Veratec

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Lewisburg, PA 17837-0020

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May 10, 1991

Director U.S. Nuclear Regulatory
Commission Region I
Nuclear Materials Safety Section B
475 Allendale Road
King of Prussia, PA 19406

Dear Sir:

I am writing this response to address the additional information requested in your letter dated June 3, 1991 (Docket #030-32156, Control #114425). The responses are as follows:

1. You have requested that we submit a letter, signed by a Management Representative, stating that he/she has reviewed the application and concurs with the statements and representations contained therein. A letter signed by the Plant Engineer is enclosed with this packet.

2. Enclosed with this packet is a sheet listing our sources by Veratec reference, Device Model, Device Serial #, Source Serial #, Isotope and Quantity.

3. Regarding leak testing, our only source that requires this is the Sr-90 source located on our Wet Former #1, Frame 2. This testing will continue to be done by Accuray Service Engineers. They have their own procedure and lab to do the leak tests. Their test kit number is the same as their manufacturing License #, which is 3400255-03 (for your reference their distributor License # is 3400255-06G).

4. Veratec feels that we do not need a calibrated survey meter or personnel dosimetry. This is based on an employee exposure assessment conducted about a year ago. We figure that the average operator exposure is approximately 0.325 mR/Qtr.

8/19

If we figure out the exposure level for one of our mechanics to change a window, it would be as follows.

- One mechanic would replace one window per quarter (this by far exceeds past experiences).
- Average time to replace a window will not exceed 30 minutes $\longrightarrow$ 1/2 hr.
- An average radiation exposure from an LFE (either whole body or skin) is 0.5 mR/hr. This is measured directly with a Geiger Counter.

$$(0.5 \text{ mR/hr})(0.5 \text{ hr})\left(\frac{1 \text{ Occurrence}}{\text{Qtr.}}\right) = 0.25 \text{ mR/Qtr.}$$

This is in addition to the regular maintenance which we already do.

However, if it is felt that we do need a calibrated survey meter, Veratec will purchase one. The calibration frequency will be one year. Personnel Dosimetry will also be provided if it is felt necessary by the NRC. However, personnel dosimetry is not needed per Bill Prendergast, because levels are not sufficient to register on Dosimeters.

5. Once again, a survey meter will be purchased if the NRC feels that, based on the Employee Exposure Assessment, in answer to #4, it is needed.

6. The training provided to the three individuals who will perform minor maintenance on the gauges include the following:

(i) Training for Individuals
Scott Neuhard, Ernie Rogers and Jeff Loss

All three of us have received a 16 hour course (given by LFE Radiation Safety Officer, Bill Prendergast)

These topics included:

- Structure of the Atom
- The Elements
- Principles of Radioactivity
- Production of X-Rays
- Characteristics of Radioisotopes
- Interaction with Matter
- Radioactive Decay
- Units of Radioactivity
- Design of Radioactive Sources
- Detection of Radiation
- Detection Statistics

- Counting Efficiency
- Principles of Radiation Gauging
- Geiger Tube Survey Meter
- Units of Radiation Exposure
- ION Chamber Survey Meter
- Licensing
- NRC and Agreement States
- Source Checking
- Protection Against Radiation
- Biological Effects of Radiation
- Radiation Safety Officer
- Transportation of Radioactive Material
- Calibration of Survey Meters
- Emergency Procedures
- Reporting Incidents

In addition to this, each of us have received 40 hours of instruction at LFE. The course was oriented towards gauge maintenance and safety (both hands-on and theory).

Scott and Ernie have both attended Accuray's 1180 Micro Schooling which entails 160 hours of both hands-on and theory with respect to Gauge Maintenance and Safety.

Jeff Loss has received a Bachelor of Science Degree in Electrical Engineering from the Pennsylvania State University. During this time I took a 3.0 credit course in Nuclear Physics (Course Grade = A).

(ii)

a) The "Responsible Individual" for Veratec is Jeff Loss. My training encompasses the following.

- Bachelor of Science Degree in Electrical Engineering from the Pennsylvania State University (3.0 Credit Nuclear Physics Course included)
- 16 hour course given by Bill Prendergast (as outlined above)
- 40 hour course at LFE in Gauge Maintenance and Safety

b) The instructor to give Veratec representatives the in-house training was Bill Predergast, LFE Radiation Safety Officer. His qualifications include training all LFE field service engineers and setting up all radiation testing procedures.

