030-30115

NRC FORM 313
(9-86)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires 5-31-87

# APPLICATION FOR MATERIAL LICENSE

**INSTRUCTIONS:** SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

**FEDERAL AGENCIES FILE APPLICATIONS WITH:**

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

**ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:**

**CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:**

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

**ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:**

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

**IF YOU ARE LOCATED IN:**

**ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:**

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

**ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:**

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

**ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:**

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

**PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.**

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [x] C. RENEWAL OF LICENSE NUMBER 32-16736-01E

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

SECURITY ENGINEERING, INC.
P.O. Box 746
3560 US 158
CLEMMONS, N.C. 27012

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

3560 US 158
CLEMMONS, N.C.

9002050298 890124
NMSS LIC30
32-16736-02E PDR

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

O. N. SWANSON

TELEPHONE NUMBER: 919-766-9902

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY 3A BYPRODUCT MAT | AMOUNT ENCLOSED $ 510.00

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

| SIGNATURE-CERTIFYING OFFICER | TYPED/PRINTED NAME | TITLE | DATE |
|---|---|---|---|
| O N Swanson | O N SWANSON | PRES | 5/26/87 |

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

- [ ] <$250K
- [x] $250K–500K
- [ ] $500K–750K
- [ ] $750K–1M
- [ ] $1M–3.5M
- [ ] $3.5M–7M
- [ ] $7M–10M
- [ ] >$10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*: 8

c. NUMBER OF BEDS:

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial–proprietary–information furnished to the agency in confidence)*

- [ ] YES
- [ ] NO

07 JUL 1987

**FOR NRC USE ONLY**

| TYPE OF FEE | FEE LOG | FEE CATEGORY | COMMENTS | APPROVED BY |
|---|---|---|---|---|
| APP | Jul. 1 HPS | 3A | VOIDED 007516 | |
| **AMOUNT RECEIVED** | **CHECK NUMBER** | | | **DATE** |
| See 029227 which | is a dup of this. | | | |

PRIVACY ACT STATEMENT ON THE REVERSE

## PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on NRC Form 313. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY:** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S):** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30, 32, 33, 34, 35 and 40 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES:** The information may be (a) provided to State health departments for their information and use; and (b) provided to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for an NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION:** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed. A request that information be held from public inspection must be in accordance with the provisions of 10 CFR 2.790. Withholding from public inspection shall not affect the right, if any, of persons properly and directly concerned need to inspect the document.

5. **SYSTEM MANAGER(S) AND ADDRESS:** U.S. Nuclear Regulatory Commission
Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555

SSE SECURITY ENGINEERING, INC.
P. O. BOX 746 CLEMMONS, N. C. 27012 (919) 766-9902

Item #5

| | | | |
|---|---|---|---|
| Americium 241 | sealed in gold foil | manufactured by Nuclear Radiation Developments #NRDA10086 & #NRD A1045 #NRD A1046 #NRD A1056 | MAX # of sealed sources processed at any one time 10,000 sources max 1μci per source max |

Item #6

As an Alpha Ionizer in smoke detector

Item #7

O.N. Swanson

FORMAL TRAINING IN RADIATION SAFETY

a. Principles and Practices of radiation protection.

b. Radioactivity measurement standardization and monitoring techniques and instruments.

c. Mathematics and calculations basic to the use and measurement of radioactivity.

d. Biological effects of radiation.

Training was received in a course in Modern Physics at N. C. State University in 1960. The duration of the course was approximately 5 months.

EXPERIENCE

(1) Eight (8) years experience with $RA_{226}$ foils 1000μci maximum
1970 - 1978

(2) Ten (10) years experience with $AM_{241}$ foils 2μci maximum
1976 - present

Item #8

Same as item 7

Item #9

Esterline Alpha Scintillation Counter
Model RM15 with AC3 probe
$2 \times 10^7$ CPM per $\mu ci/CM^2$ from 239 PU source

Item #10

RADIATION PROTECTION PROGRAM

In general the protection program consists of the following:

(1) Checking the sealed sources for contamination after fastening them to the electrodes

(2) Checking the work area for contamination after fastening the sources

(3) Making sure that sources are safely stored and inventoried

(4) Keeping equipment in good working order

(5) Reporting usage to proper agencies

The method for determining leakage is as follows:

(1) A 1µci source is placed ½" from the face of our Eberline AC-3B Alpha Probe and counts are recorded. The count is 60,000.

(2) Maximum allowable leakage is .005µci

$$\therefore \frac{.005}{1} = \frac{x}{60{,}000}; \qquad x = 300 \text{ CPM}$$

If we ever see anything over .0001µci or 6 CPM, we will not use the source.

ITEM #11

Only sealed sources are used. If it is ever necessary to dispose of any, we will return to the manufacturer (NRD).

SE

SECURITY ENGINEERING, INC.

P O BOX 746 CLEMMONS N C 27012 (919) 766-9902

June 2, 1987

U. S. Nuclear Regulatory Commission, Region II
c/o Vandy L. Miller NMSS/MACUB
Commercial Use Branch
Mail Station MS396SS
Washington, D.C. 20555

NL 16736
30 — 30052

Gentlemen:

RE: Program Code 03217
License #32-16736-01E
Application for Renewal of License

Please renew our Byproduct Material (Radioisotopes) License #32-16736-01E.

Enclosed are two (2) copies of the completed ~~Form NRC-313~~, two (2) copies of each attachment thereto, and our check in the amount of $510.00.

Thank you.

Very truly yours,

Please put with our renewal application — We apologize !!

O. N. Swanson

ONS;jp

Enclosures

no forms enclosed with this ltr. mine expired 12/31/86 status 1

87 JUN -3 P2:27 RECEIVED

87 JUN -3 P3:27 U.S. NUCLEAR REGULATORY COMMISSION

Log June 1 HRS
Remitter
Check No. 980119837
Amount $510.00
Fee Category 3H
Type of Fee application
Date Check Received 6/4/87 6/5/87
Date Completed 6/29/87
By: S. Kimbley

020227

JUN 19 1987

Security Engineering, Inc.
ATTN: O. N. Swanson
P.O. Box 746
Clemmons, NC 27012

Gentlemen:

This refers to your letter dated June 2, 1987, for renewal of Materials License 32-16736-01E, which expired December 31, 1986.

We received your check for $510. However, an application fee of $580 is required as specified in §170.31 (3H) and Footnote 1(a) of 10 CFR 170, copy enclosed. Footnote 1(a) states in part "When a license or approval has expired, the application fee for each category shall be due...." Payment of the additional $70 should be made to the U.S. Nuclear Regulatory Commission and mailed to my attention at our Washington, D.C. address.

Your application will be sent to the Licensing staff for processing upon receipt of the fee. When submitting the fee, please refer to CONTROL NUMBER 020227.

Sincerely,

Original Signed By
Glenda Jackson

Glenda Jackson
License Fee Management Branch
Division of Accounting and Finance
Office of Administration and
Resources Management

Enclosure:
10 CFR 170

DISTRIBUTION:
Pending Fee File
ARM/DAF R/F
LFMB R/F (2)
DW/RI/S&E

| | | |
|---|---|---|
| OFFICE: | ARM/LFMB | ARM/LFMB |
| SURNAME: | SKimberley:rej | GJackson |
| DATE: | 6/18/87 | 6/18/87 |

LICENSE APPLICATION FOR THE EXEMPT DISTRIBUTION OF SMOKE DETECTORS CONTAINING AMERICIUM 241

3.1 Summary Data

3.1.1 Date of application 7/25/88

3.1.2 Applicant: Security Engineering Inc.
3560 US 158 Box 746
Clemmons, NC 27012

Contact person: O. N. Swanson President 919-766-9902

3.1.3 Device type: Smoke detector

3.1.4 Models: A1---, B1---, C1---
A2---, B2---, C2---

1 models are single source single chamber detectors, they all have identical chambers. The A models are externally powered, the B models are battery powered, the C models are combination battery and externally powered. The suffixes forthe model numbers indicate different voltages, and other electrical paramaters.

2 models are single source concentric chamber detectors, they all have identical chambers. The A, B, and C and suffixes are the same as for the (1) models.

3.1.7 Both 1 and 2 models may contain one of two sources both of which are manufactured by Nuclear Radiation Developments.
source: NRD A1008B 1 microcurrie Americum 241
NRD A1056 0.9 microcurrie Americium 241

3.1.8 End user leak testing not required. Sources are batch leak tested by manufacturer.

3.1.9 Principal use code: exempt device Ion generator, smoke detectors

# INDEX



Attachments: Security Engineering drawings SDCA1, SDCA2, SDL1

## 1. DESCRIPTON OF PRODUCT AND INTENDED USE

This device is an ionization type products of combustion detector which is used for the protection of life and property from fires. The device is manufactured by Security engineering, Inc. ad is marketed and distributed under the following model numbers:

Security Engineering Model A1---, B1---, C1---
A2---, B2---, C2---

Suffix 1 models are singlesource single chamber detectors, they all have identical chambers. The A models are externally powered, the B models are battery powered, the C models are combination battery and externally powered. The suffixes for the detectors indicate different voltages, and other electrical paramaters.

Suffix 2 models are single source concentric chamber detectors, they all have identical chambers. The A, B, & C sufixes are the same as for the 1 models.

The ionization chamber, which is open to the atmosphere, is constantly irradiated with alpha particles from a Americium 241 source. As a result of this ionizaton a small current flows across the chamber. Upon entering the chamber, products of combustion absord a portion of the appha partiles and thus reduce the ionizaton current. This drop in current is sensed by the electronic circuit and initiates an alarm.

II.

A. TYPE AND QUANTITY OF BY-PRODUCT MATERIAL

The detector uses one Americium foil containing 1.0uCi $^{241}Am$. The maximum number of units to be stored in one location at any time is 4000 for a total of 4mCi $^{241}Am$. the estimated annual production is 10,000 units or a total of 10mCi.

B. CHEMICAL AND PHYSICAL FORM

1. The active material is Americium Oxide ($AmO_2$) dispersed in a gold matrix. This is sandwiched between a 0.2mm thick silver layer and a 0.002mm gold layer. The foil is circular, 0.5cm in diameter.

2. All components except Americium are noble metals not subject to oxidation or chemical attack. No change in physical form is possible without melting the piece, which would require 960° C. Therefore, no changes in chemical or physical properties are expected over the useful life of the detector.

C. SOLUBILITY IN WATER AND BODY FLUIDS

No exact data is available on the solubility of $AmO_2$ in water or body fluids. According to a report by ORNL (ORNL-TM-2684 "Containment Integrity of $^{226}Ra$ and $^{241}Am$ Foils Employed in Smoke Detectors," by R.G. Neimeyer) negligible activity can be leached from intact foils by water. According to the ICRP the absorption from the G.I. tract is less than $10^{-4}$ indicating very low solubility in body fluids. Due to the physical form of the $^{241}Am$ in the foils leaching of activity from the foils in body fluids would be expected to be even less.

III.

A. CONSTRUCTION AND DESIGN

The method of attaching the foil containing the Americium source to the source holder is described in Attachment A - NRD Q.C. Procedures and two Rivet Drawings. The edge of the foil is completely surrounded by the crimped edge of the source holder.

