

# RSSI

6312 West Oakton Street  
Morton Grove, IL 60053-2723  
708-965-1999  
Fax 708-965-1991

July 6, 1995

Steven N. Baggett  
Sealed Source Safety Section, MS T-8 F5  
U.S. Nuclear Regulatory Commission  
11545 Rockville Pike  
Rockville, MD 20852

VIA FAX 301-415-5369

RE: Temet USA Inc.  
Mail Control Number 021676

Dear Mr. Baggett:

This letter is in response to our June 14, 1995 telephone conversation regarding an application for registration of the Environics Sensor Unit to be distributed to persons exempt from license by Temet USA Inc.

1) Pursuant to 10 CFR 32.26(b)(8), the total quantity of byproduct material expected to be distributed in the Sensor Unit annually is 3.2 Ci.

2) The labeling shall contain the text in Section III.C. of our application dated 31 May, 1995. Please disregard the label artwork showing different text.

3) We are revising the safety analysis performed pursuant to 10 CFR 32.27. The safety analysis in Section III.L. of our application describes storage of multiple units in our stockroom which serves as the distribution center. In the analysis it was assumed that 10 units are stored at all times.

In the revised safety analysis it is now assumed that as many as 25 units may be present at all times and it is possible that a brief period may occur when up to 1,000 units are stored for up to one week. The dose to an individual from the storage of these quantities is calculated as follows:

For continuous storage of 25 units:  
(2,000 hours per year) ( $4 \times 10^{-8}$  rem/hour-unit) (25 units)  
=  $2 \times 10^{-3}$  rem/year

For one week storage of 1,000 units:  
(40 hours/year) ( $4 \times 10^{-8}$  rem/hour-unit) (1,000 units)  
=  $1.6 \times 10^{-3}$  rem/year

When these doses are added, the total dose to an individual is  $3.6 \times 10^{-3}$  rem/year. This conservative estimate is below the

Steven N. Baggett  
July 6, 1995  
Page Two

RSSI

0.005 limit in 10 CFR 32.28 Column I. These doses are to individuals who are working in a licensed facility. Distribution and short term storage at other sites will result in doses to any individual lower than this estimate.

Other portions of the safety analysis for storage in this fire-protected stockroom are unchanged.

4) Copies of all records of quality control tests performed by the manufacturer in Finland shall be retained by Temet USA Inc. Temet USA Inc. shall perform the following quality control tests on 100 percent of Sensor Units prior to transfer to persons exempt from license:

a) Visual inspection and external dimensional verification to confirm that Sensor Unit is as described in the registry sheet.

b) Leak test Sensor Unit inlet and outlet to confirm that leakage does not exceed 0.005  $\mu\text{Ci}$ .

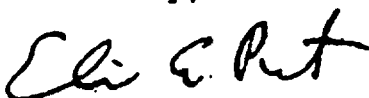
c) Verification that labels are correct.

5) A letter dated 29 March, 1994 and previously submitted with an earlier application was inadvertently attached to the application dated 31 May, 1995. It was not intended that this letter be attached to the application and we are asking that it be separated from the application.

In response to your questions, this letter described tests performed for the Army at the Edgewood Arsenal. In these tests, Sensor Units were exposed to chemical agents to which the Sensor Unit might be exposed to in the field. Following exposure, the Units were leak tested. The only documentation available from the Edgewood Arsenal is the one page attachment to the 29 March, 1994 letter indicating that no leakage was detected equal to or above 0.005  $\mu\text{Ci}$  counted in a C-14 window on a liquid scintillation spectrometer.

If you have any further questions or require additional information, please call me at 708-965-1999.

Sincerely,



Eli A. Port, CHP, CIH, P.E.

## SENSOR UNIT QUALITY CONTROL CHECKS

SN \_\_\_\_\_  
Initials

DATE: \_\_\_\_/\_\_\_\_/\_\_\_\_

A) Results of visual inspection and external  
dimensional verification for conformance with  
registry sheet:

(1.5 cm L x 11 cm W x 4.5 cm H) \_\_\_\_\_

B) Leak test results ( $< 0.005 \mu\text{Ci}$ ) \_\_\_\_\_

C) Label Verification

- I. Sensor Unit label \_\_\_\_\_
- II. System Label \_\_\_\_\_
- III. Package Label \_\_\_\_\_

Reviewed by

\_\_\_\_\_  
Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

**Temet USA Inc.**

US Nuclear Regulatory Commission  
Attn: Sealed Source Safety Section, MS T-8 F5  
(Mr. Steve Baggett)  
11545 Rockville Pike  
Rockville, MD 20852

13 July 95

Re Temet USA, Inc. Mail control number 021676

Dear Mr. Baggett,

This letter is in response to a recent telephone call from Mr. Michael Perkins of your office. He raised two issues in his call.

1). Mr. Eli A. Port, RSSI, our consultant is authorized to make commitments regarding license conditions and device registration for Temet USA, Inc. and should be contacted if there are questions or requests for information.

2. Mr. Perkins indicated that drawings are needed but did not specify which drawings the NRC still requires. It was my understanding the drawings previously submitted in the Application for Device Registration, were sufficient. Mr. Port has informed me that he has been attempting to reach both you and Mr. Perkins regarding Mr. Perkins' request and has received no responses to his telephone messages. Please call Mr. Port to discuss Mr. Perkins' request for drawings.

It was my understanding that the device review for the Sensor Unit could be completed quickly when the second set of information, Mr. Port submitted was received by your office. The need to have the Sensor Unit approved and registered is becoming critical. If you have any further questions or require additional information, please call Mr. Port at 708-965-1999.

Thank you in advance for any help you can render to expedite the approval.

Sincerely,

Richard C. Krahe  
Program Manager



cc:  
RSSI, Mr. Port  
Envirocon Oy

9602160147 950731

PDR RC \*

SSD

PDR

45-51

# Temet USA, Inc.

June 5, 1995

Steven M. Baggett  
Sealed Source Safety Section, MS T-8 F5  
U.S. Nuclear Regulatory Commission  
11545 Rockville Pike  
Rockville, MD 20852

RE: Application for Registration of Environics Oy Sensor Unit  
Mail Control Number 021676

Dear Mr. Baggett,

A request for the radiation safety evaluation and registration of the Environics Sensor Unit detector module is attached. This information reactivates mail control number 021676 and supplies additional information requested by your office in conversations with Eli Port, our consultant, and myself.

This is also a request for a license pursuant to 10 CFR 30.26 to distribute the Sensor Unit to persons exempt from license pursuant to 10 CFR 30.20.

If you have any questions or require additional information about either application for device registration or the license to distribute to persons exempt from license please contact myself at 703-759-6000 or Eli Port at 708-965-1959.

Sincerely,

  
Richard C. Krahe  
Program Manager

9602160148 950731  
PDR RC \* PDR  
SSD

106710-111  
737 Walker Road, Suite 1, P.O. Box 439, Great Falls, VA 22064 U.S.A.  
Telephone: (703) 759-6000 Telefax: (703) 759-6867

**Request for Radiation Safety Evaluation and Registration**  
**of the**  
**Sensor Unit Chemical Agent Detector Module**

**Temet USA Inc.**  
**737 Walker Road**  
**Great Falls, VA 22066**  
**(703) 759-6000**

## II. SUMMARY DESCRIPTION

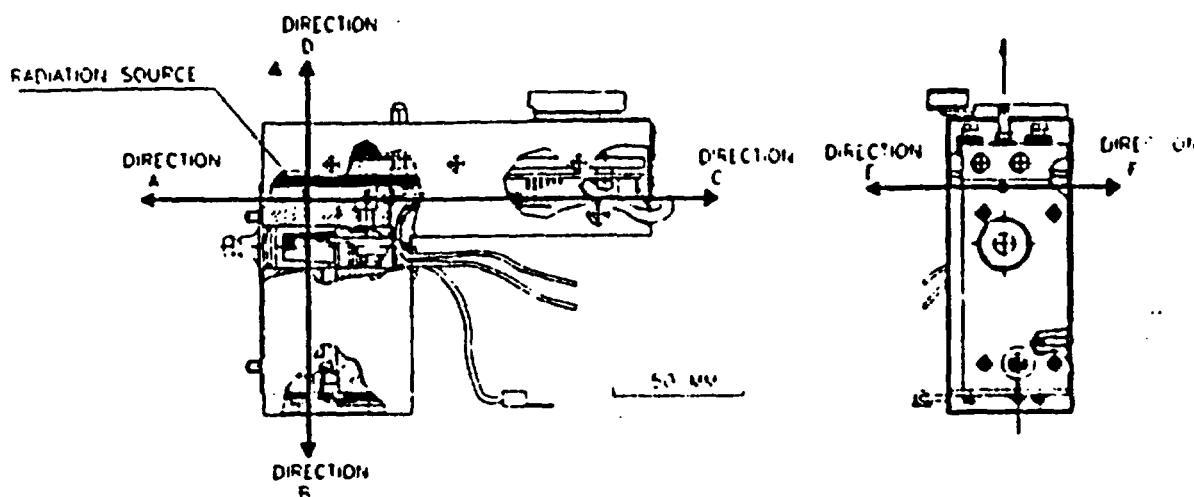
### A. Written Description

The Sensor Unit (Pack) is manufactured in Finland by Environics OY and will be distributed in the United States to persons exempt from license by Temet USA Inc. The Sensor Unit is a detector module that is incorporated into instrumentation systems to detect harmful and toxic gases and vapors. It has the ability to detect life and health threatening hazards and enables the taking of protective action. These hazards include common chemical warfare agents such as nerve and blister agents and on-the-job hazards such as waste anesthetic gases and products of combustion. The Sensor Unit will be used in larger portable and fixed systems and is normally not separated from the larger system except for replacement. The Sensor Unit in the larger system only moves as a component of the system.

