

John I. H. Patterson, R.S.O / President  
Metorex Inc.  
Princeton Crossroads Corporate Center  
250 Philips Blvd.  
Ewing, NJ 08618

September 26, 2000

Subject: Amendment of registration certificate NR-0701-D-101-B to add Models  
SUPS 0484 & 2476.

Dear Mr. Patterson:

You requested in your letter dated June 9, 2000, an amendment to registration certificate NR-0701-D101-B to include SUPS 0480 and SUPS 2476 probes. A review of your application indicated that it is lacking significant amounts of the required information. In an Enclosure to this letter, we have summarized the major issues not addressed in your application. Enclosed also is a marked copy of your General License Manual. Please update and resubmitted two copies of this manual.

Please respond within 30 days of the date of this letter. If you would like to discuss any of issues identified in this letter or have any questions, please contact me at (301) 415-7894 or Mr. Seung J. Lee at (301) 415-5787.

Sincerely,

**/RA/**

Ujagar S. Bhachu, PEng., CEng., Mechanical Engineer  
Materials Safety and Inspection Branch  
Division of Industrial and  
Medical Nuclear Safety  
Office of Nuclear Material Safety  
and Safeguards

Enclosure: As stated

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Enclosure: As stated  
cc. w/encl: SKimberley, LFDCB

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Metorex Inc.

Enclosure

## **1. Radioactive Sources**

- 1.1 Page 6 of the application indicates that the sources for the probes are manufactured by Amersham plc (UK). The Sealed Source registration certificate NR-136-S-135-S, dated October 15, 1984, indicates that sources are manufactured by Amersham Corporation, IL. Please clarify this apparent discrepancy.
- 1.2 Page 6 makes a reference to ANSI N 542-1997, as a guide, please note that this document is a American national standard and not a guide.

## **2. Engineering Drawings**

- 2.1 Please provide English translation of the text for Figure 15, Page 28 of your application.
- 2.2 Please provide title, principle dimensions and references to Figure 15A & 15B.

## **1. Radiation Profiles-SUPS Probe**

- 3.1 Please state the points of the calibration curve at which  $\pm 15\%$  check was made in February 1999. Also, state the date, place and name of the person or persons who made and recorded the radiation profile readings.
- 3.2 Last sentence of Page 77 makes a reference to a section of a regulatory requirement. This reference is incorrect, please provide the correct reference.

## **2. Prototype Testing**

- 4.1 From page 8 it appears that the shutter spring does not function adequately. Please provide test results to establish the shutter spring functional reliability.
- 4.2 On page 8 of your application, it is stated that during the development of SUPS 0484, at the Institute of Physics of Outokumpu, some testing was done on the shutter mechanism. This involved the repeated operations of the shutter mechanism on the order of 10,000 times (how ever, no formal records of those tests exist today). We understand subsequently changes were made to the shutter mechanism to overcome shutter sticking and jamming problems. Please provide test data to establish that the modified shutter mechanism will perform reliably during expected normal and abnormal operations of the device.

**Metorex Inc.**

**3. Radiation Shielding**

- 5.1 Maximum Activities of sources indicated in Radiation shielding Table 1 are incorrect. Please revise this table to indicate the correct activities and confirm the adequacy of shutter materials for the actual maximum activities

**4. Quality Assurance**

- 6.1 Please confirm that all devices and documents shall be examined and/or tested on arrival in USA to ensure:

- leak test has been done in the past six months which indicated less than 0.005 microcurie (185 Bq) removable radioactive contamination
- proper operations of the safety features including the shutter mechanism
- radiation levels do not exceed the maximum levels stated in the application.

Devices to be distributed to the General Licensees must pass through the USA point of distribution, and must be examined and/or tested to ensure:

- correct labeling on devices and inclusion of correct user manual/material
- tamper resistant hardware has been installed as stated in the application
- over all device appearance
- device safety features function properly
- if manufactured by a different manufacturer and the QA/QC functions were performed by the manufacturer, then review paper work from other manufacturer documenting QA/QC and leak testing to ensure that all required was done and that a leak test has been done in the past six months.

All Generally Licensed devices must be checked prior to distribution.

**7. Labeling**

- 7.1 Some of your units may contain two sources. Please state whether a single or two labels are used in this type of applications. Is it possible for the operator to verify which sources is being used in unit's housing two sources?

# GENERAL LICENSE

As a recipient of a Metorex instrument containing radioactive source(s), ~~the recipient is you are~~ granted a GENERAL LICENSE by the NRC or *an Agreement State* ~~(if you reside in an Agreement State)~~. The GENERAL LICENSE is ~~issued~~ *granted* to the ~~person in the name of the company to~~ *which* ~~whom~~ the instrument is shipped. The GENERAL LICENSEE is required to ~~that the licensee~~ carry out specific actions.

## *The GENERAL LICENSEE is required to:*

12. Assure that all labels affixed to the instrument are maintained in good condition and the instructions thereon are followed.
13. Assure that leak tests and shutter operation tests are performed at an interval of not greater than six (6) months.
14. Assure that all leak tests, shutter operation tests and servicing are done in accordance with the instructions provided *by the manufacturer* or by a person holding a specific license *from a regulatory authority* to do so.
15. Maintain records of the leak tests, shutter operation tests and service for at least three (3) years after the next scheduled test or until the instrument is disposed of.
16. Upon the occurrence of a failure of or damage to the shutter mechanism or other shielding of the radioactive material or the indication of 0.005 microcurie or more of removable activity, immediately suspend operation of the device until *satisfactory* repairs have been effected by Metorex. In addition, within 30 days of the occurrence of such an event, notify the appropriate regional office of the NRC.
17. Not abandon the device containing radioactive sources.
18. Not transfer or dispose of the *device* except by return to Metorex or as provided in 10 CFR 31.5, (a copy of which is found on page 8).
19. Comply with the reporting provisions of 10 CFR 20.2201 and 20.2202 (found on page 11).
20. Respond to written request from the NRC or Agreement State to provide information relating to the general license within 30 days.

**IN CASE OF ANY *Accidents*, QUESTIONS OR PROBLEMS  
CONTACT METOREX INC. AT  
(609) 406-9000**

NOTE: This page should be printed on red stock!

**SECTION ON RADIATION SAFETY**  
**AND**  
**REGULATIONS (GENERAL LICENSE)**

**XMET 800 and Courier Series Probes**

**NOTE: THIS MANUAL MUST ACCOMPANY THE INSTRUMENT AT ALL TIMES**

**METOREX INC**

**1 - 609 - 406 - 9000**

**Revised: May 15, 2000**



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## **1.0 GENERAL LICENSE** (*Same comments. See cover sheet*)

As a recipient of a Metorex instrument containing radioactive source(s), the recipient is granted a GENERAL LICENSE by the NRC or the State (if you reside in an Agreement State). The GENERAL LICENSE is issued in the name of the company to which the instrument is shipped. The GENERAL LICENSE requires that the licensee carry out specific actions.