Drawings SDCA1 and SDCA2 show the method of fastening the source holder to the printed circuit board. As can be seen the source cannot be touched without disassembly of the chamber cover.

B. PROPOSED METHOD OF LABELING

Drawing SD41 shows the labelsto be used to identify the units. The label is to be affexed to the back surface of the detector.

IV.

A. EXTERNAL RADIATION LEVELS

The external radiation levels at the surface of the unit, at 5cm from the unit, and at 25cm from the unit were measured using a Ge(Li) detector with a multichannel analyzer system. A standard $^{241}Am$ source (Eberline #S-654, 4,027,000 cpm ±10%) was counted using the same system. A conversion factor relating count rate summed over fifteen channels to exposure rate was obtained.

The gamma exposure constant calculated from the absorption coefficient for 60KeV gamma rays in air is 4.4uR/hr-μCi at 5 cm from a point source.

Activity of standard = 4,027,000 cpm ± 10%

Conversion factor = $2.68 \times 10^{-4}$ uR/hr/c/m

Maximum Exposure Rates:

25 cm from front of unit - < 0.42μR/hr
5cm from fron of unit - < 4.6μR/hr
surface of front of unit - <15.8μR/hr

25cm from side of unit - <0.27μR/hr
5cm from side of unit - <1.5μR/hr
surface of side of unit - <3.15μR/hr

25cm from back of unit - <0.33μR/hr
5cm from back of unit - <3.3μR/hr
surface of back of unit - <12.5μR/hr

The external radiation levels from the sides of the unit were found to be directional due to the other components in the case. The highest radiation level is reported.

Measurements were also taken on the packaged unit. These levels were also found to be directional. The maximum radiation levels at the side of the package corresponding to the side of the unit are reported below:

25cm from package - < 0.25μR/hr
5cm from package - < 1.4μR/hr
Surface of package - < 3.0μR/hr

B. DEGREE OF ACCESS DURING NORMAL USE

1. Normal Application

In normal use the device is wall or ceiling mounted and is not handled by anyone. Periodically the exterior surface of the mounted device is vacuum cleaned to remove any accumulation of dust. The radioactive source cannot be touched, since the source is surrounded by the printed circuit board and the ionization chamber assembly and the case surround the chamber.

2. Installation and Service

The unit is ceiling or wall mounted. The only maintenance required by the user is to periodically vaccum the housing to to remove dust and to change batteries. The unit is not to be serviced in the field otherwise.

3. Accidental Handling and Abuse

The only way a person would have access to the radioactive source would be to remove the case cover, and then remove the ionization chamber cover to expose the source.

C. QUANTITY OF BY-PRODUCT MATERIAL EXPECTED TO BE DISTRIBUTED ANNUALLY

1. Annual Distribution - 10,000 units

($10 mCi\ ^{241}Am$)

2. Maximum number of sources stored in any one location at any time - 4,000 (1mCi)

D. EXPECTED USEFUL LIFE OF THE PRODUCT - 15 YEARS

This expectation is based on manufacturing experience with the electronic and mechanical components to be used. The integrity of the radioactive source is expected to be considerably longer than 15 years.

This expectation is based upon:

1. The half-life of $^{241}Am$ is 458 years. In 15 years the source activity will be reduced less than 2.5% by radioactive decay.

2. Since the source is a sealed source i.e. sandwiched between very inert metals, it is impervious to all normally expected atmospheric conditions in residential or even commercial environments.

V.

A. PROCEDURES FOR PROTOTYPE TESTING

1. The surface of the foil in the ion chamber was wiped with filter paper. The wipe was counted in a proportional gas flow counter capable of detecting 3.69pCi of Alpha activity at the 68% confidence level.

Counter efficiency - 50%

Background count rate - 57.3cpm ± 17

Counting time - 10 min.

$$\text{Minimum detectable activity} = \frac{\sqrt{\frac{3Rb}{t}}}{\text{Efficiency}} \qquad \frac{\sqrt{\frac{3x57.3}{10}}}{0.50} =$$

08.2d/m = 3.69pCi

2. The unit was dropped from a height of eight feet one hundred times. The unit was then dismantled and the foil visually inspected for damage and wiped to detect removeable contamination. The wipe was counted as above.

3. A foil crimped into place on its mounting was wiped. The mounting was immersed in water for 18 hours then boiled for 2 hours. The foil was then wipe tested again. The wipes were counted as described above.

The water in which the foil was boiled was evaporated to dryness on a planchet and the planchet counted in the proportional counter.

4. Refer to the publication ORNL TM-2684. The foils were subjected to three weeks water leaching tests and twelve weeks of exposure to 100°F and 90% relative humidity. The foils were also subjected to fire tests, heated from 260° C to 925° C during one hour.

The ORNL TM-2684 report is applicable to the foils used in the detector. The foil processing as described in the report is the same as that used by Nuclear Radiation Development and Amersham Searle.

B. RESULTS OF PROTOTYPE TESTING

1. The alpha determination on the filter paper wipe of the foil in the ion chamber indicated 10pCi removable contamination.

2. A wipe test of the unit after being dropped 100 times from a height of eight feet showed 3pCi removable contamination. Visual inspection showed no damage either to the foil or its mounting.

3. Wipe tests made on the mounted foil before and after immersion and boiling in water showed less than 3pCi removable activity.

The planchet in which the water was evaporated contained less than 8pCi.

4. A non-measurable activity loss due to environmental and water leaching tests was noted by ORNL.

The fire test indicated only 0.31% of the initial activity was lost.

VI.

A. ESTIMATED EXTERNAL RADIATION EXPOSURES

1. Detector in home or office use

Assume 25cm from front of unit 8 hours/day

Radiation level - 0.42μR/hr

Exposure level - 0.42μR/hr x 8hr/day x 365d/yr + 1.23 mR/yr

It is highly improbable that this situation would occur; however, 25cm is used as it is the greatest distance for which accurate measurements were made. A more probable distance would be 4 feet.

2. Worker assembling or installing units

a. Assume Whole Body 25cm from unit

40 hr/wk x 50 wk/yr x 0.42μR/hr = 0.841mR/yr

b. Surface exposure to hands

Radiation level at surface of top of unit = 15.8μR/hr

Assume workers hands are in direct contact with the top of the unit 10% of the time.

15.8μR/hr x 0.1 x 40hr/wk x 50wk/yr = 3.16mR/yr

3. Homeowner installing unit

Assume maximum time needed to install unit is 30 minutes

a. Whole body exposure (25cm)

0.42μR/hr x 0.5hr = 0.2μR

b. Surface exposure to hands

15.8μR/hr x 0.5hr = 7.9μR

4. Warehouse employee

a. Surface exposure from handling one package unit

Maximum exposure from top of packaged unit

Surface - 15μR/hr

$15\mu R/hr \times 40hr/wk \times 50wk/yr \times 0.10 = 3.04 \frac{mR}{yr}$

Assume contact with the hands 10% of the time.

b. Exposure from stacked array of packaged units

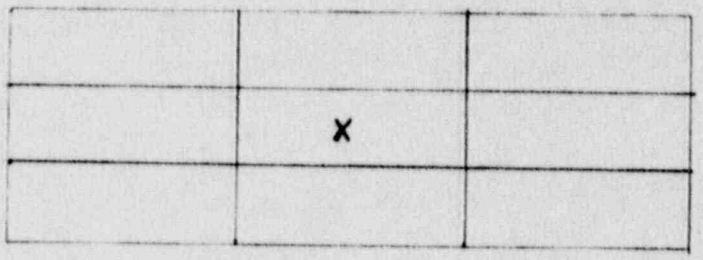
(These exposures would be from the side of the unit)

1. Surface exposure to workers hands

The radiation level at the surface of a stacked array of packaged units would not be expected to be appreciably greater than the surface radiation level at the surface of any one packaged unit due to the shielding provided by the units themselves.

This shielding in addition to the shielding provided by the packaging material would reduce the contribution to the surface radiation level of any units below the first layer to a negligible amount.

Due to shielding by the units and geometry only the immediately adjacent packages would contribute to the exposure at the surface of any one package.




The surface radiation level at X on the side surface of a stack of 9 PACKAGED units was measured and found to be 4.3μR/hr. The single unit side radiation level was 3μR/hr.

Radiation exposure to warehouse workers hands =

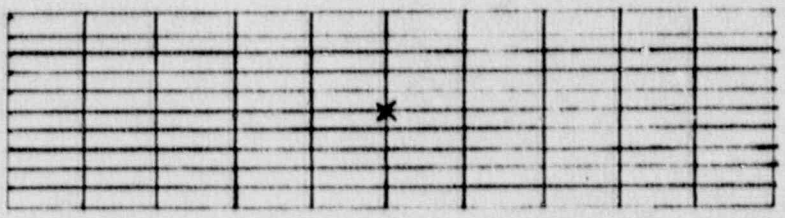
4.4μR/hr x 40h/wk x 50wk/hr x 0.10 = 0.897mR/yr

Assume workers hands in contact with packages 10% of the time.

2. Whole body exposure 3 ft. from stacked array

Due to shielding by the units themselves, only the first layer of the packages would contribute to the radiation level.

Assume a 10 x 10 array of packages with the all activity at the center of the array. This assumption results in overestimation of the exposure.



Exposure at side surface of 1 unit = 3μR/hr

Exposure at surface x = $3x10^2$μR/hr

The source is located 3 inches from the side of the box surface.

Exposure at 36" from surface = $3x10^2$μR/hr x $\frac{(3")^2}{(39")^2}$

$3x(10^2)$μR/hr x $\left(\frac{9}{1521}\right)$ = 1.76μR/hr

Annual exposure to worker 3 ft. from array = 1.75μR/hr x 40hr/wk x 50wk/yr = 3.5mR/yr

B. ESTIMATED INTERNAL DOSE

1. Ingestion of a single foil

Foils are crimped securely on a pin. The pin is mounted securely in the ion chamber. It is practically impossible that the foil would come loose from the pin.

