

03032698

030326 27 PM 1:27

VOID SHEET

TO: License Fee Management Branch
FROM: Anthony S. Kirkwood
SUBJECT: VOIDED APPLICATION

Control Number: 021974
Applicant: APOLLO FIRE DETECTORS LTD
dba RES Company, 90 Air Products and Controls, Ltd.
Date Voided: July 24, 1998
Reason for Void: Registry information
already listed for AMM-1001. New model
request did not contain sufficient
information to begin a review. Licensee
asked to resubmit if they wish to
proceed.

Anthony S. Kirkwood 7/24/98
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: After Review

Log completed ☒

Processed by: Mk



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 16, 1998

Dr. Robert Dudley
Technical Manager
Apollo Fire Detectors Limited
36 Brookside Road
Havant, Hampshire, PO9 1JR
England

Dear Dr. Dudley:

This letter is in response to your application dated May 14, 1998, requesting amendment to the license numbers 21-23805-01 and 21-23805-02E. Your application was forwarded to the sealed source and device safety review. During the process of safety review, we found that the following should be noted:

1. The Amersham International Model No. AMM-1001 was already included in the NR-0160-D-101-E, dated January 22, 1997 so no action is needed.
2. The Discovery ionization smoke detector is new product and you want this device approval. In that case, you have to submit the necessary information in pursuant to 10 CFR 32.26. Enclosed is the NUREG-1556, Vol. 3, "Consolidated Guidance About Materials Licenses," for your reference.
3. The manufacturer address is different in the registration certificate of NR-0160-D-101-E, dated January 22, 1997. If you moved, please request the amendment to reflect this change.

We will hold any further review until you provide the requested information. If you have any questions, please contact me at (301) 415-5787 or Mr. Steven Baggett at (301) 415-7273.

Sincerely,

A handwritten signature in black ink, appearing to read "Seung J. Lee", is written over a horizontal line.

Seung J. Lee, Mechanical Engineer
Materials Safety Branch
Division of Industrial and
Medical Nuclear Safety
Office of Nuclear Material Safety
and Safeguards

cc: SKimberley, LFDCB
AKirkwood, MSB
JB Cuppio,

LO5
Family
Ch
IS ZERO)
Feb
Tues
Wed
Thurs
Fri

Free sheet
info -
(Free sheet
missing)
See also 321973
+ 98-61

STATES WHERE USE IS AUTHORIZED: 1

0 - ALL LISTED STATES
1 - SAME AS STATE IN ADDRESS
2 - ALL STATES
3 - NON-AGREEMENT STATES
(USE ONLY IF ABOVE)

AUTHORIZED STATES:

APPROVAL FOR: REDISTRIBUTION: N STORAGE ONLY: N
TEMPORARY JOB SITES: N INCINERATION: N

EXEMPTIONS GRANTED :	
EXEMPTIONS REQUESTED :	
EXEMPTIONS DENIED :	



14 May 1998

030-32698

Mr Steve Baggett
United States Nuclear Regulatory Commission
11555 Rockville Pike
Rockville MD 20852
United States of America

Dear Mr Baggett

Ref: Amendment To License No. 21-23805-01 and 21-23805-02E

I would like to advise you of amendments to our products and purchasing procedures as they will impact upon the licenses that we have with the NRC.

At this time the licenses that we have for our ionisation smoke detectors allow us to use the alpha emitting Americium 241 foil supplied by the company NRD. We now wish to include the equivalent Americium 241 foil manufactured by Amersham International on our licenses. The foil manufactured by Amersham International is the Model No AMM 1001, a copy of the relevant documentation is enclosed.

In addition to the use of this foil in our smoke detectors, Amersham will supply Apollo with the foil fitted into the foil holder assembly. A copy of the Apollo engineering drawing number 43785-069/070 that describes the foil fitted into the foil holder is enclosed. This is a departure from our normal practice which has been to buy in the radioactive foil and to fit it into the foil holder here at Apollo. All of the assemblies that we build up are then 100% wipe tested. Could you advise me if the wipe testing procedure that we use in house will change when we buy in a complete foil holder assembly. Amersham will supply a Declaration of Conformity that states that they have carried out 100% wipe testing on the foil holder assemblies.

Apollo has also developed a new product called the Discovery ionisation smoke detector and we would like to have this product added to our licenses. I enclose copies of the test reports generated by the National Radiological Protection Board that contain the results of the work that they have carried out. The tests undertaken by the NRPB were made on samples of this detector fitted with both the Amersham and the NRD foils.

This detector will be marketed in the United States using the part number 58000-550 instead of the part number 58000-500 that is called up on the NRPB reports. There will not be any mechanical changes made to the product and the radiological components will remain unchanged.



INVESTOR IN PEOPLE



THE QUEEN'S AWARD FOR EXPORT ACHIEVEMENT

Quality Systems Certificate No 010
Assessed to ISO 9002

021974

PENDING



The final amendment that I wish to make to Apollo's licenses is to add another company to our list of OEM badged customers. This company is Firecom Inc of Woodside NY. The details of the Apollo and Firecom product designations are listed below;

Apollo Part Number	Description	Firecom Part Number
55000-250	S60A Ion smoke	F600-250
55000-550	XP95A Ion smoke	F900-550

As with all of the previous badging exercises that we have carried out, we will ensure that the NRC license number is on the label fitted to the smoke detector.

