MAY 16 1986

[redacted]
Mr. Jerald Smuda
General Instrument Corp.
4433 N. Ravenswood Avenue
Chicago, Illinois 60640

Dear Mr. Smuda:

Thank you for speaking with me on May 14, 1986. I understand that Mr. Alfred West is no longer an employee of the company and that manufacturing of the products no longer occurs at the above address. I was concerned to discover that no person at General Instruments Corp. (GIC) has been assigned the responsibility of maintaining the regulatory requirements of License No. 12-19460-02E. My concern also exists for License No. 12-19460-01. I have advised Region III about your situation and they should be contacting you about the 12-19460-01 license. Just in case you cannot find Mr. West's August 9, 1985 letter, a copy is enclosed.

To continue with the 12-19460-02E licensing renewal request, we need additional information or clarification on the following items:

1. Explain how GIC is insuring that imported glow switches contain the activity specified in the GIC license application and in Section 30.15 10 CFR Part 30 (copy enclosed).

2. Explain how GIC is insuring that incoming switches and lamps are built to GIC specifications.

3. Explain how GIC is insuring that glow switches and containers are being labeled in accordance with Section 32.14(b)(6), copy enclosed.

4. Since Mr. West is no longer an employee of the company, the response to this letter must include a resubmitted application. Both the response and the application must be signed by a representative of GIC or legal entity who is authorized to sign official documents and to certify that the application contains information that is true and correct to the best of their knowledge and belief.

5. GIC's request to distributed a unknown quantity of glow switches that they have no idea how much tritium or krypton-85 is contained in each product cannot be honored. Given the information in the August 9, 1985 letter, there appears to be no way in which GIC can meet the requirements specific in Section 32.14(b)(6), 32.15, or 32.16, 10 CFR Part 32. Please provide a written withdrawal of this request or provide information that demonstrates GIC will comply with the regulations of Section 32.14, 10 CFR Part 32.

OFFICE ➤						
SURNAME ➤						
DATE ➤						

We will continue with our review upon receipt (in duplicate) of the above information. Please refer to Control No. 79538 in your reply. Your current license will not expire until final action is taken on the renewal application.

To continue prompt review of your application, we request that you send your response to this letter within 30 calendar days from the date of this letter.

If you have any questions, please call me at (301) 427-9005.

Sincerely,

/s/

Steven L. Baggett
Material Licensing Branch
Division of Fuel Cycle and
Material Safety

Enclosures:
1. 10 CFR Parts 30, 32
2. Ltr dtd 08/09/85

cc: Bruce Mallett-RIII
Bill Adam -RIII

DISTRIBUTION:
FCML r/f
NMSS r/f
FC Central File
SLBaggett

OFFICE ▶	FCML						
SURNAME ▶	SLBaggett:ht						
DATE ▶	05/15/86						

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY

GENERAL INSTRUMENT

Lamp Division
General Instrument Corporation
4433 N. Ravenswood Avenue
Chicago IL 60640
312/784-1020

August 9, 1985

U. S. Nuclear Regulatory Commission
Region III
Materials Licensing Section
799 Roosevelt Road
Glen Ellyn, Illinois 60137

SUBJECT: Renewal and amendments of By-Product Material License #'s 12-19460-01
12-19460-02E

Dear Sirs:

The information provided on the submitted application is that which we feel is necessary to fulfill N.R.C. requirements for the issuance of by-product material licenses for the receipt and distribution of parts that contain "licensed material" as classified by sections 20, 30 and 32-10 C.F.R.

Our current license indicates krypton 85 as the radioactive material used in parts that we receive. Our supplier for the lamp has indicated to us that they have also begun to use tritium within lamps produced for us and that we have no way of physically identifying lamps that contain tritium or krypton. Since it would be illegal to store and distribute the parts containing tritium without the approval of the N.R.C. we ask that attention be given to our license renewal application which adds tritium along with krypton as the radioactive materials used in parts that we store and distribute. Possibly a lenthy renewal process would financially burden us and affect many employees unfavorably. Please give strong consideration to our request for a timely review of the application in view of the information that we have provided.