Air is drawn through the Sensor Unit by an externally mounted sampling pump. Air is heated, flows through an ionization chamber containing a 160  $\mu$ Ci Am-241 source in a source bed and into a detector chamber adjacent to the source bed. The source bed also incorporates a heater and the sampling passages. The current in the detector chamber is affected by ion capture by particles and gases passing through the ionization chamber. The analytical system in which the Sensor Unit is incorporated includes software to perform analyses for selected gases and aerosols.

The source, ISO/ANSI classification C64646, is cut and shaped to fit in the ionization chamber in the source bed. A fiberglass/epoxy resin composite chamber cover is bolted to the source bed locking the source into position. The source bed assembly is partially shielded with 1 mm lead and fastened into the stainless steel Sensor Unit housing with stainless steel screws. The Sensor Unit is 15 cm long, 11 cm wide, and 4.8 cm high. The Sensor Unit is then installed in a larger system with the heater and detector electrically connected to the analysis system. In a typical application, a semiconductor detector is attached to the outside of the Sensor Unit. The source in the Sensor Unit has no on-off mechanism, and radiation levels are constant during both use and storage. Radiation levels at 10 cm from the Sensor Unit surface are less than or equal to 30  $\mu$ rem/hr. The only openings into the ionization chamber are 3 mm ports, too small for human access.

## B. Drawing:



## III. DETAILS OF CONSTRUCTION AND USE.

### A. Conditions of Use

The Sensor Unit is typically installed in and used with a larger analytical system to detect hazardous gases and aerosols. It can be used with its analytical support equipment either as a portable survey instrument or in a fixed monitoring location. It is designed to operate in temperature ranges from  $-30^{\circ}\text{C}$  to  $55^{\circ}\text{C}$  at relative humidities ranging from 0 to 95% and can withstand harsher environments than its human operator can survive.

The components of the Sensor Unit related to radiation safety including the Teflon source block, the ionization chamber cover made of fiberglass/epoxy resin composite and stainless steel fasteners and housing, are capable of resisting corrosive atmospheres. Because of the absence of moving parts in the ionization chamber, it can withstand vibrations in excess of those which are likely to be encountered in use and that can be sustained by associated support equipment.

Users of the Sensor Unit in an analytical system will include trained military and civilian personnel who will use the Sensor Unit under conditions ranging from battlefield conditions where chemical warfare agents will be monitored to surgical theaters where waste anesthetic gases will be monitored. Vibration exposures will be incidental to the handling and transportation. When used in a fixed monitoring mode, users will be near the device when setting it up and relocating it. In survey applications, the user carries the system. It is unlikely that the Sensor Unit can be



incorporated as a component at any product other than the analytical system with which it is used. The expected useful life of the Sensor Unit is in excess of ten years.

### B. Details of Construction

Figure 1. gives the dimensions and final shape of the source cut from AIAA 2 stock. Figure 2. illustrates how the source fits in the ionization chamber in the Teflon source block and how it is held in place by the fiber-glass/epoxy resin composite cover with its Teflon gasket (Figure 3). The source block also contains a heater to maintain an operating temperature of 35°C or above and air passages to route the sampling stream through the heater, the ionization chamber and to a detector chamber outside the source bed. Figure 4. illustrates the source bed installed in the stainless steel Sensor Unit which has no openings except for gas flow and cabling. The source is constructed of americium-241 oxide in a gold/palladium matrix minimizing the potential for uptake of americium from a bare source. The source itself is an alpha/low energy gamma emitter and is partially shielded with lead to reduce radiation levels to those described in Section III.F. *Note: All dimensions are given in millimeters*