This process is becoming a problem for Apollo as a high volume manufacturer of ionisation smoke detectors. To be able to develop our business we must expand our market position and one way that we do this is to label our detectors with our customers names and part numbers. It is a condition of our licenses that the NRC is advised of any badging that is done for our customers. This becomes expensive and time consuming as it requires undergoing a license amendment procedure.

Is there any alternative process that we can use to badge detectors for our customers that does not require submitting details for a license amendment to the NRC and at the same time enables Apollo to retain its licenses? Could we use a procedure that enables us to advise the NRC of all of the details of OEM badging operations just once a year, maybe prior to the licenses being renewed. That way all of this type of license amendment could be tackled in one go and will keep down our costs.

Could I ask that you consider this proposal and also come back to me with some ideas of your own that could help us.

Yours sincerely

Dr Robert Dudley
Technical Manager

DO NOT SCALE

IF IN DOUBT - ASK

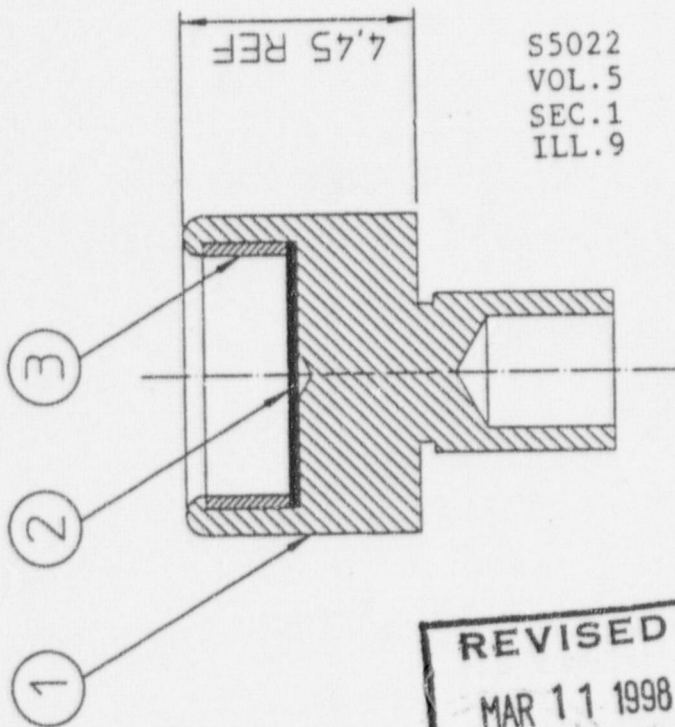
METRIC DIMENSIONS

THIRD ANGLE PROJECTION

CAUTION



RADIOACTIVE FOIL



REVISED
MAR 11 1998
UNDERWRITERS
LABORATORIES INC.

NOTES

1. INSERT IONISATION FOIL (ITEM 2) INTO THE FOIL HOLDER (ITEM 1) USING AIR PICK UP TOOL. (GOLD FINISH - ACTIVE SIDE.)
2. FIT IONISATION FOIL HOLDER SPACER (ITEM 3) INTO THE FOIL HOLDER (ITEM 1).
3. PLACE THE ABOVE ASSEMBLED PARTS INTO THE JIG AND PIN OVER USING THE PRESS.
4. HOLDER ASSY 43785-069, ITEM 2 FOIL USES PART NO 35112-454 OR 35112-455
5. HOLDER ASSY 43785-070, ITEM 2 FOIL USES PART NO 35112-455 ONLY. THIS ASSY TO BE 100% WIPE TESTED.

2 - A2014 NOTES 4 & 5 AMENDED FEB'98 PJS

A A809

PAI NO 43785-070 ADDED
NOTES 4 AND 5 ADDED
SEPT 92 ACT.

A A594

DESIGN FIRM MARCH 91 DJC

A

INTRODUCED MARCH 91 DJC

ISS. MOD. D.C.N.

CHANGE, DATE AND SIGNATURE

SPECIFICATION

MATERIAL

TOLERANCES

FINISH

UNLESS STATED

SCALE

10:1

CLEAN

apollo
FIRE DETECTORS LIMITED

DESIGN
APPROVED

TITLE

SERIES 60, 60A /XP95
IONISATION
SOURCE HOLDER ASSEMBLY

APPROVED

CHECKED

DRG. No.

DRAWN

DJC

CAD

43785-069/07

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

APR 17 1975

APR 15 1975

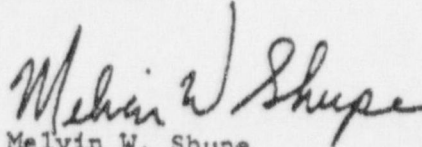
Amersham/Searle Corporation
ATTN: Mr. Fred Andrews
2636 S. Clearbrook Drive
Arlington Heights, Illinois 60005

Gentlemen:

We have evaluated information contained in Amersham/Searle Corporation (A/S) submittals dated November 4, 1974, November 8, 1974 and March 10, 1974 concerning Model AMM 1001 foils and Model AMM 1001H standard mounted foils for use in smoke detectors. Both models have been accepted for licensing purposes.