The worst possible case of exposure due to ingestion would occur if an individual swallowed a foil. The 50 year dose commitment due to the ingestion of 2μCi of $^{241}Am$ is as follows:

Critical organ - bone - $7 \times 10^3$ g

Fraction reaching bone by ingestion $-2.5 \times 10^{-5}$

Effective energy - 28 MeV/dis

$$\text{Dose (Rem)} = 2\mu\text{Ci} \times 2.2 \times 10^6 \text{d/m-}\mu\text{Ci} \times 28 \text{ MeV/dis} \times 1.6 \times 10^{-6} \text{erg/MeV} \times \frac{2.5 \times 10^{-5}}{7 \times 10^3} \text{g} \times 10^{-2} \frac{\text{rad-gm}}{\text{erg}} \times 10 \text{ Rem/rad} \times 5.28 \times 10^5 \text{m/yr} \int_0^{50} e^{-\lambda t} dt =$$

$$37.05 \times 10^{-3} \text{Rem/yr} \left[ -\frac{1}{\lambda} \left( e^{-\lambda t} - 1 \right) \right]_0^{50}$$

$$\lambda = \frac{.693}{140} = 4.95 \times 10^{-3} \qquad t = 50y$$

$$\text{Dose (Rem)} = 37.05 \times 10^{-3} \left[ 44.3y \right] \text{Rem/50y} = 1.64 \text{ Rem/50y}$$

2. Inhalation of $^{241}Am$ from home or office fire

Assume

a. 0.31% of the radioactive material is lost in burning.

b. All Americium is converted to particulates in the respirable range.

c. Inhabitants remain in building five minutes after foil is burned (this is unlikely since the detector would have warned of the fire).

d. One unit per 1000 $ft^2$ floor space; 8 ft. ceilings

$V = 8000\ ft^3 = 2.27 \times 10^8 cc$

e. No exchange of air

f. Pulmonary lymph nodes are the critical organ (H.P.16, (480), 1969). Fraction reaching lymph nodes = 0.945%

Mass of lymph nodes = 50g

g. Breathing rate = $1.04 \times 10^5$ cc/5min

$10^7$/8hrs = $2.08 \times 10^4$ cc/min

$$\text{Dose (Rem)} = 2\mu Ci \times 2.2\times10^6 d/m\text{-}\mu Ci \times 5.7 MeV/d \times 1.6\times10^{-6} \frac{erg}{MeV}$$

$$\times 0.0031 \times \frac{1.04\times10^5 cc/5min}{2.27\times10^8 cc} \times \frac{0.00945}{50g}$$

$$\times 10^{-2} \frac{Rad\text{-}gm}{erg} \times 10 \frac{Rem}{Rad} \times 5.28\times10^5 min/yr \int_0^{50} e^{-\lambda t}\, dt$$

$$\text{Dose (Rem)} = 56.7\times10^{-5}\text{Rem/yr} \int_0^{50} e^{-\lambda t}\, dt$$

$$t = 50y \qquad \lambda = \frac{.693}{433y} = 1.6 \times 10^{-3}$$

$$\text{Dose (Rem)} = 56.7\times10^{-5}\text{Rem/yr} \left[ -\frac{1}{\lambda} \left(e^{-\lambda t} - 1\right) \right]_0^{50}$$

Dose (Rem = $56.7\times10^{-5}$ (48.06) = .027Rem

3. Inhalation of $^{241}Am$ from warehouse fire

Assume: 2000 units stored

Fire area 100,000 $ft^2$ with 8 ft. ceilings

300,000 $ft^3 = 2.27\times10^{10}cc$

Other assumptions as in part 2.

$$\text{Dose (Rem)} = 2\mu Ci \times 2\times10^{3} \times 2.2\times10^{6}\text{d/m-}\mu Ci \times 5.7\text{MeV/d} \times 1.6\times10^{-6}\frac{erg}{MeV} \times 0.0031 \times \frac{0.00945}{50g} \times \frac{1.04\times10^{5}cc}{2.27\times10^{10}cc} \times$$

$$10^{-2}\ \frac{Rad\text{-}gm}{erg} \times 10\ \frac{Rem}{Rad} \times 5.28\times10^{5}\text{min/yr} \int_0^{50} e^{-\lambda t}\, dt$$

$$\text{Dose (Rem)} = 11.42\times10^{3} \left[ \frac{1}{\lambda} \left(e^{-\lambda t} - 1\right) \right]_0^{50}$$

$$\lambda = 1.60\times10^{-3} \qquad t = 50y$$

$$\text{Dose (Rem)} = 11.42(10^{-3}) \quad (48.06) = 0.548\text{Rem}$$

C. COMPLIANCE WITH 32:27

1. Normal Use

a. External exposures during normal use and installation

1. Homeowner or office worker - 1.23 mR/yr

2. Worker assembling or installing unit

a. Whole body - 0.84 mR/yr

b. Surface exposure to hands - 3.16 mR/yr

3. Homeowner installing unit

a. Whole body - 0.2μR

b. Hands - 7.9μR

4. Warehouse employee

a. Exposure to hands from single packaged unit -3.04 $\frac{mR}{yr}$

b. Exposure to hands from array of units - 4.3 $\frac{mR}{yr}$

c. Whole body exposure from array of units - 3.5 $\frac{mR}{yr}$

b. Internal exposures during normal use - none

c. All of the above values fall within the limits set in Column 1 of 32:28

2. Abnormal Conditions

a. Ingestion of a single foil - 1.64 $\frac{Rem}{50y}$

The probability of an individual swallowing a foil is negligible. The foils are crimped securely on pins.

b. Inhalation from home or office fire - 0.027 Rem.
The probability of the foil burning completely before the inhabitants escape from the home or office is low. In a one hour burn test at ORNL only 0.31% of the activity was released. The fraction released in five minutes would be expected to be much lower.

c. Inhalation from a warehouse fire - 0.548 Rem.
The probability of a fire of this magnitude occuring is very low since presumably the area is equipped with warning devices. As in part b, the fraction of the activity released in five minutes will be considerably less than the 0.31% factor used. The probability of all the foils in storage in the warehouse burning at the same time is also negligible. Therefore, it may be concluded that the probability of the limits in 32:28 column 3 being exceeded is negligible.

VII.

A. QUALITY CONTROL PROCEDURES RECORD KEEPING

Quality control procedures to insure that the $^{241}Am$ sources used have the proper activity and the minimum removeable contamination will be in effect both at NRD, the supplier of the foils, and at Security Engineering, Inc.

The quality control of removeable contamination at NRD Inc. consists of batchwiping the sources after mounting in the source holder. The filter paper wipes are counted in a gas-flow proportioned counter. Approximately 10-50 sources are wiped per filter paper. The upper limit of removeable contamination per shipment to Security Engineering is 0.001 μCi although their experience has been that the removeable contamination per shipment is considerably lower.

At Security Engineering wipe tests are made on 22 of every 1000 source lots and the wipes are counted on an alpha scintilation counter. If removable contamination ever reaches .001 microcurie the lot will be returned to the manufacturer.

There are several assembly line tests that indirectly measure the activity of the radioactive source. NRD certifies that the activity of the foils, If by chance a source is used that had activity significantly outside of that range it will be rejected and sent back to the supplier for disposal.

100% visual inspection of the source holder-printed circuit board assembly is the Q.C. procedure we plan to use to insure a properly riveted assembly. A full, roll set clinch without evidence of cracks represents an acceptable set. If an unacceptable clinch is made the rivet portion will be drilled out and another source holder will be used.

Our decision to use visual inspection is based on our high level of confidence in the integrity of the joints made by riveting the assembly. Laboratory tests of the assembly revealed a force of 30 lbs. was required to separate the Source Holder from the P.C. Board. Also, examination of the prototype unit after being subjected to drop tests (ref: Section V, page 1, par. 2) showed the Source Holder - P.C. Board Assembly to be intact.

Records will be kept of the number of radioactive sources received, the number that are accepted or rejected and the number transferred annually to persons exempt from specific licensing.

**SmokeMaster™**
**IONIZATION SMOKE DETECTOR**

**MODEL A1P-115V 60HZ A.C. 60ma. max.**
**Sensitivity – 2% optical obscuration.**
**Install per owners manual 74A1 and NFPA STD 74.**
**Available at 470 Atlantic Ave., Boston, Ma. 02210**

**CONTAINS RADIOACTIVE MATERIAL – 1 MICROCURIE.**
**AMERICIUM - 241, U.S. NRC LICENSE NO. 32-16736-01E**

**DO NOT REMOVE COVER – LINE VOLTAGE INSIDE.**
**Removal of this label is prohibited.**
**Security Engineering Inc., Clemmons, N.C.**
**DATE MANUFACTURED**

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**SmokeMaster™ Ionization Smoke Detector**

MODEL B1 — Sensitivity — 2% optical obscuration
Install per owners manual B1 and NFPA STD 74. Available at 470 Atlantic Ave., Boston, Ma. 02210. Do not paint or spray with cleaners.

Test weekly with smoke. Replace battery when Detector emits a short chirping sound at approximately one-minute intervals.

— WARNING —

Use only the following batteries: Mallory MN1604, or Radio Shack 23-553. A different battery may have a detrimental effect on Detector operation and will void warranty.

**CONTAINS RADIOACTIVE MATERIAL — 1 MICROCURIE**
**AMERICIUM-241, U.S. NRC. LICENSE NO. 32-16736-01E**

**Security Engineering Inc., Clemmons, N. C.**
DATE MANUFACTURED

FM

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**SmokeMaster™ Ionization Smoke Detector**
MODEL A1S 2% optical obscuration

**CONTAINS RADIOACTIVE MATERIAL — 1 MICROCURIE**
**AMERICIUM-241, U.S. NRC. LICENSE NO. 32-16736-01E**

**Security Engineering Inc., Clemmons, N.C.**
DATE MANUFACTURED

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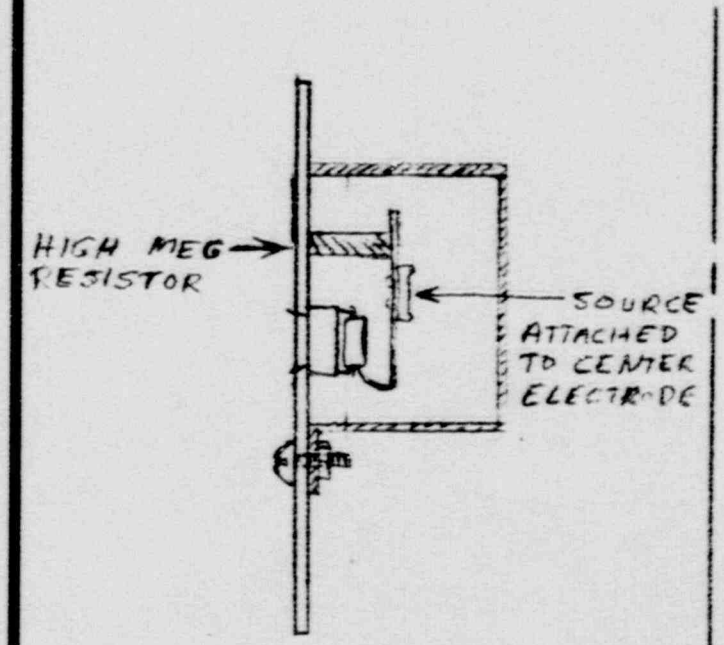
SECURITY ENGINEERING INC.

