

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
☐ B. AMENDMENT TO LICENSE NUMBER _____
☐ C. RENEWAL OF LICENSE NUMBER _____

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

Measurex Systems, Inc.
c/o Measurex
One Results Way
Cupertino, CA 95014

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

Measurex Systems, Inc.
1834 Walden Office Square
Suite 550
Schaumburg, IL 60195

ATTN: RADIATION SAFETY OFFICE

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Elsa Nimmo, Radiation Safety Officer

TELEPHONE NUMBER

(408) 725-3127

SUBMIT ITEMS 5 THROUGH 11 ON 8 1/2 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 <u>170.31</u> <u>3E (Byproduct)</u> AMOUNT ENCLOSED \$ <u>230.00</u>

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 <i>Elsa Nimmo</i>	TYPED/PRINTED NAME ELSA NIMMO	TITLE RADIATION SAFETY OFFICER	DATE 8/19/85
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14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS <table border="1"><tr><td><\$250K</td><td>\$1M-3.5M</td></tr><tr><td>\$250K-500K</td><td>\$3.5M-7M</td></tr><tr><td>\$500K-750K</td><td>\$7M-10M</td></tr><tr><td>\$750K-1M</td><td>>\$10M</td></tr></table>	<\$250K	\$1M-3.5M	\$250K-500K	\$3.5M-7M	\$500K-750K	\$7M-10M	\$750K-1M	>\$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) <input type="checkbox"/> YES <input type="checkbox"/> NO
<\$250K	\$1M-3.5M									
\$250K-500K	\$3.5M-7M									
\$500K-750K	\$7M-10M									
\$750K-1M	>\$10M									

FOR NRC USE ONLY

TYPE OF FEE <i>new app</i>	FEE LOG <i>Sept 6/85</i>	FEE CATEGORY <i>3P</i>	8510020340 850910 REG 3 LIC 30 04-24564-01 PDR	APPROVED BY <i>CP</i>
AMOUNT RECEIVED <i>8230</i>	CHECK NUMBER <i>4948</i>	CONTROL NO. <i>7 9 6 4 4</i>		DATE <i>9/6/85</i>

Item 5 - MATERIAL TO BE POSSESSED

Refer to Page 1 of attached description titled: "Measurex Model 2201 Kr-85 Sensor".

Item 6 - PURPOSE FOR WHICH LICENSED
MATERIAL WILL BE USED

Licensed material will be used in gauge for the purposes of customer demonstration. Gauge is designed to measure thickness, density, or weight per unit area of product that is a thin continuous sheet such as paper, plastic, or fabric.

Item 7 - INDIVIDUAL(S) RESPONSIBLE FOR
RADIATION SAFETY PROGRAM -
TRAINING AND EXPERIENCE

The gauge containing the licensed material will be used under the supervision of (but not limited to being in the physical presence of) Elsa Nimmo. Please refer to the attached resume for a summary of training and experience related to radiation safety.

Item 8 - TRAINING PROVIDED TO OTHER USERS

Installation, initial, and semiannual tests of warning lights and radiation safety interlocks, all maintenance and use of the gauge possessed under this specific license will be restricted to individuals specifically licensed to perform these activities under California License No. 1663-43, Measurex, One Results Way, Cupertino, CA 95014.

Item 9 - FACILITIES AND EQUIPMENT

This gauge is designed to be a generally licensed device and to withstand the fairly hostile environmental conditions often present at customer sites. Please refer to Page 4 of the attached document "Measurex Model 2201 Kr-85 Sensor" for a summary. The environment that this particular gauge will be subjected to will be a clean one of normal temperature and humidity (necessary since the facility will be used as a customer demonstration center).

Radiation levels adjacent to this sensor do not require establishment of a radiation area; refer to Pages 5 and 8 of the document "Measurex Model 2201 Kr-85 Sensor" for details.

The gauge will not be accessible to persons except when accompanied by a user under California License No. 1663-43.

Item 10 - RADIATION SAFETY PROGRAM

The licensee will be responsible for insuring that tests to verify the correct function of radiation warning lights, shutter mechanism, and radiation safety interlocks are performed following installation and at six-month intervals thereafter.