Reference to these sources should utilize the above model designations without modification.

Sincerely,



Melvin W. Shupe
Materials Branch
Division of Materials and Fuel
Cycle Facility Licensing



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

(Corrected Copy)

NO.: NR136S174U

DATE: October 25, 1979

PAGE 1 OF 4

SEALED SOURCE TYPE: Fo11 Source

MODEL: AMM1001, AMM1001H

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

MANUFACTURER/DISTRIBUTOR:

ISOTOPE: Americium-241

MAXIMUM ACTIVITY: 50 microcuries per square cm
of foil

LEAK TEST FREQUENCY:

PRINCIPAL USE: Ion Generators, Smoke Detectors

CUSTOM SOURCE: ☐ YES ☒ NO

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

NO.: NR136S174U

DATE: October 26, 1976

PAGE 2 OF 4

SEALED SOURCE TYPE: Foil Source

DESCRIPTION:

The Model AMM 1001 sealed source consists of americium oxide uniformly distributed and sintered in a pure gold matrix which is further contained between a backing of gold coated pure silver and a front covering of either gold or gold-palladium alloy and fabricated by hot forging methods. The continuously welded metal layers are rolled so that the minimum thickness of the layers are:

gold-palladium alloy	0.0015 mm
americium oxide plus gold	0.0001 mm
gold	0.0001 mm
substrate	0.20 mm

Sub-division of the rolled foil is accomplished by cutting or punching into discs of 5 mm diameter or strips of say 2 mm x 10 mm diameter. At the activity loading specified above, there is no loose or wipeable contamination above the wipe test limit of 0.005 microcuries.

The Model AMM 1001H mounted sealed source consists of a sized foil mounted in a "T" shaped standard holder constructed of tin plated brass. Lips of the source holder are rolled over the edge of the foil so the cut edges of the foil are not exposed. The larger diameter of the holder is approximately 5 mm and the length is approximately 6 mm. The useful life is 20 years.

LABELING:

Neither the foils nor mounts are labeled. This evaluation does not describe possible A/S foil sources distributed under other model designations nor sources previously distributed under "AMM" designation.

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

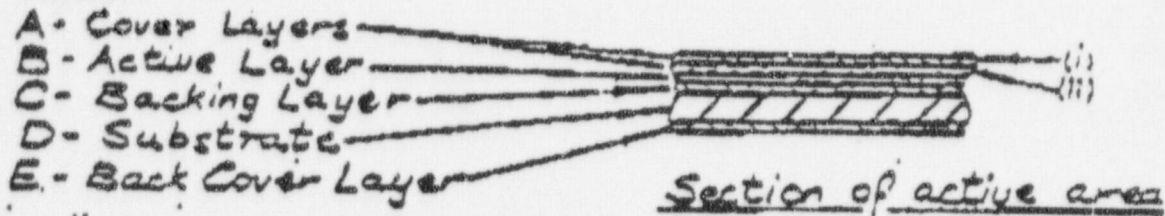
NO.: NR136S174U

DATE: October 26, 1979

PAGE 3 OF 4

SEALED SOURCE TYPE: Foil Source

DIAGRAM:



- A - (i) Palladium ~ 0.002 mm
 (ii) Gold ~ 0.002 mm
- B - Americium Oxide plus Gold ~ 0.002 mm
- C - Gold ~ 0.001 mm
- D - 0.20 - 0.25 mm
- E - Gold - < 0.001 mm

PROTOTYPE TESTING:

Prototype Model AMM 1001 blanked sealed sources and Model AMM 1001H mounted sources have been tested to conditions described by USASI standard NS.10-1968 and respective classifications of C54545 and C44444 have been demonstrated. Results of wipe tests of the tested foils were acceptable to less than 0.005 microcuries. In addition, AMM 1001 samples have successfully passed "special form" testing conditions.

Model AMM 1001 foils have experienced the following additional tests:

1. Immersion in water of prototype foils for 3 weeks at room temperature: less than 0.001 microcurie per foil loaded at maximum activity was found in the water.
2. Immersion in 0.1 N hydrochloric acid for 24 hours at room temperature: less than 0.004 microcurie activity was leached out.
3. Foils were subjected to tests in moist air, dry air, sulfur dioxide fumes, hydrochloric acid fumes, ammonia vapor, to repetitive wipe tests (5000X) and welding tests: less than 0.005 microcurie wipeable contamination was found. Shelf-life tests of foils with 50 microcuries/cm² loading show no deleterious aging effects after 6 years.

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

NO.: NR136S174U

DATE: October 26, 1979

PAGE 4 OF 4

SEALED SOURCE TYPE: Foil Source

PROTOTYPE TESTING (CONT'D):

Foils and mounted foils have been subjected to ozone at 0.75 ppm for a period of 60 days and salt spray for 16 days without deleterious results.

QUALITY ASSURANCE AND CONTROL:

Not less than 10 percent of the Model AMM 1001H sources are checked by gamma counting to ensure that the activity in each foil is within specified limits. Each product is visually inspected to check that the rolled-over edge is satisfactory and that the alpha emitting surface is free from surface defects. Each source is wipe tested to an acceptance limit of 0.005 microcuries.