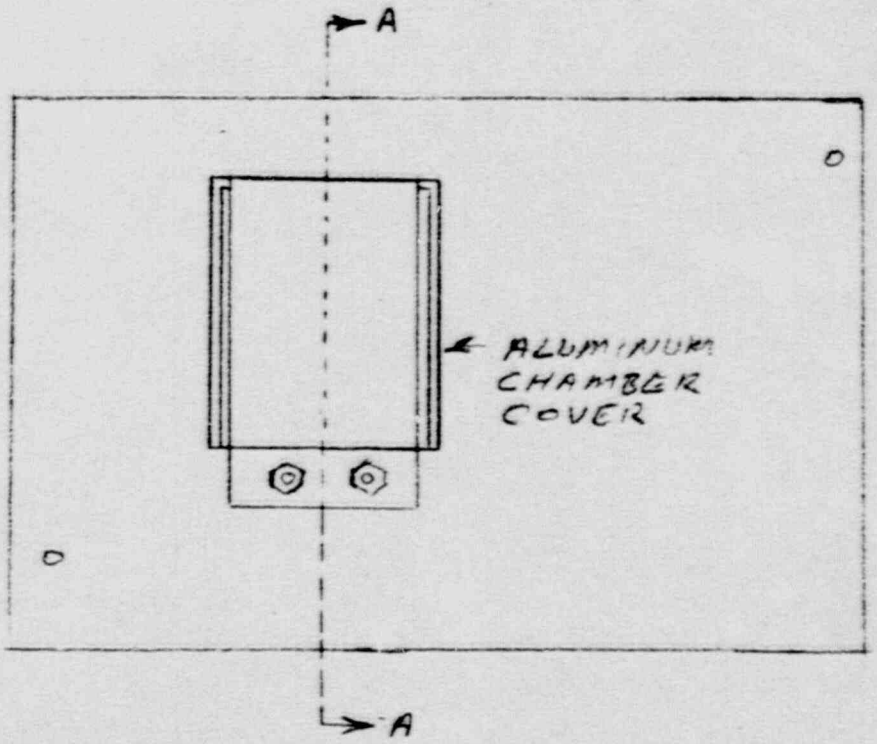
| | | |
|---|---|---|
| SCALE: FULL | APPROVED BY: | DRAWN BY |
| DATE: 7/25/88 | | REVISED |

SMOKE DETECTOR LABELS

DRAWING NUMBER
SDL-1




SECTION A-A



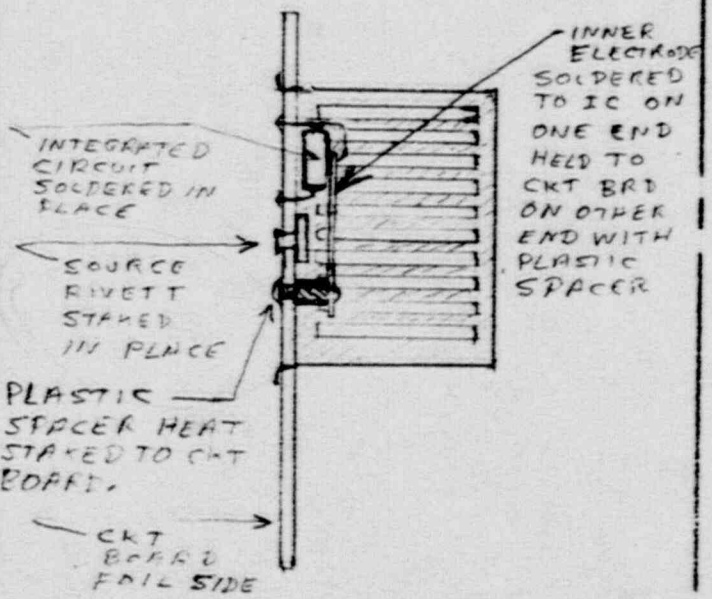

PLAN VIEW OF CKT. BRD. WITH CHAMBER HOUSING IN PLACE

SECURITY ENGINEERING INC.

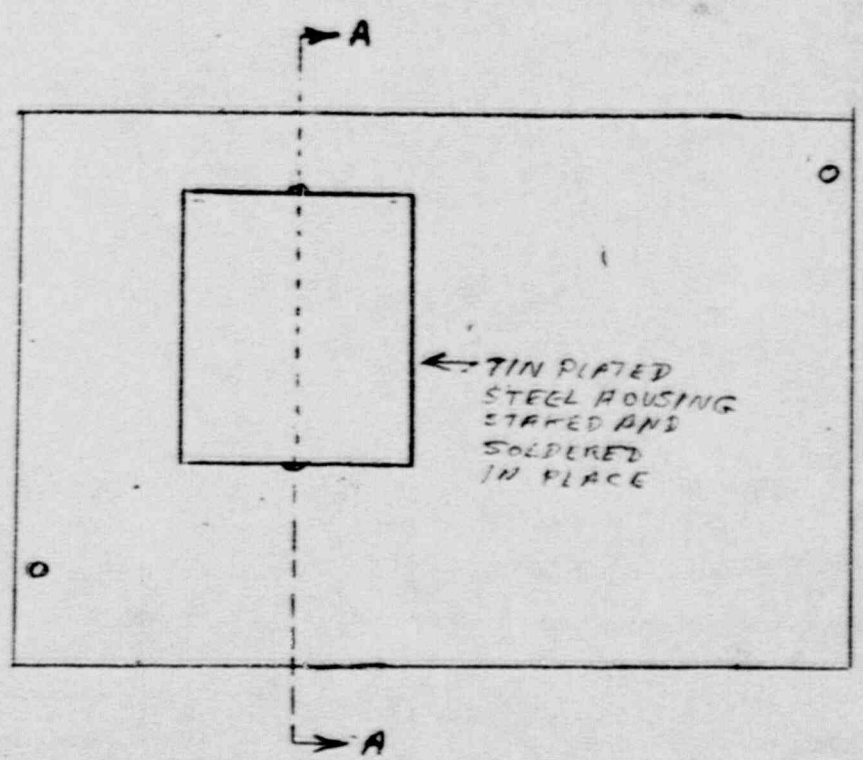
| | | |
|---|---|---|
| SCALE: FULL | APPROVED BY: DLB | DRAWN BY DLB |
| DATE: 7/25/88 | | REVISED |

CHAMBER ASSEMBLY (SINGLE)
MODELS A1, B1, & C1

DRAWING NUMBER
SDCA1




SECTION A-A




PLAN VIEW OF CKT. BRD. WITH CHAMBER HOUSING IN PLACE

SECURITY ENGINEERING INC.

| | | |
|---|---|---|
| SCALE: FULL | APPROVED BY: DHO | DRAWN BY: DHS |
| DATE: 7/25/88 | | REVISED |

CHAMBER ASSEMBLY MODELS A2, B2, & C2

DRAWING NUMBER: SDCA2

LICENSE APPLICATION FOR THE EXEMPT DISTRIBUTION OF SMOKE DETECTORS CONTAINING AMERICIUM 241

3.1 Summary Data

3.1.1 Date of application 7/25/88

3.1.2 Applicant: Security Engineering Inc.
3560 US 158 Box 746
Clemmons, NC 27012

Contact person: O. N. Swanson President 919-766-9902

3.1.3 Device type: Smoke detector

3.1.4 Models: A1---, B1---, C1---
A2---, B2---, C2---

1 models are single source single chamber detectors, they all have identical chambers. The A models are externally powered, the B models are battery powered, the C models are combination battery and externally powered. The suffixes forthe model numbers indicate different voltages, and other electrical paramaters.

2 models are single source concentric chamber detectors, they all have identical chambers. The A, B, and C and suffixes are the same as for the (1) models.

3.1.7 Both 1 and 2 models may contain one of two sources both of which are manufactured by Nuclear Radiation Developments.
source: NRD A1008B 1 microcurrie Americum 241
NRD A1056 0.9 microcurrie Americium 241

3.1.8 End user leak testing not required. Sources are batch leak tested by manufacturer.

3.1.9 Principal use code: exempt device Ion generator, smoke detectors

# INDEX



Attachments: Security Engineering drawings SDCA1, SDCA2, SDL1

1. DESCRIPTON OF PRODUCT AND INTENDED USE

This device is an ionization type products of combustion detector which is used for the protection of life and property from fires. The device is manufactured by Security engineering, Inc. ad is marketed and distributed under the following model numbers:

Security Engineering Model A1---, B1---, C1---
A2---, B2---, C2---

Suffix 1 models are singlesource single chamber detectors, they all have identical chambers. The A models are externally powered, the B models are battery powered, the C models are combination battery and externally powered. The suffixes for the detectors indicate different voltages, and other electrical paramaters.

Suffix 2 models are single source concentric chamber detectors, they all have identical chambers. The A, B, & C sufixes are the same as for the 1 models.

The ionization chamber, which is open to the atmosphere, is constantly irradiated with alpha particles from a Americium 241 source. As a result of this ionizaton a small current flows across the chamber. Upon entering the chamber, products of combustion absord a portion of the appha partiles and thus reduce the ionizaton current. This drop in current is sensed by the electronic circuit and initiates an alarm.

II.

A. TYPE AND QUANTITY OF BY-PRODUCT MATERIAL

The detector uses one Americium foil containing 1.0uCi $^{241}Am$. The maximum number of units to be stored in one location at any time is 4000 for a total of 4mCi $^{241}Am$. the estimated annual production is 10,000 units or a total of 10mCi.

B. CHEMICAL AND PHYSICAL FORM

1. The active material is Americium Oxide ($AmO_2$) dispersed in a gold matrix. This is sandwiched between a 0.2mm thick silver layer and a 0.002mm gold layer. The foil is circular, 0.5cm in diameter.

2. All components except Americium are noble metals not subject to oxidation or chemical attack. No change in physical form is possible without melting the piece, which would require 960° C. Therefore, no changes in chemical or physical properties are expected over the useful life of the detector.

C. SOLUBILITY IN WATER AND BODY FLUIDS

No exact data is available on the solubility of $AmO_2$ in water or body fluids. According to a report by ORNL (ORNL-TM-2684 "Containment Integrity of $^{226}Ra$ and $^{241}Am$ Foils Employed in Smoke Detectors," by R.G. Neimeyer) negligible activity can be leached from intact foils by water. According to the ICRP the absorption from the G.I. tract is less than $10^{-4}$ indicating very low solubility in body fluids. Due to the physical form of the $^{241}Am$ in the foils leaching of activity from the foils in body fluids would be expected to be even less.

III.

A. CONSTRUCTION AND DESIGN

The method of attaching the foil containing the Americium source to the source holder is described in Attachment A - NRD Q.C. Procedures and two Rivet Drawings. The edge of the foil is completely surrounded by the crimped edge of the source holder.

Drawings SDCA1 and SDCA2 show the method of fastening the source holder to the printed circuit board. As can be seen the source cannot be touched without disassembly of the chamber cover.

B. PROPOSED METHOD OF LABELING

Drawing SD&I shows the labelsto be used to identify the units. The label is to be affexed to the back surface of the detector.

IV.

A. EXTERNAL RADIATION LEVELS

The external radiation levels at the surface of the unit, at 5cm from the unit, and at 25cm from the unit were measured using a Ge(Li) detector with a multichannel analyzer system. A standard $^{241}Am$ source (Eberline #S-654, 4,027,000 cpm ±10%) was counted using the same system. A conversion factor relating count rate summed over fifteen channels to exposure rate was obtained.

The gamma exposure constant calculated from the absorption coefficient for 60keV gamma rays in air is 4.4uR/hr-μCi at 5 cm from a point source.

Activity of standard = 4,027,000 cpm ± 10%

Conversion factor = $2.69 \times 10^{-4}$ uR/hr/c/m

Maximum Exposure Rates:

25 cm from front of unit - < 0.43μR/hr

5cm from from of unit - < 4.6μR/hr

surface of front of unit - <15.8μR/hr

25cm from side of unit - <0.27μR/hr

5cm from side of unit - <1.5μR/hr

surface of side of unit - <3.15μR/hr

25cm from back of unit - <0.33μR/hr

5cm from back of unit - <3.3μR/hr

surface of back of unit - <12.5μR/hr

The external radiation levels from the sides of the unit were found to be directional due to the other components in the case. The highest radiation level is reported.