Installation of the gauge, radiation safety testing, and maintenance will be performed by persons specifically licensed to perform these activities under California License No. 1663-43. Personnel monitoring, radiation detection devices, etc., will be provided as specified in that license. Leak testing will not be required since the sensor will contain a Kr-85 source only. Lock-out procedures are not required due to the configuration of the sensor as described on Pages 1 and 2 of the document "Measurex Model 2201 Kr-85 Sensor".

Item 11 - WASTE MANAGEMENT

Licensed material will be disposed of by transfer to a recipient holding a specific license for the source.

Measurex Model 2201 Kr-85 Sensor

The purpose of this document is to provide information relevant to obtaining a specific license for the Measurex Model 2201 Kr-85 sensor. This sensor is approved for distribution as a generally licensed device under California License No. 1856-43.

Name and address of manufacturer/distributor:

Measurex Corporation
One Results Way
Cupertino, CA 95014

Sensor model:

2201

Radionuclide:

Kr-85

Maximum quantity:

1 Ci per sensor

Source capsule manufacturer and model no:

New England Nuclear Model NER586 or Amersham Model KAC.D2

Purpose for which gauge designed:

Measure thickness, density, or weight per unit area of a product that is produced as a thin continuous sheet such as paper, plastic, or fabric.

Brief description:

The gauging portion of this process control system consists of two sensor heads, one of which contains the radiation source in the source holder and one which contains the ion chamber. These sensor heads are mounted directly opposite one another. The product to be measured passes between the two sensor heads through a gap of no more than 0.5". As the sheet product moves through the gauge, the sensor heads scan back and forth in a motion perpendicular to the direction of the sheet movement.

Please refer to Attachment 1 for a representation of the typical scanner configuration.

Shutter status indicators:

Lights which indicate the status of the source shutter are mounted on both ends of the scanner. The red lights which indicate the shutter open condition are in series with the shutter solenoid such that any red lamp failure will result in shutter closure. The green lights are driven by a microswitch and require the shutter to be closed before power is supplied to the lamps.

Labels:

All sensors containing radioactive sources are labeled to satisfy the requirements of the U.S. Nuclear Regulatory Commission. Both sides of the sensor heads containing the source and the source holder are labeled with the following:

The standard radiation symbol
Words: "Caution Radioactive Material"
Activity of sealed source
Material of sealed source
Date of assay of sealed source
Serial number of sealed source
Model number of sealed source
Gauge model number
Gauge serial number
Name and address of device manufacturer
Words: "Removal of this label is prohibited"

In addition, the labels on the sides of the sensor include the following text:

"The receipt, possession, use and transfer of this device are subject to a general license or equivalent and the regulations of the U.S. NRC or of agreement states.

Operation of this device shall be immediately suspended until any necessary repairs have been made if there is any indication of possible failure of or damage to the shielding 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.

Maintenance, tests or other service involving the radioactive material, its shielding and containment shall be performed by persons holding a specific radioactive material license to provide these services.

Installation, relocation, and initial radiation surveys of devices containing radioactive materials, and maintenance, repair, leak testing, installation 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."

Both the source holder and sensor head labels are made of metallic material designed to withstand hostile mill environments. All labels have a yellow background with magenta lettering.

Source holder:

The source holder is a shielded assembly constructed of tungsten which holds the source in place, provides collimation, and contains the shutter mechanism. Attachment 2 is a diagram of the source holder assembly. Attachment 3 shows the radiation levels near the surface of the source holder. (The source holder is normally installed inside the sensor heads and is not to be removed except by persons specifically licensed to do so.)

The beam size is limited by a circular aperture 0.5" in diameter. The aperture is mounted in the center of the end of source holder below the Kr-85 capsule; please refer to Attachment 3.

The source shutter is actuated by a solenoid. The shutter is normally closed and continual power is required for it to remain in the open position. A loss of power to the sensor thus results in immediate shutter closure. As noted above, failure of any red warning light also results in shutter closure.

Environmental effects:

This device has been designed to withstand the environmental conditions normally present in a typical customer's location.

Vibration:

Vibration is normally minimal. Where higher levels exist, fragility of the electronics requires vibration isolation mounting of the entire scanner frame.