Respectfully,

Alfred L. West

Alfred L. West
Government Compliance
Administrator

ALW;tp

~~8612100341~~

RECEIVED
AUG 9 1985
REGION III

CONTROL NO. 7 9538

NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY C[illegible]MISSION
APPROV[illegible]Y OMB
3150-012[illegible]
Expires: 5-[illegible]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 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
- [X] B. AMENDMENT TO LICENSE NUMBER 12-19460-01&12-19460-02E
- [X] C. RENEWAL OF LICENSE NUMBER 12-19460-01&12-19460-02E

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

General Instrument Lamp Divisio
4433 North Ravenswood
Chicago, Illinois 60640

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

General Instrument Lamp Division
4433 N. Ravenswood
Chicago, Illinois 60640

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

*Alfred West

TELEPHONE NUMBER

(312) 784-1020 X28

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 3P & 3I

AMOUNT ENCLOSED $ $350.00

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
Alfred L. West	Alfred L. West	Government Compliance Administrator	8-8-8

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

- [ ] <$250K
- [ ] $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)*

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

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
			~~861210365~~	
AMOUNT RECEIVED	CHECK NUMBER		CONTROL NO. 79538	DATE

Model and Types of Parts

A. High Brightness Lamp - Type LT
B. Circuit component Lamp - Type A, V and Z

Construction and Design

Glass construction with hermetically sealed electrodes.

Method of Containment for Radioactivity

Parts will not pass electrical acceptability tests if leaks appear. A very low amount of radioactivity is contained within each part, approximately .04 microcuries.

Method of Labeling or Marking

When the parts are distributed, they are accompanied by a packing slip that identifies the "source material" contained in the parts.

RADIOACTION LEVEL AND METHOD OF MEASUREMENT

When the area where by product material is stored was checked for radioactivity levels, there was no measurable reading registered on the survey meter.

Radiation Detection Instrument

Type - Survey Meter

Manufacturer's Name - Texas Nuclear (Searle)

Model# - 2650

Number Available - 1

Radiation Detected - Beta/Gamma

Sensitivity Range - .1 to 100 M.R./H.R.

Interval of Calibration - Yearly

Calibrated by - Warrington laboratorys
Pflugersville, Texas

* Denotes amendment to application.

Items 5 through 12

5. Radioactive Material

A. Element, Mass # and Chemical or Physical form	-Tritium Mass 3* Krypton 85 form - Gas
B. Maximum Amount that will be processed	10 Curies *

6. Purpose for which Licensed material will be used.
*Redistribution to general Licenses.

7. Individuals Responsible for Radiation Safety Program and their training and experience.

*Alfred L. West, Radiation Protection Officer
*Kin Wai Au

Type of Training	Formal Course
Radiation Safety Protection Program	Yes

Trained by:	Area's Covered
Radiation Safety Services, Inc. Evanston, Illinois	A. Principles and practices of radiation protection. B. Radioactivity measurement Standardization & Monitoring techniques & instruments C. Mathematics & calculations basic to the use & measurement of radioactivity D. Biological effects of radiation

8. Training for individuals working in or frequenting restricted area.

Since the accumulative amount of radioactivity is far below the minimum established for an area to be classified as restricted, we do not have a designated "restricted" area for the parts that are stored on the premises. Each part stored contains approximately .04 microcuries.

Supervisory personnel in the area where the parts are stored have completed a "Radiation Safety Protection Program" and are responsible for the proper labeling of packages that contain the radioactive source when it is distributed to general licenses.

9. Facilities and Equipment

Only finished parts will be received, stored and shipped at this facility. The finished part is a-glow lamp which consists of two electrodes sealed in a vacumn glass envelope filled with in ert gas.

10. Radiation Safety Program

Supervisory personnel from Quality Assurance, Inventory Control, manufacturing and Facility maintenance have completed a "Radiation Safety Protection Program ". Quality Assurance and Inventory Control are the sole handlers of the parts when they are recieved, stored and shipped. The training provided to the supervisory personnel more than adequately provided them with the necessary knowledge and understanding for the safe handling of parts by personnel under their supervision.

11. Waste Management.

N/A

12. License Fees

License Number	Fee	Fee Catagory
12-19460-01	$120	3P
12-19460-02E	$230	3I

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

MAY 30 1986

NO: NR-284-D-102-S DATE: PAGE: 1 of 10

DEVICE TYPE: Industrial Backscatter Gauge

MODELS:
A. 41574/9810
B. 41575/9820
C. 41574/9830
D. 41574/9840
E. 41574/9850

DISTRIBUTOR:

FAG Kugelfischer Georg Schafer
Kommanditgesellschaft auf Aktien
P.O. Box 1660
Tennenloher Str. 41
D-8520 Erlangen
West Germany

SEALED SOURCE MODEL DESIGNATION:

A. New England Nuclear Model NER-8170
B. New England Nuclear Model NER-593
C. Amersham Corporation Model CLC.D1
D. Amersham Corporation Model AMC.D1
E. Amersham Corporation Model PHC.C1

ISOTOPE:

A. Krypton 85
B. Strontium 90
C. Californium 244
D. Americium 241
E. Promethium 147

MAXIMUM ACTIVITY:

A. 30 millicuries
B. 5 millicuries
C. 500 millicuries
D. 250 millicuries
E. 500 millicuries

LEAK TEST FREQUENCY:

A. N/A
B. 6 months
C. 6 months
D. 6 months
E. 6 months

PRINCIPAL USE: (E) Beta/Gamma gauges

CUSTOM DEVICE: _____YES __X__NO

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: MAY 3 0 [illegible] PAGE: 2 of 10

DEVICE TYPE: Industrial Backscatter Gauge

DESCRIPTION:

The Models 41574/9810(85Kr), 9820(90Sr), 9830(244Cm), 9840(241Am), 9850(147Pm) systems are designed for use as backscatter measuring gauges for determination of coating thickness of plated materials or thickness of thin film materials.