7. The Basis Weight Gauges used within our plant are adequate to protect personnel and facilities. They are located on the concrete floor and are subjected to very little vibration. Also, the home position for the source housing is located on the backside of all machines and away from the normal work area of operating personnel.

Although the area around the gauges is slightly elevated in temperature, there is no cooling system on either the LFE or Accuray gauges. There is, however, an air shower on the scanning heads which is to keep the source window free from dust. This will provide some degree of cooling.

With respect to maintenance on gauges, a visual inspection is performed on approximately a weekly basis. However, at no time will corrosive material or material at high temperature be placed in an area near the Basis Weight Gauges.

Sincerely,

Jeffrey Loss
Radiation Safety Officer

James R. Israelson
Plant Engineer

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encl.

EMPLOYEE EXPOSURE ASSESSMENT

(IONIZING RADIATION)

Employee exposure to ionizing radiation at Veratec, Lewisburg (due to nuclear measuring gauges) is limited. This is due to the following reasons:

1. The offsheet condition is always on the non-operator side of the line. This position is a minimum of 105" from the edge of the frame on the operator's side. Also, the source shutter is closed in this position.
2. While scanning, access to the nuclear source is prohibited because the former web physically prevents a close proximity to the source.

However, exposure limits for operating personnel working in the area of nuclear sources will still be calculated according to "International Paper Industrial Hygiene Regulatory Guidelines RG-09, Appendix E".

This guideline states that the inverse square law should be used to calculate radiation levels. However, in our case all applicable distances are measured by the gauge manufacturer.

NOTE: 1. At distances greater than 3', readings from the Geiger Counter read negligible mR/hr.

NOTE: 2. At distances less than 3', the machine web physically limits closeness to the source housing.

Therefore, we will use 3' as our employee exposure distance.

NOTE: 3. Upon surveying employees from the production areas, it was estimated that approximately three minutes per week is spent within an area of 3' from the source.

Employee Exposure:

An average radiation exposure from an LFE at 3' (either whole body or skin) is 0.5 mR/hr. This is measured directly with a a Geiger Counter.

Employee Exposure Per Quarter

$$(0.5 \text{ mR/hr})(3 \text{ min/wk})\left(\frac{1 \text{ hr}}{60 \text{ min.}}\right)\left(\frac{13 \text{ wks.}}{\text{QTR.}}\right) = 0.325 \text{ mR/qtr.}$$

NOTE: 4. A maximum of 125 mR/QTR is allowable to remain under a general license.

Veratec Reference	Device Model	Device Ser. #	Source Ser. #	Isotope	Quantity (mCi)
NOTE: The following items are manufactured by Accuray					
DL-8	O-5	383194631	K-1002-G	Kr-85	250
DL-6	O-5	383194632	K-1003-G	Kr-85	250
WF-1,F1	U-7	972242631	K-1203-G	Kr-85	250
WF-1,F2	O-7	972242632	S-1126-T	Sr-90	70
NOTE: The following items are manufactured by LFE					
DL-1	5001	5301	009025	Kr-85	1200
DL-3	5510	5235	008945	Kr-85	1200
DL-5	5001	5305	009031	Kr-85	1200
DL-7	5001	5308	009035	Kr-85	1200
WF-2	5510	5236	008947	Kr-85	1200

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

NO.: NR-420-D-135-B DATE: DEC 08 1988

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauges

MODEL: SU-P77A and SU-77A

MANUFACTURER/DISTRIBUTOR: LFE Corporation
55 Green Street
Clinton, MA 01510

SEALED SOURCE MODEL DESIGNATION: LFE Model S-70A
Amersham Model KAC.D1
Amersham Model KAC.D3

ISOTOPE:	MAXIMUM ACTIVITY:
Krypton-85	1200 millicuries (S-70A) 1000 millicuries (KAC.D1) 750 millicuries (KAC.D3)

LEAK TEST FREQUENCY: Not Required

PRINCIPAL USE: (E) Beta Gauge

CUSTOM DEVICE: _____ YES ___x___ NO

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

NO.: NR-420-D-135-B DATE: DEC 08 1988

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauges

DESCRIPTION:

LFE Models SU-P77A and SU-77A are used to measure product weight per unit area. Both models use encapsulated Krypton-85 gas. The devices consist of three main parts: the source head, the detector, and the frame. The detector measures the change in beta radiation due to the absorbtion by the product material. The source head and detector are attached to a mechanical frame that allows the source head and detector to transverse back and forth across the product. The source head and detector can be attached to three different frame configurations designated as "O", "MO", or "C" type frame (see attachment 1). In all cases the detector is attached to the top arm of the frame and the source head is attached to the bottom arm of the frame.

