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13 March 1995

U.S. Nuclear Regulatory Commission Region II 101 Marietta Street, NW Suite 2900 Atlanta, GA 30323

Subject: Report ner 10 CFR 31.5(c)(5)

On behalf of a customer who possesses a Measurex industrial thickness gauge under the general license in 10 CFR 31.5, we wish to report a shutter mechanism failure. Details are as follows:

General licensee:	Rock Tenn PO Box 980 (Concord Turnpike) Lynchburg, VA 24505-0980					
Contact:	William Ashworth					
Measurex system no.:	4199					
Date of failure:	23 February 1995					
Model no. of device:	2201					
License no. authorizing device distribution to general licensees:	CA 1856					

Upon the occurrence of the failure, the Measurex Radiation Safety Office was notified, the device was taken out of service, and a replacement source assembly (containing the source capsule) was shipped to the site. The shutter of the source assembly that had failed was locked into the closed position and the assembly returned to the Measurex Radiation Safety Office by a Measurex engineer.

Upon receipt of the assembly at Measurex, the Radiation Safety staff removed the source capsule and confirmed that the shaft that connects the solenoid to the shutter had broken. This finding was expected, based on the description provided by personnel on site.

The Radiologic Health Branch of the California Department of Health Services has been informed of this problem and has been in contact with Measurex to discuss our findings and actions.



MEASUREX CORPORATION ONE RESULTS WAY CUPERTINO, CAI, "ORNIA 95014-5991 (408) 255-1500

measurex

Please contact me with any questions; I can be reached at (408) 725-3127.

Sincerely, MEASUREX CORPORATION

Elsa Nimmo

Elsa Nimmo Radiation Safety Officer

CC: Radiation Safety Committee William Ashworth, Rock Tenn Dennis Bigam John Goss Mark Gottlieb, Radiologic Health Branch, CA Terry Kerr Bill Lew, Radiologic Health Branch, CA John Preston

SAFETY EVALUATION OF DEVICE

(Amended pages 5 and 6 on September 6, 1990) (Amended pages 2,3,4,5, and 7 on December 23, 1991) BAC-/036

DATE: March 10, 1990 PAGE: 1 of 11 pages NO.: CA501D101G

DEVICE TYPE: Thickness gauge

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MODEL: 1201/2201 Series, 1202/2202 Series, 1203 Series, 2204 Series

MANUFACIURER/DISTRIBUTOR: Measurex Corporation One Results Way Cupertino, CA 95014

SEALED SOURCE MODEL DESIGNATION:

Nuclide	<u>Manufacturer</u> American Atomics Dupont/New Fngland Nuclear Amersham		Model No. Kr85C, Kr85E, Kr85J, Kr85m NER586, NER586M KAC.D2, KAC.D5				
Kr-85							
Sr-90	3M Amersham General Radioi:	sotope	3F1V, 3F1L SIF.D2, SIFW804	, SIFW805			
Am-241	Products, Inc Dupont/New Eng. Amersham	land Nuclear	8131, 8133 NER478C AMC-17.X92				
Ru-106	Amersham		X-112 (1202, 2 series only)	202 and 2204			
Pm-147	Amersham		PHB.D1				
ISOTOPE: Kr-85 Sr-90 Am-24 Pm-147 Ru-106		MAXIMUM ACTIVITY 1 curie 0.05 curie 0.5 curie 0.54 curie 0.03 curie	:				
LEAK TEST FRI	BOUENCY: Sr-90, Kr-85,	, Pm-147, Am-241, Not required	Ru-106, - Six (6) month intervals,			
PRINCIPAL USI	E: Beta Gauges Gamma Gauges	(Kr-85, Sr-90, 1 s (Am-241, Ru-106)	Pm-147)				
CUSTOM DEVICE	e:Yes	_X_NO					
CUSTOM USER:	N/A						

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SAFETY EVALUATION OF DEVICE (Amended December 23, 1991)

NO.: CA501D101G

DATE: March 10, 1990 PAGE: 2 of 11 pages

DEVICE TYPE: Thickness gauge (1201/2201, 1202/2202, 1203, 2204 series)

DESCRIPTION:

All series devices are designed to be either beta or gamma thickness measuring devices. All source holders in these series are basically the same construction. (See Fig. 1). Only the 1202, 2202, and 2204 series contain Ru-106 sources. The difference between the series lies in the electronic system designs or sizes and types of equipment. For instance, the 1203 series model is of C- arm construction, while the others have supports on each end of the scanning device. (see Fig.s 2-4).