Temperature:

The device has been tested for continuous operation at 212°F. The source holder has been tested up to 240°F without failure. In the event of a mill fire, the thermal safety nut in the source holder will melt and cause the shutter to close. This occurs at approximately 450°F.

Corrosive Environment:

The source housing is designed to be air-tight to prevent corrosive environments from reaching sensitive electronics.

Product Impact:

The device has been tested to withstand impact from a 24" x 72" x 0.12" thick aluminum sheet being fired at the head casting at speeds up to 1800 fpm without being cracked or dislodged. In the unlikely event that a sensor head is dislodged from its mountings, damage would be slight because of the sturdy construction of the components.

Aging:

The shutter solenoid has been tested by the vendor to greater than 50 million actuations without failure. It is estimated that in actual operation the shutter solenoid will experience 1 million actuations in 5 years.

Radiation levels:

The radiation levels present at a distance of 12" from the sensor heads will not exceed 5mR/hr when measured with the source shutter open using an air ionization chamber with a 300mg/cm² window. Measurex will survey the gauge(s) before shipment and will provide the customer with the radiation profiles for retention in the files. A copy of a typical radiation profile is enclosed; please refer to Attachment 4.

Radiation interlocks:

Because Measurex sensors are usually acquired as a generally licensed device, they are designed to include many features which make them safe to operate. Interlocks provided include:

Head Displacement Interlock:

Interlock causes source shutter to close if either source or receiver head is removed from its mountings; prevents open beam condition in the event of accident or careless repair work.

Thermal Safety Nut:

Fusible nut causes source shutter to lock in the closed position if the source holder is exposed to high temperature ($\approx 450^{\circ}\text{F}$).

Belt Break Interlock:

Interlock causes source shutter to close if transmitted radiation detected by receiver drops below a set level. This prevents an open beam condition if the heads are accidentally separated.

Source Holder Lock:

The source holder is locked in place inside the sensor head to prevent casual removal of the source holder.

Computer Crash Shutter Closure:

This interlock causes the source shutter to close after a brief time delay in the event of computer failure or shut down.

Radiation Safety Testing:

All radiation safety features are fully tested before a gauge is shipped by Measurex. The customer is responsible for having the shutter mechanism, warning lights and interlocks tested and documented upon installation and at no greater than 6-month intervals thereafter. Such testing must be performed by an individual specifically licensed to do so. Measurex will provide such service under contract.

Safety and Emergency Instruction:

Attached is Document RS51 which provides instructions for the safe use of Measurex gauges.

SAFETY AND EMERGENCY INSTRUCTIONS
FOR NUCLEAR OR NUCLEAR AND X-RAY SENSORS

Measurex sensors have been designed with built-in safety features to prevent accidental exposure to radiation. However, there are a few additional common sense rules that must be followed:

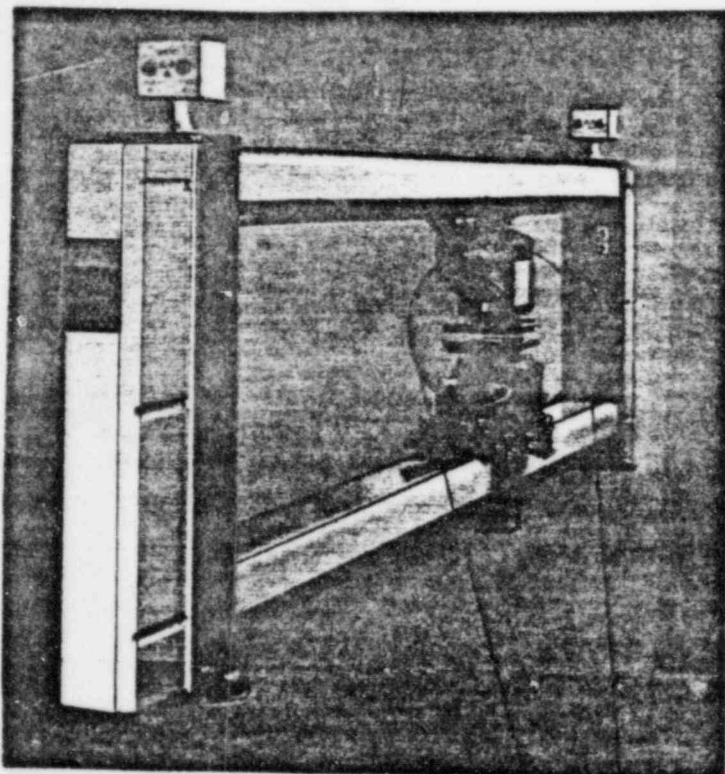
- If you work near the sensor, become familiar with the safety procedures given below.
- Before approaching the sensor head, determine the status of the source shutter(s) by observing the radiation warning lights:

RED - shutter open
GREEN - shutter closed
AMBER - present only if sensor includes x-ray source
x-ray tube power on

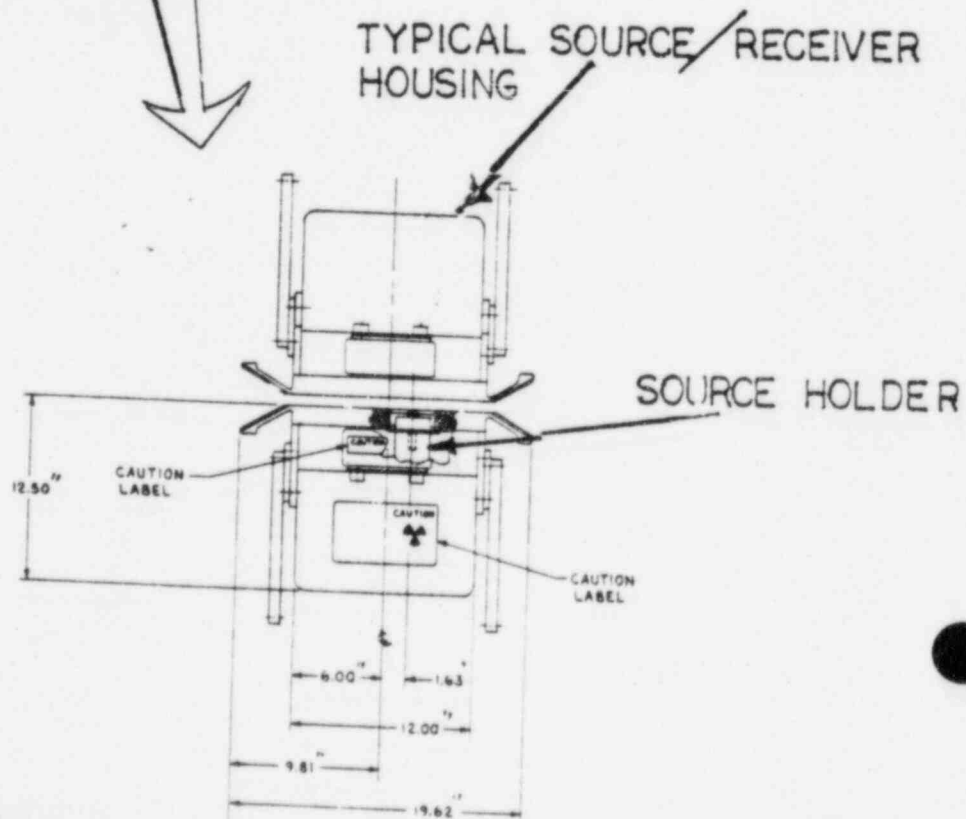
- Avoid exposure to the radiation beam. Never insert hands (or any portion of the body) in the measurement gap.

- When a source shutter is open, spend no more time than necessary close to the measurement gap of the sensor.
- Do not attempt to operate or repair the sensor unless you have been trained and authorized to do so.
- If the heads become damaged or misaligned, turn the sensor power off before approaching the heads. Contact the Measurex Technical Representative to remount the heads.
- In the event of fire, turn the equipment off and put out the fire. Contact the Measurex Technical Representative to examine the equipment before it is returned to service.
- If radiation safety checks are not performed under contract by Measurex personnel, check local regulations for information on required records and frequency of leak tests (not required for Kr-85) and testing shutter mechanisms, interlocks, and indicators for proper function.

