Linda This goes with 6/3/85

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

Lic. 06-20631-01

MAY 21 1985

Thks
Tom T.

~~M816~~
P1

FAG Bearing Corp.
ATTN: Mr. Dieter Seidal
118 Hamilton Avenue
P. O. Box 811
Stamford, Connecticut 06904

Dear Mr. Seidal:

Based on the information submitted by your letter dated October 29, 1984 we have concluded that your Model 41574 Series Backscatter gauge design is acceptable for licensing purposes in accordance with the conditions of the attached certificate of registration.

We have forwarded a copy of this certificate to Region I so they can continue with the licensing action.

You are reminded that possession and distribution of this device is contingent on the receipt of the amendment to your possession and distribution license.

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

Respectfully,

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

Enclosure: Certificate No. NR-478-D-102-S

cc: Thomas Thompson, Region I

03079

"OFFICIAL RECORD COPY"

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REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR284D102S DATE: MAY 17 1985

DEVICE TYPE: Industrial Backscatter Gauge

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

DISTRIBUTOR: FAG Bearing Corporation
118 Hamilton Avenue
P. O. Box 811
Stanford, CT 06904

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

SEALED SOURCE MODEL DESIGNATION:

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

ISOTOPES:

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

MAXIMUM ACTIVITY

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

LEAK TEST FREQUENCY

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

PRINCIPAL USE: Beta/Gamma gauges.

CUSTOM DEVICE: _____ Yes X No

CUSTOMER USER: N/A

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR284D102S DATE: MAY 17 1985 PAGE 2 OF 10

DEVICE TYPE: Industrial Backscatter Gauge

DESCRIPTION:

The Models 41574/9810, 9820, 9830 and 9840 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 or Americium 241 contained in shielded housings with shutter mechanisms, ionization detectors and radiatior beam backstops.

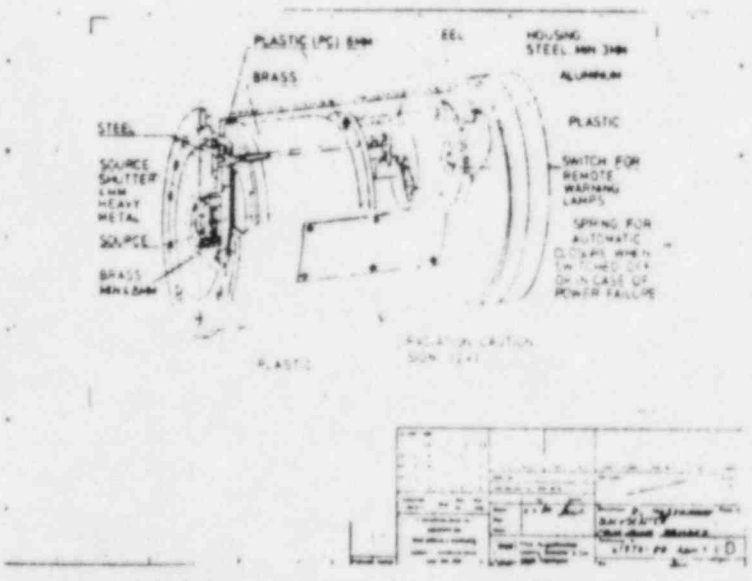
The outer housings of these devices are of 3mm thick steel in all directions except in the direction of the radiation beam. This is covered with a thin plastic or metal foil (dust cover).

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

NO.: NR284D102S DATE: MAY 17 1985

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 such as 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 devices listed in this document would be expected to operate safely during normal use.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
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NO.: NR284D102S DATE: MAY 17 1985

DEVICE TYPE: Industrial Backscatter Gauge

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 in 5 cm, 30 cm and 100 cm distance at positions shown on drawing no. II.

2. Test Results

The measuring results are shown in tables I and II.

3. Suggested ANSI N538 Classification

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

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) source holder housing were measured. All measurements were made against a steel roll with a 500 mm diameter. All measurements were made at an angle of maximum dose rate.

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TABLE II

MAXIMUM DOSE EQUIVALENT RATES - SHUTTER OPEN

MAXIMUM mREM/hour

SOURCE	MAXIMUM ACVITITY 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	0.20
		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.

TABLE I

MAXIMUM DOSE EQUIVALENT RATES - SHUTTER OPEN

SOURCE	MAXIMUM ACVITITY mCi	DISTANCE cm	MAXIMUM mREM/hour 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	0.01	0.07
^{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

NO.: NR284D102S DATE: MAY 17 1985

DEVICE TYPE: Industrial Backscatter Gauge

QUALITY ASSURANCE AND CONTROL (QA,QC)

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 QA/QC functions have authority to examine all records which relate to radiation safety of gauging devices and reject and dispose of any defects.

- QA-QC responsibilities include:

  1) Participating in the design review of the gauge, suggesting necessary improvements to satisfy features, especially those identified in Section 3 of 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
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DEVICE TYPE: Industrial Backscatter Gauge

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE

A. These devices shall be distributed only to persons specifically licensed by NRC or an Agreement State.

B. No later than the time of installation, FAG Bearing Corporation shall provide the licensed recipient's personnel with training on the safe use and handling of all devices being tranferred.

C. Prior to installation of these devices FAG Bearing Corporation shall coordinate with the licensed recipient regarding conditions of intended use and shall insure that all devices installed are properly protected against environmental factors which might lead to loss of shielding or containment of radioactive sources.

D. Prior to actual placing of devices into operation, FAG Bearing Corporation shall provide the receiving licensee with written instructions for safe operation and use of the devices, a current leak test report, an initial radiation survey report and results of operational checks to insure proper operation of "on-off" mechanism and indicators.

E. Only individuals specifically licensed by NRC or Agreement States shall install, service or remove these devices from service.

G. 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.

H. This registration sheet and the information contained within the references shall not be changed or transferred without the written consent of the NRC.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR284D102S DATE: MAY 17 1985

DEVICE TYPE: Industrial Backscatter Gauge

SAFETY ANALYSIS SUMMARY

Based on our review of the design information and prototype test data cited below, we conclude that the FAG Bearing Corporation, Model 41574/9810, 9820, 9830 and 9840 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 decies may be subjected, we recommend that the FAG Bearing Corporation specialists assist customers in selecting sites for and installing these devices such that they will be protected from environmental factors which might lead to damage or malfunction.

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.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

MAY 17 1985

NO.: NR284D102S DATE: PAGE 10 OF 10

DEVICE TYPE: Industrial Backscatter Gauge

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.

- Letter dated October 29, 1984 and attachments thereto
- Letter dated April 11, 1985 and attachments thereto

Date: MAY 17 1985 Reviewed By: Earl G Wright

Date: MAY 17 1985 Concurrence: _____

ISSUING AGENCY:

Nuclear Regulatory Commission