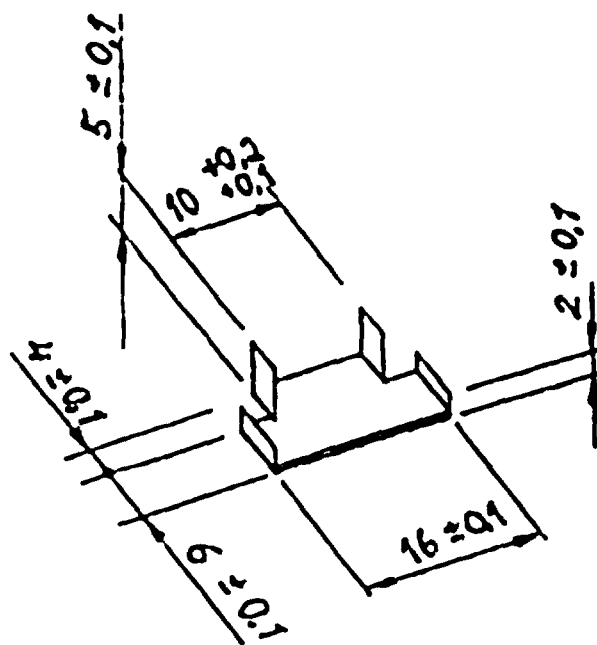


Figure 1- Dimensions and final shape of source  
Scale 2:1

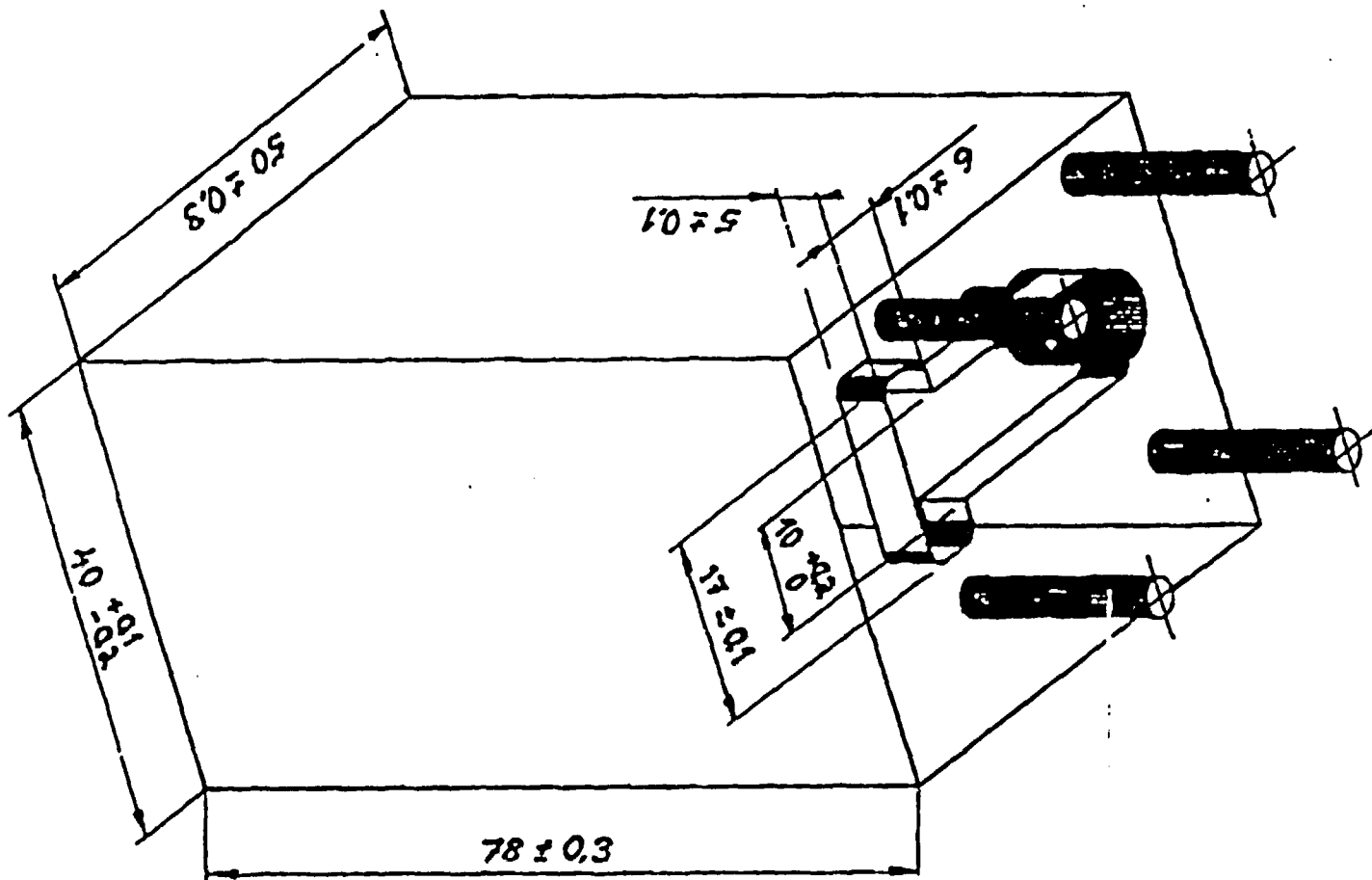


Figure 2 -Source Block  
Scale 2:1

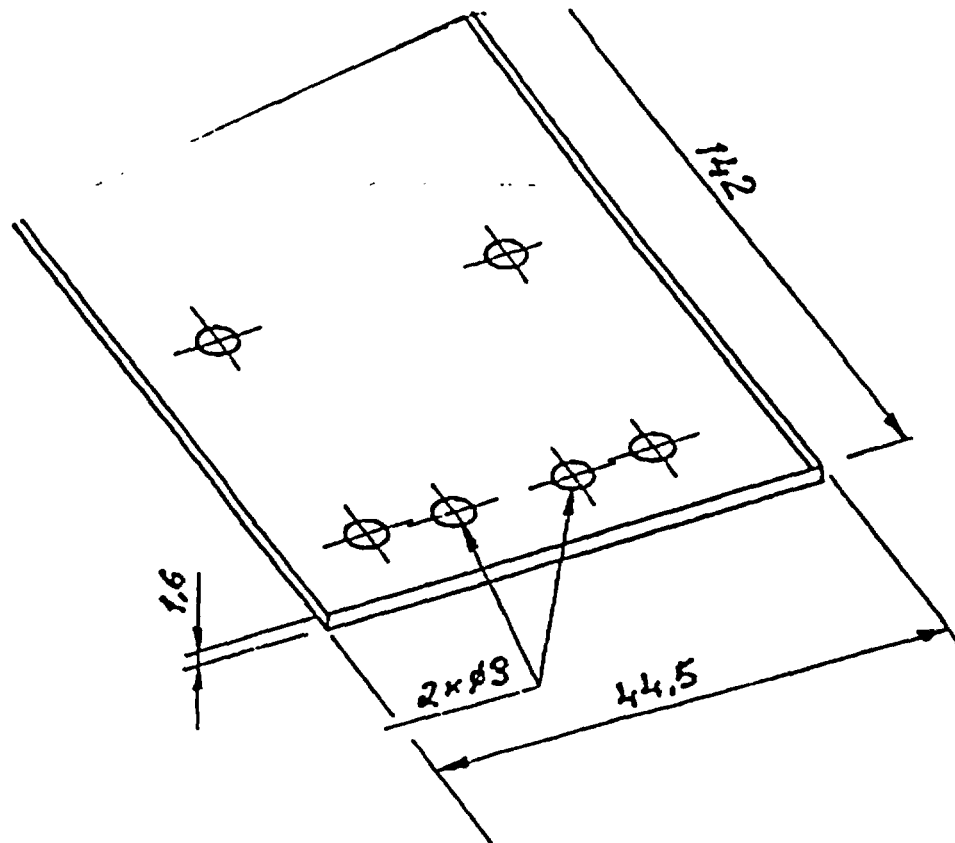


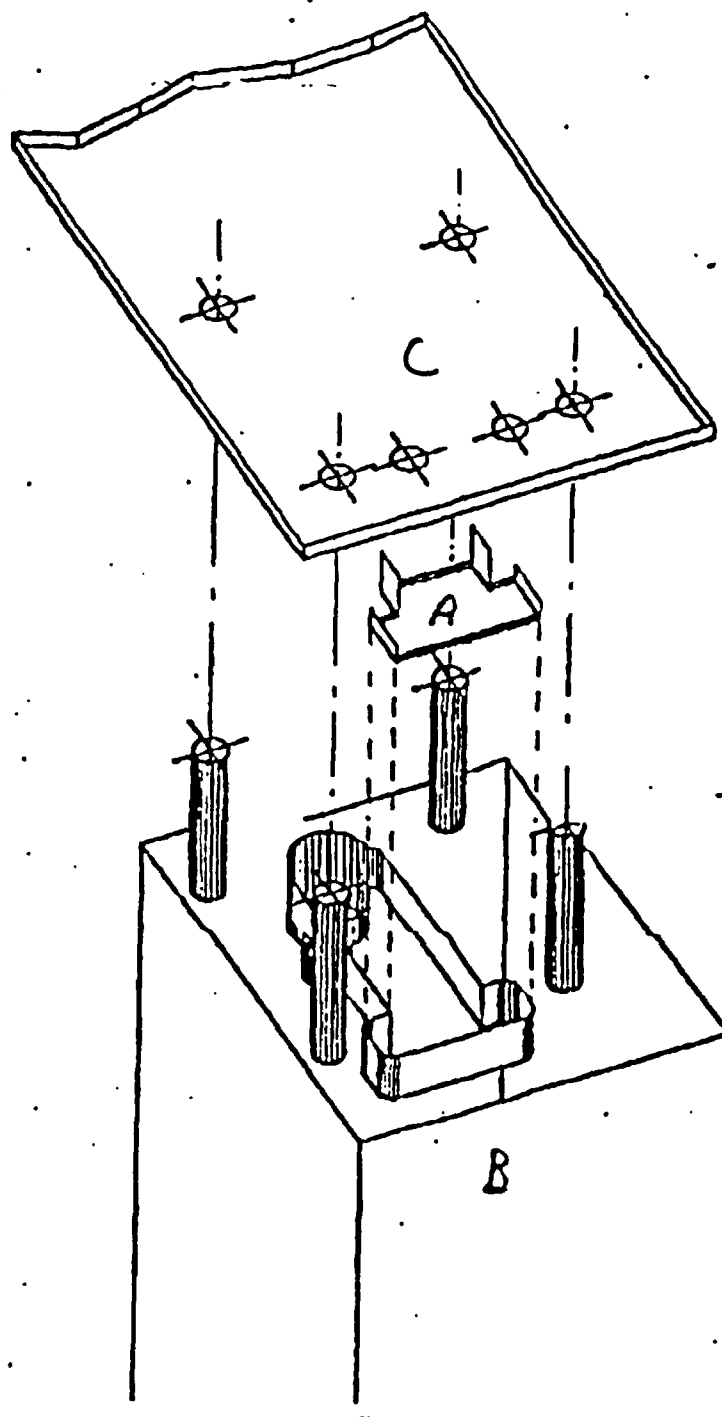
Figure 3 drawing of the fiberglass/epoxy resin cover  
Scale 2:1

Figure 4- See Attached Source bed installed in stainless steel Sensor Unit  
Scale 1:1