### **The GENERAL LICENSEE is required to:**

1. Assure that all labels affixed to the instrument are maintained in good condition and the instructions thereon are followed.
2. Assure that leak tests and shutter operation tests are performed at an interval of not greater than six (6) months.
3. Assure that all leak tests, shutter operation tests and servicing are done in accordance with the instructions provided or by a person holding a specific license to do so.
4. Maintain records of the leak tests, shutter operation tests and service for at least three (3) years after the next scheduled test or until the instrument is disposed of.
5. Upon the occurrence of a failure of or damage to the shutter mechanism or other shielding of the radioactive material or the indication of 0.005 microcurie or more of removable activity, immediately suspend operation of the device until repairs have been effected by Metorex. In addition, within 30 days of the occurrence of such an event, notify the appropriate regional office of the NRC.
6. Not abandon the device containing radioactive sources.
7. Not transfer or dispose of the unit except b return to Metoerx or as provided in 10 CFR 31.5, (a copy of which is found on page 8).
8. Comply with the reporting provisions of 10 CFR 20.2201 and 20.2202
9. Respond to written request from the NRC or Agreement State to provide information relating to the general license within 30 days.

## 0.1. General Discussion

The instrument you have received contains sealed radioisotope sources and is subject to licensing and ~~regulation by~~ the U.S. Nuclear Regulatory Commission (NRC) *regulations*. Many states have an agreement with the NRC to control radioisotopes within their state, these states are known as Agreement States. In most cases, the state and the NRC regulations are similar and allow the ~~receipt~~ *distribution* of the instrument under a General License. In those states, it is normally required that the recipient of the device notify the state within 30 days of receipt of the unit. The best way to determine if your state is an agreement state is via the Internet at:

<http://www.hsrld.ornl.gov/nrc/asframe.htm>

If Internet access is not available, contact Metorex. Once you have determined the proper contact person, you should call and inform the state that you have taken possession of a device which is Generally Licensed by the NRC under 10 CFR 31.5 and ask what steps must be taken to comply with state regulations.

Instead of the general license, it is possible to possess, *acquire and operate* these units under a specific license issued by the NRC or an Agreement State. At this time, a few states require a specific license to possess this device. The need for a specific license can be determined by contacting the appropriate individual for your state. If you prefer to maintain the instrument under a specific license please contact Metorex to arrange for redistribution of your instrument under your specific license.

### VERY IMPORTANT:

**Please note** that **it is the probe** of the X-MET analyzer rather than the X-MET itself **which is to be reported as the device containing radioactive source**. The probe type and serial number, and source type and serial number(s) to be reported are on the radioactive device label(s) placed on the probe. These must be reported.

## 1.2. DISCUSSION OF REQUIREMENTS

All the requirements summarized above stem from the language of the *federal* regulations,

- ad 1) All instructions provided with the device, both in manuals and on labels attached to the device have to be observed, and labels must be maintained in good condition. This requirement also means that all instruction manuals, copy of this General License *Manual*, and all test records have to accompany the device at all times and be always available for reference or inspection. This refers also to any records of receipt, installation, servicing, assignment, transfer and disposal.

ad 2, 3 & 4). The user of the device containing radioactive material (source) has to have the device tested for leakage every six months. The results and records of the tests have to be maintained for at least three years or until the device has been transferred to *a person the specifically licensed-recipient* (usually the manufacturer). There are a number of facilities that specialize in performing the wipe test for a nominal fee. The detailed instructions on how to perform the wipe test for each probe (device) type are described in sub-section 3.1 of manual along with few addresses of services as an example.

Only the *original* manufacturer of the device, its legally appointed representative or *NRC and Agreement State specific licensees* are allowed to perform the servicing and disassembly of the device. Whenever it is necessary to ship the device for service to Metorex service facility the user should contact Metorex which will advise on proper shipping procedures. These procedures are outlined in sub-section 3.4. Metorex uses only trackable methods of shipment such as provided by the second day Fedex Service.

Anytime a wipe test is performed on the device its ON/OFF or trigger mechanism - whichever applicable - should also be tested for operation and test results recorded.

ad 5). If the leak test shows a removable activity of greater than 0.005 microcuries or the shutter mechanism test fails, or any other indication exist that the shielding has failed, it is essential that the unit be removed from operation immediately. Then you should contact Metorex immediately and arrange for the unit to be returned to Metorex. It is also required that the event be reported to the NRC. Please contact the Radiation Safety Officer at Metorex for assistance in completing this report.

ad 6, 7). The recipient of the radioactive device under provisions of general license is not allowed to dispose of or transfer the device to a third party. The only transfer allowed is either to Metorex Inc for the purpose of service or disposal or the party specifically licensed to receive the device. *~~In particular, it is illegal for the recipient of the device to sell it to a third party.~~*

ad 8). Any loss of the device, for whatever the reason, has to be reported immediately to appropriate agency (NRC Regional Office or to an Agreement State) and Metorex. Similarly, in the remote case of leakage from radioactive source or damage to the radiation shielding report the event to Metorex and appropriate agency. Metorex will advise on proper safety procedures and repair the device.

ad 9). The NRC and Agreement states may contact you for additional information regarding the unit you possess under a general license. It is required that you provide the requested information within 30 days of receiving the request. If you are not certain of the correct response to the request please contact Metorex for assistance.

### 1.3 MAINTANENCE AND REPAIR

~~Under a~~ General License ~~the user~~ is prohibited from opening or dismantling the probes ~~holding the radioactive materials~~ in any way. Thus, in order to maintain or repair the probe it is necessary to return the probe to Metorex or another company that is specifically licensed by either the NRC or an Agreement State to perform the repairs to the probe. The wipe tests and shutter tests outlined in Section 3 of this manual can and should be performed by the user.

## **2. GENERAL LICENSE.**

### **2.1. INFORMATION ABOUT METOREX MATERIALS LICENSE.**

Metorex Inc possesses materials license and distribution license, both issued by the USNRC. The license numbers are:

Materials possession	29-30342-01
Distribution	29-30342-02G

These licenses authorize Metorex Inc to ~~manufacture~~ possess and distribute its *radioactive* devices under General License as set out in the federal regulations. As a manufacturer and distributor, Metorex Inc is required to furnish to the recipient of the device(s) parts of the regulations pertaining to General Licensees.

The excerpts from the NRC regulations (10 CFR ~~35.1~~ *31.5*, 20.2201 and 20.2202) attached outline the recipient's responsibilities as a licensee and the conditions under which he must possess, use and transfer these devices.

### **2.2 Excerpts from the Title 10 CFR, Energy, related to general license.**

#### **§31.5 Certain measuring, gauging or controlling devices.<sup>(2)</sup>**

(a) A general license is hereby issued to commercial and industrial firms and research, educational and medical institutions, individuals in the conduct of their business, and Federal, State or local government agencies to acquire, receive, possess, use or transfer, in accordance with the provisions of paragraphs (b), (c) and (d) of this section, byproduct material contained in devices designed and manufactured for the purpose of detecting, measuring, gauging or controlling thickness, density, level, interface location, radiation, leakage, or qualitative or quantitative chemical composition, or for producing light or an ionized atmosphere.

(b) The general license in paragraph (a) of this section applies only to byproduct material contained in devices which have been manufactured or initially transferred and labeled in accordance with the specifications contained in a specific license issued pursuant to §32.51 of this chapter or in accordance with the specifications contained in a specific license issued by an Agreement State which authorizes distribution of the devices to persons generally licensed by the Agreement State.