Measurements were also taken on the packaged unit. These levels were also found to be directional. The maximum radiation levels at the side of the package corresponding to the side of the unit are reported below:

| | | |
|---|---|---|
| 25cm from package | - | < 0.25μR/hr |
| 5cm from package | - | < 1.4μR/hr |
| Surface of package | - | < 3.0μR/hr |

B. DEGREE OF ACCESS DURING NORMAL USE

1. Normal Application

In normal use the device is wall or ceiling mounted and is not handled by anyone. Periodically the exterior surface of the mounted device is vacuum cleaned to remove any accumulation of dust. The radioactive source cannot be touched, since the source is surrounded by the printed circuit board and the ionization chamber assembly and the case surround the chamber.

2. Installation and Service

The unit is ceiling or wall mounted. The only maintenance required by the user is to periodically vaccum the housing to to remove dust and to change batteries. The unit is not to be serviced in the field otherwise.

3. Accidental Handling and Abuse

The only way a person would have access to the radioactive source would be to remove the case cover, and then remove the ionization chamber cover to expose the source.

C. QUANTITY OF BY-PRODUCT MATERIAL EXPECTED TO BE DISTRIBUTED ANNUALLY

1. Annual Distribution - 10,000 units

($10 mCi\ ^{241}Am$)

2. Maximum number of sources stored in any one location at any time - 4,000 (1mCi)

D. EXPECTED USEFUL LIFE OF THE PRODUCT - 15 YEARS

This expectation is based on manufacturing experience with the electronic and mechanical components to be used. The integrity of the radioactive source is expected to be considerably longer than 15 years.

This expectation is based upon:

1. The half-life of $^{241}Am$ is 458 years. In 15 years the source activity will be reduced less than 2.5% by radioactive decay.

2. Since the source is a sealed source i.e. sandwiched between very inert metals, it is impervious to all normally expected atmospheric conditions in residential or even commercial environments.

V.

A. PROCEDURES FOR PROTOTYPE TESTING

1. The surface of the foil in the ion chamber was wiped with filter paper. The wipe was counted in a proportional gas flow counter capable of detecting 3.69pCi of Alpha activity at the 68% confidence level.

Counter efficiency - 50%

Background count rate - 57.3cpm ± 17

Counting time - 10 min.

$$\text{Minimum detectable activity} = \frac{\sqrt{\frac{3Rb}{t}}}{\text{Efficiency}} \qquad \frac{\sqrt{\frac{3x57.3}{10}}}{0.50} =$$

$$08.2d/m = 3.69pCi$$

2. The unit was dropped from a height of eight feet one hundred times. The unit was then dismantled and the foil visually inspected for damage and wiped to detect removeable contamination. The wipe was counted as above.

3. A foil crimped into place on its mounting was wiped. The mounting was immersed in water for 18 hours then boiled for 2 hours. The foil was then wipe tested again. The wipes were counted as described above.

The water in which the foil was boiled was evaporated to dryness on a planchet and the planchet counted in the proportional counter.

4. Refer to the publication ORNL TM-2684. The foils were subjected to three weeks water leaching tests and twelve weeks of exposure to 100°F and 90% relative humidity. The foils were also subjected to fire tests, heated from 260°C to 925°C during one hour.

The ORNL TM-2684 report is applicable to the foils used in the detector. The foil processing as described in the report is the same as that used by Nuclear Radiation Development and Amersham Searle.

B. RESULTS OF PROTOTYPE TESTING

1. The alpha determination on the filter paper wipe of the foil in the ion chamber indicated 10pCi removable contamination.

2. A wipe test of the unit after being dropped 100 times from a height of eight feet showed 3pCi removable contamination. Visual inspection showed no damage either to the foil or its mounting.

3. Wipe tests made on the mounted foil before and after immersion and boiling in water showed less than 3pCi removable activity.

The planchet in which the water was evaporated contained less than 8pCi.

4. A non-measurable activity loss due to environmental and water leaching tests was noted by ORNL.

The fire test indicated only 0.31% of the initial activity was lost.

VI.

A. ESTIMATED EXTERNAL RADIATION EXPOSURES

1. Detector in home or office use

Assume 25cm from front of unit 8 hours/day

Radiation level - 0.42μR/hr

Exposure level - 0.42μR/hr x 8hr/day x 365d/yr = 1.23 mR/yr

It is highly improbable that this situation would occur; however, 25cm is used as it is the greatest distance for which accurate measurements were made. A more probable distance would be 4 feet.

2. Worker assembling or installing units

a. Assume Whole Body 25cm from unit

40 hr/wk x 50 wk/yr x 0.42μR/hr = 0.841mR/yr

b. Surface exposure to hands

Radiation level at surface of top of unit = 15.8μR/hr

Assume workers hands are in direct contact with the top of the unit 10% of the time.

15.8μR/hr x 0.1 x 40hr/wk x 50wk/yr = 3.16mR/yr

3. Homeowner installing unit

Assume maximum time needed to install unit is 30 minutes

a. Whole body exposure (25cm)

0.42μR/hr x 0.5hr = 0.2μR

b. Surface exposure to hands

15.8μR/hr x 0.5hr = 7.9μR

4. Warehouse employee

a. Surface exposure from handling one package unit

Maximum exposure from top of packaged unit

Surface - 15μR/hr

15μR/hr x 40hr/wk x 50wk/yr x 0.10 = 3.04 $\frac{mR}{yr}$

Assume contact with the hands 10% of the time.

b. Exposure from stacked arrry of packaged units

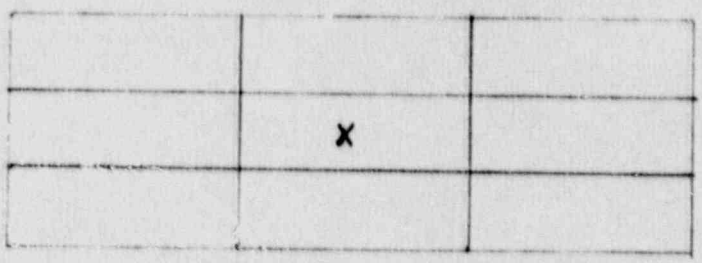
(These exposures would be from the side of the unit)

1. Surface exposure to workers hands

The radiation level at the surface of a stacked array of packaged units would not be expected to be appreciably greater than the surface radiation level at the surface of any one packaged unit due to the shielding provided by the units themselves.

This shielding in addition to the shielding provided by the packaging material would reduce the contribution to the surface radiation level of any units below the first layer to a negligible amount.

Due to shielding by the units and geometry only the immediately adjacent packages would contribute to the exposure at the surface of any one package.




The surface radiation level at X on the side surface of a stack of 9 PACKAGED units was measured and found to be 4.3μR/hr. The single unit side radiation level was 3μR/hr.

Radiation exposure to warehouse workers hands =

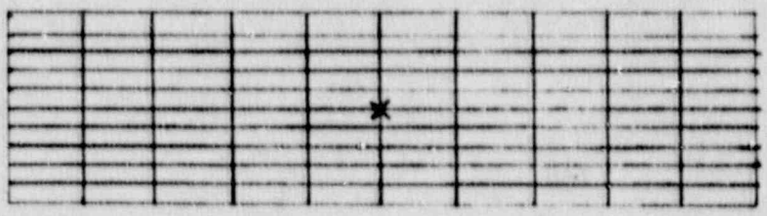
4.4μR/hr x 40h/wk x 50wk/hr x 0.10 = 0.897mR/yr

Assume workers hands in contact with packages 10% of the time.

2. Whole body exposure 3 ft. from stacked array

Due to shielding by the units themselves, only the first layer of the packages would contribute to the radiation level.

Assume a 10 x 10 array of packages with the all activity at the center of the array. This assumption results in overestimation of the exposure.



Exposure at side surface of 1 unit = 3μR/hr

Exposure at surface x = $3 \times 10^2$ μR/hr

The source is located 3 inches from the side of the box surface.

Exposure at 36" from surface = $3 \times 10^2$ μR/hr x $\frac{(3")^2}{(39")^2}$

$3 \times (10^2)$ μR/hr x $\left(\frac{9}{1521}\right)$ = 1.76μR/hr

Annual exposure to worker 3 ft. from array = 1.75μR/hr x 40hr/wk x 50wk/yr = 3.5mR/yr

B. ESTIMATED INTERNAL DOSE

1. Ingestion of a single foil

Foils are crimped securely on a pin. The pin is mounted securely in the ion chamber. It is practically impossible that the foil would come loose from the pin.

The worst possible case of exposure due to ingestion would occur if an individual swallowed a foil. The 50 year dose commitment due to the ingestion of 2μCi of $^{241}Am$ is as follows:

Critical organ - bone - $7 \times 10^3$ g

Fraction reaching bone by ingestion - $2.5 \times 10^{-5}$

Effective energy - 28 MeV/dis

$$\text{Dose (Rem)} = 2\mu\text{Ci} \times 2.2 \times 10^6 \text{d/m-}\mu\text{Ci} \times 28 \text{ MeV/dis}$$

$$\times 1.6 \times 10^{-6} \text{erg/MeV} \times \frac{2.5 \times 10^{-5}}{7 \times 10^3} \text{g} \times 10^{-2} \frac{\text{rad-gm}}{\text{erg}}$$

$$\times 10 \text{ Rem/rad} \times 5.28 \times 10^5 \text{m/yr} \int_0^{50} e^{-\lambda t} \, dt =$$

$$37.05 \times 10^{-3} \text{Rem/yr} \left[ -\frac{1}{\lambda} \left( e^{-\lambda t} - 1 \right) \right]_0^{50}$$

$$\lambda = \frac{.693}{140} = 4.95 \times 10^{-3} \qquad t = 50\text{y}$$

$$\text{Dose (Rem)} = 37.05 \times 10^{-3} \left[ 44.3\text{y} \right] \text{Rem/50y} = 1.64 \text{ Rem/50y}$$

2. Inhalation of $^{241}Am$ from home or office fire

Assume

a. 0.31% of the radioactive material is lost in burning.

b. All Americium is converted to particulates in the respirable range.

c. Inhabitants remain in building five minutes after foil is burned (this is unlikely since the detector would have warned of the fire).

d. One unit per 1000 $ft^2$ floor space; 8 ft. ceilings

$V = 8000\ ft^3 = 2.27 \times 10^8 cc$

e. No exchange of air

f. Pulmonary lymph nodes are the critical organ (H.P. 16, (480), 1969). Fraction reaching lymph nodes = 0.945%

Mass of lymph nodes = 50g

g. Breathing rate = $1.04 \times 10^5$ cc/5min

$10^7$/8hrs = $2.08 \times 10^4$ cc/min

$$\text{Dose (Rem)} = 2\mu Ci \times 2.2 \times 10^6 d/m\text{-}\mu Ci \times 5.7 MeV/d \times 1.6 \times 10^{-6} \frac{erg}{MeV}$$

$$\times 0.0031 \times \frac{1.04 \times 10^5 cc/5min}{2.27 \times 10^8 cc} \times \frac{0.00945}{50g}$$

$$\times 10^{-2} \frac{Rad\text{-}gm}{erg} \times 10 \frac{Rem}{Rad} \times 5.28 \times 10^5 min/yr \int_0^{50} e^{-\lambda t} dt$$

$$\text{Dose (Rem)} = 56.7\times10^{-5}\text{Rem/yr} \int_0^{50} e^{-\lambda t}\, dt$$

$$t = 50y \qquad \lambda = \frac{.693}{433y} = 1.6 \times 10^{-3}$$

$$\text{Dose (Rem)} = 56.7\times10^{-5}\text{Rem/yr} \left[ -\frac{1}{\lambda} \left(e^{-\lambda t} - 1\right) \right]_0^{50}$$