Sealed sources are placed in a cast iron box 6 inches square by 3.625 inches high. The box houses the source, shutter, cylinder, and shutter mechanism. Model SU-P77A contains a pneumatic cylinder where as Model SU-77A contains an electric cyclinder. Both systems have a fail-safe shutter design in that if the air supply or current supply fails, or shuts off, a spring attached to the end of the cylinder shaft returns the shutter to the closed position. Another safety feature equiped on both models is a visible check of the shutter's position. The edge of the shutter has a green and red painted section on it which is visible through an acrylic window located in the side of the box. If the green surface is seen through the window it indicates the shutter is closed "safe" position, if a red surface is seen then the shutter is in the "open" position.

The shutter mechanism consists of a clevis, compression spring, two levers, roll pin, pivot block, and shutter. When the cylinder engages a shaft is pulled back against the safety spring and rotates the levers which move the shutter to the open position. Disengaging the power supply causes the shutter to return to the closed position.

A gasket is bonded to the cast iron box perimeter and then a 10 inch diameter lid is attached with screws. The lid houses a collimator and aluminium window. The collimator is placed in the lid and then an O-ring gasket is fitted in place. An aluminium window is streched over the collimator and held in place with a clamp ring.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauges

DESCRIPTION (CONT.):

One of three collimators can be used with each device and are notated as collimater "A" (D241553), collimator "B" (D241554), or collimator "C" (D241555). The collimator has an outside diameter of 1.125 inches and is 0.250 inches thick (see attachment 4). The radiation beam produced is oval in shape and is 1 inch by 0.5 inches if collimator "A" is used, 1 inch by 0.375 inches if collimator "B" is used, and 1 inch by 0.250 inches if collimator "C" is used.

The sealed source dimensions are shown in attachment 3. A stainless steel holder will be used to adapt Amersham's KAC.D1 and KAC.D3 sealed sources in order to secure them in LFE's devices.

The sources are attached by (2) machine screws and lock washers to the source support plate which is attached to the box by use of spacers and (3) machine screws and lock washers.

LABELING:

An aluminium caution plate is cemented to the side of the source head. The plate is labeled in accordance section 20.203, 10 CFR20 and section 32.51, 10 CFR 32. Also a warning is engraved in the label stating "REMOVAL OF THIS LABEL IS PROHIBITED BY REGULATIONS OF THE NUCLEAR REGULATORY COMMISSION".

DIAGRAM:

See attachments 1 through 4.

CONDITIONS OF NORMAL USE:

The devices are used in process lines to measure the product weight per unit area of plastics, paper, rubber, and similar materials.

The devices are used in factories having environments that are fit for human occupancy. The surface temperature of the device is not expected to reach temperatures in excess of 100° F.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

NO.: NR-420-D-135-B DATE: DEC 08 1988 PAGE 4 OF 9

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauge

CONDITIONS OF NORMAL USE (CONT.):

Access to the radiation beam is restricted due to both the location of the device in the process line and the pre-set gap of 5/8 inch between the source and detector.

PROTOTYPE TESTING:

LFE Corporation has performed prototype tests on the above models. A bench test was performed in which the device was actuated to open and close the shutter for 8,000 cycles. The prototypes were then placed in each of four possible mount orientations for 35,000 additional cycles.

The prototypes were then placed in an oven with an environmental temperature of 250° F, and subjected to 30,000 more cycles. At the end of each test, the prototypes were examined. After the completion of over 70,000 cycles (estimated 80 year life expectancy for normal industrial use of these devices) the prototypes operated with no mechanical failures.

Sealed source Model S-70A was approved and has been in use since 1965.

The manufacture of sealed source Models KAC.D1 and KAC.D3 have tested prototype models in accordance with ANSI N542-1977 and the prototype sealed sources acheived ANSI classifications 77C33232, 77C43232 respectively.