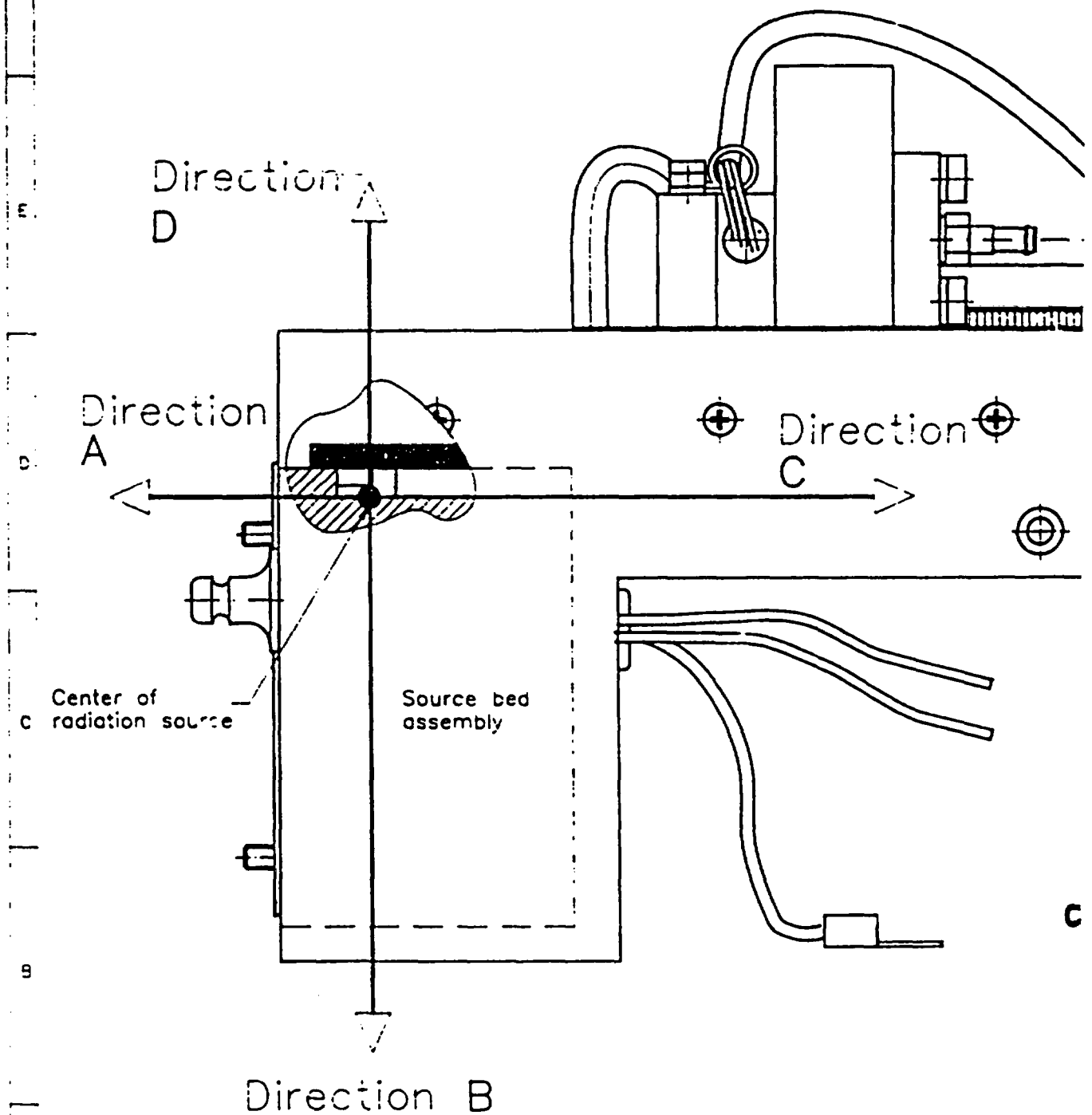
### C. Labeling

Each Sensor Unit and associated equipment will be labeled to comply with the requirements in 10 CFR 32.29(b). Sensor Units will have durable, legible, readily visible self-adhesive Lexan film labels on their external surface containing the following:

Contains Radioactive Material Am-241, 160  $\mu$ Ci. This Sensor Unit is authorized for distribution to persons exempt from license by Temet USA Inc.

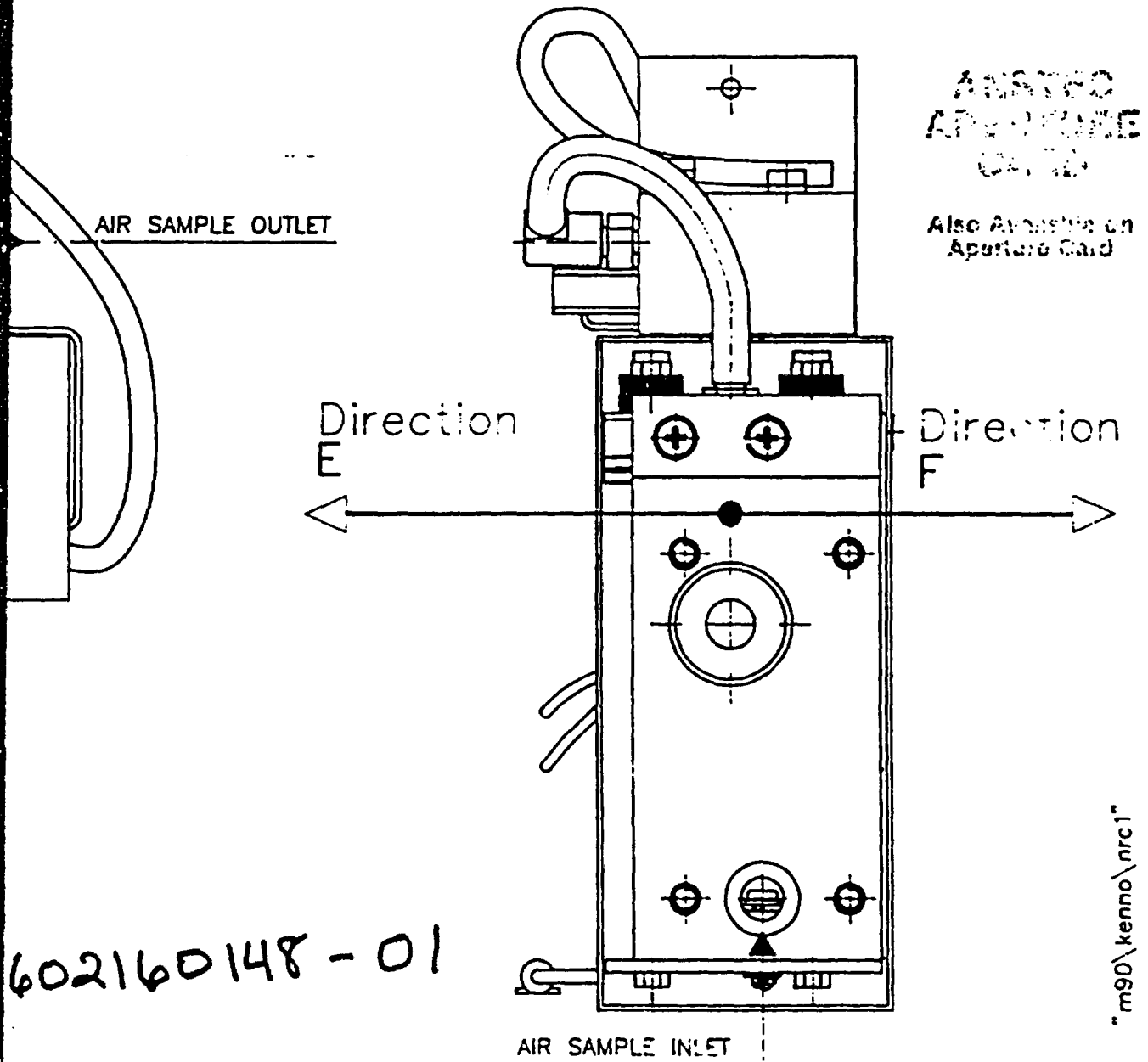


# Top view



Verio Rev.	Muutos Description	Muutaja Drawn	Pvm. Date	Koord. Coord.	Lukum. Pce

# Front view



"m90\kenno\nrc1"

Osa/no Part/No	Osa tai kokoonpanoryhmän nimitys Part or Group	Piirustuksen ja osan no Drawg and Part No	Lehti Material	Muoto, mitat, malli Shape, Dimensions, Code	Massa/osa Weight/ Part	Kpl Pcs
				Osa on työturvallisuuden Material incl. working allowance		
Yleistoleransit General tolerances		Tilaaja Client		suunn. Design	JL	271094
		Lisäyksi Related		Suhte Scale	JL	271094
				1:1 Hyy. Appr.	TK	271094
		Vainio Product		Pir. no Drawg No		Version Rev.
		The M90 CWA Detector Sensor Pack unit				
		Nimitys Title		Korvaa osan Supersedes drawg		Korvattu osalla Superseded by drawg
		Picture 1				



ENVIRONICS OY  
MIKKELI FINLAND

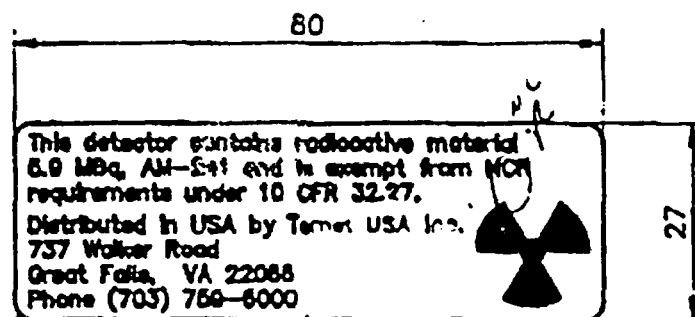
Rev.	Description	Drawn	Date	Checked	Pos.	Mark

D

C


B

A



Tekstikorkeus 2.0 mm  
hopean värinen teksti  
mustalla pohjalla  
Height of a text 2.0 mm.  
silver text on a black ground

m90\ilmior

Osa/No Part/No		Osa tai kokoonpanoryhmän nimitys Part or Group		Päivätyksen ja osan no Date and Part No		Lasku Memo		Muuta, miet. malli, koodi Shape, Dimension, Code		Määrä/osa Weight/Part		Kpl Pos
Yleistoleranssi General tolerances		Määrä Weight		Tuote Client		M90-D1		Suunn. Design		JL	030894	
				Käyttö Related				Suhte. Scale		JL	030894	
				Väri Product				1:1				
 ENVIRONICS OY MIKKELI FINLAND				Nimike Title		Tarra Ilmaislman koteloon Sticker to outside the detector		Pik. no Drug No		1004 07612		Versio Rev.
								Käyttö Supersedes drug		Käyttö Superseded by drug		

The external surface of the system in which the Sensor Unit is installed and its package shall contain readily visible labels with the following:

Caution, contains radioactive material. This Sensor Unit is authorized for distribution to persons exempt from license by Temet USA Inc. pursuant to 10 CFR 32.26. The Sensor Unit installed in this device contains Am-241, 160  $\mu$ Ci. The sensor unit is authorized for distribution to persons exempt from license by Temet USA Inc.