These devices consists of sealed sources of Krypton 85, Strontium 90, Californium 244, Americium 241 or Promethium 147 contained in shielded housings with shutter mechanism, ionization detectors and radiation beam backstops.

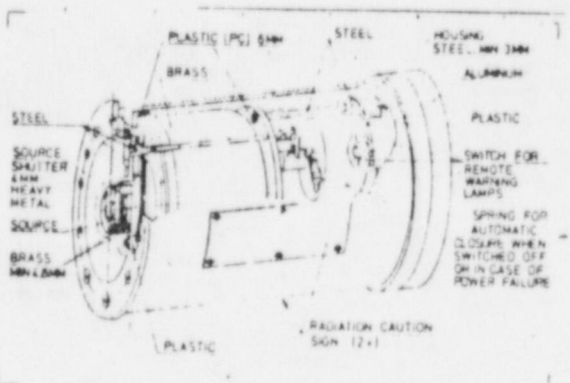
The outer housings of these devices are of 3mm thick steel in all directions except in the direction of the radiation beam. This is covered with a thin plastic or metal foil (dust cover).

The source shielding and mounting device is manufactured from brass and steel and the shutter from heavy metal (91% tungsten, 9% nickel and copper) and steel. This assembly is mounted to the steel and brass housing of the device ionization chamber.

The shutter is operated by an electromagnetic circuit and has a spring return for closing. During operation the shutter triggers microswitches which activate warning lights to show shutter position.

When installed the radiation beam is pointed toward a stainless steel calendar or other beam intercept to provide backscattered radiation for device operation. This operational characteristic enhances safety by shielding the primary beam.

DIAGRAM:



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: MAY 30 1986 PAGE: 3 of 10

DEVICE TYPE: Industrial Backscatter Gauge

LABELING:

The labeling proposed for these devices is deemed to meet the requirements of 10 CFR 20.203.

CONDITIONS OF NORMAL USE:

These gauges are designed to measure thickness of materials suchas plastic and metal coating and rubber film. Typical industrial environments include ambient temperatures of 50°F to 158°F, slight corrosion and dust and slight potential for fire or explosion. Temperatures of measured products range from 104°F to 840°F.

PROTOTYPE TESTING:

All sealed sources utilized have been tested and found to meet the recommended ANSI standards for sources used in gauging devices. Furthermore, based on our review of prototype test data provided by FAG Bearing Corporation, we conclude that the device listed in this document would be expected to operate safely during normal use.

EXTERNAL RADIATION LEVELS:

The device distributor's radiation measurements were done according to ANSI N538-1979, paragraph 7.3.

1. Testing Procedures

   All tests were performed with sources mounted in the backscatter measuring chambers, measuring geometry and source configuration according to Drawing No. 41574/9810..99. The measurements were made at 5cm, 30cm and 100cm distance positions shown on Drawing No. II.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: MAY 30 1986 PAGE: 4 of 10

DEVICE TYPE: Industrial Backscatter Gauge

EXTERNAL RADIATION LEVELS: (Continued)

2. Test Results

The measuring results are shown in Tables I, II and III

3. ANSI N538 Classificaion

A.	Kr-85	ANSI - 43 - S24-675-R2
B.	Sr-90	ANSI - 43 - S32-885-R2
C.	Cm-244	ANSI - 43 - 565-675-R2
D.	Am-241	ANSI - 43 - 685-985-R2
E.	Pm-147	ANSI - 43 - 485-985-R2

RADIATION EXPOSURE:

Dose equivalent rates resulting from the indicated sources installed in Model 41574/9810 (^{85}Kr), 9820(^{90}Sr), 9830(^{244}Cm), 9840 (^{241}Am), 9850 (^{147}Pm) source holder housing were measured. All measurements were made against a steel roll with a 500mm diameter. All measurements were made at an angle of maximum dose rate.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: MAY 30 1986 PAGE: 5 of 10

DEVICE TYPE: Industrial Backscatter Gauge

RADIATION EXPOSURE:

TABLE I

MAXIMUM DOSE EQUIVALENT RATES - SHUTTER OPEN
MAXIMUM mREM/hour
AMENDED IN ENTIRETY

SOURCE	MAXIMUM ACTIVITY mCi	DISTANCE cm	BETA SHALLOW+	PHOTON DEEP@	NEUTRON DEEP#	TOTAL DEEP
^{85}Kr	30	5	1200.0	0.98	-	0.98
		30	64.0	0.42	-	0.42
		100	0.74	0.07	-	0.07
^{90}Sr	5	5	258.0	22.0	-	22.0
		30	35.2	4.8	-	4.8
		100	2.7	0.3	-	0.3
^{241}Am	250	5	-	3.2	0.14	3.34
		30	-	0.2	0.04	0.24
		100	-	0.06	0.04	0.1
^{244}Cm	500	5	-	10.0	2.4	12.4
		30	-	1.0	0.6	1.6
		100	-	0.08	0.13	0.21

+ Beta measured with 7 mg/cm^2 window
@ Photon measured with 300 mg/cm^2 window
# Neutron from actual measurements

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: MAY 30 1986 PAGE: 6 of 10

DEVICE TYPE: Industrial Backscatter Gauge

RADIATION EXPOSURE:

TABLE II

MAXIMUM DOSE EQUIVALENT RATES - SHUTTER CLOSED
MAXIMUM mREM/hour
AMENDED IN ENTIRETY

SOURCE	MAXIMUM ACTIVITY mCi	DISTANCE cm	BETA SHALLOW+	PHOTON DEEP@	NEUTRON DEEP#	TOTAL DEEP
^{85}Kr	30	*	-	8.4	-	8.4
		5	-	1.8	-	1.8
		30	-	0.36	-	0.36
		100	-	0.06	-	0.06
^{90}Sr	5	*	-	7.2	-	7.2
		5	-	0.6	-	0.6
		30	-	0.1	-	0.1
		100	-	0.04	-	0.04
^{241}Am	250	*	-	0.24	0.18	0.42
		5	-	0.06	0.14	0.2
		30	-	0.02	0.04	0.06
		100	-	0.02	0.01	0.03
^{244}Cm	500	*	-	2.6	3.0	5.6
		5	-	0.4	2.4	2.8
		30	-	0.1	0.6	0.7
		100	-	0.06	0.13	0.19

+ Beta measured with 7 mg/cm^2 window
@ Photon measured with 300 mg/cm^2 window
# Neutron from actual measurements
* Measurements made at essentially zero distance, against the window with the shutter closed.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: MAY 30 1985 PAGE: 7 of 10

DEVICE TYPE: Industrial Backscatter Gauge

RADIATION EXPOSURE:

TABLE III

MAXIMUM DOSE EQUIVALENT RATES - SHUTTER OPEN/CLOSED

Maximum mREM/HOUR

AMENDED IN ENTIRETY

15mm Gap
Maximum Dose Equivalent Rate

Source	Activity mCi	Distance cm	mRem/hr Beta	Photon
		Shutter Open		
147Pm	500	5	46	_____
		30	0.18	_____
		100	0.05	_____
		Shutter Closed		
147Pm	500	5	0.02	_____
		30	0.02	_____
		100	0.02	_____

These measurements were made with an ion chamber at depths of 7 mg/cm^2. Based upon this information, the ANSI rating for the device is ANSI-43-485-985-R2.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: MAY 30 1985 PAGE: 8 of 10

DEVICE TYPE: Industrial Backscatter Gauge

QUALITY ASSURANCE AND CONTROL:

The Registrant has provided a written quality assurance and control program which is deemed adequate and which appears to exceed the recommendation of ANSI N538. Program elements include but are not limited to the following:

- FAG Bearing Corporation is responsible for manufacturing and quality assurance and control of the gauging devices named in this registry document.

- Persons performing the assurance functions have authority to examine all records which relate to radiation safety of gauging devices and reject and dispose of any defects.

- Program responsibilities include:

  1) Participating in the design review of the gauge, suggesting necessary improvements to satisfy features, especially those identified in Section 3 ANSI N538.

  2) Monitoring the performance of the recordkeeping associated with prototype testing, and verifying that gauge production models meet the stated radiation numerical classification.

  3) Devising and implementing documented test, inspection, and corrective action for gauge components which constitute or satisfy the safety features of Section 3 of ANSI N538.