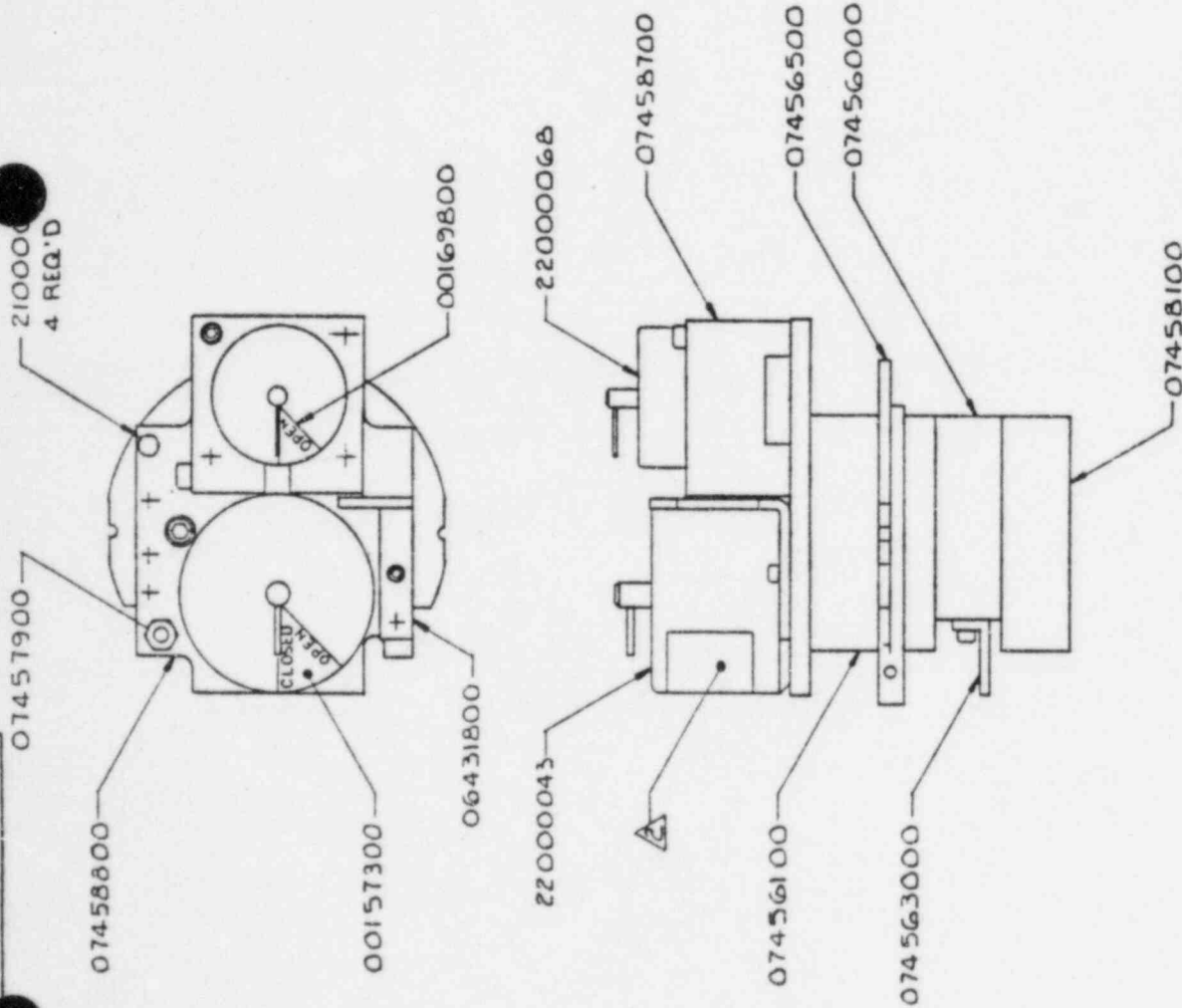
Contact the Measurex Technical Representative or the Measurex Radiation Safety Office (24 hour phones - USA: 408/255-1500, Ireland: 353 51 72151) if you have questions concerning radiation safety.