(c) Any person who acquires, receives, possesses, uses or transfers byproduct material in a device pursuant to the general license in paragraph (a) of this section:

(1) Shall assure that all labels affixed to the device at the time of receipt and bearing a statement that removal of the label is prohibited are maintained thereon and shall comply with all instructions and precautions provided by such labels;

(2) Shall assure that the device is tested for leakage of radioactive material and proper operation of the on-off mechanism and indicator, if any, at no longer than six-month intervals or at such other intervals as are specified in the label; however:

(i) Devices containing only krypton need not be tested for leakage of radioactive material, and  
(ii) Devices containing only tritium or not more than 100 microcuries of other beta and/or gamma emitting material or 10 microcuries of alpha emitting material and devices held in storage in the original shipping container prior to initial installation need not be tested for any purpose;

(3) Shall assure that the tests required by paragraph (c)(2) of this section and other testing, installation, servicing, and removal from installation involving the radioactive materials, its shielding or containment, are performed:

(i) In accordance with the instructions provided by the labels; or  
(ii) By a person holding a specific license pursuant to parts 30 and 32 of this chapter or from an Agreement State to perform such activities;

(4) Shall maintain records showing compliance with the requirements of paragraphs (c)(2) and (c)(3) of this section. The records must show the results of tests. The records also must show the dates of performance of, and the names of persons performing, testing, installing, servicing, and removing from the installation radioactive material and its shielding or containment. The licensee shall retain these records as follows:

(i) Each record of a test for leakage or radioactive material required by paragraph (c)(2) of this section must be retained for three years after the next required leak test is performed or until the sealed source is transferred or disposed of.

(ii) Each record of a test of the on-off mechanism and indicator required by paragraph (c)(2) of this section must be retained for three years after the next required test of the on-off mechanism and indicator is performed or until the sealed source is transferred or disposed of.

(iii) Each record that is required by paragraph (c)(3) of this section must be retained for three years from the date of the recorded event or until the device is transferred or disposed of.

(5) Upon the occurrence of a failure of or damage to, or any indication of a possible failure of or damage to, the shielding of the radioactive material or the on-off mechanism or indicator, or upon the detection of 0.005 microcurie or more removable radioactive material, shall immediately suspend operation of the device until it has been repaired by the manufacturer or other person holding a specific license pursuant to parts 30 and 32 of this chapter or from an

Agreement State to repair such devices, or disposed of by transfer to a person authorized by a specific license to receive the byproduct material contained in the device and, within 30 days, furnish to the Administrator of the appropriate Nuclear Regulatory Commission, Regional Office listed in appendix D of part 20 of this chapter, a report containing a brief description of the event and the remedial action taken;

(6) Shall not abandon the device containing byproduct material;

(7) Shall not export the device containing byproduct material except in accordance with part 110 of this chapter;

(8) Except as provided in paragraph (c)(9) of this section, shall transfer or dispose of the device containing byproduct material only by transfer to persons holding a specific license pursuant to parts 30 and 32 of this chapter or from an Agreement State to receive the device and within 30 days after transfer of a device to a specific licensee shall furnish to the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 a report containing identification of the device by manufacturer's name and model number and the name and address of the person receiving the device. No report is required if the device is transferred to the specific licensee in order to obtain a replacement device;

(9) Shall transfer the device to another general licensee only:

(i) Where the device remains in use at a particular location. In such case the transferor shall give the transferee a copy of this section and any safety documents identified in the label of the device and within 30 days of the transfer, report to the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, the manufacturer's name and model number of device transferred, the name and address of the transferee, and the name and/or position of an individual who may constitute a point of contact between the Commission and the transferee; or

(ii) Where the device is held in storage in the original shipping container at its intended location of use prior to initial use by a general licensee.

(10) Shall comply with the provisions of §§20.2201, and 20.2202 of this chapter for reporting radiation incidents, theft or loss of licensed material, but shall be exempt from the other requirements of parts 19, 20, and 21, of this chapter.

(11) Shall respond to written requests from the Nuclear Regulatory Commission to provide information relating to the general license within 30 calendar days of the date of the request, or other time specified in the request. If the general licensee cannot provide the requested information within the allotted time, it shall, within that same time period, request a longer period to supply the information by submitting a letter to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001 and provide written justification as to why it cannot comply.

(d) The general license in paragraph (a) of this section does not authorize the manufacture or import of devices containing byproduct material.

~~[39 FR 43532, Dec. 16, 1974, as amended at 40 FR 8785, Mar. 3, 1975; 40 FR 14085, Mar. 28, 1975; 42 FR 25721, May 19, 1977; 42 FR 28896, June 6, 1977; 43 FR 6922, Feb. 17, 1978; 53 FR 19246, May 27, 1988; 56 FR 23471, May 21, 1991; 56 FR 61352, Dec. 3, 1991; 58 FR 67659, Dec. 22, 1993]~~

#### **20.2201 Reports of theft or loss of licensed material.**

(a) Telephone reports. (1) Each licensee shall report by telephone as follows:

(i) Immediately after its occurrence becomes known to the licensee, any lost, stolen, or missing licensed material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in appendix C to part 20 under such circumstances that it appears to the licensee that an exposure could result to persons in unrestricted areas; or

(ii) Within 30 days after the occurrence of any lost, stolen, or missing licensed material becomes known to the licensee, all licensed material in a quantity greater than 10 times the quantity specified in appendix C to part 20 that is still missing at this time.

(2) Reports must be made as follows:

(i) Licensees having an installed Emergency Notification System shall make the reports to the NRC Operations Center in accordance with §50.72 of this chapter, and

(ii) All other licensees shall make reports by telephone to the NRC Operations Center ( 301-816-5100 or 301 - 951 - 0550).

(b) *Written reports.* (1) Each licensee required to make a report under paragraph (a) of this section shall, within 30 days after making the telephone report, make a written report setting forth the following information:

(i) A description of the licensed material involved, including kind, quantity, and chemical and physical form; and

(ii) A description of the circumstances under which the loss or theft occurred; and

(iii) A statement of disposition, or probable disposition, of the licensed material involved; and

(iv) Exposures of individuals to radiation, circumstances under which the exposures occurred, and the possible total effective dose equivalent to persons in unrestricted areas; and

(v) Actions that have been taken, or will be taken, to recover the material; and



(vi) Procedures or measures that have been, or will be, adopted to ensure against a recurrence of the loss or theft of licensed material.

(2) Reports must be made as follows:

(i) For holders of an operating license for a nuclear power plant, the events included in paragraph (b) of this section must be reported in accordance with the procedures described in §50.73(b), (c), (d), (e), and (g) of this chapter and must include the information required in paragraph (b)(1) of this section, and *(Not applicable to General licensees)*

(ii) All other licensees shall make reports to the Administrator of the appropriate NRC Regional Office listed in appendix D to part 20.

(c) A duplicate report is not required under paragraph (b) of this section if the licensee is also required to submit a report pursuant to §§30.55(c), 40.64(c), 50.72, 50.73, 70.52, 73.27(b), 73.67(e)(3)(vi), 73.67(g)(3)(iii), 73.71, or §150.19(c) of this chapter.

(d) Subsequent to filing the written report, the licensee shall also report any additional substantive information on the loss or theft within 30 days after the licensee learns of such information.

(e) The licensee shall prepare any report filed with the Commission pursuant to this section so that names of individuals who may have received exposure to radiation are stated in a separate and detachable part of the report.