The devices has been used in an industrial environment since 1973 with no reported incidents.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

NO.: NR-420-D-135-B DATE: DEC 08 1988

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauge

EXTERNAL RADIATION LEVELS:

The maximum external radiation levels as reported by the manufacturer for Model SU-P77A loaded with a 500 millicurie Kr-85 sealed source (Model S-70A) were as follows:

Distance from the source (cm.)	Measured radiation levels (mR/hr)
Shutter Open	
30	2.4
100	0.4
Shutter Closed	
30	1.7
100	.3

QUALITY ASSURANCE AND CONTROL:

LFE Corporation has supplied an adequate Quality Control Policy and is on file with the Medical, Academic and Commercial Use Safety Branch. LFE Corporation's Quality Control Policy includes the following:

- o Design Control
- o Procurement Document Control
- o Instructions, Procedures, and Drawings
- o Document Control
- o Inspection
- o Non-Conforming Material Parts, or Components
- o Quality Assurance Records

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

NO.: NR-420-D-135-B DATE: DEC 08 1988

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauge

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- Devices intended for distribution to persons specifically licensed by the NRC or an Agreement State shall be labeled in accordance with Section 20.203(f).
- Devices intended for distribution to persons under the general license pursuant to Section 31.5 shall be labeled in accordance with Section 32.51 (a)(3).
- Devices intended for use under a general license shall be installed and initially tested for proper operation of the source exposure mechanism, safety warning components, labels, and external radiation levels by LFE Corporation, or other persons specifically licensed by the NRC or an Agreement State.
- The device shall be subjected to a safety performance test each year. The test will check for proper shutter and warning light/indicator operation.
- Handling, Storage, Use, Transfer, and Disposal: For devices used under a specific license to be determined by the licensing authority.
- This registration sheet and the information contained with the references shall not be changed without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

The sealed source Models KAC.D1 and KAC.D3 have an ISO ANSI N542 classification of 77C33232, and 77C43232 respectively. Sealed source Model S-70A has been in use since 1965 with no reported incidents. This indicates that temperature, pressure, impact, vibration, and puncture stresses imposed during use are highly unlikely to cause breach of containment intergrity of the capsule. During use the source is sealed within the housing such that the source is protected against possible airborne corrosive and other types of contaminates. Protection provided by the source housing further assures radiation material containment in the event of an accident.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

NO.: NR-420-D-135-B DATE: DEC 08 1988

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauge

SAFETY ANALYSIS SUMMARY (CONT.):

It is not expected that personnel will have access to the radiation beam due to the location of the device in the process line and the pre-set 5/8 inch gap between the source housing and the detector.

The devices will be used in an industrial environment; however, these environments are not expected to be severe because of the need to protect the detection system.

A number of these units have been in operation since 1973 throughout the country. LFE Corporation's experience shows that these devices provide adequate radiation protection.

LFE Corporation has submitted sufficient information to provide reasonable assurance that:

- The device can be safely operated by persons not having training in radiological protection.
- Under ordinary conditions of handling, storage, and use of the device, the byproduct material contained in the device will not be released or inadvertently removed from the device, and it is unlikely that any person will receive in any period of one calendar quarter a dose in excess of 10 percent of the limits specified in the table in Section 20.101(a), 10 CFR 20.
- Under accident conditions (such as fire and explosion) associated with handling, storage, and use of the device, it is unlikely that any person would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in the following chart:

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

NO.: NR-420-D-135-B DATE: DEC 08 1988 PAGE 8 OF 9

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauge

SAFETY ANALYSIS SUMMARY (CONT.):

PART OF BODY	REM
Whole body; head and trunk; active blood-forming organs; gonads; or lens of eye	15
Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than 1 square centimeter	200
Other Organs	50

Based on the above and the information referenced below, we continue to conclude that LFE Corporation's Models SU-P77A and SU-77A are acceptable for distribution to persons under a general license. Further, we conclude that the source housings can be expected to maintain its containment integrity adequately for normal conditions of use and for accidental conditions that might occur during use.

REFERENCES:

The following supporting documents for LFE Corporation's Models SU-P77A and SU-77A are hereby incorporated by reference and are made a part of this registry document.

