION

Based on prototype tests, the stated ANSI source classification and the manufacturer's quality assurance and control program, it is our conclusion that the Model AMM foil source is acceptable for licensing purposes. The Model AMM foil is designed for use in ionization chambers and similar devices being used in industrial and military environments. It is essentially similar to the Model AMM1001 foil listed with the NRC but has considerably higher radioisotope content and loading. The AMM1001 foil is intended for ultimate distribution within domestic environments as part of a device that is exempt from licensing whereas the AMM is to be available to specific licensees only.

The source is constructed by laminating a sintered gold/americium oxide mixture between layers of precious or semi-precious metals and extending by power-rolling. Because of its close relationship to smoke detector sources, the AMM has been included in extensive prototype testing programs involving extremely severe operating conditions. Only in the most severe of these conditions have removable contamination levels in excess

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of 5 nCi been observed and it is expected that these conditions are characteristic of either catastrophic accidents or of considerable operational abuse of the sources. As the sources will be handled only by trained personnel in possession of specific licenses, it is expected that correct procedures would be employed and that any potential contamination could be detected at an early stage.

REFERENCES

The following supporting documents for the Model AMM alpha foil are hereby incorporated by reference and are made a part of this registry document.

- Letter with attachments dated January 11, 1982.
- ARC 8433/S Drawing with statement dated January 28, 1982.
- AEC Catalog Sheet for Model AMM source dated January 11, 1968.

ISSUING AGENCY

U.S. Nuclear Regulatory Commission

Reviewer

*Joseph M. Brown, Jr.*  
 \_\_\_\_\_  
 Joseph M. Brown, Jr.

Concurrence

*Bernard Singer*  
 \_\_\_\_\_  
 Bernard Singer

Attachment No. 1: Drawing No. ARC 8433/S



Reference GB/325/S- 85

Certificate Issue 1

# Certificate of Approval of Design for Special Form Radioactive Material

Title	
Alpha Foil Strip - Indispersible Solid Radioactive Materials	
Drawing Nos and Specification Reference	
Specification AI/SF/184 dated 16 October 1984 Drawings 3A1 10752 Issue I or ARC 10752/S Issue G & 3A 10756 Issue H & ARC 10756/S Issue F with Gold Palladium 3 micrometres Alloy, or Laminate, Face QCS's 537, 538, 550 & 551 dated 17 October 1984 apply	
Q. A. Programme Reference I P Q A M	
Radioactive Material	Maximum Activity
Americium 241	592 MBq Maximum Activity Loading: 4.7 MBq/cm <sup>2</sup>

THIS IS TO CERTIFY that the Secretary of State for Transport 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 Amersham International plc

In the event of any alteration to the above mentioned drawings and specifications or in any of the 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 31 January 1995

Competent Authority  
Identification Mark:

GB/325/S- 85



APR 27 1993

  
 Transport Radiological Adviser  
 Department of Transport  
 2 Marsham Street  
 London SW1P 3EB 4 6 4 6 8 2

On behalf of the Secretary of State