~~{56 FR 23406, May 21, 1991, as amended at 58 FR 69220, Dec. 30, 1993; 60 FR 20186, Apr. 25, 1995}~~

#### **§20.2202 Notification of incidents.**

(a) Immediate notification. Notwithstanding any other requirements for notification, each licensee shall immediately report any event involving byproduct, source, or special nuclear material possessed by the licensee that may have caused or threatens to cause any of the following conditions --

(1) An individual to receive --

(i) A total effective dose equivalent of 25 rems (0.25 Sv) or more; or

(ii) A lens dose equivalent of 75 rems (0.75 Sv) or more; or

(iii) A shallow-dose equivalent to the skin or extremities of 250 rads (2.5 Gy) or more; or

(2) The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the

annual limit on intake (the provisions of this paragraph do not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures).

(b) Twenty-four hour notification. Each licensee shall, within 24 hours of discovery of the event, report any event involving loss of control of licensed material possessed by the licensee that may have caused, or threatens to cause, any of the following conditions:

(1) An individual to receive, in a period of 24 hours --

(i) A total effective dose equivalent exceeding 5 rems (0.05 Sv); or

(ii) A lens dose equivalent exceeding 15 rems (0.15 Sv); or

(iii) A shallow-dose equivalent to the skin or extremities exceeding 50 rems (0.5 Sv); or

(2) The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one occupational annual limit on intake (the provisions of this paragraph do not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures).

(c) The licensee shall prepare any report filed with the Commission pursuant to this section so that names of individuals who have received exposure to radiation or radioactive material are stated in a separate and detachable part of the report.

(d) Reports made by licensees in response to the requirements of this section must be made as follows:

(1) Licensees having an installed Emergency Notification System shall make the reports required by paragraphs (a) and (b) of this section to the NRC Operations Center in accordance with 10 CFR 50.72; and *(Not applicable to General Licensees.)*

(2) All other licensees shall make the reports required by paragraphs (a) and (b) of this section by telephone to the NRC Operations Center (301) 816-5100.

(e) The provisions of this section do not include doses that result from planned special exposures, that are within the limits for planned special exposures, and that are reported under §20.2204.

[56 FR 23406, May 21, 1991, as amended at 56 FR 40766, Aug. 16, 1991; 57 FR 57879, Dec. 8, 1992; 59 FR 14086, Mar. 25, 1994]

## **Appendix D to Part 20 -- United States Nuclear Regulatory Commission Regional Offices**

		Telephone (24 hour)
Region I: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.	USNRC, Region I 475 Allendale Road King of Prussia, PA 19406.	(610) 337-5000
Region II: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, Virginia, Virgin Islands, and West Virginia.	USNRC, Region II Atlanta Federal Center 61 Forsyth Street, SW., Suite 23T85 Atlanta, GA 30303.	(404) 562-4400
Region III: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin.	USNRC, Region III 801 Warrenville Road Lisle, IL 60532-4351.	(708) 829-9500
Region IV: Alaska, Arizona, Arkansas, California, Colorado, Hawaii, Idaho, Kansas, Louisiana, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming, and the U.S. territories and possessions in the Pacific.	USNRC, Region IV 611 Ryan Plaza Drive Suite 400 Arlington, TX 76011.	(817) 860-8100
Region IV: Field Office	USNRC, Region IV <del>Walnut Creek Field Office, 1450 Maria Lane, Suite 300, Walnut Creek, CA 94596. (Closed)</del>	(510) 975-0200.

~~[56 FR 23468, May 21, 1991, as amended at 56 FR 41449, Aug. 21, 1991; 58 FR 64111, Dec. 6, 1993; 59 FR 17465, Apr. 13, 1994; 60 FR 24551, May 9, 1995; 62 FR 22880, Apr. 28, 1997]~~

### **3. APPENDICES**

### **3.1. WIPE TEST PROCEDURES.**

#### **3.1.1. Wipe test kits.**

There are many companies which provide the wipe test kits along with subsequent analysis of the wipe. The addresses of few are listed in Section 3.1.3. The cost of the kit and service runs about 30 to 60 US\$. The company providing this type of service has to be certified either by the State Department of Radiation Safety (if in Agreement State) or by Nuclear Regulatory Commission (if in Non-agreement State). Therefore, prior to the intended use of the services of a particular company you should ask for the copy of the license authorizing them to perform the service. Most of these companies will put a new customer on their list and will send wipe tests automatically every six months. This way the user of the equipment is assured of timely wipe tests as required by regulations.

The wipe test kit usually consists of wipe solution, the wipe, and a plastic container to store the used wipe in it for transport to the laboratory. Typically the wipe solution may be a mild detergent or an alcohol solution in water. The alcohol-based solution is recommended over the detergent one because it does not leave any residue on the probe window. A detergent based solution may leave some phosphorus salt residue, which can interfere with analysis. A wipe is usually a piece of a soft paper tissue or a cotton swab on a wooden stick (a "Q-tip"). A plastic container may be in the form of plastic bag or a small, 25 ml capacity polyethylene bottle with a tight stopper. Each manufacturer of the kit provides instructions on how to prepare and use the kit.

#### **2.0.2. Performing the wipe test.**

**IF ANY ASSISTANCE IS NEEDED PLEASE CONTACT THE X-MET SERVICE DEPARTMENT AT: 609-406-9000**

#### **3.1.2.1. HEPS and LEPS Probes.**

- Obtain the wipe test kit.
- Prepare the kit for use according to the manufacturer's instructions.
- Wet the wipe tissue or cotton swab with the wipe solution so that it is moist but not dripping.
- Move the probe measuring head in forward position so that the probe measuring head cover can be opened by tilting to the back. Lift the sample chamber from the probe head. Wipe the plastic film on the bottom of sample chamber with moist wipe tissue paper or cotton swab. Perform the wipe on this side of the film which faces the source.

**NOTE:** *Under the provisions of general license, the user of the device containing radioisotope is restricted from dismantling the device (probe) to expose the source. Therefore, it is not the source which is to be wipe tested, but that part of the probe which comes in closest proximity to the source and which is accessible to the user without taking the probe apart. For the probes mentioned above this is the surface of the plastic film on the bottom of sample chamber.*

- Place the wipe in a plastic bag provided, or break off the tip of the Q-tip and drop it into the bottle with wipe solution. However, the exact handling of the wipe should follow the instructions provided with the kit by its supplier.
- Seal the plastic bag or a bottle.
- Mark the bag or a bottle with a type and serial number of the source just wiped. Record the date of wipe, source serial number, and type of the isotope on the form provided by kit manufacturer.
- Make copy of that record for your own files, and send the original along with the wipe to the lab for analysis.
- After you receive the results of the wipe test place them in a safe place. By law you are obliged to maintain these record for at least three consecutive years or until you transfer the radioisotope containing device permanently back to manufacturer.

#### **3.1.2.2. DOPS, SAPS, SLPS, SUPS and SSPS Probes.**

- Obtain the wipe test kit.
- Prepare the kit for use according to the manufacturer's instructions.
- Wet the wipe tissue or cotton swab with the wipe solution so that it is moist but not dripping.
- Wipe the plastic window of the probe with a moist wipe.