- LFE Corporation's letters dated October 25, 1988, November 16, 1987 and enclosures thereto.
- LFE Corporation's Applications dated November 23, 1983, August 18, 1978, December 29, 1977, December 15, 1977, and enclosures thereto.
- LFE Corporation's letters dated November 14, 1974, January 2, 1973, December 19, 1972, October 13, 1972, May 25, 1972 and enclosures thereto.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(Amended in its Entirety)

NO.: NR-420-D-135-B DATE: DEC 08 1988 PAGE 9 OF 9

DEVICE TYPE: "O", "MO", or "C" Frame Beta Gauge

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date: DEC 08 1988 Reviewer: [signature]

Date: DEC 08 1988 Concurrence: [signature]

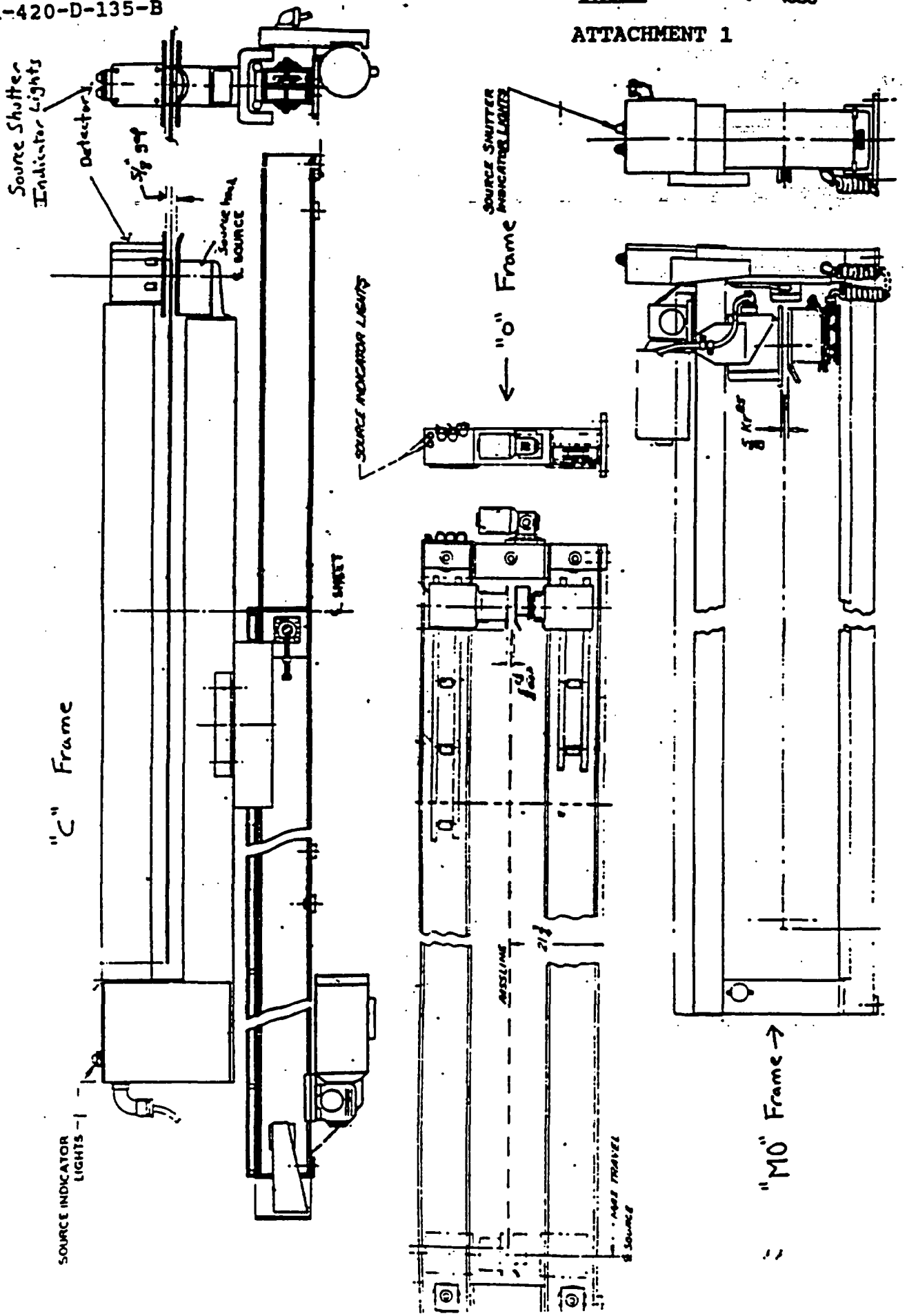
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