In addition to the above, each Model AMM 1001 foil is checked by alpha spectrometry to determine the adequacy of the gold cover.

REFERENCES:

Date October 26, 1979

Reviewed By /s/
Joseph M. Brown, Jr.

Date October 26, 1979

Concurrence /s/
Earl G. Wright

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

AMERSHAM INTERNATIONAL
RADIATION SOURCES
SOURCES PRODUCT SPECIFICATION (SPS)

Title: Americium-241 Foil, Single Sided Discs

Prepared by: B S Fisher

Date: 23 July 1991

Approved by: Production

Date: 24 July 1991

QA Manager

Date: 24 July 1991

Scope

This is a specification for Am-241 alpha foil, 5mm diameter discs, 0.9 microcuries with the following product code AMMK5039.

This document consists of 5 pages and the 3 drawings listed in Section 2.

Customer Approval

NAME: R. D. PAYNE

TITLE: TECHNICAL DIRECTOR

COMPANY: Apollo Manufacturing Limited

SIGNATURE:

DATE: 26 July 1991

Q.C.
AUTHENTICATED

1. Details of Active Contents

Radionuclide:	Americium-241 (Am-241)
Nuclear data:	Half life 433 years
Major radiations:	Alpha plus 60 keV gamma. 12-22 keV X-rays.
Activity:	See list attached
Form:	See drawing No. 3A 10756/S
Radionuclidic purity:	Normal QC specification

2. Details of Foil Construction

Drawings:	3A 10756/S
	3A 10757/S
	SS/SK/1927

3A drawings referenced above indicate the general construction of foil strip and discs. These drawings are cited on ANSI, ISO and SFC documents.

Detailed specifications for individual source types is provided by SS/SK/1927 in conjunction with the attached specification sheet.

Reference: Drawing SS/SK/1927

2.1 Material Specification (Figure 1)

C) Backing material	Silver 0.15-0.25 mm.
D) Interface layer	Gold/Palladium alloy approx. 1 μ m.
E) Active matrix	Americium oxide/gold approx. 1 μ m.
F) Face material	Gold palladium alloy approx. 2 μ m.

2.2 External Dimensions

B) Thickness (figure1)	0.15-0.25mm.
J) Diameter (figure 3)	5mm +0, -0.02mm.
A) Burr (figure1)	0.05mm.
K) Flatness (figure 4)	0.05mm.

2.3 Finish (Figure 4)

M) Active surface	Free from obvious blemishes.
L) Back surface	Not critical.
N) Cutting direction	Punched through back so that any burr is on silver surface.

2.4 Radioactivity

Active content:	0.9 μ Ci + 10%. Measured on crystal (photomultiplier) detector against 0.9 μ Ci to a 1% AQL.
Emission:	Checked at foil stage, before blanking, on air ionisation chamber against Q1742 standard.
H) Peak Alpha Energy (figure 2)	4.5 MeV \pm 10%.
G) Peak Width (figure 2)	> 0.8 MeV.

3. Special Requirements

Wipe tests carried out using lint free tissue pieces.

4. Manufacturing Procedures

In line with divisional QA Manual, ie materials, manufacturing (including measurement), procedures and process controls are specified and documented, see Product Dossier.

5. Documentation

Internally- full manufacturing records are maintained.

Externally (ie despatched with order) test report, handling instructions and despatch notes.

6. Testing and Inspection

ISO classification: C64444.
(reference: ISO 2919= BS.5288= ANSI N542 1977).

Recommended Working Life: 10 years.

Special Form Certificate Number: See 9 below.

Other: None.

Inspection

Standard in-process and final inspection with leak tests performed in line with international standards; see further details in the Product Dossier.

7. Application

Smoke detection.


8. Conditions of Use

Normal industrial laboratory and domestic environment. The sources should be visually checked and leak tested at least every 26 months (depending on usage) and records of these checks maintained.

9. Additional Information

Special Form Certificate number

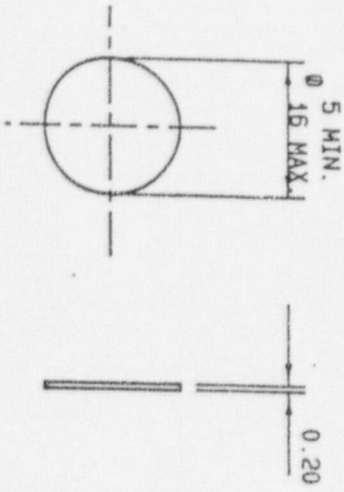
GB/321/S AMMK5039.