Each gauge consists of two heads mounted opposite each other, one which contains the radioactive source in the source holder and one which contains the detector. The product to be measured passes between the two gauge heads through a gap (Maximum "Height" of gap given below). In most cases, gauges are mounted on scanners such that the gauge heads will scan back and forth in a motion perpendicular to the direction of the product movement through the gauge.

DIMENSIONS: The outer dimensions of the sensor source and detector heads are at listed in the following table:

Model No.	Head	ad Designation Approx. Outer Dime				er Dimensions	
1201	1033	(Head II)	12"	X	12"	X	12"
1201	2033	(Head III)	20"	X	14"	x	12"
1.202	1036		8"	x	6"	x	Q11
1203	1203	(C-frame)	14"	x	4"	x	611
2201	2033	(Head III)	20"	x	14"	x	12!
2201	2034	(Nodular)	8"	x	8"	x	811
2201	2050	(Intellipack)	21"	x	15"	x	12"
2202	2202	(Decade)	8"	x	811	x	611
2204	2034	(Modular)	8"	X	BH	X	811

The measurement gap between detector and head varies as follows:

Radionuclide	Max. Height Gap				
Kr-85	10 cm (4 in.)				
Sr-90	10 cm (4 in.)				
Am-241	51 cm (20 in.)				
Pm-147	10 cm (4 in.)				
Ru-106	10 cm (4 in.)				

Gauges with gaps in excess of 10 cm (4 in) are considered to be wide gap sensors (consistent with ANSI N538: "Classification of Industrial Ionizing Radiation Gauging Devices"). Wide gap gauges are provided with an enclosure where the gauge heads will be parked when not making on-sheet measurements. This enclosure is to prevent access to the measurement gap.

SAFETY EVALUATION OF DEVICE (Amended December 23, 1991)

NO.: CA 501D101G

DATE: March 10, 1990 PAGE: 3 of 11 pages

DEVICE TYPE: Thickness gauge (1201/2201, 1202/2202, 1203, 2204 series)

DESCRIPTION: (cont.)

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MATERIALS OF CONSTRUCTION: Sensor heads - aluminum, plastic, stainless steel Source housing - stainless steel, aluminum (tungsten/nickel mallory) Lource capsule - stainless steel, titanium

Sensor heads (covers in which source housings, detectors, and associated electronics are contained), source housings, and source capsules are produced by vendors to Measurex specifications. All critical dimensions of sensor heads and source housings are checked by the manufacturer before being accepted for use.

The mallory/stainless steel/aluminum source housing is the principal radiation shielding. With the shutter open and useful beam present, the detector gauge head serves as the "beam stop".

A stainless steel or mallory shutter (which covers the source capsule window when in the closed position) provides the means of useful beam control. The shutter is operated by a solenoid which may be actuated manually or by computer command. The shutter is normally closed and continual power is required for it to remain in the open position. A loss of power to the gauge thus results in shutter closure.

The Measurex source holder assemblies contain a thermal safety nut that contains a low melting material holding a spring loaded piston. When the material reaches a temperature high enough to soften or melt, the spring forces the piston out of its housing to contact the source shutter and cause it to close. The shutter cannot be reopened until the thermal nut is removed.