The detector in this system contains radioactive material and has been manufactured in compliance with USNRC safety criteria in 10 CFR 32.27. The purchaser is exempt from any regulatory requirements.

Label art work is attached.

#### D. Testing of Prototypes

The Sensor Unit installed in a military gas detector system was tested according to MIL-STD-810D for vibration and shock resistance. The testing report is attached

In the vibration test the Sensor Unit was subjected to wide band random vibrations on each of three perpendicular axes for 60 minutes per axis. Following the test the Sensor Unit functioned normally without any changes that could adversely affect radiation safety.

In the shock test, the Sensor Unit in a gas detector system was dropped from a height of 122 cm onto each face, edge and corner, on a concrete floor covered with plywood. Following the drop test, the Sensor Unit functioned normally with no changes that could affect radiation safety.

In the temperature test, the Sensor Unit in a gas detector system was temperature tested for function at the extremes of temperatures to which it might be exposed. The Sensor Unit in the system was maintained at -30°C, function tested for normal operation and then heated to 55°C for three to five hours. The Sensor Unit and system functioned normally during the test and underwent no changes that could adversely affect radiation safety.



In the humidity test, the Sensor Unit was tested at relative humidities ranging from 10 to 95% and functioned normally with no changes that would adversely affect radiation safety. Engineering analysis indicates that there would be no changes in the Sensor Unit at 0-100% relative humidity that could adversely affect radiation safety. These tests were performed primarily to test the complete system for operability at humidity extremes.

#### **E. Quality Control**

The manufacturer of the Sensor Unit, Environics OY, is applying for ISO 9000 certification and all production is in accordance with military standard specifications. Quality control procedures for parameters that could affect radiation safety follows:

Visual inspection is performed on all components before assembly. Measurements to verify that dimensions are within tolerances will be performed for the foil, Drawing 1, the source bed, Drawing 2, the chamber cover, Drawing 3, and the sensor unit housing, Drawing 4.

Foils will be 100% leak tested before assembly. Foils must demonstrate less than 0.005 microcuries leakage for acceptance.

Assembled components will be visually inspected for proper assembly and fit.

10 percent of assembled Sensor units will be leak-tested in the United States by Temet before transfer to persons exempt from license. Foils must demonstrate less than 0.005 microcuries leakage for acceptance.

All records of these tests will be maintained at Temet in the United States. Documentation will be verified for each unit before transfer to a person exempt from license.

#### **F. Radiation Profiles**

Measurements of external radiation doses were performed by the Finnish Centre for Radiation and Nuclear Safety. These measurements were performed on:

1. Doses outside a typical instrumentation system in which the Sensor Unit was installed
2. Doses outside the Sensor Unit, and
3. Doses outside the source bed component in the Sensor Unit.

A copy of the Centre's report, including measurement instrumentation data, is attached.

#### K. Leak Testing

Sensor Units are leak tested following assembly by the manufacturer. Sensor Units demonstrating any detectable leakage on external surfaces in excess of 0.005  $\mu\text{Ci}$  per Sensor Unit will be rejected. Ten percent of Sensor Units distributed by Temet USA will be leak tested. If any leakage above 0.005  $\mu\text{Ci}$  is detected on a leak tested Sensor Unit, distribution will be suspended until the cause can be identified and corrected.

#### L. Safety Analysis

The following safety analysis has been performed to determine compliance with the requirements in 10 CFR 32.27. External doses were calculated for several scenarios, including normal use and disposal of a Sensor Unit and the doses from distribution, servicing, and transportation.

For purposes of conservative calculations it is assumed that there is no additional shielding provided by the system in which the Sensor Unit is installed. External doses were measured at 10 cm by the Finnish Centre for Radiation and Nuclear Safety. The highest measured dose rate at 10 cm was 30  $\mu\text{rem}$  per hour. The calculated doses at other distances are in the table below.

<u>Distance (cm)</u>	<u>Dose Rate rem/h</u>
5	$9.3 \times 10^{-5}$
30	$4 \times 10^{-6}$
100	$3.9 \times 10^{-7}$
300	$4 \times 10^{-8}$

It is assumed that during normal use of a Sensor Unit an operator will handle an instrumentation system containing the Sensor Unit for 500 hours, that the technician's hands will be 5 cm from the area of highest external dose rate, and that the major portion of the technician's trunk is 30 cm from the same area.

The dose to his hands is calculated as follows:

$$(500 \text{ hours/year})(9.3 \times 10^{-5} \text{ rem/hr}) = 0.046 \text{ rem/year.}$$

The dose to his trunk is calculated as follows:

$$(500 \text{ hours/year})(4 \times 10^{-6} \text{ rem/hr}) = 0.002 \text{ rem/year.}$$

These conservative results are below the values in 10 CFR 32.38, column I.

Multiple units may be stored in the stockroom of the distribution center. It is assumed that 10 units are stored at all times in this area and that individuals are three meters away from these 10 units for 2,000 hours per year.

The dose to an individual is calculated as follows:

$$(2,000 \text{ hours/year})(4 \times 10^{-6} \text{ rem/unit})(10 \text{ units}) = 8 \times 10^{-4} \text{ rem/year.}$$

These conservative results are below the values in 10 CFR 32.38, column I.

It is conservatively estimated that 100 instrumentation systems containing Sensor Units will require service or Sensor Unit replacement each year. Each service will require one hour during which the technician's hands will be 5 cm from the Sensor Unit surface with the highest external dose rate, and the trunk of the technician's body will be within 30 cm of the same surface.

The dose to the technician's hands is calculated as follows:

$$(100 \text{ hours/year})(9.3 \times 10^{-5} \text{ rem/hour}) = 9.3 \times 10^{-3} \text{ rem/year.}$$

The dose to the trunk of the technician's body is calculated as follows:

$$(100 \text{ hours/year})(4 \times 10^{-6} \text{ rem/hour}) = 4 \times 10^{-4} \text{ rem/year.}$$

It is assumed that a single truck driver could deliver up to 1,000 Sensor Units to the distribution center per year and that the driver would have each Sensor Unit three meters from the cab for eight hours.

The dose to the truck driver is calculated as follows:

$$(1,000 \text{ units})(8 \text{ hrs/unit})(4 \times 10^{-6} \text{ rem/hr}) = 3.2 \times 10^{-4} \text{ rem/year.}$$

These conservative results are below the values in 10 CFR 32.38, column I.

Because of the high economic value of systems containing the Sensor Unit, it is unlikely that a Sensor Unit will be casually disposed of. However, to conservatively estimate the external dose for disposal of a single Sensor Unit, it is assumed that a refuse truck picks up the Sensor Unit and that it is three meters from the driver for eight hours.

The dose to this refuse truck driver is calculated as follows:

$$(8 \text{ hrs})(4.0 \times 10^{-6} \text{ rem/hr}) = 3.2 \times 10^{-7} \text{ rem.}$$

During normal use of a single unit and in normal handling and storage of the quantities of Sensor Units likely to accumulate at any one location during distribution or servicing, it is unlikely that any significant dose commitment could result from the intake of the licensed material in Sensor Units. The analysis in NUREG/CR-1156 for disposal of larger quantities of Am-241 in similar sources in smoke detectors indicates that the probability is negligible that a person could receive a dose commitment in excess of the column I values from Sensor Units.

The Sensor Unit is a rugged stainless steel device containing no moving parts, and that could result in any significant in the effectiveness of the containment shielding or safety features under normal handling and use during the useful life of the product. Under battlefield conditions where conventional or nuclear weapons might result in damage to the Sensor Unit, the concurrent threat to individuals would be much greater than from any resulting compromise of radiation safety features of the Sensor Unit.