Third Angle Projection 
This drawing conforms to BS 308

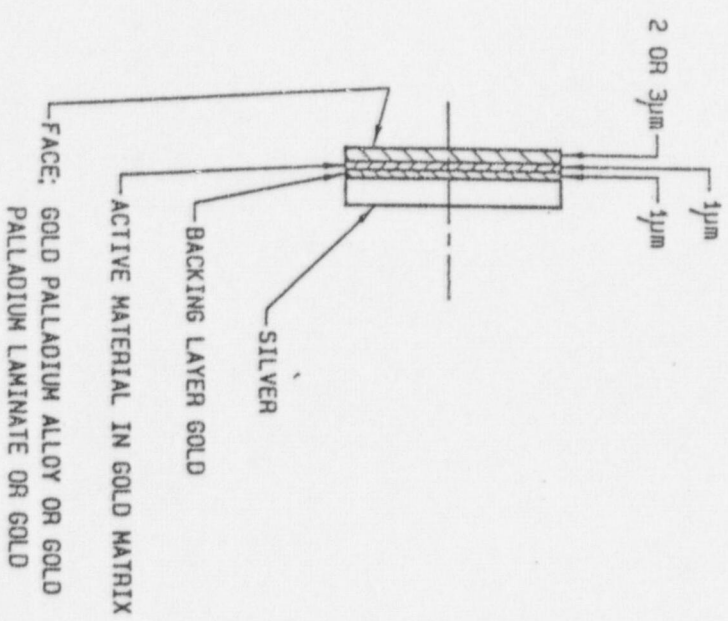
This drawing is the private and confidential property of Amersham International plc. and must not be loaned, copied or reproduced without written permission.

Components shown form a capsule of approved design.
Modifications must not be made without reference to the capsule design office.

INDISPERSIBLE SOLID RADIOACTIVE MATERIAL
REFER TO MANUFACTURING PROCEDURE'S - MP006, MP020 & MP144
SEE ALSO DRAWING NUMBER 3A 10756



FOIL DISC BLANKED
FROM ROLLED SHEET



ENLARGED SECTION THRU FOIL

REDRAWN FROM ARC 10757/S

NSM	1	27-2-89	MS333
A.M.B.	H	27-1-88	MS467
Approved	Issue	Date	Mod. No.

BEFORE USE CHECK ISSUE
WITH Q.A. SECTION

Material & Spec.	Tolerances	Surface Texture	Finish	Title	
SEE ABOVE	± 0.05	Unless stated	Remove all burrs		
Original Scale	Dims. in millimetres	Drawn M.A. Checked M.P.	Used on	Job	Job No.
Do not scale					
				Alpha Foil Disc	
				Drq.	3A10757

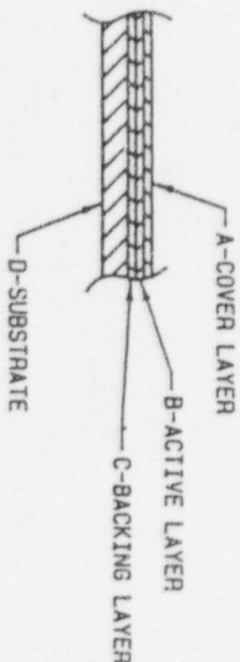
Amersham International plc.
Amersham UK

Amersham

Third Angle Projection
This drawing conforms to BS 308

This drawing is the private and confidential property of Amersham International plc. and must not be loaned, copied or reproduced without written permission.

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SECTION OF ACTIVE AREA

- A- GOLD OR GOLD PALLADIUM ALLOY OR GOLD PALLADIUM LAMINATE (Pd ON SURFACE) 0.002 OR 0.003mm
- B- AMERICIUM OXIDE PLUS GOLD 0.002mm OR RADIUM SULPHATE PLUS GOLD 0.002mm
- C- GOLD 0.001mm
- D- SILVER 0.15-0.25mm

INDISPERSIBLE SOLID RADIOACTIVE MATERIAL

REFER TO MANUFACTURING PROCEDURE'S - MP006, MP008, MP020, MP087 & MP144

SEE ALSO DRAWING NUMBERS 3A 10752 & 3A 10757

CONSTRUCTION

THE RADIONUCLIDE AS AMERICIUM OXIDE OR RADIUM SULPHATE IS CONTAINED UNIFORMLY DISTRIBUTED & SINTERED IN A MATRIX OF FINE GOLD AT TEMPERATURES OF 750°C ± 20°C. IT IS FURTHER CONTAINED BETWEEN A GOLD COATED SUBSTRATE OF PURE FINE SILVER & A FRONT COVERING OF NOBLE METAL (SEE 'A' ABOVE) BY HOT FORGING THE METAL LAYERS NOW CONTINUOUSLY WELDED ARE EXTENDED IN AREA BY A POWER ROLLING MILL TO GIVE REQUIRED ACTIVE & OVERALL FOIL AREAS.

TESTING FOR LEAKAGE & CONTAMINATION.

EACH ROLLED LENGTH OF FOIL IS WIPE TESTED OVER THE ENTIRE AREA - ACCEPTANCE LIMIT 0.005 µCi (185 Bq).

BEFORE USE CHECK ISSUE WITH Q.A. SECTION

REDRAWN FROM ARC 10756/S

Rev	H	27-2-88	MS23
A.H.B.	Q	27-1-88	MS467
Approved	Issue	Date	Mod.NC

Amersham International plc.
Amersham UK

Amersham

Title

ALPHA FOIL

Job

Job No.

Dwg.