**NOTE:** *Under the provisions of general license, the user of the device containing radioisotope is restricted from dismantling the device (probe) to expose the source. Therefore, it is not the source which is to be wipe tested, but that part of the probe which comes in closest proximity to the source and which is accessible to the user without taking the probe apart. For the probes mentioned above this is the surface of the mylar film covering probe measurement window. It is not required to open the probe shutter in order to perform the wipe test!!*

- Place the wipe in a plastic bag provided, or break off the tip of the Q-tip and drop it into the bottle with wipe solution. However, the exact handling of the wipe should follow the instructions provided with the kit by its supplier.
- Seal the plastic bag or a bottle.
- Mark the bag or a bottle with a type and serial number of the source(s) just wiped. Record the date of wipe, source(s) serial number(s), and type of the isotope on the form provided by kit manufacturer.
- Make copy of that record for your own files, and send the original along with the wipe to the lab for analysis.
- After you receive the results of the wipe test place them in a safe place. By law you are obliged to maintain these record for at least three consecutive years or until you transfer the radioisotope containing device permanently back to manufacturer.

**NOTE:** *If the probe contains two sources, it is not necessary to perform two wipes. You need only to mark on the bottle or plastic bag both isotopes and their serial numbers, as well as to include that information on the form.*

#### **3.1.2.3. Courier 10 and 20.**

- Obtain the wipe test kit.
- Prepare the kit for use according to the manufacturer's instructions.
- Wet the wipe tissue or cotton swab with the wipe solution so that it is moist but not dripping.
- Set the MAINTENANCE switch to "ON".
- In Courier 10S detach the sample cell by unscrewing it, in Courier 20 and in Courier 10 with the slurry type sample cell swing the cell on its hinge bracket away from the measuring window.
- Wipe the plastic window separating detector compartment from the sample cell with a moist wipe.
- If Courier 20 is fitted with two sample cells repeat the whole procedure for the second cell.

**NOTE:** *Under the provisions of general license, the user of the device containing radioisotope is restricted from dismantling the device (probe) to expose the source. Therefore, it is not the source which is to be wipe tested, but that part of the sample cell assembly which comes in closest proximity to the source and which is accessible to the user without taking the assembly apart. For the Courier heads this is the surface of the mylar film separating detector/source compartment from sample cell. One must not expose the source in order to perform the wipe test!!*

- Place the wipe in a plastic bag provided, or break off the tip of the Q-tip and drop it into the bottle with wipe solution. However, the exact handling of the wipe should follow the instructions provided with the kit by its supplier.
- Seal the plastic bag or a bottle.
- Mark the bag or a bottle with a type and serial number of the source(s) just wiped. Record the date of wipe, source(s) serial number(s), and type of the isotope on the form provided by kit manufacturer.
- Make copy of that record for your own files, and send the original along with the wipe to the lab for analysis.
- After you receive the results of the wipe test place them in a safe place. By law you are obliged to maintain these record for at least three consecutive years or until you transfer the radioisotope containing device permanently back to manufacturer.

**NOTE:** *If the probe contains two sources, it is not necessary to perform two wipes. You need only to mark on the bottle or plastic bag both isotopes and their serial numbers, as well as to include that information on the form.*

### **3.1.3. Partial list of suppliers of wipe test services.**

ATOMIC ENERGY INDUSTRIAL LAB.  
9261 Kirby Drive  
Houston, TX 77054-2514  
Tel.: 713-790-9719

MONITORING SERVICES  
P.O.Box 266677  
Houston, TX 77207-6677  
Tel.: 713-242-9038

**NOTE:** *This list does not constitute the endorsement of those companies by Metorex Inc.*

## **3.2. Instructions for testing the shutter mechanisms of METOREX probes.**

### **3.2.1. General.**

Under the provisions of the general license, the user or recipient of the device containing radioisotope source is obliged to test the so called "on-off mechanism and indicator, if any" (see 10 CFR 31.5, paragraph c), and maintain the log of those tests. The phrase "on-off mechanism" relates also to the shutter mechanism, which prevents the source exposure when not in measurement state.

### **3.2.2. HEPS and LEPS Probes.**

These probes do not have an "on-off" mechanism as such. Instead the sources are contained within the probe body which effectively blocks the source radiation from emerging outside. The only moving part of the probe is the probe cover which slides back and forth. When in the front (safe) position this cover blocks radiation from the source. When in the rear (measurement) position, this probe cover brings the sample over the source for measurement. Testing of this mechanism involves nothing more than just the routine, operational check of the probe, inadvertently performed as a part of each measurement. Therefore, if the instrument is being used frequently, the test described below is an integral part of the daily routine work.

#### **Performing the test**

- Visually inspect the probe for any visible defects such as cracks, dents, etc.
- Move the sliding cover of the probe back and forth several times. It should slide in both directions without any resistance, squeak or mechanical jamming.
- Connect the probe to analyzer and turn the analyzer on. Select any calibrated model.
- Select relatively short measurement time, say 5 sec. Place the sample in the probe and start measurement.
- Repeat this sequence several times.
- Make a signed entry in a test log book stating name of the tester, date, time, and the result of the test (such as "passed" or "satisfactory"). This log book should accompany the probe at all times. It is also recommended that the dates and results of the mandatory six months wipe tests be recorded in that book.

**NOTE:** *Should any part of the probe fail to work as indicated in this test stop using the probe. In the event of malfunctioning, place a piece of at least 3 mm thick (1/8 of an inch) steel plate flush with the probe window completely covering it. Place the probe in a secure location with controlled access. Notify the supervisor and immediately contact Metorex Service Department at 609-406-9000.*

### **3.2.3. DOPS Probe.**

The DOPS probe does not have an "on-off" mechanism as such, but has a mechanical shutter which blocks the radiation from the source when probe is not used. Testing of this mechanism involves



nothing more than just the routine, operational checks of the probe, ordinarily performed before each measurement session. Therefore, if the instrument is being used frequently, the test described below is an integral part of the daily routine work.

### **Performing the test**

- Visually inspect the probe for any visible defects such as cracks, dents, etc.
- Inspect the probe measuring window. You should see the shutter in the window. In the small, round window on the side of the probe you should see a green indicator. Unlock the probe trigger.
- Place the probe against the sample. Pull the trigger several times. It should operate smoothly, without resistance, friction and jamming. Each time the trigger is being pulled all the way, a red indicator with a white digit 1 (one) should be clearly visible in the window on the side of the probe. A green indicator should be visible when the trigger is completely released.
- Connect the probe to analyzer and turn the analyzer on. Select the calibration model which uses both sources.
- Select relatively short measurement time, say 5 sec. Place the probe against the sample. Pull the trigger. A white "1" on a red background should be visible in the indicator window on the side of the probe. At the same time a red LED on the probe handle should light and stay on for the duration of the measurement.
- Hold the trigger until the first source measurement is completed. You should then hear the click caused by a second source going into measurement position, followed by a white "2" on red background visible in the indicator window. The red LED in the probe handle should stay lit.
- Wait until the measurement with the second source is over and release the trigger. The shutter should return to closed position, signaled by a green color in the indicator window. The red LED should be off.
- Visually inspect the shutter position. It should be closed.
- Repeat this sequence several times.
- Make an signed entry in a test log book stating name of the tester, date, time, and the result of the test (such as "passed" or "satisfactory"). This log book should accompany the probe at all times. It is also recommended that the dates and results of the mandatory six months wipe tests be recorded in that book.