Fire is the most likely accident event that could affect a Sensor Unit. It is conservatively assumed that ten Sensor Units are destroyed by fire in the distribution center. The fire releases  $10^{-3}$  of the activity as respirable particles. Fire damage and emergency response... ventilation will result in at least a  $10^2$  reduction in concentration during the fire-fighting period. If an emergency responder fights a fire for eight hours and has a respiration rate of  $1.2 \text{ m}^3/\text{hr}$ , we can calculate the intake as follows:

$$\frac{(1.6 \times 10^3 \text{ } \mu\text{Ci})(10^{-3})(10^{-2})(1.2 \text{ m}^3/\text{hr})(8 \text{ hrs})}{(3 \times 10^2 \text{ m}^3)} = 5.1 \times 10^{-4} \text{ } \mu\text{Ci}$$

NUREG/CR-1156 reports that uptake from salvage operations are likely to be lower than from firefighting activities.

The resulting dose commitments are shown in the table below.

Organ	Dose Commitment (rem)
Total body	$1 \times 10^{-2}$
Liver	$2 \times 10^{-1}$
Bone	$2 \times 10^{-1}$
Lung	$3 \times 10^{-1}$

The probability is negligible that in either normal use and disposal or in distribution transportation and servicing doses from the Sensor Unit would exceed the values in 10 CFR 32.28, column II or III would be exceeded. The most reasonable accident scenario would be a fire destroying ten instrument systems in a distribution center. The probability is low that even in the case of fire, the values in 10 CFR 32.28, column II will be exceeded and negligible that the column III values could be exceeded.

**LCN CLOSERS**

Part of worldwide Ingersoll-Rand

LCN Closers Division

Schlage Lock Co.  
P.O. Box 100  
Princeton, Illinois 61356-0100  
815-875-3311  
Fax 815-875-3222

September 30, 1994

Director of Nuclear Material Safety and Safeguards  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Re: Report, LCN Closers, Lic. #12-19544-02E

Gentlemen:

During the period of June 30, 1990 to June 30, 1994, LCN Closers transferred the following materials to purchasers exempt from regulatory requirements:

Product: LCN Model SED-300 Integral Smoke Detector

Radionuclide: 2 ea. Americium Oxide (Am241) sealed source,  
.7 micro curie per detectorTotal Smoke  
Detectors Transferred: 15,281Total Sealed Sources  
Transferred: 30,562

Product: LCN Model MED-300 Integral Smoke Detector

Radionuclide: 2 ea. Americium Oxide (Am241) sealed source,  
.7 micro curie per detectorTotal Smoke Detectors  
Transferred: 4,570Total Sealed Sources  
Transferred: 9,140Grand Total Am241, .7 micro curie sealed sources in smoke detectors transferred  
to exempt purchasers: 39,702

Director of Nuclear Material Safety and Safeguards  
U. S. Nuclear Regulatory Commission

September 30, 1994  
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If you require further information regarding this report, please contact me.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ray Schnarr".

Ray Schnarr  
Radiation Safety Officer

RHS:rac

cc: U.S. Nuclear Regulatory Commission  
Region III Office of Inspection and Enforcement  
801 Warrenville Road  
Lisle, IL 60532-4351

**LCN CLOSERS**  
Part of worldwide Ingersoll-Rand

LCN Closers Division  
Schlage Lock Co.  
P.O. Box 100  
Princeton, Illinois 61356  
815/875-3311 Telex 72-3434  
Fax 815/875-3222

March 1, 1991

Director of Nuclear Material Safety and Safeguards  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Re: Report, LCN Closers, Lic. #12-19544-02E

Gentlemen:

During the period of June 30, 1986 to June 30, 1990, LCN Closers transferred the following materials to purchasers exempt from regulatory requirements:

PRODUCT:	LCN Model SED-300 Integral Smoke Detector
RADIONUCLIDE:	2 ea. Americium Oxide (Am241) sealed source, .7 micro curie per detector

TOTAL SMOKE DETECTORS TRANSFERRED:	23,204
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TOTAL SEALED SOURCES TRANSFERRED:	46,408
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PRODUCT:	LCN Model MED-300 Integral Smoke Detector
RADIONUCLIDE:	2 ea. Americium Oxide (Am241) sealed source, .7 micro curie per detector

TOTAL SMOKE DETECTORS TRANSFERRED:	6,572
------------------------------------	-------

TOTAL SEALED SOURCES TRANSFERRED:	13,090
-----------------------------------	--------

GRAND TOTAL Am241, .7 micro curie sealed sources in smoke detectors transferred to exempt purchasers: 59,498

Director of Nuclear Material Safety and Safeguards  
U. S. Nuclear Regulatory Commission

September 30, 1994  
Page - 2 -

If you require further information regarding this report, please contact me.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ray Schnarr".

Ray Schnarr  
Radiation Safety Officer

RHS:rac

cc: U.S. Nuclear Regulatory Commission  
Region III Office of Inspection and Enforcement  
801 Warrenville Road  
Lisle, IL 60532-4351



American Scitec, Incorporated  
3505 Cadillac Avenue, Building J-5  
Costa Mesa, California 92626  
(714) 549-8680  
FAX (714) 662-2008



10 June 1993

Director of Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission,  
Washington D.C 20555

Ref: USNRC License # 04-21357-01E  
10 CFR Part 32, 32.12 Material Transfer Report

PERIOD: 25 June 1988 through 10 June 1993

32.12(b)(1)

Residential Smoke Detectors

Model 168101-series=	1,658,153
Model 168102-series=	0
Model 168103-series=	0
Model 168104-series=	9,796
Model 168106-series=	184,424
Model 168108-series=	550
Model 168111-series=	94,862
Model 168112-series=	84,104

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TOTAL = 2,031,889

32.12(b)(2)

Wing Wah Chong Investment Company, Ltd.

40 Lee Chung Street

Chai Wan, Hong Kong 9/2/83 To 7/5/90

Greaton Industries Limited

40 Lee Cheng Street

Chai Wan, Hong Kong 7/5/90 To 11/25/91

Shanghai Fenghua Radio Factory

238 Guang Xi Bei Road

Shanghai, P.R. China 11/25/91 To Present

REC'D

JUN 18 1993

Continued on Page 2

Material Transfer Report<sup>1</sup>, USNRC License Number 04-21357-01E

10 June 1993

Page 2

32.12(b)(3)

Americium-241 (Amersham Model AMM1001H Foil Source)

32.12(b)(4)

0.9 uCi +- .09 uCi/unit

32.12(c)(1) This report is filed five years following the preceding report on USNRC License # 04-21357-01E,

Respectfully,



R.R. Ludt  
Operations Manager  
American Scitec Inc.

cc - USNRC  
Region V  
1450 Maria Lane, Suite 210  
Walnut Creek, CA 94596



SECURITY ENGINEERING, INC.

P. O. BOX 746

CLEMMONS N C 27012

(919) 766-9902

December 14, 1992

*product transfer  
file*

License Fee and Debt Collection Branch  
Division of Accounting and Finance  
Office of the Controller  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

Attention: Mr. Michael A. Lamastra  
Section Leader

RE: License #32-16736-02E  
#NR-0529D-102E

Dear Mr. Lamastra:

In September, 1991 we wrote a letter to the commission that was intended to request termination of our license to distribute smoke detectors. A copy of that letter is attached.

In September, 1992 Mrs. Patricia Vacca outlined several steps necessary to complete this termination. This letter and the enclosed documents are for that purpose.

1. We do want license #32-16736-02E to be terminated.
2. Please change device registration NR-0529D-102E to inactive status.
3. We do desire to permanently discontinue licensed activities.
4. The last year that detectors were distributed was 1987. Only 900 detectors were shipped that year. We did renew our license in 1989, but have not manufactured or distributed any detectors since 1987.

If you have questions or if I may be of further assistance, please do not hesitate to call me.

Very truly yours,

**FEE EXEMPT**  
*12/23/92*

*to Steve Baggett ✓*

RECEIVED BY	<i>[Signature]</i>
Date	<i>12/23/92</i>
Log	<i>Dec 2</i>
By	<i>[Signature]</i>
Manufacturing Engineers	
Date Completed	<i>12/23/92</i>