NO.: NR-420-D-135-B

DATE: DEC 08 1988

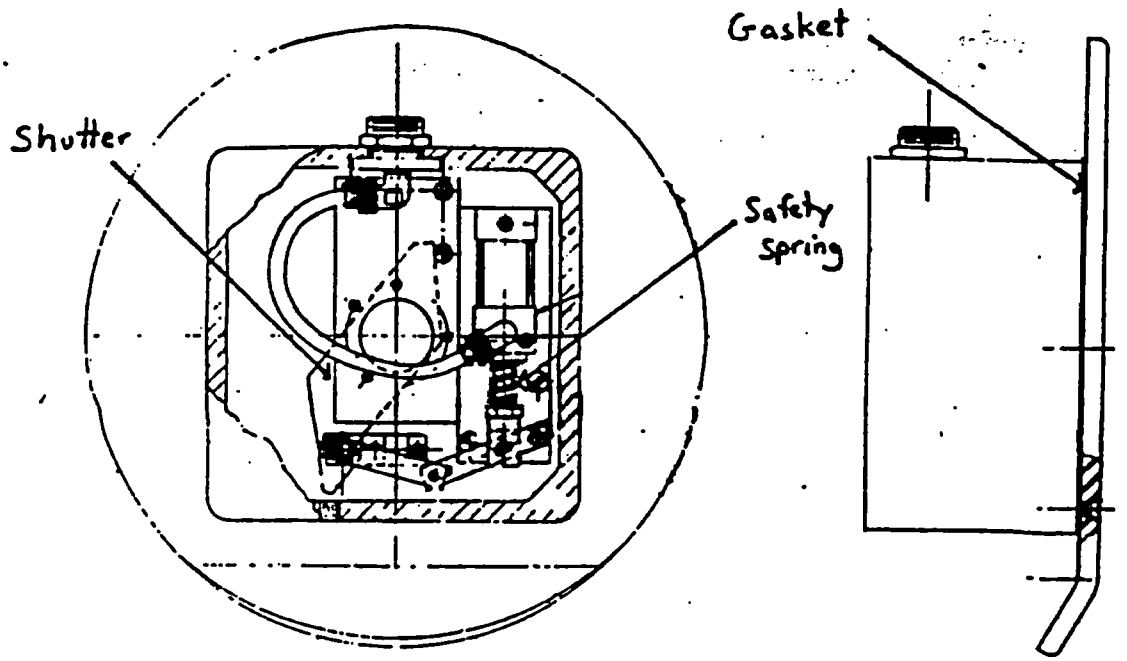
ATTACHMENT 1



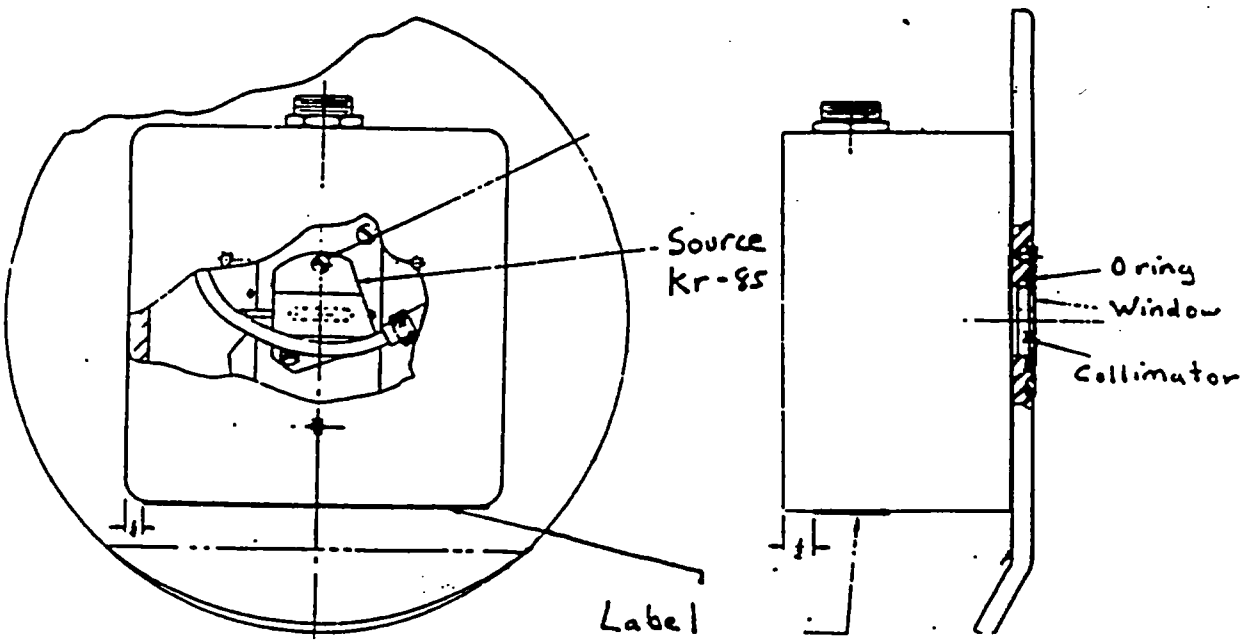
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