  4) Establishment of an audit procedure, monitoring all aspects of the gauge program which may affect radiation safety such as installation, servicing, shipping, and instruction manuals.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: [redacted] 30 1986 PAGE: 9 of 10

DEVICE TYPE: Industrial Backscatter Gauge

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- These devices shall be distributed only to persons specifically licensed by NRC or an Agreement State.
- Handling, storage, use, transfer, and disposal: To be determined by the licensing authority.
- The device shall be installed and initially tested for proper operation of the source exposure mechanism, safety warning components, labels, external radiation levels (source exposed, source shielded) and leak tested by FAG Bearing Corporation or other persons specifically licensed by the NRC or an Agreement State.
- The device shall be leak tested, except for Kr-85, at six month intervals using techniques capable of detecting 0.005 microcurie of removal contamination.
- This registration sheet and the information contained within the references shall not be changed without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

Based on our review of the design information and prototype test data cited below that this amendment adds a promthium 147 source, we continued conclude that the FAG Bearing Corporation, Model 41574/9810, 9820, 9830, 9840 and 9850 backscatter gauging devices described in this certificate are acceptable for licensing purposes. However, due to the variety of environmental and other conditions to which the gauging devices may be subjected, we recommend that the FAG Bearing Corporation specialists assist customers in selecting sites for and installing these device such that they will be protected from environmental factors which might lead to damage or malfunction.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
AMENDED IN ENTIRETY

NO: NR-284-D-102-S DATE: MAY 30 1986 PAGE: 10 of 10

DEVICE TYPE: Industrial Backscatter Gauge

SAFETY ANALYSIS SUMMARY: (Continued)

Even so, if these devices are misused or subjected to extreme fire, explosion or corrosive environments, a partial or total loss of containment may occur. Accordingly, the responsible licensing authority should require licensees to develop and use appropriate operating and emergency procedures to prevent misuse and insure proper precautions in the event of foreseeable accidents such as fire, explosion or deterioration under corrosive environments.

REFERENCES:

This Certificate of Registration is based on information and test data contained in the following supporting documents which are hereby incorporated by reference and made a part of this registry document.

- FAG Bearing Corporation letters dated October 29, 1984, April 11, 1985 and June 2, 1986 with enclosures thereto.
- Supersedes registry document dated May 17, 1985

ISSUING AGENCY:

U. S. NUCLEAR REGULATORY COMMISSION

DATE: MAY 30 1986 REVIEWER: [signature]

DATE: MAY 30 1986 CONCURRENCE: [signature]

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED COPY)

NO: NR-284-D-101-B DATE: JUN 04 1986 PAGE: 1 of 7

DEVICE TYPE: Gauging Systems Source Holder

MODEL: FH 46 series (drawing # 41521/8810-90, see description for further explanation)

DISTRIBUTOR:

FAG Bearing Corporation
118 Hamilton Avenue
P. O. Box 811
Stamford, Connecticut 06904

MANUFACTURER:

FAG Kugelfischer Gear Schafer
Kommanditgesellschaft auf Aktien
P. O. Box 1660, Tennenloher Str. 41, D-8520
Erlanger, West Germany

SEALED SOURCE MODEL DESIGNATION:

NEN Model Numbers NER-8170 (Kr-85), NER-593 (Sr-90); Amersham Corporation Model Numbers CLC.D1 (Cm-244) or AMC.D1 (AM-241)

ISOTOPE:	MAXIMUM ACTIVITY:
Krypton-85	up to 150 millicuries (50 millicuries for General licensee)
Strontium-90	5 millicuries
Curium-244	up to 1000 millicuries (200 millicuries for General licensee)
Americium-241	600 millicuries

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (E) Beta Gauges & (D) Gamma Gauges

CUSTOM DEVICE: _____YES ___X__NO

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SAFETY EVALUATION OF DEVICE
(AMENDED COPY)

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DEVICE TYPE: Gauging Systems Source Holder

DESCRIPTION:

The model FH source housing is constructed of aluminium 5mm thick. There is a window (4mm glass) on one side that lets the user manually determine if shutter is closed (green) or open (red). The housing contains a pneumatically operated source shutter of 1.5mm steel and 4.5mm of heavy metal. The source holder is constructed of heavy metal and to the unique dimension of each source to provide sufficient additional shielding. A mechanical spring returns the shutter to the fully closed position in the event of a failure of the shutter actuating mechanism or power failure or moving the mounting frame off line. The housing contains the supporting electronics and on some units a calibration shutter mechanism. The top cover of the housing is constructed of aluminium if Kr-85 is used and brass if other isotopes are used. The cover contains a foil shutter window which is assembled to the base with screws; fifty percent of the slots are lead filled and filled flush to deter user access to the source.

The housing can be mounted in one of three configurations (i.e., fixed head, O-frame or C-frame). The housing is mounted diametrically to the detectors and is attached to the supports using tamper resistant bolts. A keylock out is located on the power and control unit.