O. Nat Swanson

REC'D DEC 18 1992

*121470*

## DOMESTIC SHIPMENT HISTORY REPORT

\*\* YTD ROLLING 12, ROLLING 12 VZ, ROLLING 6 VZ, ROLLING 3 VZ

	JAN ***	FEB ***	MAR ***	1ST QTR ***	APR ***	MAY ***	JUN ***	2ND QTR ***	YTD ***	JUL ***	AUG ***	SEP ***	3RD QTR ***	YTD ***	OCT ***	NOV ***	DEC ***	4TH QTR ***	FULL YEAR ***
FIRE SAFETY PRODUCTS:																			
SPK6/D																			
1983	0.0	0.0	0.0	0.0	0.0	0.0	16.6	16.6	16.6	35.1	36.0	31.1	102.2	118.8	26.8	32.9	67.6	127.3	246.1
1984	29.2	37.4	35.7	102.3	22.4	21.3	84.3	128.0	230.3	40.8	43.0	64.1	147.9	378.2	123.3	98.1	172.1	393.5	771.7
1985	62.1	93.0	70.3	225.4	33.0	38.9	70.3	142.2	367.6	111.4	67.0	118.4	296.8	664.4	40.1	51.4	44.8	136.3	800.7
1986	33.1	59.7	77.0	169.8	37.0	20.2	47.1	104.3	274.1	58.2	58.3	90.4	206.9	481.0	70.1	34.1	60.1	164.3	645.3
1987	33.9	50.5	45.8	130.2	39.6	26.9	36.3	102.8	233.0	36.1	66.8	35.6	138.5	371.5	70.7	47.7	32.8	151.2	522.7
1988	30.1	38.4	63.8	132.3	24.5	43.7	67.8	136.0	268.3	38.7	54.5	85.9	179.1	447.4	74.7	60.9	40.6	176.2	623.6
1989	39.5	18.2	32.9	90.6	18.0	41.4	40.4	99.8	190.4	34.6	28.0	29.9	92.5	282.9	44.0	41.9		85.9	368.8
**	409.4	-33.5%	-42.8%	-47.7%															
SPK6/M																			
1988	0.0	0.0	0.0	0.0	1.5	10.6	16.1	28.2	28.2	2.0	15.9	22.0	39.9	68.1	0.0	0.0	0.0	0.0	0.0
1989	6.0	13.3	11.2	30.5	18.9	9.5	15.6	44.0	74.5	9.5	8.5	6.0	24.0	98.5	16.8	29.9	29.1	75.8	143.9
**	153.6	33.8%	-36.1%	-53.4%											12.6	13.4		26.0	124.5
SPK9																			
1988	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	151.3	1.5	43.8	196.6	196.6	0.0	0.0	0.0	0.0	0.0
1989	0.2	-0.5	0.6	0.3	0.1	1.1	0.3	1.5	1.8	0.1	1.7	0.2	2.0	3.8	40.6	0.4	0.0	41.0	237.6
**	4.7	-98.0%	-98.7%	-98.7%											0.5	0.4		0.9	4.7
SPK12																			
1987	0.0	0.0	2.4	2.4	0.0	0.0	0.0	0.0	2.4	0.0	1.1	1.7	2.8	5.2	0.0	0.0	0.0	0.0	0.0
1988	0.2	0.5	0.9	1.6	0.4	0.3	0.9	1.6	3.2	0.3	2.0	4.8	7.1	10.3	0.2	1.2	0.4	1.8	7.0
1989	0.4	0.7	0.7	1.8	0.5	0.7	1.2	2.4	4.2	0.6	2.9	1.9	5.4	9.6	0.9	3.8	3.8	8.5	18.8
**	18.5	20.1%	-7.9%	-26.3%											2.6	2.5		5.1	14.7
SPK18																			
1989	2.2	1.4	2.7	6.3	0.2	0.0	0.4	0.6	6.9	0.0	1.5	2.6	4.1	11.0	0.0	0.0	4.0	4.0	4.0
**	15.0	N/A	N/A	N/A											0.0	0.0		0.0	11.0
SPK20																			
1987	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.4	1.6	1.6	0.0	0.0	0.0	0.0	0.0
1988	0.0	0.1	12.8	12.9	0.0	0.6	0.0	0.6	13.5	0.0	0.0	0.0	0.0	13.5	0.3	0.5	0.1	0.9	2.5
**	N/A	N/A	N/A	N/A											0.0	0.0	0.0	0.0	13.5
SPK25																			
1988	0.8	2.5	7.1	10.4	2.4	3.1	12.6	18.1	28.5	15.4	27.2	20.9	63.5	92.0	0.0	0.0	0.0	0.0	0.0
1989	14.9	7.0	12.9	34.8	16.6	4.0	4.3	24.9	59.7	5.4	5.8	4.4	15.6	75.3	5.2	9.8	8.3	23.3	115.3
**	96.3	-10.0%	-64.2%	-52.4%											5.3	7.4		12.7	89.0
SPK30																			
1987	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	27.6	30.4	30.4	0.0	0.0	0.0	0.0	0.0
1988	5.6	0.6	12.4	18.6	-1.2	0.0	1.9	0.7	19.3	0.3	-0.3	0.0	0.0	19.3	4.1	8.2	6.6	18.9	49.3
1989	-3.0	-0.4	0.0	-3.4	6.2	0.6	24.1	30.9	27.5	1.0	5.6	0.7	7.3	34.8	0.1	-0.9	0.0	-0.8	18.5
**	34.9	39.0%	N/A	N/A											0.1	0.0		0.1	34.9 INVENTORY DEPLETED

Black n Decker - 7/1/91  
06.20704.02E

all obsolete versions are  
similar to the SPK25 except  
for minor cosmetic differences

## SHIPMENT HISTORY REPORT -- SPECIALTY

YTD ACTUAL: MAY 91

\*\* YTD ROLLING 12, ROLLING 12 VX, ROLLING 6 VX, ROLLING 3 VX

	JAN	FEB	MAR	1ST QTR	APR	MAY	JUN	2ND QTR	YTD	JUL	AUG	SEP	3RD QTR	YTD	OCT	NOV	DEC	4TH QTR	FULL YEAR
*****																			
HEATERS																			
*****																			
HF200U																			
1986				0.0			0.2	0.2	0.2	3.9	4.4	2.0	10.3	10.5	5.4	4.2	0.4	10.0	20.5
1987	0.6	-0.4	0.1	0.3	0.1	-1.3	1.0	-0.2	0.1	3.9	1.6	10.0	15.5	15.6	1.2	1.3	0.7	3.2	18.8
1988	0.8	2.3	-0.3	2.8	-3.1	0.1	0.6	-2.4	0.4	0.6	1.0	1.2	2.8	3.2	2.5	1.2	1.8	5.5	8.7
1989	1.6	0.8	0.3	2.7	-0.3	0.0	0.2	-0.1	2.6	0.6	0.4	1.4	2.4	5.0	1.5	1.1	0.6	3.2	8.2
**	N/A	N/A	N/A	N/A															
HF230U/G																			
1986				0.0				0.0	0.0	0.0	8.0	9.9	17.9	17.9	1.4	3.2	2.7	7.3	25.2
1987	5.2	2.0	-0.5	6.7	-0.2	0.4	1.5	1.7	8.4	3.4	12.6	7.8	23.8	32.2	3.9	7.1	2.4	13.4	45.6
1988	1.4	0.0	-0.3	1.1	-1.4	-0.1	-2.1	-3.6	-2.5	1.0	13.2	7.1	21.3	18.8	22.4	4.5	7.6	34.5	53.3
1989	3.0	0.0	0.0	3.0	-1.5	-0.4	0.4	-1.5	1.5	1.3	3.2	9.8	14.3	15.8	24.8	10.4	0.6	35.8	51.6
1990	0.0	-0.6	-3.4	-4.0	-0.2	0.1	0.3	0.2	-3.8	3.8	10.4	5.1	19.3	15.5	4.5	9.6	4.5	18.6	34.1
1991	2.3	0.8	0.1	3.2	0.1	1.4													
**	42.9	-7.5X	-362.9X	-145.7X															
TOTAL HEATERS																			
1986	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	3.9	12.4	11.9	28.2	28.4	6.8	7.4	3.1	17.3	45.7
1987	5.8	1.6	-0.4	7.0	-0.1	-0.9	2.5	1.5	8.5	7.3	14.2	17.8	39.3	47.8	5.1	8.4	3.1	16.6	64.4
1988	2.2	2.3	-0.6	3.9	-4.5	0.0	-1.5	-6.0	-2.1	1.6	14.2	8.3	26.1	22.0	24.9	5.7	9.4	40.0	62.0
1989	4.6	0.8	0.3	5.7	-1.8	-0.4	0.6	-1.6	4.1	1.9	3.6	11.2	16.7	20.8	26.3	11.5	1.2	39.0	59.8
1990	0.0	-0.6	-3.4	-4.0	-0.2	0.1	0.3	0.2	-3.8	3.8	10.4	5.1	19.3	15.5	4.5	9.6	4.5	18.6	34.1
1991	2.3	0.8	0.1	3.2	0.1	1.4													
**	42.9	-17.8X	-417.2X	-145.7X															
*****																			
FIRE SAFETY																			
*****																			
SMK6/D																			
1983	0.0	0.0	0.0	0.0	0.0	0.0	16.6	16.6	16.6	35.1	36.0	31.1	102.2	118.8	26.8	32.9	67.6	127.3	246.1
1984	29.2	37.4	35.7	102.3	22.4	21.3	84.3	128.0	230.3	40.8	43.0	64.1	147.9	378.2	123.3	98.1	172.1	393.5	771.7
1985	62.1	93.0	70.3	225.4	33.0	38.9	70.3	142.2	367.6	111.4	67.0	118.4	296.8	664.4	40.1	51.4	44.8	136.3	800.7
1986	33.1	59.7	77.0	169.8	37.0	20.2	47.1	104.3	274.1	58.2	58.3	90.4	206.9	481.0	70.1	34.1	60.1	164.3	645.3
1987	33.9	50.5	45.8	130.2	39.6	26.9	36.3	102.8	233.0	36.1	66.8	35.6	138.5	371.5	70.7	47.7	32.8	151.2	522.7
1988	30.1	38.4	63.8	132.3	24.5	43.7	67.8	136.0	268.3	38.7	54.5	85.9	179.1	447.4	74.7	60.9	40.6	176.2	623.6
1989	39.5	18.2	32.9	90.6	18.0	41.4	40.4	99.8	190.4	34.6	28.0	29.9	92.5	282.9	44.0	41.9	29.3	115.2	398.1
1990	7.8	8.2	14.7	30.7	10.6	5.4	8.1	24.1	54.8	2.5	5.7	9.0	17.2	72.0	7.5	14.6	8.7	30.8	102.8
1991	3.0	31.6	24.7	59.3	0.0	-0.4													
**	115.0	-61.0X	-11.1X	-20.8X															
SMK6OM																			
1988	0.0	0.0	0.0	0.0	1.5	10.6	16.1	28.2	28.2	2.0	15.9	22.0	39.9	68.1	16.8	29.9	29.1	75.8	143.9
1989	0.0	0.0	0.0	0.0	18.9	9.5	15.6	44.0	44.0	9.5	8.5	6.0	24.0	68.0	12.6	13.4	15.6	41.6	109.6
1990	4.6	4.5	2.0	11.1	1.0	12.5	17.5	31.0	42.1	39.0	25.0	22.4	86.4	128.5	-1.0	1.0	0.0	0.0	128.5
**	N/A	N/A	N/A	N/A															
SMK9																			
1988	15.3	20.1	45.8	81.2	0.0	0.0	0.0	0.0	81.2	151.3	1.5	43.8	196.6	277.8	0.0	0.0	0.0	0.0	0.0
1989	19.1	15.1	35.1	69.3	0.1	1.1	0.3	1.5	70.8	0.1	1.7	0.2	2.0	72.8	40.6	0.4	0.0	41.0	318.8
1990	0.4	0.6	1.1	2.1	1.1	0.7	0.5	2.3	4.4	1.1	0.0	0.0	1.1	5.5	0.5	0.4	0.3	1.2	74.0
**	N/A	N/A	N/A	N/A															