Dose (Rem = $56.7\times10^{-5}$ (48.06) = .027Rem

3. Inhalation of $^{241}Am$ from warehouse fire

Assume: 2000 units stored

Fire area 100,000 $ft^2$ with 8 ft. ceilings

800,000 $ft^3 = 2.27\times10^{10}cc$

Other assumptions as in part 2.

$$\text{Dose (Rem)} = 2\mu Ci \times 2\times10^{3} \times 2.2\times10^{6}\text{d/m-}\mu Ci \times 5.7\text{MeV/d} \times 1.6\times10^{-6}\frac{\text{erg}}{\text{MeV}} \times 0.0031 \times \frac{0.00945}{50\varepsilon} \times \frac{1.04\times10^{5}cc}{2.27\times10^{10}cc} \times$$

$$10^{-2}\ \frac{\text{rad-gm}}{\text{erg}} \times 10\ \frac{\text{Rem}}{\text{Rad}} \times 5.28\times10^{5}\text{min/yr} \int_0^{50} e^{-\lambda t}\, dt$$

$$\text{Dose (Rem)} = 11.42\times10^{3} \left[ \frac{1}{\lambda} \left(e^{-\lambda t} - 1\right) \right]_0^{50}$$

$$\lambda = 1.60\times10^{-3} \qquad t = 50y$$

$$\text{Dose (Rem)} = 11.42(10^{-3}) \quad (48.06) = 0.548\text{Rem}$$

C. COMPLIANCE WITH 32:27

1. Normal Use

a. External exposures during normal use and installation

1. Homeowner or office worker - 1.23 mR/yr

2. Worker assembling or installing unit

a. Whole body - 0.84 mR/yr

b. Surface exposure to hands - 3.16 mR/yr

3. Homeowner installing unit

a. Whole body - 0.2μR

b. Hands - 7.9μR

4. Warehouse employee

a. Exposure to hands from single packaged unit -3.04 $\frac{mR}{yr}$

b. Exposure to hands from array of units - 4.3 $\frac{mR}{yr}$

c. Whole body exposure from array of units - 3.5 $\frac{mR}{yr}$

b. Internal exposures during normal use - none

c. All of the above values fall within the limits set in Column 1 of 32:28

2. Abnormal Conditions

a. Ingestion of a single foil - 1.64 $\frac{Rem}{50y}$

The probability of an individual swallowing a foil is negligible. The foils are crimped securely on pins.

b. Inhalation from home or office fire - 0.027 Rem.
The probability of the foil burning completely before the inhabitants escape from the home or office is low. In a one hour burn test at ORNL only 0.31% of the activity was released. The fraction released in five minutes would be expected to be much lower.

c. Inhalation from a warehouse fire - 0.548 Rem.
The probability of a fire of this magnitude occuring is very low since presumably the area is equipped with warning devices. As in part b, the fraction of the activity released in five minutes will be considerably less than the 0.31% factor used. The probability of all the foils in storage in the warehouse burning at the same time is also negligible. Therefore, it may be concluded that the probability of the limits in 32:28 column 3 being exceeded is negligible.

A. QUALITY CONTROL PROCEDURES RECORD KEEPING

Quality control procedures to insure that the $^{241}Am$ sources used have the proper activity and the minimum removeable contamination will be in effect both at NRD, the supplier of the foils, and at Security Engineering, Inc.

The quality control of removeable contamination at NRD Inc. consists of batchwiping the sources after mounting in the source holder. The filter paper wipes are counted in a gas-flow proportioned counter. Approximately 10-50 sources are wiped per filter paper. The upper limit of removeable contamination per shipment to Security Engineering is 0.001 μCi although their experience has been that the removeable contamination per shipment is considerably lower.
At Security Engineering wipe tests are made on 22 of every 1000 source lots and the wipes are counted on an alpha scintilation counter. If removable contamination ever reaches .001 microcurie the lot will be returned to the manufacturer.

There are several assembly line tests that indirectly measure the activity of the radioactive source. NRD certifies that the activity of the foils. If by chance a source is used that had activity significantly outside of that range it will be rejected and sent back to the supplier for disposal.

100% visual inspection of the source holder-printed circuit board assembly is the Q.C. procedure we plan to use to insure a properly riveted assembly. A full, roll set clinch without evidence of cracks represents an acceptable set. If an unacceptable clinch is made the rivet portion will be drilled out and another source holder will be used.

Our decision to use visual inspection is based on our high level of confidence in the integrity of the joints made by riveting the assembly. Laboratory tests of the assembly revealed a force of 30 lbs. was required to separate the Source Holder from the P.C. Board. Also, examination of the prototype unit after being subjected to drop tests (ref: Section V, page 1, par. 2) showed the Source Holder - P.C. Board Assembly to be intact.

Records will be kept of the number of radioactive sources received, the number that are accepted or rejected and the number transferred annually to persons exempt from specific licensing.

**SmokeMaster™**
**IONIZATION SMOKE DETECTOR**

MODEL A1P-115V 60HZ A.C. 60ma. max.
Sensitivity – 2% optical obscuration.
Install per owners manual 74A1 and NFPA STD 74.
Available at 470 Atlantic Ave., Boston, Ma. 02210

CONTAINS RADIOACTIVE MATERIAL – 1 MICROCURIE.
AMERICIUM - 241, U.S. NRC LICENSE NO. 32-16736-01E

DO NOT REMOVE COVER – LINE VOLTAGE INSIDE.
Removal of this label is prohibited.

**Security Engineering Inc., Clemmons, N.C.**

DATE MANUFACTURED

---

**SmokeMaster™ Ionization Smoke Detector**

MODEL B1 — Sensitivity — 2% optical obscuration

Install per owners manual B1 and NFPA STD 74. Available at 470 Atlantic Ave., Boston, Ma. 02210. Do not paint or spray with cleaners.

Test weekly with smoke. Replace battery when Detector emits a short chirping sound at approximately one-minute intervals.

— WARNING —

Use only the following batteries: Mallory MN1604, or Radio Shack 23-553. A different battery may have a detrimental effect on Detector operation and will void warranty.

**CONTAINS RADIOACTIVE MATERIAL — 1 MICROCURIE**
**AMERICIUM-241, U.S. NRC. LICENSE NO. 32-16736-01E**

**Security Engineering Inc., Clemmons, N. C.**

DATE MANUFACTURED

---

**SmokeMaster™ Ionization Smoke Detector**

MODEL A1S 2% optical obscuration

**CONTAINS RADIOACTIVE MATERIAL — 1 MICROCURIE**
**AMERICIUM-241, U.S. NRC. LICENSE NO. 32-16736-01E**

**Security Engineering Inc., Clemmons, N.C.**

DATE MANUFACTURED

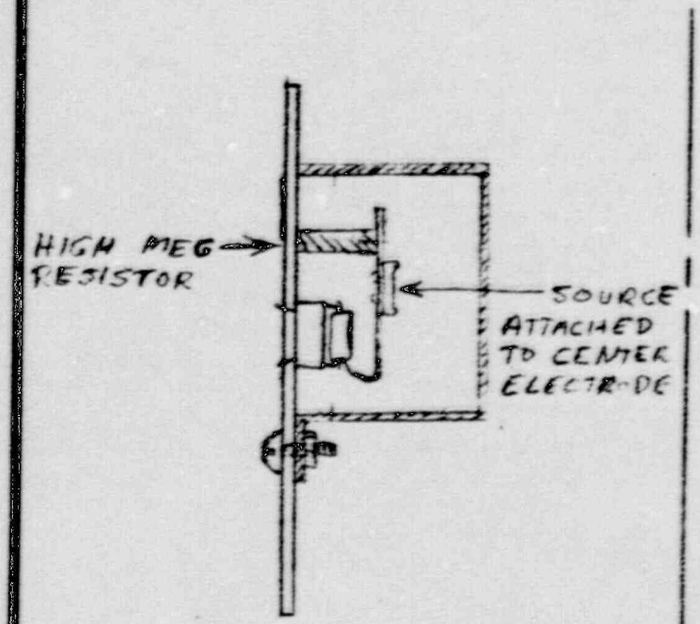
---

SECURITY ENGINEERING INC.

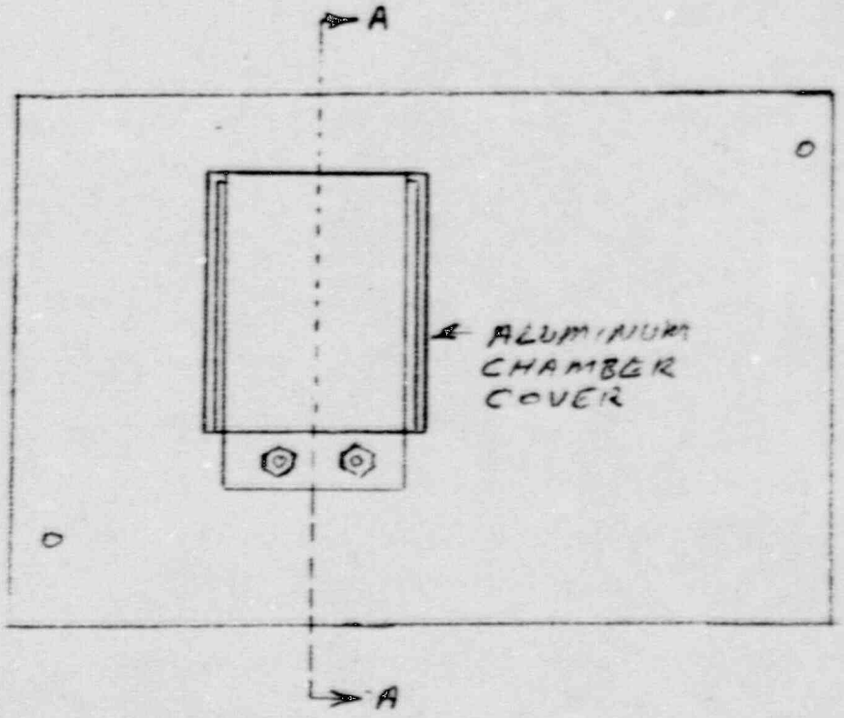
| | | |
|---|---|---|
| SCALE FULL | APPROVED BY: | DRAWN BY: |
| DATE 7/25/88 | | REVISED |

SMOKE DETECTOR LABELS

DRAWING NUMBER: SDL-1




SECTION A-A



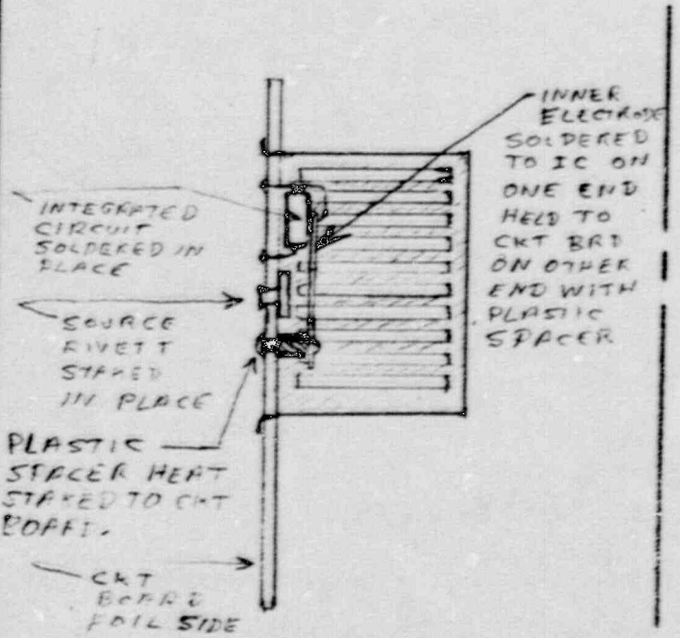

PLAN VIEW OF CKT. BRD. WITH CHAMBER HOUSING IN PLACE

SECURITY ENGINEERING INC.