3A10756

Material & Spec.	Tolerances	Surface Texture	Finish
Unless stated	Unless stated	Remove all burrs	
Original Scale	Dims. in millimetres	Drawn M.A.	Used on
Not scale		Checked M.P	

FIG 1

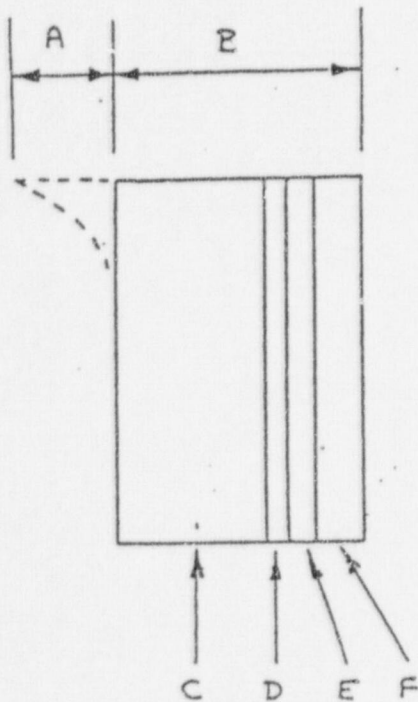


FIG 2

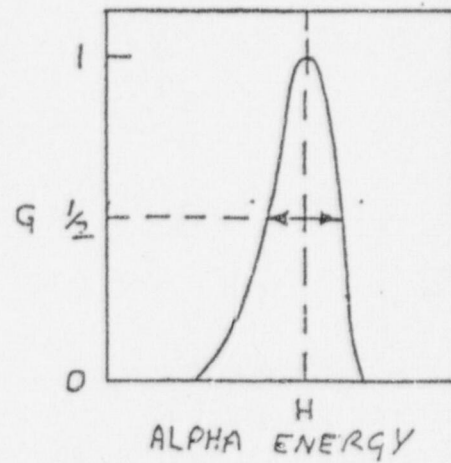


FIG 3

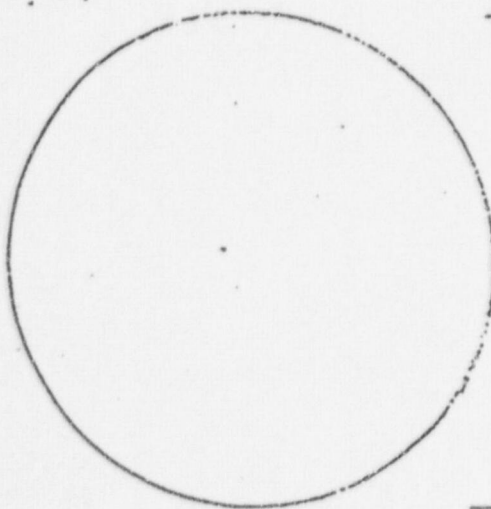
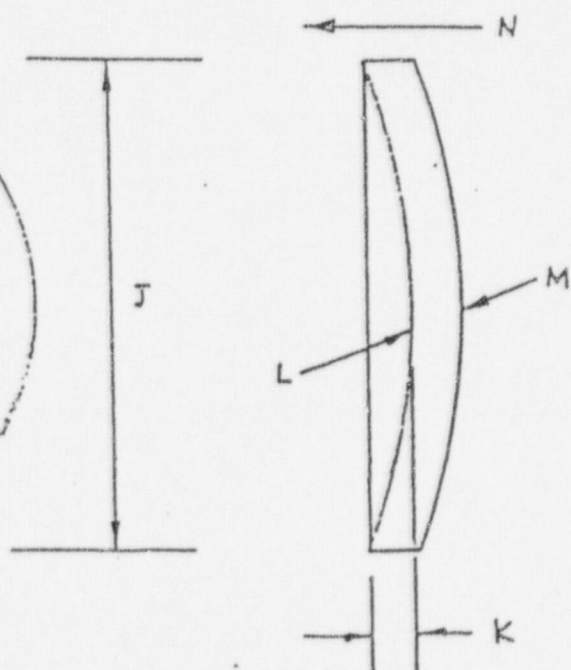


FIG 4



AUTHENTICATED

Checked by PBR

Approved by [Signature]

CONSUMER PRODUCTS REPORT

Report number: NRPB/CP/3/075

Report for: Ms Dianne Fisher
Quality Assurance Manager
Apollo Fire Detectors Limited
36 Brookside Road
Havant
Hampshire
PO9 1JR

Subject: Testing of ionisation chamber smoke detectors to NEA recommendations.

Sample: Multi-station ionisation chamber smoke detector, "Discovery" model containing an Amersham americium-241 source

Date of report: 6 January 1998

INTRODUCTION

The model 58000-500 'Discovery' is a multi-station ionisation chamber smoke detector principally designed for industrial use. The detector contains an americium-241 source produced by Amersham International which has a nominal activity of 33 kBq [0.9 μ Ci]. The detectors were tested for compliance with the recommendations of the Nuclear Energy Agency given in the publication "Recommendations for ionization chamber smoke detectors in implementation of radiation protection standards" published by the Organisation for Economic Co-operation and Development (OECD), 1977.

PRELIMINARY TESTS

1. Access to the source

Access to the radioactive source can only be gained by forcibly dismantling the detector.