ID.: NR-420-D-135-B DATE: DEC 08 1988 ATTACHMENT 2

Source Head Top and Side View



Source Head Bottom and Side View



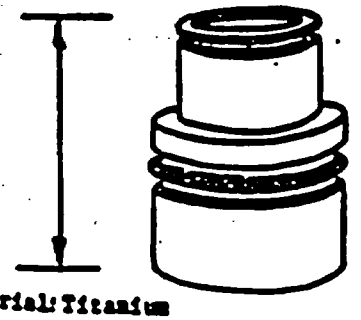
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR-420-D-135-B DATE: DEC 08 1988

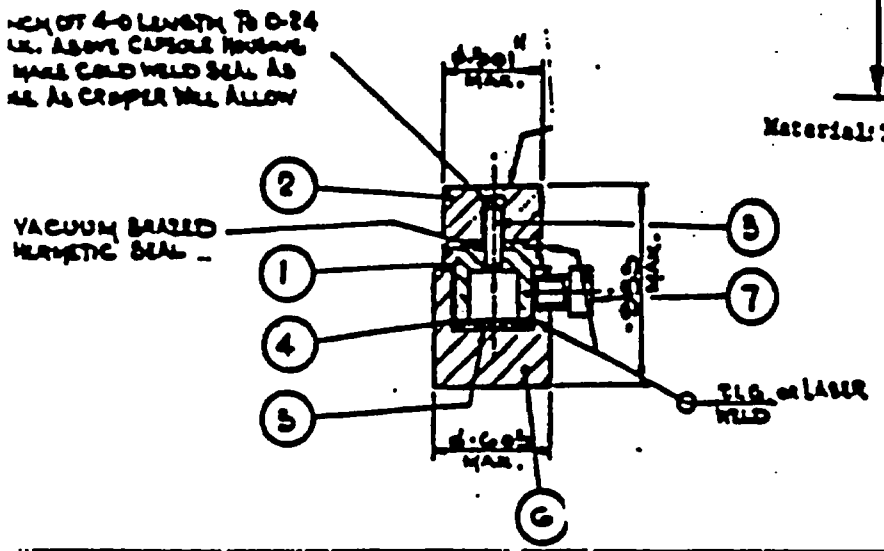
ATTACHMENT 3

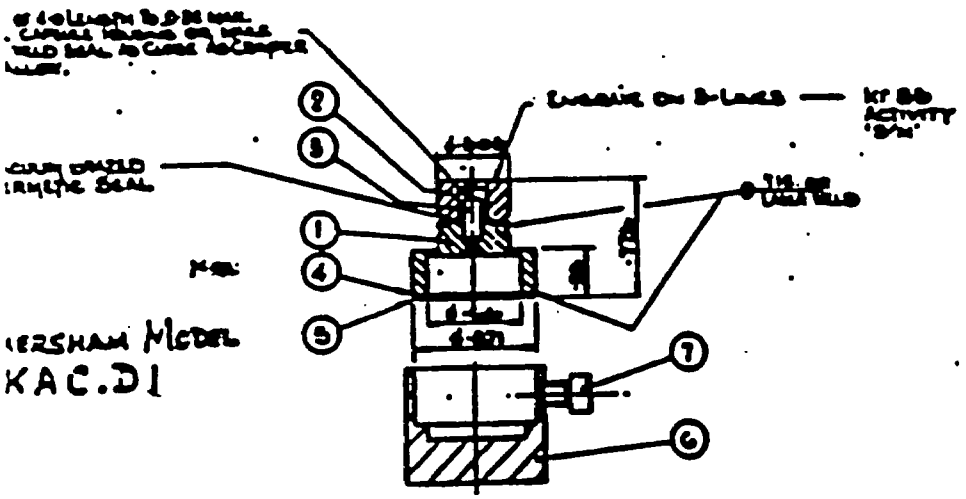
Specific for the model

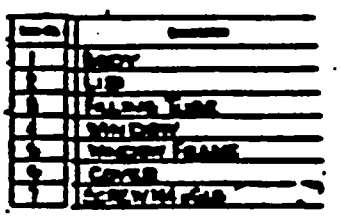
Amersham Model
KAC.D3 Source



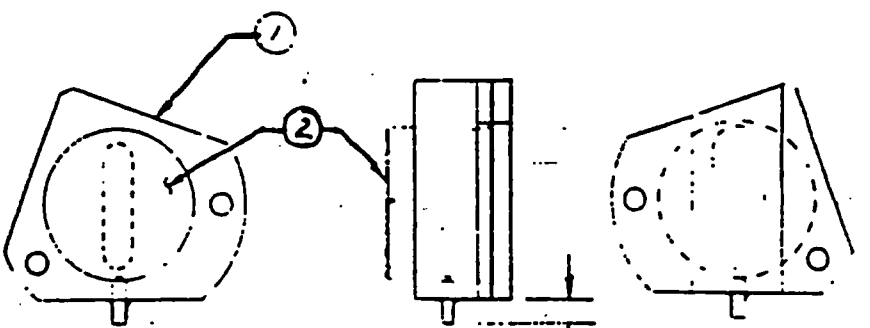
Overview of KAC.D3 Source







S70A KRYPTON-85 SOURCE CAPSULE ASSEMBLY



OPERATION INSTRUCTIONS

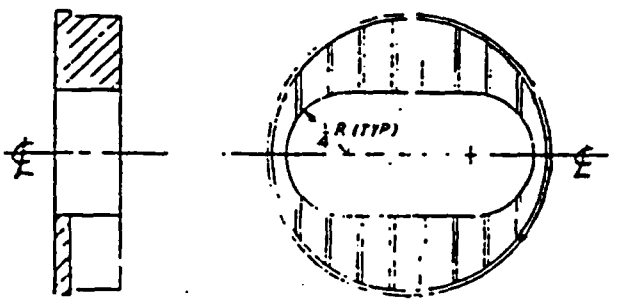
1. Assemble items 1, 2, 3 and 4 by brazing with B.T. solder in hydrogen atmosphere without flux. Inside window area 3/16 in. wide x 1 in. long, minimum, must be entirely free of solder.
2. Trim excess window material on 1.18" diameter.