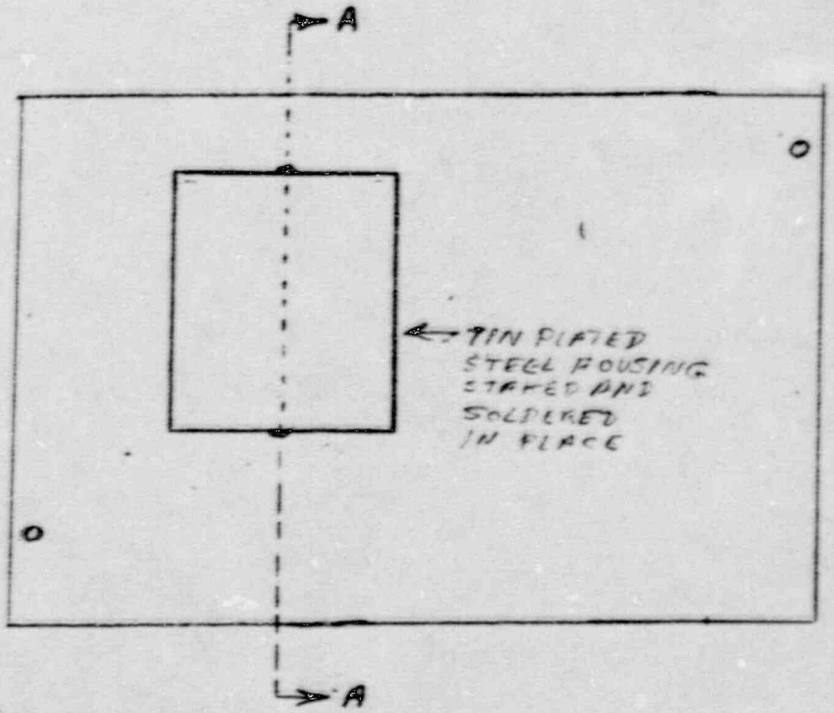
| | | |
|---|---|---|
| SCALE: FULL | APPROVED BY: OAL | DRAWN BY: OAL |
| DATE: 7/25/88 | | REVISED |

CHAMBER ASSEMBLY (SINGLE)
MODELS A1, B1, & C1

DRAWING NUMBER: SDCA1




SECTION A-A




PLAN VIEW OF CKT. BRD. WITH CHAMBER HOUSING IN PLACE

SECURITY ENGINEERING INC.

| | | |
|---|---|---|
| SCALE: FULL | APPROVED BY: CH's | DRAWN BY: CH's |
| DATE: 7/25/88 | | REVISED |

CHAMBER ASSEMBLY MODELS A2, B2, & C2

DRAWING NUMBER: SDCA2

SE SECURITY ENGINEERING, INC.
P O BOX 746 CLEMMONS N C 27012 (919) 766-9902

Docket No. 030-30052
Control No. 020227

U. S. Nuclear Regulatory Commission
ATTN: Anthony Huffert, Commercial Section
Medical, Academic, & Commercial Use Safety Branch
Division of Industrial & Medical Nuclear Safety
Office of Nuclear Material Safety & Safeguards
Mailstop 6H3
Washington, D. C. 20555

December 5, 1988

Gentlemen:

This is in answer to your November 8, 1988 letter requesting additional information for our application.

Item 1. The procedure for wipe testing and source handling which has been approved by the North Carolina Radiation Protection Section is attached. Also attached is their description of the tests as part of our North Carolina license.

Item 2. The NRD numbers on the application are for source holders with sources already attached. The foil used is NRD A001, which was approved by the NRC in 1969 before source registration numbers were used.

Item 3. Attached is the revised Drawing #SDCA1 showing the adhesive applied to the screws which hold the chamber cover in place. The other chamber cover is soldered in place as shown on Drawing #SDCA2.

Item 4. The counter used was a CANBERRA Model #8180 with a multichannel analyzer and a GE(L1) detector.

Please call if you need additional information.

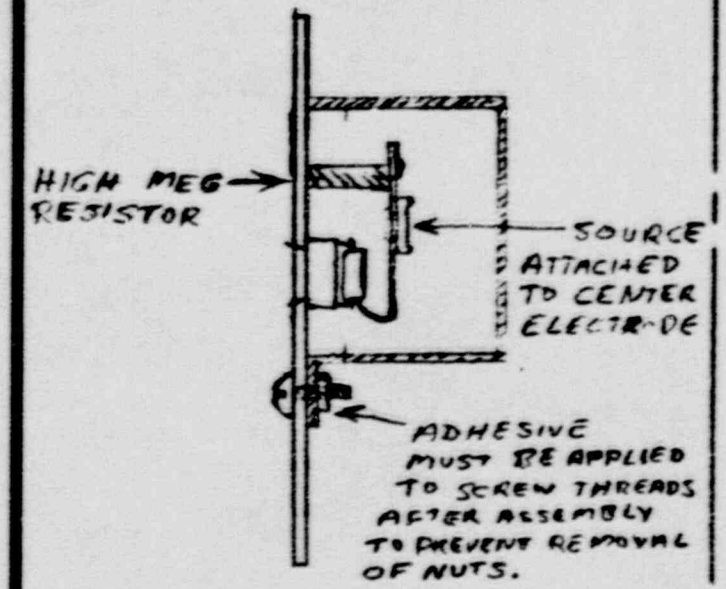
Sincerely,

ON Swanson

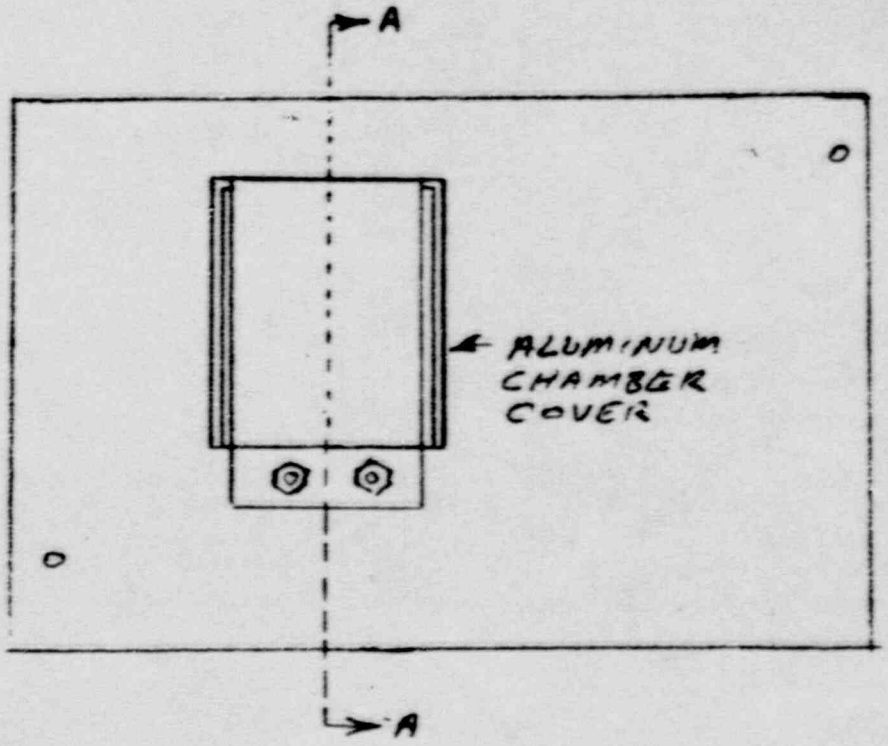
O. N. Swanson

ONS:jp

Enclosures (3)




SECTION A-A




PLAN VIEW OF CKT. BRD. WITH CHAMBER HOUSING IN PLACE

SECURITY ENGINEERING INC.

| | | |
|---|---|---|
| SCALE FULL | APPROVED BY: [illegible] | DRAWN BY [illegible] |
| DATE 7/25/88 | | REVISED 12/1/88 |

CHAMBER ASSEMBLY (SINGLE)
MODELS A1, B1, & C1

DRAWING NUMBER SDCA1

| | | |
|---|---|---|
| 6A. Americium 241 | 7A. Foil (NRD-A1008b) | 8A. 50 millicuries |
| B. Radium 226 | B. Foil (Amersham-Searle Corp. or NRD Model, R001) | B. See 9.B. on Page 1 |

Conditions (continued):

13.A. The sealed sources shall be tested for leakage and/or contamination in lots of 1000 sources. Twenty-two (22) sources of the lots shall be inspected and tested prior to use or transfer as a sealed source. If the inspection or test reveals construction defects or 0.005 microcurie or greater leakage and/or contamination, the source shall not be used or transferred as a sealed source until it has been repaired or decontaminated.

B. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Agency.

C. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Agency regulations. A report shall be filed within five (5) days of the test with the Radiation Protection Section, Division of Facility Services, Department of Human Resources, P. O. Box 12200, Raleigh, North Carolina 27605, describing the equipment involved, the test results and the corrective action taken.

D. Tests for leakage or contamination shall be performed by the licensee or by other persons specifically authorized by the Agency to perform such services.

14. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 7 and 8 of this license in accordance with statements, representations and procedures contained in:

a. Application (with attachments) dated October 14, 1984 and signed by O. N. Swanson, President.

Cecil B. Brown

For - Dayne H. Brown

November 8, 1984

Date of Issuance

Chief, Radiation Protection Section

SE

SECURITY ENGINEERING, INC.

P. O. BOX 749 CLEMMONS, N. C. 27012 (919) 766-8002

## Handling Procedures for AM241 Sources

1. Attach sources to the electrodes, 1000 at a time.

2. Place a 1μci source ¼inch from the Alpha probe. The count should be 250,000 CPM to 300,000 CPM. Maximum allowable leakage is .005μci

3. Wipe 22 of the 1000 sources with a swab. Place the swab ¼ inch from the probe. If the count ever exceeds 500 CPM the sources are not to be used. Our supplier does not ship anything with leakage over .0001 and we have never measured anything over .0001 μci.

4. After completing the wipe test, use the Alpha probe to survey the work area. If any activity over .005 μci is found, the area is to be decontaminated.