Visible indication of the shutter status is provided by lights located on the source gauge head and/or on the scanner on which the source and detector heads are mounted. On scanning units more than fifteen feet in length, the indicator lights are located on each end. The red (shutter open) light (or LED indicator) is in series with the shutter solenoid such that a red light bulb (or LED) failure interrupts solenoid power causing the shutter to close. The green (shutter closed) lamp is lighted when the shutter contacts a microswitch in the closed position.

The radioactive source is contained within a shielded source housing and security is achieved either by locking the source housing to the sensor head or the sensor head cover is locked to make the contents inaccessible.

SAFETY EVALUATION OF DEVICE (Amended December 23, 1991)

NO.: CA501D101G

DATE: March 10, 1990

PAGE: 4 of 11 pages

DEVICE TYPE: Thickness gauge (1201/2201, 1202/2202, 1203, 2204 series)

LABELING:

The devices are labeled in accordance with California Radiation Control Regulations Title 17, Section 30192.1, which is equivalent to 10 CFR 32.51. The source holder containing the radioactive source is labeled with the following (or equivalent):

The standard radiation symbol Words: "Caution Radioactive Materia." Activity and radionuclide contained in sealed source Date of assay of radionuclide Serial number and model number of sealed source Words: "Removal of this label is prohibited"

In addition to including the information specified above, the gauge source head is labeled with the information that follows (or equivalent):

Gauge model and serial number Name and address of Measurex Text: "The receipt, possession, use and transfer of this device are subject to a general license of the U.S.NRC or Agreement States.

Operation of this device shall be immediately suspended until any necessary repairs have been made if there is any possible indication of possible failure of or damage to the sheilding or containment of radioactive material, or the on-off mechanism or indicator.

The sealed radioactive source contained in this device shall be tested at installation and every six months thereafter for leakage of radioactive material, except that devices containing only Krypton 85 need not be tested.

This device shall not be transferred, abandoned or disposed of except by transfer to a person holding a specific radioactive material license to receive this device.

This device shall be tested for proper operation of the on-off mechanism and indicator at intervals not to exceed six months.

Installation, relocation, and initial radiation surveys of devices containing radioactive materials, and maintenance, repair, leak testing and replacement or disposal of sealed sources containing radioactive material used in this device shall be performed only by persons holding a specific license to perform this service."

SAFETY EVALUATION OF DEVICE (Amended September 6, 1990) (Amended December 23, 1991)

NO.: CA501D101G DATE: March 10, 1990 PAGE: 5 of 11 pages

DEVICE TYPE: Thickness gauge (1201/2201, 1202/2202, 1203, 2204 series)

LABELING (Cont):

Wide gap gauges will be labeled with the sign or equivalent shown in Fig. 5.

Source holder and gauge head labels are made of metallic material designed to withstand mill environments. All labels have a yellow background with magenta lettering.

The label on the Model 2050 source head will have equivalent information as described above along with the "wide gap" sign, regardless of gap size.

DIAGRAM:

A diagram of a typical source holder assembly is given in Fig. 1 and Fig.s 2-4 show types of gauge heads mounted on scanners in common configurations.

CONDITIONS OF NORMAL USE:

These gauges are typically used in a continuous flow process. Examples of the types of products include paper textiles, aluminum sheet, plastics, rubber and building products. The gauges are thus intended for industrial environments which may be located in any area of the U.S. (or elsewhere).

PROTOTYPE TESTING:

Because these gauges were initially designed and tested 19 or more years ago, details of prototype testing are not available. These and similar gauges have had a total of over 10,000 operating years in a wide variety of customer applications and facilities. The manufacturer has provided an ANSI classification of 43-255-565-R2 in accordance with ANSI 538-1979.

EXTERNAL RADIATION LEVELS:

No sensor exceeds the following limits when measured at a distance of 30 cm (12 in) with the source(s) shutter(s) open:

D	(Gamma	radiation)	1,	<	5	mrem/hr
D	(Gamma	and Beta radiation)	1	<	30	mrem/hr

(This is consistent with ANSI N538, Section 7.3.3.1.) Surveys for external radiation levels are to include instrumentation and procedures as stated in the Measurex procedure manual.