The maximum air gaps for the above configurations are as follows:

ISOTOPE	MAXIMUM AIR GAP IN MM
Kr-85	40
SR-90	30
Cm-244	100
Am-241	100

The reviewer may find applicants submitting information about a drawing number 41521/8810-90 are designations for a unique holder and maximum activity loading. The license should be issued for a model FH-46 source housing.

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DEVICE TYPE: Gauging Systems Source Holder

LABELING:

The label is constructed of aluminum and bears the necessary information to meet the requirements of Section 20.203, 10 CFR 20 for the Specific licensee or Section 32.51, 10 CFR 32 for the General licensee.

DIAGRAM:

See attachments 1, 2, and 3.

CONDITIONS OF NORMAL USE:

The source housing model FH-46 is used on an O-frame or fixed head (mounted directly to the user's equipment) configuration in plastic industries, rubber industries or aluminum industries. These facilities would be expected to subject the source housing to temperatures of 50°F to 140°F, in a wide range of humidity and airborne debris.

The manufacturer reports that thickness gauge useful life is dependent on the half-life or 15 years, whichever is less.

PROTOTYPE TESTING:

The sources have been tested to ANSI N542 requirements by the source manufacturer. The sources achieved the following ANSI classifications:

- Model NER-8170 77C33232
- Model NER-593 77C64545
- Model CLC.D1 77C64344
- Model AMC.D1 77C64344

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DEVICE TYPE: Gauging Systems Source Holder

PROTOTYE TESTING: (Continued)

The device manufacturer subjected the source housing to a temperature range of 0°C to 85°C. The shutter mechanism continued to operate properly during the test. The manufacturer subjected the source housing to a vibration test at a frequency of 50 k Hertz, amplitude ±0.5mm for 30 minutes. The vibration in the x, y and z plane did not cause any fasteners to come loose and the shutter continued to function properly. The source shutter mechanism limit or life span was established by the manufacturer to be 40,000 "open-close" cycles. The manufacturer actually tested the unit for 40,000 cycles and no problems occurred with the mechanism or with the supporting electrical switching components.

The manufacturer reported they have approximately 650 of these or equivalently constructed devices in use in German industries for the past 10 years. No problems have been reported on failure of any safety components or loss of source containment. Furthermore, they report that 10 fires involving the source housing have occurred in aluminum refining mills over the the last 5 years. In all cases the fire damaged all electrical cables entering the gauge. However, no leakage of radioactive material occurred and the source to housing was found intact. To augment the historical data the manufacturer tested the source housing ANSI N538 requirements. for a classification of 2 (5 minutes at 538°C) they report the housing did not leak radiation and it remained intact.

EXTERNAL RADIATION LEVELS:

The manufacturer has submitted information that exposure to users of the equipment is within the limits specified in Section 32.51, 10 CFR 32.

The dose rates for the specifically licensed units are the same for strontium-90 and americium-241; the larger activity associated with the krypton-85 (150 millicuries) and curium-244 (1 curie) produce total dose rates in the plane of the gap area (with no material in the gap) at 5cm from the beam center of 259 mRem/hr and 12.6 mRem/hr, respectively.

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DEVICE TYPE: Gauging Systems Source Holder

QUALITY ASSURANCE AND CONTROL:

FAG Bearings Corporation in Connecticut is responsible for the quality assurance and control of the gauging device. Therefore they will keep copies of all quality assurance certificates of test performed on the device. They report that FAG Kugelfischer performs a 10% check during receipt of goods/components. Furthermore the manufacturer performs the following tests.

- A 100% check on all components necessary for radiation safety
- Once assembled all gauges are calibrated and operated for several days to insure proper performance.

LIMITATION AND/OR OTHER CONSIDERATION OF USE:

- The devices distributed to persons specifically licensed by the NRC or an Agreement State shall be labeled in accordance with 10 CFR 20.203.
- The devices distributed to persons generally licensed by the NRC or an Agreement State shall be labeled in accordance with 10 CFR 32.51(3)iii and each device contains a maximum activity of 50 millicuries of Kr-85, 5 millicuries of Sr-90, 200 millicuries of Cm-244, or 600 millicuries of Am-241.
- The device shall be installed and initially tested for proper operation of the source exposure mechanism, safety warning components, labels, external radiation levels (source exposed, source shielded) and leak tested by FAG Bearing Corp. or other persons specifically licensed by the NRC or an Agreement State.
- Reviewer Note: Devices with air gaps between 21-40mm may only be distributed to specific licensed users.
- The registration sheet and the information contained within the references shall not be changed without the direct consent of the NRC.