\* Same as SMK6D except for  
Cosmetic picture on box

## SHIPMENT HISTORY REPORT -- SPECIALTY

YTD ACTUAL: MAY 91

\*\* YTD ROLLING 12, ROLLING 12 VZ, ROLLING 6 VZ, ROLLING 3 VZ

	JAN	FEB	MAR	1ST QTR	APR	MAY	JUN	2ND QTR	YTD	JUL	AUG	SEP	3RD QTR	YTD	OCT	NOV	DEC	4TH QTR	FULL YEAR
SHK12/																			
1987	0.0	0.0	2.4	2.4	0.0	0.0	0.0	0.0	2.4	0.0	1.1	1.7	2.8	5.2	0.0	0.0	0.0	0.0	0.0
1988	0.2	0.5	0.9	1.6	0.4	0.3	0.9	1.6	3.2	0.3	2.0	4.8	7.1	10.3	0.2	1.2	0.4	1.8	7.0
1989	0.4	0.7	0.7	1.8	0.5	0.7	1.2	2.4	4.2	0.6	2.9	1.9	5.4	9.6	0.9	3.8	3.8	8.5	18.8
1990	0.3	0.0	0.3	0.6	0.1	0.1	0.2	0.4	1.0	0.4	0.2	0.0	0.6	1.6	2.6	2.5	1.8	6.9	16.5
**	N/A	N/A	N/A	N/A											0.0	0.0	0.0	0.0	1.6
SHK18/																			
1989	2.2	1.4	2.7	6.3	0.2	0.0	0.4	0.6	6.9	0.0	1.5	2.6	4.1	11.0	0.0	0.0	4.0	4.0	4.0
1990	2.6	0.4	1.1	4.1	0.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	4.1	0.0	0.0	3.7	3.7	14.7
**	N/A	N/A	N/A	N/A											0.0	0.0	0.0	0.0	4.1
SHK28/																			
1987	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.4	1.6	1.6	0.0	0.0	0.0	0.0	0.0
1988	0.0	0.1	12.8	12.9	0.0	0.6	0.0	0.6	13.5	0.0	0.0	0.0	0.0	13.5	0.3	0.5	0.1	0.9	2.5
**	N/A	N/A	N/A	N/A											0.0	0.0	0.0	0.0	13.5
SHK25																			
1988	0.8	2.5	7.1	10.4	2.4	3.1	12.6	18.1	28.5	15.4	27.2	20.9	63.5	92.0	0.0	0.0	0.0	0.0	0.0
1989	14.9	7.0	12.9	34.8	16.6	4.0	4.3	24.9	59.7	5.4	5.8	4.4	15.6	75.3	3.2	9.8	8.3	23.3	115.3
1990	2.7	1.8	2.9	7.4	0.6	1.6	2.5	4.7	12.1	2.1	3.3	2.9	8.3	20.4	5.3	7.4	5.5	18.2	93.5
1991	0.5	2.3	2.4	5.2	1.7	0.2									2.4	18.0	2.8	23.2	43.6
**	41.1	-13.8X	-34.4X	-15.7X															
SHK30																			
1987	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	27.6	30.4	30.4	0.0	0.0	0.0	0.0	0.0
1988	5.6	0.6	12.4	18.6	-1.2	0.0	1.9	0.7	19.3	0.3	-0.3	0.0	0.0	19.3	4.1	8.2	6.6	18.9	49.3
1989	-3.0	-0.4	0.0	-3.4	6.2	0.6	24.1	30.9	27.5	1.0	5.6	0.7	7.3	34.8	0.1	-0.9	0.0	-0.8	18.5
1990	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	34.7
**	N/A	N/A	N/A	N/A											0.0	0.0	0.0	0.0	0.0
SHK100																			
1989																			
1990	4.2	12.6	7.6	24.4	0.5	7.5	7.1	15.1	39.5	5.9	43.0	29.2	78.1	117.6	29.5	15.1	25.5	25.5	25.5
1991	14.8	9.0	19.0	42.8	21.6	6.3												69.8	187.4
**	225.7	289.8X	65.6X	200.6X															
SHK200																			
1990	0.0	0.0	1.1	1.1	0.1	0.1	2.7	2.9	4.0	0.6	0.4	5.6	6.6	10.6	0.8	0.3	0.7	1.8	12.4
1991	0.9	0.9	1.3	3.1	3.6	0.2													
**	18.0	1284.6X	484.6X	292.3X															
SHK300																			
1989												19.4	19.4	19.4	79.5	48.8	19.8	148.1	167.5
1990	3.2	1.3	0.8	5.3	0.1	0.6	0.9	1.6	6.9	0.4	0.4	0.6	1.4	8.3	0.5	0.3	1.8	2.6	10.9
1991	0.2	0.5	0.2	0.9	0.3	0.4													
**	6.5	-96.3X	-86.8X	-40.0X															
SHK400																			
1990	0.0	0.7	3.9	4.6	0.3	0.5	3.7	4.5	9.1	1.1	2.6	8.8	12.5	21.6	4.0	2.0	0.3	6.3	27.9
1991	0.1	-0.2	0.2	0.1	-0.1	-1.4													
**	21.1	290.7X	-120.4X	-127.7X															

INVENTORY DEPLETED

\* Not covered by this license. These are manufactured by  
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# DICON SYSTEMS LIMITED

719 CLAYSON RD., TORONTO (WESTON), CANADA M9M 2H4 (416) 745-6044 TLX 06-969667 FAX (416) 745-6938

May 11, 1990

United States  
Nuclear Regulatory Commission  
Washington, D.C.

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

Dear Mr. Carrico

Based on our records the following represents the ionization smoke alarms shipped through Sonwill:

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	
300B	38,000	49,000	30,000	80,000	80,000	74,000	
SA4	6,000	8,000	13,000	40,000	40,000	37,000	
330L	2,000	2,000	6,000	8,000	8,000	8,000	
Total	46,000	59,000	49,000	128,000	128,000	119,000	TSC

Yours very truly  
DICON SYSTEMS LIMITED

John Mallory

Am-241

Each Dicon smoke detector was authorized for not more than 0.5 microcuries, therefore the above table in activity translates as follows:

TSC  
5/20/90

34,200	39,690	27,000	72,000	72,000	66,000
5,400	7,200	11,700	36,000	36,000	33,200
1,800	1,800	5,400	7,200	7,200	7,200
41,400	53,100	44,100	115,200	115,200	107,100

mCi

on microcuries