**NOTE:** *Should any part of the probe fail to work as indicated in this test stop using the probe. Block the trigger with the lock provided. In the unlikely event of the shutter malfunction, place a piece of at least 3 mm thick (1/8 of an inch) steel plate flush with the probe window completely covering it. Place the probe in a secure location with controlled access. Notify the supervisor and immediately contact Metorex Service Department at 1-609-406-9000.*

### **3.2.4. SAPS Probe.**

The SAPS probe does not have an "on-off" mechanism as such, but has a mechanical shutter which blocks the radiation from the source when probe is not used. Testing of this mechanism involves

nothing more than just the routine, operational checks of the probe, ordinarily performed before each measurement session. Therefore, if the instrument is being used frequently, the test described below is an integral part of the daily routine work.

### **Performing the test**

- Visually inspect the probe for any visible defects such as cracks, dents, etc.
- Inspect the probe measuring window. You should see the shutter in the window. In the small, round window on the side of the probe you should see a green indicator. Unlock the probe trigger.
- Place the probe against the sample. Pull the trigger several times. It should operate smoothly, without resistance, friction and jamming. Each time the trigger is being pulled all the way, a red indicator should be clearly visible in the window on the side of the probe. A green indicator should be visible when the trigger is completely released.
- Connect the probe to analyzer and turn the analyzer on. Select any calibrated model.
- Select relatively short measurement time, say 5 sec. Place the probe against the sample. Pull the trigger. A red indicator should be visible in the indicator window on the side of the probe. At the same time a red LED on the probe handle should light and stay on for the duration of the measurement.
- Hold the trigger until the measurement is completed and then only release the trigger. The shutter should return to closed position, signaled by a green color in the indicator window. The red LED on the probe handle should be off.
- Visually inspect the shutter position. It should be closed.
- Repeat this sequence several times.
- Make an signed entry in a test log book stating name of the tester, date, time, and the result of the test (such as "passed" or "satisfactory"). This log book should accompany the probe at all times. It is also recommended that the dates and results of the mandatory six months wipe tests be recorded in that book.

**NOTE:** *Should any part of the probe fail to work as indicated in this test stop using the probe. Block the trigger with the lock provided. In the unlikely event of the shutter malfunction, place a piece of at least 3 mm thick (1/8 of an inch) steel plate flush with the probe window completely covering it. Place the probe in a secure location with controlled access. Notify the supervisor and immediately contact Metorex Service Department at 1-609-406-9000.*

### **3.2.5. SLPS Probe.**

The SLPS probe does not have an "on-off" mechanism as such, but has a mechanical shutter which blocks the radiation from the source when probe is not used. Testing of this mechanism involves nothing more than just the routine, operational checks of the probe, ordinarily performed before

each measurement session. Therefore, if the instrument is being used frequently, the test described below is an integral part of the daily routine work.

### **Performing the test**

- Visually inspect the probe for any visible defects such as cracks, dents, etc.
- Inspect the probe measuring window. You should see the shutter in the window. By the window you should see the push-in pin, which actuates the shutter when probe is pressed flush against the measured surface.
- Place the probe against the sample and push until flush with the sampled surface. Do this several times. The push-in pin should operate smoothly, without any other resistance but that of the returning spring, without friction or jamming.
- Connect the probe to analyzer and turn the analyzer on. The LED in the probe handle should be green. Select any calibrated model.
- Select relatively short measurement time, say 5 sec. Place the probe against the sample and push it flush with the sampled surface. The LED on the probe handle should change from green to red and stay red for the duration of the measurement.
- Hold the probe against sample until the measurement is completed and then only release it. The shutter should return to closed position and the red LED on the probe handle should change to green.
- Visually inspect the shutter position. It should be closed.
- Repeat this sequence several times.
- Make a signed entry in a test log book stating name of the tester, date, time, and the result of the test (such as "passed" or "satisfactory"). This log book should accompany the probe at all times. It is also recommended that the dates and results of the mandatory six months wipe tests be recorded in that book.

**NOTE:** *Should any part of the probe fail to work as indicated in this test stop using the probe. In the unlikely event of the shutter malfunction, place a piece of at least 3 mm thick (1/8 of an inch) steel plate flush with the probe window completely covering it. Place the probe in a secure location with controlled access. Notify the supervisor and immediately contact Metorex Service Department at 1-609-406-9000.*

### **3.2.6. Mechanical SUPS 484 Probe.**

Two SUPS probes exist, one has a mechanical shutter activation the other has an electrical shutter activation. If there is no button on the handle of your SUPS probe, you have a SUPS 484 probe and this section applies. The SUPS probe does not have an "on-off" mechanism as such, but has a mechanical shutter which blocks the radiation from the source when probe is not used. Testing of this mechanism involves nothing more than just the routine, operational checks of the probe, ordinarily performed before each measurement session. Therefore, if the instrument is being used frequently, the test described below is an integral part of the daily routine work.

## Performing the test

- Visually inspect the probe for any visible defects such as cracks, dents, etc.
- Inspect the probe measuring window. You should see the shutter in the window. By the window you should see the push-in pin, which actuates the shutter when probe is pressed flush against the measured surface.
- Place the probe against the sample and push until flush with the sampled surface. Do this several times. The push-in pin should operate smoothly, without any other resistance but that of the returning spring, without friction or jamming.
- Connect the probe to analyzer and turn the analyzer on. Select any calibrated model.
- Select relatively short measurement time, say 5 sec. Place the probe against the sample and push it flush with the sampled surface. A red LED on the probe handle should light and stay on for the duration of the measurement.
- Hold the probe against sample until the measurement is completed and then only release it. The shutter should return to closed position and the red LED on the probe handle should go off
- Visually inspect the shutter position. It should be closed.
- Repeat this sequence several times.
- Make a signed entry in a test log book stating name of the tester, date, time, and the result of the test (such as "passed" or "satisfactory"). This log book should accompany the probe at all times. It is also recommended that the dates and results of the mandatory six months wipe tests be recorded in that book.

**NOTE:** *Should any part of the probe fail to work as indicated in this test stop using the probe. In the unlikely event of the shutter malfunction, place a piece of at least 3 mm thick (1/8 of an inch) steel plate flush with the probe window completely covering it. Place the probe in a secure location with controlled access. Notify the supervisor and immediately contact Metorex Service Department at 1-609-406-9000.*

### 3.2.7. Electro-mechanical SUPS 2476 Probe.

Two SUPS probes exist, one has a mechanical shutter activation the other has an electronic shutter activation. If there is a button on the handle of your SUPS probe, you have a SUPS 2476 probe and this section applies. The SUPS probe does not have an "on-off" mechanism as such, but has an electro-mechanical shutter which blocks the radiation from the source when probe is not used. Testing of this mechanism involves nothing more than the routine, operational checks of the probe, ordinarily performed before each measurement session. Therefore, if the instrument is being used frequently, the test described below is an integral part of the daily routine work.

## Performing the test

- Visually inspect the probe for any visible defects such as cracks, dents, etc.
- Inspect the probe measuring window. You should see the shutter in the window. By the window you should see the push-in pin, which enables the shutter when probe is pressed flush against the measured surface.