5. Results of the wipe test and area survey are to be recorded on the original leak test and receiving report, signed and dated.

6. Once a year the scintillation counter is to be calibrated.

10/14/84

JUN 2 7 1988

SECURITY ENG



Security Engineering, Inc.
ATTN: O. N. Swanson
P. O. Box 746
Clemmons, NC 27012

Docket No. 030-30052
Control No. 020227

Gentlemen:

SUBJECT: APPLICATION FOR MATERIAL LICENSE

This concerns your application for a material license and our letter (copy enclosed) in which we notified you that the application was deficient and that certain additional information was required.

You are hereby notified that unless within 30 days from the date of this notice we receive the additional information requested, we will consider your application as having been abandoned by you. This action is without prejudice to the resubmission of an application.

Sincerely,

Original Signed By
J. Bruce Carrico

J. Bruce Carrico
Medical, Academic and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Enclosure: As stated

DISTRIBUTION:
IMNS Central File
NMSS r/f
IMAB r/f
VMiller
BCarrico
MLamastra

| OFC: IMAB | :IMAB | : | : | : | : |
|---|---|---|---|---|---|
| NAME:BCarrico | :MLamastra: | : | : | : | : |
| DATE: 06/27/88 | : 06/27/88: | : | : | : | : |

OFFICIAL RECORD COPY

FEB 18 1988

Security Engineering, Inc.
ATTN: O. N. Swanson
P. O. Box 746
Clemmons, NC 27012

Gentlemen:

This refers to your letter dated June 2, 1986, which enclosed an application requesting renewal of Materials License No. 32-16736-01E.

As you are aware, License No. 32-16736-01E expired December 31, 1987, well before you submitted your renewal application. Because you allowed your license to elapse, we must process your request as an application for a new license. Therefore, you must submit complete, up-to-date information, without reference to previously submitted documents, concerning the products you wish distribute to persons exempt from licensing pursuant to Section 30.20 of 10 CFR Part 30.

The information you should submit is outlined in Sections 32.26 through 32.29 of 10 CFR Part 32. Each item in these sections must be appropriately addressed. After since issuance of your initial license, the NRC has initiated procedures for conducting a formal evaluation and registration of smoke detector device designs. The information you must submit for this evaluation/registration process is outlined in Regulatory Guide 10.10, "Guide for the Preparation of Applications for Radiation Safety Evaluation and Registration of Sealed Sources Containing Byproduct Material," a copy of which is enclosed. The sources you have listed on your application have previously been registered by the manufacturer, so additional information concerning the sources need not be submitted.

Section 32.29(c) of 10 CFR Part 32 requires that each person licensed to distribute smoke detectors to persons exempt submit periodic reports to NRC concerning its distribution activities. In reviewing your expired license file, the most recent report we appear to have received from your company is dated October 17, 1979 and is for the period from June 30, 1978 to June 30, 1979. Therefore, you should include a distribution report for the period from June 30, 1979 to the date you discontinued distribution. The information which must be included in this report is outlined in paragraph 32.29(c)(1) of 10 CFR Part 32. This report should be included with your resubmission.

Our review of your application will continue upon receipt of the above information. Please respond within 30 days, in duplicate, and reference Mail Control No. 020227.

Sincerely,

Original Signed By
J. Bruce Carrico

J. Bruce Carrico
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Enclosures:
1. 10 CFR Part 30
2. 10 CFR Part 32
3. Reg Guide 10.10

cc: State of North Carolina
Department of Human Resources
Radiation Protection Section
ATTN: Cecil Brown
701 Barbour Drive
Raleigh, NC 27603

DISTRIBUTION:
NRC File Center
IMNS Central File
NMSS r/f
IMAB r/f
BCarrico
SBaggett
MLamastra

| OFC: IMAB | : IMAB | : IMAB |
|---|---|---|
| NAME: BCarrico/bc | : SBaggett | : MLamastra |
| DATE: 02/10/88 | : 02/10/88 | : 02/ /88 |

OFFICIAL RECORD COPY

November 8, 1988

Docket No. 030-30052
Control No. 020227

Security Engineering, Inc.
ATTN: O. N. Swanson
P. O. Box 746
Clemmons, NC 27012

Gentlemen:

This is to confirm our telephone conversation on November 4, 1988 with Mr. Swanson in which we discussed the information we need to continue review of your application dated May 26, 1987.

The items specified below are those we discussed:

1. A description of your quality assurance program and related procedures for monitoring of radioactive contamination.
2. Information on Nuclear Radiation Developments Am-241 sources # NRD A1008b, # NRD A1045, # NRD A1046, and # NRD A1056, such as source registration number and other information required in Regulatory Guide 10.11 (copy enclosed).
3. Drawings showing features that discourage unauthorized access to the source. In addition, provide other drawings as discussed in section 3.2.2. of Regulatory Guide 10.10.
4. Information on the gas-flow proportional counter used for source prototype testing.

Please note that you are not currently authorized to distribute smoke detectors to persons exempt as defined by 10 CFR 30.20. If we do not receive a reply from you within 30 calendar days from the date of this letter, we shall assume that you do not wish to pursue your application. This action is without prejudice to the resubmission of an application.

Sincerely,

/S/

Anthony M. Huffert
Commercial Section
Medical, Academic, and
Commercial Use Safety Branch
Division of Industrial and
Medical Nuclear Safety
Office of Nuclear Material
Safety and Safeguards

Enclosure:
As stated

DISTRIBUTION:
IMNS Central File
NMSS r/f
IMAB r/f
MLamastra
AHurfert

OFC: IMAB
NAME: AMHuffert/cv
DATE: 11/8/88

Concur to MLamastra
11/8/88

OFFICIAL RECORD COPY

FEB 18 1988

Security Engineering, Inc.
ATTN: O. N. Swanson
P. O. Box 746
Clemmons, NC 27012

Gentlemen:

This refers to your letter dated June 2, 1986, which enclosed an application requesting renewal of Materials License No. 32-16736-01E.

As you are aware, License No. 32-16736-01E expired December 31, 1987, well before you submitted your renewal application. Because you allowed your license to elapse, we must process your request as an application for a new license. Therefore, you must submit complete, up-to-date information, without reference to previously submitted documents, concerning the products you wish distribute to persons exempt from licensing pursuant to Section 30.20 of 10 CFR Part 30.

The information you should submit is outlined in Sections 32.26 through 32.29 of 10 CFR Part 32. Each item in these sections must be appropriately addressed. Also, since issuance of your initial license, the NRC has initiated procedures for conducting a formal evaluation and registration of smoke detector device designs. The information you must submit for this evaluation/registration process is outlined in Regulatory Guide 10.10, "Guide for the Preparation of Applications for Radiation Safety Evaluation and Registration of Sealed Sources Containing Byproduct Material," a copy of which is enclosed. The sources you have listed on your application have previously been registered by the manufacturer, so additional information concerning the sources need not be submitted.

Section 32.29(c) of 10 CFR Part 32 requires that each person licensed to distribute smoke detectors to persons exempt submit periodic reports to NRC concerning its distribution activities. In reviewing your expired license file, the most recent report we appear to have received from your company is dated October 17, 1979 and is for the period from June 30, 1978 to June 30, 1979. Therefore, you should include a distribution report for the period from June 30, 1979 to the date you discontinued distribution. The information which must be included in this report is outlined in paragraph 32.29(c)(1) of 10 CFR Part 32. This report should be included with your resubmission.

Our review of your application will continue upon receipt of the above information. Please respond within 30 days, in duplicate, and reference Mail Control No. 020227.

Sincerely,

J. Bruce Carrico
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Enclosures:
1. 10 CFR Part 30
2. 10 CFR Part 32
3. Reg Guide 10.10

cc: State of North Carolina
Department of Human Resources
Radiation Protection Section
ATTN: Cecil Brown
701 Barbour Drive
Raleigh, NC 27603

DISTRIBUTION:
NRC File Center
IMNS Central File
NMSS r/f
IMAB r/f
BCarrico
SBaggett
MLamastra

| OFC: IMAB | : IMAB | : IMAB |
|---|---|---|
| NAME: BCarrico/bc: | SBaggett: | MLamastra |
| DATE: 02/10/88 | : 02/10/88: | 02/ /88 |

OFFICIAL RECORD COPY

48/48

July 25,1988

Mr.J. Bruce Carrico
Medical,Academic, and Commercial
Use Safety Branch
Division of Indusrrial and
Medical Nuclear Safety,NMSS
Nuclear Regulatory Commision
Washington, DC 20555

Dockett No. 030-30052
Control No. 020227

Subject: Application for disribution
of smoke detector.

Dear Mr. Carrico:

Enclosed are two copies of additional information for our license application. None of the information including drawings is considered proprietary.

Also enclosed are copies of annual usage reports.

If further information is required please call me at 919 766 9902.

Thank you for your help.

Very truly yours,
Security Engineering, Inc.

O N Swanson

O. N. Swanson
President

Enclosures:
License Application, 2 copies
Copies of annual usage reports

cc: State of North Carolina
Department of Human Resources
Radiation Protection Section
ATTN: Mr Cecil Brown
701 Barbour Drive
Raleigh, NC 27603

Copy

SE

SECURITY ENGINEERING, INC.

P O BOX 746 CLEMMONS N C 27012 (919) 766-9802

November 12, 1980

Director of Licensing
Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: ANNUAL REPORT - License #32-16736-01E

Dear Sir:

From June 30, 1979 to June 30, 1980 we shipped Smoke Detectors containing 11,000 2μci $AM_{241}$ sources and 4,000 1μci $AM_{241}$ sources.

Very truly yours,

O. N. Swanson

O. N. Swanson

cc: Mr. Cecil B. Brown
Radiation Protection Section
N. C. State Department of Human Resources
P. O. Box 1200
Raleigh, N. C. 27605

U. S. Nuclear Regulatory Commission
230 Peachtree Street, N.W.
Suite 818
Atlanta, Georgia 30303

Copy

SOE SECURITY ENGINEERING, INC.
P. O. BOX 746 CLEMMONS, N. C. 27012 (919) 766-9902

June 1, 1987

Mr. Steven Baggett
Nuclear Regulatory Commission
Mail Stop 396-SS
Washington, D. C. 20555

Subject: ANNUAL USAGE - License #32-16736-01E

Dear Sir:

Listed below is the 1980 thru 1986 annual usage of $AM_{241}$ sealed sources used in smoke detectors that we have shipped.

| Date | 1μci | 2μci |
|---|---|---|
| 06/30/80 - 06/30/81 | 9000 | 5000 |
| 06/30/81 - 06/30/82 | 8000 | 5000 |
| 06/30/82 - 06/30/83 | 5000 | 1000 |
| 06/30/83 - 06/30/84 | 10000 | 1000 |
| 06/30/84 - 06/30/85 | 1000 | 1000 |
| 06/30/85 - 06/30/86 | 2000 | 1000 |

Very truly yours,

O. N. Swanson

cc: Mr. Cecil B. Brown
Radiation Protection Section
N. C. State Department of Human Resources
P. O. Box 1200
Raleigh, N. C. 27605

U.S. Nuclear Regulatory Commission
230 Peachtree Street, N.W.
Suite 818
Atlanta, Georgia 30303