— TYPICAL SCANNER
CONFIGURATION



ATTACHMENT 2: SOURCE HOLDER DIAGRAM (SOURCE 6)



0 1 2
SCALE

NOTES:

1. ASSEMBLE PER GNO18600.
- △ IDENTIFY PER GNO26100.

measurex CORPORATION ONE STEWART WAY COSTA MESA, CALIFORNIA 92626		ORIGINAL DATE: 11-23-81 BY: [Signature] CHECKED: [Signature] APPROVED: [Signature]	
SOURCE ASSY. SOURCE VI B/W SENSOR		PART NUMBER: C 08423500 A 01 SCALE: 1:1	
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES AND TOLERANCES ARE: DECIMALS: .005 FRACTIONS: 1/16 ANGLES: 1/2 HOLE: 2 TAP: 2		UNLESS OTHERWISE SPECIFIED: MATERIAL: 304 STAINLESS STEEL FINISH: POLISHED	
PREP - PART DATE:	ASSEMBLY DATE:	FINISH - PART DATE:	FINISH - MATERIAL DATE:

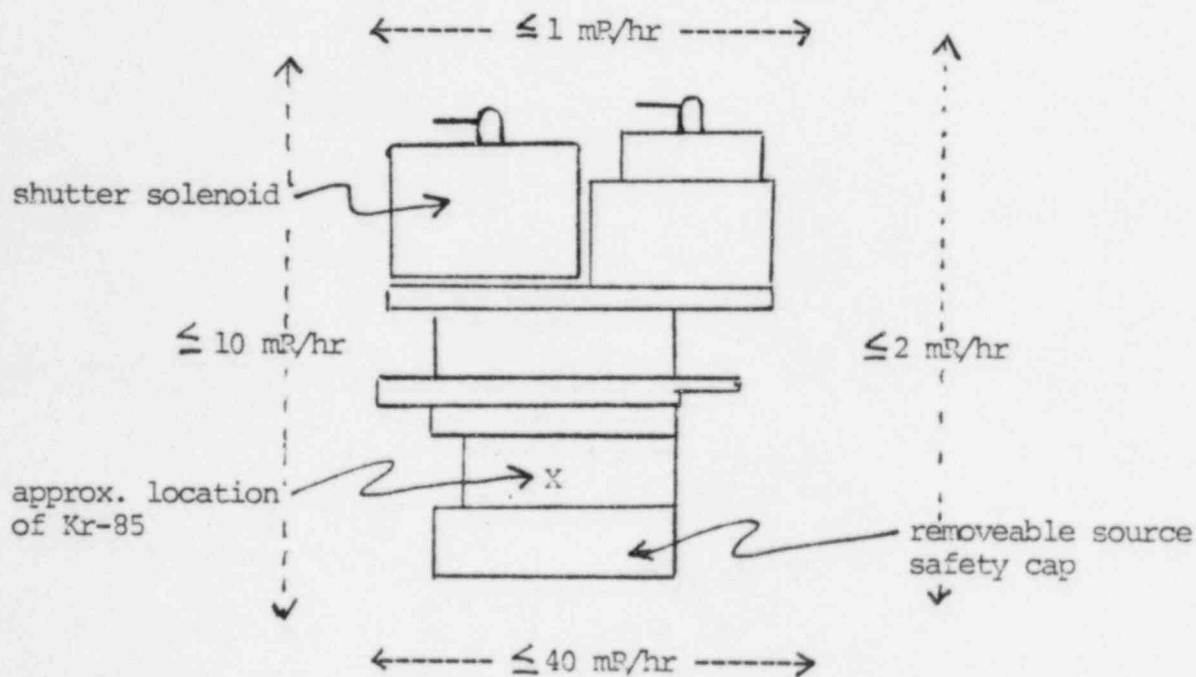
SOURCE-VI

ATTACHMENT 3: RADIATION LEVELS ADJACENT TO SOURCE HOLDER

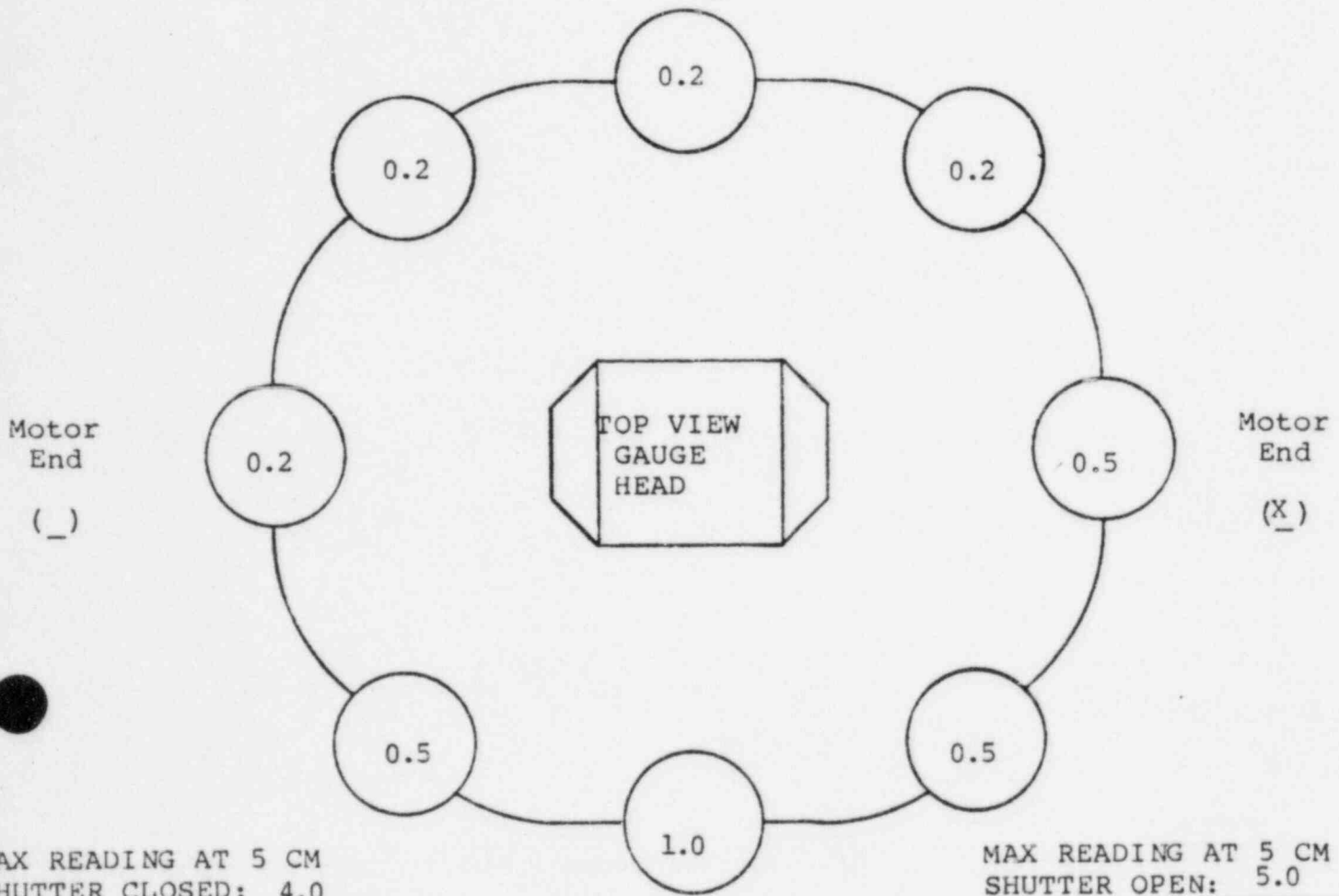
Survey meter: Victoreen 440
s/n 3220
300 mg/cm² window

Source: Kr-85
≤ 1 Ci
Source 6 Holder

Survey conditions:
Shutter closed
Measurements at distance of
2" to center of ion chamber
active volume
Source aperture covered by
source safety cap



ATTACHMENT 4: RADIATION PROFILE

RS1
3/84

ALL READINGS TAKEN WITH AN IONIZATION CHAMBER WITH A WINDOW THICKNESS OF 300 MG/CM². READINGS ARE IN PLANE OF GAP BETWEEN SOURCE AND RECEIVER HEADS. THE INDICATED DISTANCE WAS MEASURED FROM THE EDGE OF THE OUTERMOST PROTRUSION OF THE HEAD. ALL READINGS ARE IN MR/HOUR.