- Place the probe against the sample and push until flush with the sample. Do this several times. The push-in pin should operate smoothly, without any other resistance but that of the returning spring, without friction or jamming.
- Connect the probe to analyzer and turn the analyzer on. The LED on the handle of the probe should be green. Select any calibrated model.
- Select relatively short measurement time, say 5 sec. Place the probe against the sample and push it flush with the sampled surface then momentarily press the button on the handle. The LED on the probe handle should change to red and stay red for the duration of the measurement.
- Hold the probe against sample until the measurement is completed. The shutter should return to closed position and the red LED on the probe handle should change back to green.
- Visually inspect the shutter position. It should be closed.
- Repeat this sequence several times.
- Make a signed entry in a test log book stating name of the tester, date, time, and the result of the test (such as "passed" or "satisfactory"). This log book should accompany the probe at all times. It is also recommended that the dates and results of the mandatory six months wipe tests be recorded in that book.

**NOTE:** *Should any part of the probe fail to work as indicated in this test stop using the probe. In the unlikely event of the shutter malfunction, place a piece of at least 3 mm thick (1/8 of an inch) steel plate flush with the probe window completely covering it. Place the probe in a secure location with controlled access. Notify the supervisor and immediately contact Metorex Service Department at 1-609-406-9000.*

### 3.2.8. SSPS Probe.

The SSPS probe does not have an "on-off" mechanism as such. Instead its sources are contained in tungsten alloy tubes which effectively block the radiation from sources when probe is not used. Testing of this mechanism involves nothing more than just the routine, operational checks of the probe, ordinarily performed as a part of each measurement. Therefore, if the instrument is being used frequently, the test described below is an integral part of the daily routine work.

#### Performing the test

- Visually inspect the probe for any visible defects such as cracks, dents, etc.
- Inspect the probe measuring window. You should not see any of the two sources in openings in tungsten tubes. A green indicator should be visible in each window on the probe cover.
- Connect the probe to analyzer and turn the analyzer on. Select any model calibrated for two sources.
- Select relatively short measurement time, say 5 sec. Place the probe against the sample and push the START button on the probe handle. A red LED on the probe handle should light and stay on for the duration of the measurement cycle. Also, a red indicator should appear in the side window in the probe cover on that side of the probe on which the source being used for measurement is located. Wait until the measurement with the first source is completed and second source is placed in measurement position. This time the red indicator should appear on the other side, while a green indicator on the side of the first source should replace the red one.
- Hold the probe against sample until the measurement is completed. Both sources should return to secured position and the red LED on the probe handle should go off. The indicators in both windows should be green.
- Repeat this sequence several times.
- Make a signed entry in a test log book stating name of the tester, date, time, and the result of the test (such as "passed" or "satisfactory"). This log book should accompany the probe at all times. It is also recommended that the dates and results of the mandatory six months wipe tests be recorded in that book.

**NOTE:** *Should any part of the probe fail to work as indicated in this test stop using the probe. In the event of malfunctioning, place a piece of at least 3 mm thick (1/8 of an inch) steel plate flush with the probe window completely covering it. Place the probe in a secure location with controlled access. Notify the supervisor and immediately contact Metorex Service Department at 609-406-9000.*

### 3.2.9. Courier 10 and 20.

The measuring heads of these analyzers do not have an "on-off" mechanism as such. Instead the source(s) mounted on the detector are moved to the measuring position and to the safe, reference position. There are four situations in which the source/detector assembly should move into reference position:

- when MAINTENANCE switch is set in "ON" position;
- when there is sample cell window rupture;
- when operator inadvertently opens the sample cell;
- when there is a power failure.

These conditions are easily tested by deliberate creation of the conditions as described above.

## 3.3. INSTRUCTIONS FOR SAFE OPERATION OF METOREX PROBES

### 3.3.1. HEPS and LEPS Probes.

**CAUTION:** *The HEPS and LEPS probes are designed to measure bulk samples presented for analysis in plastic cups of at least 30 mm in diameter and 10 mm high. The probe should be handled and operated according to the instructions provided in the X-MET Operating Manual. The probe should be operated by a person trained on the use of the probe, or under the supervision of a trained person.*

#### ***Operation***

- Connect the probe to the X-MET analyzer (Note: If the probe is built into the analyzer, such as X-MET 820, it is already connected to the analyzer!).
- Turn on the analyzer and let it warm up for about 20 to 30 minutes.
- To perform the measurement place sample cup filled with the substance to be analyzed in the probe measuring tray and push the probe measuring tray to the back. Press the START button on the analyzer keyboard to initiate measurement. At the end of the measurement the analyzer will beep at which time this sequence should be repeated.
- Do not leave the probe unattended. Whenever not in use, the probe should be placed in secure location.

#### ***Storage***

- Whenever not in use, the probe should be disconnected from the X-MET unit (with the exception of the X-MET 820 analyzer).
- Probe (or instrument) should be stored in a cool, dry place. The access to the storage area should be controlled at all times.

### 3.3.2. DOPS and SAPS Probes.

**CAUTION:** *The DOPS or SAPS probe is designed to measure extended surfaces such as the surface of a soil or metal plate, or metal samples which are at least 30 mm in diameter and 1 mm thick. The probe should be handled and operated according to the instructions provided in the X-MET Operating Manual. The probe should be operated by a person trained on the use of the probe, or under the supervision of a trained person.*

### **Operation**

- Connect the probe to the X-MET analyzer.
- Turn on the analyzer and let it warm up for about 20 to 30 minutes.
- To perform the measurement, remove the lock from the probe trigger.
- Place the probe measuring window against the sample and only then pull the trigger to initiate the measurement. Hold the probe steady for the measurement time. At the end of the measurement the analyzer will beep at which time the trigger should be released. To measure another sample, place the probe on the new sample and repeat this sequence.
- Do not leave the probe unattended. Whenever not in use, the probe trigger should be secured with the lock provided.

*- DURING OPERATION, NEVER POINT THE PROBE IN THE DIRECTION OF ANOTHER PERSON OR AT YOURSELF. PULL THE TRIGGER ONLY AFTER THE PROBE IS POSITIONED AGAINST THE MEASURED SAMPLE.*

### **Storage**

- Whenever not in use, the probe trigger must be blocked with the lock provided with the probe.
- Probe should be stored in a cool, dry place. The access to the storage area should be controlled at all times.

### **3.3.3. SLPS Probe.**

**CAUTION:** *The SLPS probe is designed to measure extended surfaces such as the surface of a paper or metal plate, or metal samples which are at least 30 mm in diameter and 1 mm thick. The probe should be handled and operated according to the instructions provided in the X-MET Operating Manual. The probe should be operated by a person trained on the use of the probe, or under the supervision of a trained person.*

### **Operation**

- Connect the probe to the X-MET analyzer.
- Turn on the analyzer and let it warm up for about 20 to 30 minutes.
- To perform the measurement place the probe measuring window against the sample and push the probe flush with the measured surface. Press the START button on the analyzer keyboard to initiate measurement. Hold the probe steady for the measurement time. At the end of the measurement the analyzer will beep at which time the probe can be removed. To measure



another sample, place the probe on the new sample and repeat this sequence.

- Do not leave the probe unattended. Whenever not in use, the probe should be placed in secure location.

### ***Storage***

- Whenever not in use, the probe should be disconnected from the X-MET unit.
- Probe should be stored in a cool, dry place. The access to the storage area should be controlled at all times.

### **3.3.4. SUPS Probe.**

***CAUTION:*** The SUPS probe is designed to measure extended surfaces such as the surface of a paper or metal plate, or metal samples which are at least 30 mm in diameter and 1 mm thick. The probe should be handled and operated according to the instructions provided in the X-MET Operating Manual. The probe should be operated by a person trained on the use of the probe, or under the supervision of a trained person.