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DEVICE TYPE: Gauging Systems Source Holder

SAFETY ANALYSIS SUMMARY:

Based on our review of the information and test data cited below, the historical data on equivalent devices previously deemed acceptable for licensing purposes by European Regulatory Authority, for devices containing Kr-85, 50 mCi, Sr-90, 5 mCi, Cm-244, 200 mCi and Am-241, 600 mCi and 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, by 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% of the limits specified in the table in Section 20.10(a) of 10 CFR Part 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 table:

PART OF BODY	REM
Whole body; hand 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

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DEVICE TYPE: Gauging Systems Source Holder

SAFETY ANALYSIS SUMMARY: (Continued)

We continue to conclude that the FH46 source housing design is acceptable for both specific and general licensing purposes when containing the activities references in this document.

Furthermore, we conclude that the device would be expected to maintain its containment integrity for normal condition of use and accident conditions which might occur during uses specified in this certificate.

This amendment increases the air gap of the Kr-85 device to 40mm. This increase does not adversely effect the intergrity of the device design.

REFERENCES:

The following supporting documents for the Model FH 46 device design are hereby incorporated by reference and are made part of this registry document:

- FAG Corporation applications March 8, 1984 and letters dated June 28, 1984 and September 26, 1985 with enclosures thereto.
- Supersedes document dated August 31, 1984.

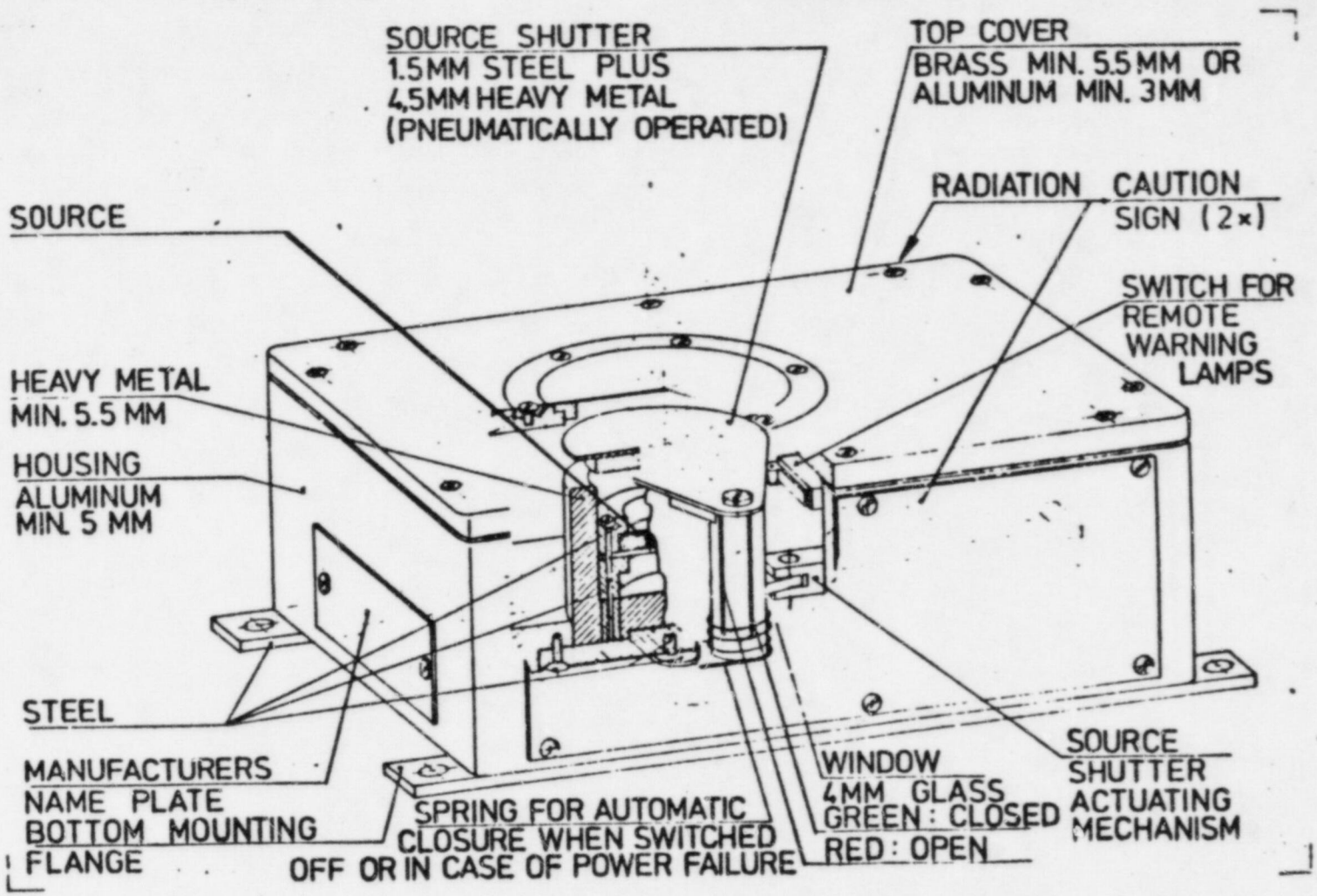
ISSUING AGENCY:

U. S. NUCLEAR REGULATORY COMMISSION

DATE: JUN 04 1986 REVIEWER: [signature]

DATE: JUN 04 1986 CONCURRENCE: [signature]

FH 46 SOURCE HOLDER HOUSING



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
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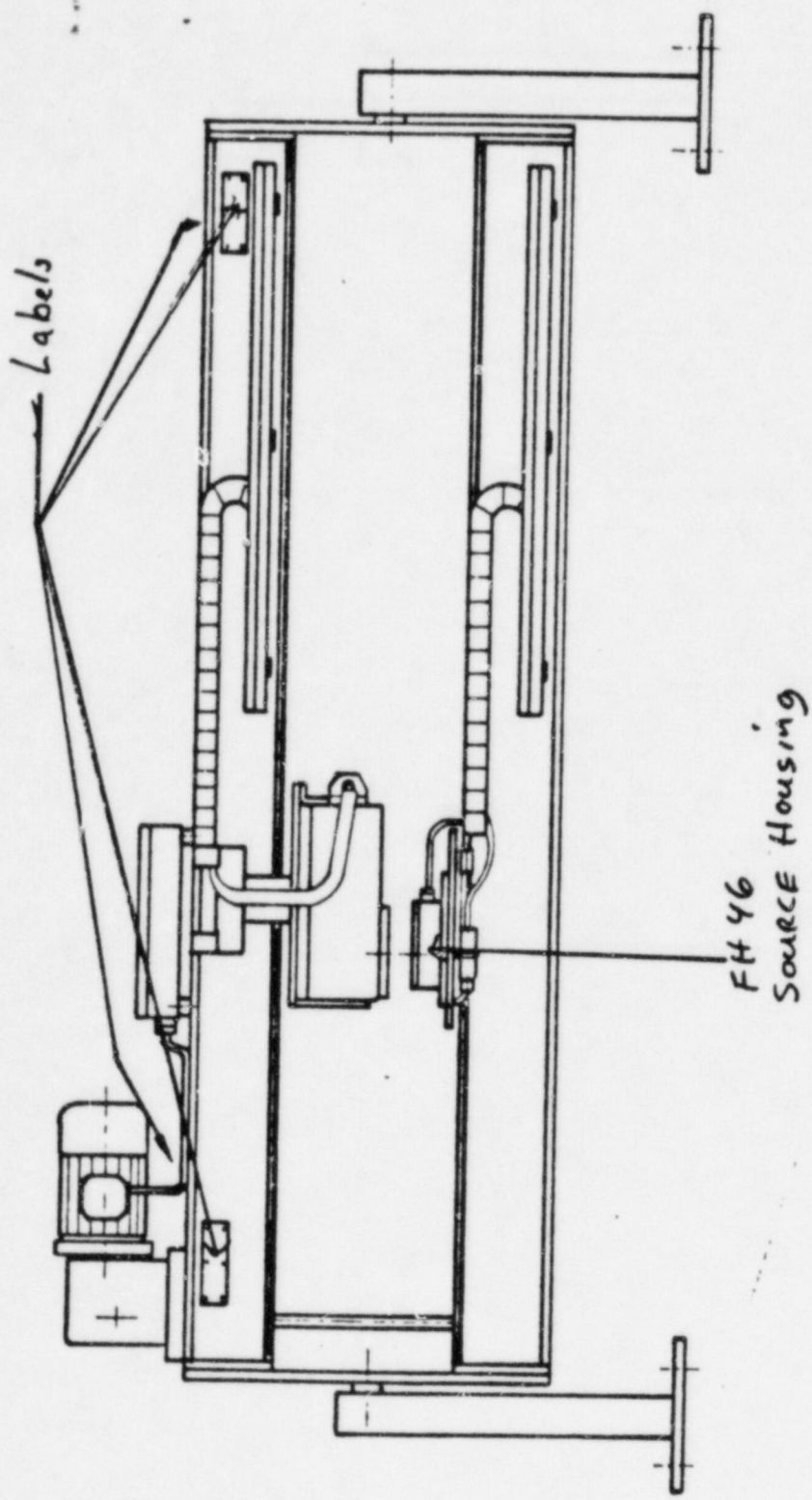
NO: NR-284-D-101-B DATE: JUN 04 1986 ATTACHMENT 2

O-FRAME



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
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C-FRAME