2. Marking and labelling

The base of the detector bears an adhesive label. The label carries details which includes the name and address of the supplier, the radionuclide installed in the detector and its activity together with instruction for installation, operation and disposal.

3. Dose rate measurement

A photon spectrum from a single smoke detector was accumulated using a shielded lithium drifted silicon detector. Dose rates were calculated using the intrinsic efficiency of the detector and appropriate dose rate conversion factors. The results were used to calibrate a low energy photon scintillation detector.

The maximum dose equivalent rate measured was $0.013 \mu\text{Sv h}^{-1}$ at a distance of 0.1 m from the surface of the detector. The NEA requires that the dose rate does not exceed $1 \mu\text{Sv h}^{-1}$ at 0.1 m from the surface of the detector.

4. Surface contamination

Surface contamination was assessed by wiping each detector with methanol moistened swabs. The amount of contamination removed was evaluated by measuring the transferred activity using an alpha scintillation detector. The following areas of the detector were assessed:

- a) the outer surfaces of the smoke detector
- b) The inner surface of the smoke detector's lid
- c) The outer surface of the ionisation chamber

In all cases the estimated levels of radioactive contamination were less than 0.1 Bq cm^{-2} . The detector shall fail the initial tests if the level of contamination exceeds 0.37 Bq cm^{-2} .

ADDITIONAL TESTS

These tests are intended to simulate the damage and other effects caused by normal use, credible abuse and likely accidental damage. The test programme is detailed in reference 1. The integrity of the sources after each test was evaluated principally by wipe testing as described above. The following areas of each detector was checked:

- a) The inside surfaces of the ionisation chamber
- b) The source and its holder

With the exception of the 600°C fire test and the 1200°C incineration test the results are given below.

Test	Activity transferred from the source after test (Bq)
Temperature	< 0.1
Impact	< 0.1
Vibration	< 0.1
Drop	< 0.1

A source is considered to have retained its integrity if the removed activity is less than 200 Bq.

FIRE TEST AT 600°C AND INCINERATION TEST AT 1200°C

The procedure and details of the apparatus used in the tests can be found in reference 1. The measured activities in each part of the apparatus after the test are given below.

Test	Measured activity (Bq)	
	600°C	1200°C
Vapour trap	< 0.4	< 0.4
Filter	< 0.4	< 0.4
Debris	< 0.1	-
Wipe of source and holder	0.2	-
Total	< 1.1	< 0.8

A detector is considered to have failed the 600°C fire test if the sum of the activity exceeds 185 Bq.

For the 1200°C incineration test, a detector is considered to have failed if the activity in the vapour trap and on the in-line filter exceeds 1% of the source activity.

CONCLUSIONS

The model 58000-500 'Discovery' ionisation chamber smoke detector manufactured with an Amersham americium-241 source performed satisfactorily in the NEA recommended tests.



Julian Dunderdale

- Reference 1 Recommendations for ionisation chamber smoke detectors in the implementation of radiation protection standards. Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD), 1977.

CONSUMER PRODUCTS REPORT

Report number: NRPB/CP/3/076

Report for: Ms Dianne Fisher
Quality Assurance Manager
Apollo Fire Detectors Limited
36 Brookside Road
Havant
Hampshire
PO9 1JR

Subject: Testing of ionisation chamber smoke detectors to NEA recommendations.

Sample: Multi-station ionisation chamber smoke detector, "Discovery" model containing an NRD americium-241 source

Date of report: 6 January 1998

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3. Dose rate measurement

A photon spectrum from a single smoke detector was accumulated using a shielded lithium drifted silicon detector. Dose rates were calculated using the intrinsic efficiency of the detector and appropriate dose rate conversion factors. The results were used to calibrate a low energy photon scintillation detector.

The maximum dose equivalent rate measured was $0.012 \mu\text{Sv h}^{-1}$ at a distance of 0.1 m from the surface of the detector. The NEA requires that the dose rate does not exceed $1 \mu\text{Sv h}^{-1}$ at 0.1 m from the surface of the detector.

4. Surface contamination

Surface contamination was assessed by wiping each detector with methanol moistened swabs. The amount of contamination removed was evaluated by measuring the transferred activity using an alpha scintillation detector. The following areas of the detector were assessed:

- a) the outer surfaces of the smoke detector
- b) the inner surface of the smoke detector's lid
- c) the outer surface of the ionisation chamber

In all cases the estimated levels of radioactive contamination were less than 0.1 Bq cm^{-2} . The detector shall fail the initial tests if the level of contamination exceeds 0.37 Bq cm^{-2} .

ADDITIONAL TESTS

These tests are intended to simulate damage and other effects caused by normal use, credible abuse and likely accidental damage. The test programme is detailed in reference 1. The integrity of the sources after each test was evaluated principally by wipe testing as described above. The following areas of each detector was checked:

- a) The inside surfaces of the ionisation chamber
- b) The source and its holder

With the exception of the 600°C fire test and the 1200°C incineration test the results are given below.

Test	Activity transferred from the source after test (Bq)
Temperature	< 0.1
Impact	< 0.1
Vibration	< 0.1
Drop	< 0.1

A source is considered to have retained its integrity if the removed activity is less than 200 Bq.