### ***Operation***

- Connect the probe to the X-MET analyzer.
- Turn on the analyzer and let it warm up for about 20 to 30 minutes.
- To perform the measurement place the probe measuring window against the sample and push the probe flush with the measured surface. Press the START button on the analyzer keyboard (or on the probe handle for the electro-mechanical SUPS) to initiate measurement. Hold the probe steady for the measurement time. At the end of the measurement the analyzer will beep at which time the probe can be removed. To measure another sample, place the probe on the new sample and repeat this sequence.
- Do not leave the probe unattended. Whenever not in use, the probe should be placed in secure location.

### ***Storage***

- Whenever not in use, the probe should be disconnected from the X-MET unit.
- Probe should be stored in a cool, dry place. The access to the storage area should be controlled at all times.

### 3.3.5. SSPS Probe

**CAUTION:** *The SSPS probe is designed to measure extended surfaces such as the surface of a soil or metal plate, or metal samples which are at least 30 mm in diameter and 1 mm thick. Alternatively, the probe can be used for measurement of bulk samples in cups, but only after a special probe shield is mounted over the probe measuring window. The probe should be handled and operated according to the instructions provided in the X-MET Operating Manual. The probe should be operated by a person trained on the use of the probe, or under the supervision of a trained person*

#### **Operation**

- Fill the probe dewar with nitrogen. Close the filling port with the plug provided.
- Connect the probe to the X-MET analyzer.
- Turn on the analyzer and let it warm up for about 20 to 30 minutes.

#### *Measurement of Extended Surfaces:*

- To perform the measurement, place the probe on the surface to be analyzed with the probe measuring window in direct contact with the measured surface, and push the red START button on the probe handle. Do not lift the probe or shift it during the measurement. Only after the measurement is completed may the probe be moved to another site for the next measurement. If there is a need to abort the measurement, press the green STOP button on the probe handle.

#### *Measurement of Bulk Samples:*

- Set the probe on a flat, level surface, with the measuring window facing up.
- Install the special, hinged shield over the probe measuring window.
- Place the sample cup (containing sampled material such as powder, liquid) on the probe measuring window and close the shield's hinged cover. Press the START button on the probe handle to initiate the measurement. Only after the measurement is finished, open the shield cover and remove the sample cup. To continue measurements place another sample cup on the probe, close the shield cover, and press the START button again. If there is a need to abort the measurement, press the green STOP button on the probe handle.
- Do not leave the probe unattended. Whenever not in use, the probe should be disconnected from the X-MET analyzer, and the plug in its filling port loosened.

**- DURING OPERATION, NEVER POINT THE PROBE IN THE DIRECTION OF ANOTHER PERSON OR AT YOURSELF. INITIATE THE MEASUREMENT ONLY AFTER THE PROBE IS POSITIONED AGAINST THE MEASURED SAMPLE OR THE PROBE SHIELD COVER IS CLOSED.**

#### **Storage**

- Whenever not in use, the probe should be disconnected from the X-MET unit, and the plug in its filling port loosened.
- Probe should be stored in a cool, dry place. The access to the storage area should be controlled at all times.

### **3.4. INSTRUCTIONS IN CASE OF DAMAGE TO THE PROBE**

#### **3.4.1. Test Shutter Mechanism**

If the probe is potentially damaged (for example, dropped or involved in a transportation accident), the user must – at the first available opportunity – assess the proper functioning of the shutter mechanism.

*CAUTION: If the probe is dropped during a measurement, it is possible that the shutter will not close properly. Never point a potentially damaged probe in the direction of another person or at yourself (e.g., body, hands, and face).*

Perform the shutter test procedure outlined in Section 3.2 of this manual.

*WARNING: Do not attempt to service the probe. Only Metorex Inc. is authorized by the USNRC to disassemble and service the probe.*

#### **3.4.2 Secure the damaged/failed probe.**

If the probe fails to work as indicated in the shutter test procedure, do the following:

- Place the end cap cover or a piece of lead or steel over the probe window;
- Secure the cover mechanically or with tape;
- Place the probe in a secure location with controlled access; and
- Make the appropriate notifications.

#### **3.4.3 Notifications in case of a damaged/failed probe**

The failure of the shutter mechanism(s) to operate properly reduces the radiation shielding properties of the probe. Therefore, the following entities must be notified:

- Metorex Inc.'s Service Department (1-609-406-9000).
- US Nuclear Regulatory Commission Regional Office (or state radiation control office for Agreement States).

### 3.5. INSTRUCTIONS FOR SHIPPING OF DEVICES CONTAINING RADIOACTIVE MATERIAL.

Due to the fact that the sources being shipped are in Special Form (49 CFR 173.401), the devices containing the sources can be classified with the proper shipping name “Radioactive Material, Excepted Package – Instruments.” This classification allows the shipper to be exempted from most of the packaging, labeling, marking and placarding requirements that would normally apply to a fully regulated radioactive material shipment. Although the material is excepted, in some cases, the devices may be considered a Hazardous Substance due to the presence of a Reportable Quantity of Americium-241 (49 CFR 171.8). Hazardous substance that are in exempt quantities as subject to a slightly higher degree of regulation than non-hazardous substances in exempt quantities. Below are guidelines for the proper shipment of radioactive materials in excepted packages, however, all applicable requirements of 49 CFR must still be met, including 49 CFR 173.424.

#### Guidelines for a Non-hazardous Substance, Radioactive Material, Excepted Packages (containing <sup>55</sup>Fe and/or <sup>109</sup>Cd only):

Proper Shipping Name:	Radioactive Material, Excepted Package - Instruments
Class:	7
UN #:	UN2910
Packaging:	Non-specification packaging that complies with 49 CFR 410 (i.e., a “strong-tight” container).
Marking/Labeling:	None required.
Mode:	Any
Paperwork:	No Shippers Declaration is required. However, at a minimum, there must be a paper in the box with the name of either the consignor or the consignee and the following statement: “This package conforms to the conditions and limitations specified in 49 CFR 173.424 for radioactive material, excepted package – instruments or articles, UN2910”.
Additional Information:	A copy of the special form certificate for each source and a copy of the leak test results should also be included.

#### Guidelines for a Hazardous Substance, Radioactive Material, Excepted Packages (containing <sup>241</sup>Am or <sup>244</sup>Cm):

<b>Proper Shipping Name:</b>	<b>RQ, Radioactive Material, Excepted Package - Instruments</b>
Class:	7
UN #:	UN2910
Packaging:	Non-specification packaging that complies with 49 CFR 410 (i.e., a “strong-tight” container).
Marking/Labeling:	None required.
Mode:	If shipping by air, then it must go by cargo aircraft only.
Paperwork:	A fully completed Shippers Declaration is required. It must include the following statement: “This package conforms to the conditions and limitations specified in 49 CFR 173.424 for radioactive material, excepted package – instruments or articles, UN2910”. It also must include a 24-hour emergency telephone number.
Additional Information:	<ul style="list-style-type: none"> <li>◆ Must include emergency response information (e.g., a copy of an ERG)</li> <li>◆ Should include a copy of the special form certificate for each source</li> <li>◆ Should include a copy of the leak test results (no older than 6 months)</li> </ul>

### **3.6. TABLES OF TYPICAL DOSE RATES AROUND PROBES.**