PROFILE DISTANCE 12 inchesSOURCE TYPE Kr-85SOURCE NER586 1 Ci N/A
Model Activity Serial No.X-RAY SOURCE N/A N/A N/A KV
Model Current VoltageSURVEY METER Victoreen 440 N/A
Mfr. Model Ser. No.

SURVEYED BY _____ DATE _____

APPROVED BY _____ DATE _____

GAP 0.4 INCH GAUGE MODEL 2201MEASUREX CORPORATION
ONE RESULTS WAY
CUPERTINO, CA 95014, USAISODISTANCE RADIATION PROFILE
SOURCE SHUTTER OPENSAMPLE
CUSTOMER

LOCATION

SYSTEM NO. _____ SCANNER _____

ELSA ANITA NIMMO

ADDRESS: 339 Nita Avenue
Mountain View, California 94043
Telephone: (415) 969-5295

PERSONAL: Born September 1, 1953
Married (maiden name: Ginkel)

EDUCATION:

1975-77 M.S. Radiological Sciences (Medical Physics)
University of Wisconsin-Madison

1971-73 B.S. Physics and Chemistry, magna cum laude
1974-75 Mathematics minor
University of Redlands, California

1973-74 University of Munich, Germany

EMPLOYMENT:

1983 - present Radiation Safety Officer
Measurex Corporation, Cupertino, CA
Responsible for employee and customer radiation
safety in development, manufacturing, and use of
industrial process control sensors containing
x-ray and sealed radiation sources.

1981-83 Radiation Safety Officer
Zikonix Corporation, Sunnyvale, California
Responsibilities similar to those described
under present employment. Calibrated and tested
prototype aluminum sheet thickness x-ray sensor.

1979-81 Health Physicist Supervisor (Radiation Safety Officer)
University of Wisconsin-Madison
Developed radiation protection programs for
multiple irradiator licenses and for broad
license for research and medical uses of
radionuclides. Supervised staff of 12 health
physicists and technicians.

1978-79 Assistant Health Physicist
University of Wisconsin-Madison

1975-77 Research Assistant, Teaching Assistant
University of Wisconsin-Madison
Assisted in tissue equivalent materials, in vivo
bone mineral and body composition research.
Assisted in postgraduate courses and laboratories
including: Health Physics, Physics of Radiology,
Physics of Diagnostic Radiology.

ELSA ANITA NIMMO

- 1977 Health Physics Consultant (fall only)
General Electric, Medical Systems Division
Waukesha, Wisconsin
- 1976 Student Research Assistant (summer only)
Mayo Clinic, Rochester, Minnesota
Medical Physics
- 1972-75 Research Assistant (summers only)
University of Redlands, California
Assisted with measurement of total reaction cross
sections of various nuclei with 20-50 MeV protons.

PROFESSIONAL AFFILIATIONS:

Health Physics Society
Northern California Chapter Health Physics Society
American Association of Physicists in Medicine

NON-DEGREE AND CONTINUING EDUCATION:

- 1984 Dosimetry and Shielding
San Jose State University
- 1982 Radiation Chemistry in Biological Systems
San Jose State University
- 1980 NRC-sponsored Radiological Emergency Response
Operations course
Reynolds Electrical & Engineering Company,
Nevada Test Site

PUBLICATIONS:

A. M. Sourkes, M. S. de Jong, C. A. Goulding, W.
T. H. van Oers, E. A. Ginkel, R. F. Carlson, A. J.
Cox, and D. J. Margaziotis. Proton loss by nuclear
inelastic interactions in CsI, NaI, NE102, NE213,
and stilbene. Nuclear Instruments and Methods
1977:143:589-594.

Elsa Nimmo. Experiences with various waste disposal
methods at the University of Wisconsin-Madison.
U. S. EPA Waste Management in Universities and
Colleges. Madison Seminar Proceedings 1981:3:13-17.