3. Handle this capsule with care, window must be free of all scratches, indentations or creases.
4. Attach tags to each capsule indicating the date of test, results, and signature.
5. FILL WITH HELIUM TO INDICATE SEAL OF CAPSULE AND TUBE, AND TEST FOR LEAKS IN HELIUM LEAK DETECTOR
6. Individually wrap each capsule in soft absorbent material to prevent damage to capsule.
7. Send all capsules, when finished, to source department.

PARTS LIST

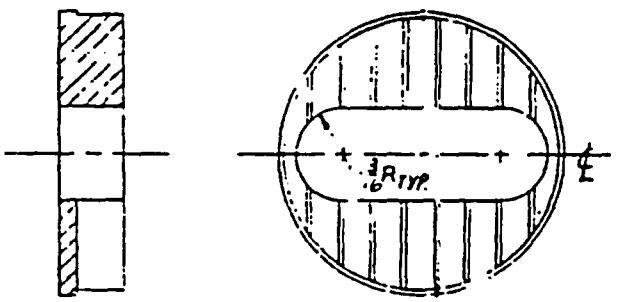
QTY	PART NUMBER	DESCRIPTION	ITEM NO
1	A237219	SOURCE CAPSULE BODY	1
1	A239666	WINDOW	2
1	A297302	BASE	3
1	A246752	FILLER TUBE	4

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR-420-D-135-B DATE: DEC 08 1988 ATTACHMENT 4

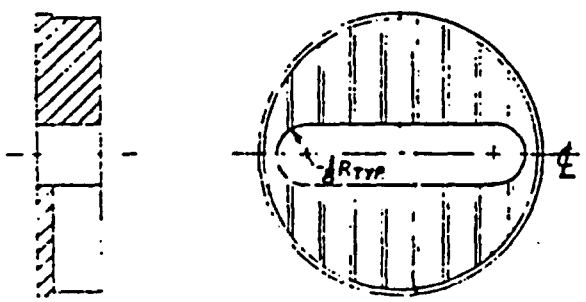


D241553
COLLIMATOR "A"



SECT "B-B"
OTHERWISE SAME AS D241553

D241554
COLLIMATOR "B"



SECT "C-C"
OTHERWISE SAME AS D241553

D241555
COLLIMATOR "C"

104003

"SECTION COPY"