FIRE TEST AT 600°C AND INCINERATION TEST AT 1200°C

The procedure and details of the apparatus used in the tests can be found in reference 1. The measured activities in each part of the apparatus after the test are given below.

Test	Measured activity (Bq)	
	600°C	1200°C
Vapour trap	< 0.4	< 0.4
Filter	< 0.4	< 0.4
Debris	< 0.1	-
Wipe of source and holder	0.5	-
Total	< 1.4	< 0.8

A detector is considered to have failed the 600°C fire test if the sum of the activity exceeds 185 Bq.

For the 1200°C incineration test, a detector is considered to have failed if the activity in the vapour trap and on the in-line filter exceeds 1% of the source activity.

CONCLUSIONS

The model 58000-500 'Discovery' ionisation chamber smoke detector manufactured with an NRD americium-241 source performed satisfactorily in the NEA recommended tests.



Julian Dunderdale

- Reference 1 Recommendations for ionisation chamber smoke detectors in the implementation of radiation protection standards. Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD), 1977.

LICENSE FEE REQUIREMENTS

ATTN: Sandra Kimberley, MS T-9E10
U.S. Nuclear Regulatory Commission
License Fee and Accounts Receivable Branch
P. O. Box 954574
St. Louis, MO 63195-4514

Apollo Fire Detectors Ltd
%Air Products and Controls
ATTN: Mr. R. E. Scaggs
1749 E Highwood
Pontiac, MI 48340

TYPE OF ACTION

- ☐ NEW LICENSE
☐ RENEWAL OF LICENSE
☒ AMENDMENT TO LICENSE

REQUESTED DATE

05/14/1998

LICENSE NUMBER

21-23805-01, -02E, NR0160D101E

CONTROL NUMBER

321973, 021974, 98-61

I. APPLICATION FEE DUE

Your request for a licensing action is subject to the fee(s) in the category(ies) noted below in accordance with Section 170.31 of 10 CFR Part 170. Payment of the fee is required prior to the issuance of the license, renewal, or amendment.

FEE CATEGORY	APPLICATION	RENEWAL	AMENDMENT
3B	\$	\$	\$ 580.00
3H	\$	\$	\$ 1,000.00
9A	\$	\$	\$ 610.00
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$

FEE(s) DUE	\$	2,190.00
PAYMENT RECEIVED	\$	0.00
AMOUNT DUE	\$	2,190.00

☒ Your request was received without the prescribed application fee.

☐ We received your check listed below. Payment of the additional fee noted above is required.
Check Number _____
\$ 0.00 Amount

☐ Your request will increase the scope of your license program. Therefore, your request is subject to the application fee(s) noted above. Refer to Section 170.31 and Footnote 1(d)(2).

☐ Your license expired prior to the receipt of your application for renewal. Therefore, your request is subject to the application fee(s) noted above. Refer to Section 170.31 and Footnote 1(a).

MAKE PAYMENT OF THE FEE(S) TO THE U.S. NUCLEAR REGULATORY COMMISSION AND MAIL THE PAYMENT TO THE ADDRESS LISTED AT THE TOP OF THIS FORM. IF WE DO NOT RECEIVE A REPLY FROM YOU WITHIN 30 CALENDAR DAYS FROM THE DATE LISTED BELOW, WE SHALL ASSUME THAT YOU DO NOT WISH TO PURSUE YOUR APPLICATION AND WILL VOID THIS ACTION.

II. FEE NOT REQUIRED

- ☐ Check Number _____ Enclosed is your check which accompanied your request. The fee is not required because:
- ☐ Check Number _____ We received your check listed in payment of the fee.
- ☐ Date of Request _____ The Licensing staff has informed us that your request is to be considered as a continuation of the request listed.
- ☐ Control Number _____
- ☐ Date of Request _____ Your request was combined, prior to review, with the request listed.
- ☐ Control Number _____

III. CHECK RETURNED

- ☐ Check Number _____ Enclosed is your check which was returned to us by the bank for:
- ☐ INSUFFICIENT FUNDS
- ☐ ACCOUNT CLOSED
- ☐ OTHER

MAIL THE REPLACEMENT CHECK TO THE ADDRESS LISTED AT THE TOP OF THIS FORM AND REFERENCE THE ABOVE CONTROL NUMBER.

IV. LICENSE ISSUED WITHOUT THE REQUIRED FEE

- ☐ License Number _____ The listed license was issued without the required fee being collected. The fee required is noted in Section I of this form.
- ☐ Amendment Number _____
- ☐ Date Issued _____
- ☐ The scope of your licensed program was increased. Therefore, your request is subject to the application fee(s) noted in Section 1 of this form. Refer to Section 170.31 and Footnote 1(d)(2).
- ☐ Because of the urgency of your request, the license was issued without remittance of the prescribed fee noted in Section 1 of this form.

SIGNATURE - LICENSE FEE ANALYST

LFDCB

LFDCB

Distribution:
OC/DAF/LFARB S/F
(LF-3 2.7)
OC/DAF/LFARB RF
OC/DAF R/F

Pending Cy

DATE

Sandra Kimberley (301-415-6096)

6/1/98

cc: SBaggett

06/01/1998