



## TEXAS DEPARTMENT OF STATE HEALTH SERVICES

EDUARDO J. SANCHEZ, M.D., M.P.H.  
COMMISSIONER

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April 26, 2006

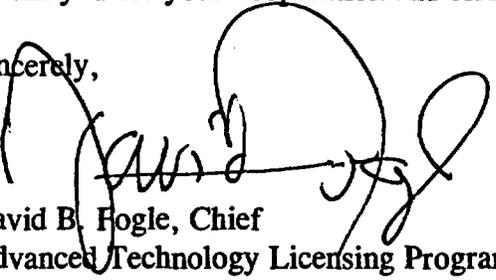
SOURCE CONTAINMENT AND DEVICES BRANCH  
OFFICE OF NUCLEAR MATERIAL SAFETY  
AND SAFEGUARDS  
U.S. NUCLEAR REGULATORY COMMISSION  
ATTN TRACI KIME  
DOCUMENT CONTROL DESK P1-37  
WASHINGTON DC 20555

Dear Ms. Kime:

Enclosed are the device sheets, TX-0634-D-113-B, TX-0634-D-128-B and TX-0634-D-147-B for Thermo MeasureTech Models 9256, 9254 and 9800 x-ray fluorescence analyzers. In accordance with a directive from the NRC, these device sheets have been amended in entirety to restrict the distribution of special nuclear material (Pu-238) to specific licensees only. We would appreciate you distributing copies of this sheet to the other State Programs and NRC Regions, as appropriate.

Thank you for your cooperation and efforts.

Sincerely,



David B. Fogle, Chief  
Advanced Technology Licensing Program  
Radioactive Material Licensing Group  
Radiation Safety Licensing Branch

Enclosures

41MSS12

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-147-B

DATE: April 24, 2006

PAGE 1 OF 5

DEVICE TYPE: X-ray Fluorescence Analyzer

MODEL: 9800 (INSCAN Assay System)

MANUFACTURER/DISTRIBUTOR:

Thermo MeasureTech  
(formerly TN Technologies)  
1410 Gillingham Lane  
Sugar Land, Texas 77478

SEALED SOURCE MODEL DESIGNATION:

Texas Nuclear Models  
1. 696782  
2. 57242B  
3. 696782  
4. 696280  
5. 696928  
6. 57242B

RADIONUCLIDE:

1. Cd-109
2. Pu-238
3. Fe-55
4. Am-241
5. I-125
6. Cm-244

MAXIMUM ACTIVITY:

1. 3 sources of 15 mCi (555 MBq) each
2. 3 sources of 100 mCi (3.7 GBq) each
3. 2 sources of 45 mCi (1.67 GBq) each
4. 2 sources of 10 mCi (370 MBq) each
5. 3 sources of 100 mCi (3.7 GBq) each
6. 1 source of 200 mCi (7.4 GBq)

LEAK TEST FREQUENCY:

6 months

PRINCIPAL USE:

(U) X-ray Fluorescence

CUSTOM DEVICE:

\_\_\_\_ YES  X  NO

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-147-B

DATE: April 24, 2006

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DEVICE TYPE: X-ray Fluorescence Analyzer

DESCRIPTION:

The INSCAN assay system is an energy dispersive X-ray fluorescence analyzer. At the top of the assembly is a ten liter dewar for the storage of liquid nitrogen to cool the detector. The dewar is mounted on top of a rectangular stainless steel base plate which is in turn mounted to a frame located over the process stream. From the bottom of the base plate there extends a probe consisting of a cryostat, a source-detector assembly and a shroud. The cryostat is an evacuated stainless steel tube with a copper thermal conductor located inside. At the bottom of the cryostat is the source-detector assembly. The in-stream analyzer employs a solid-state, lithium-drifted silicon (SiLi) detector. This type of detector provides extremely good energy resolution (less than 500 eV) and a reasonable detection efficiency. The SiLi detector must be cooled to liquid nitrogen temperature (77 degrees Kelvin) for proper operation. Mounted in front of the detector is the source holder assembly consisting of an annular brass piece drilled to receive three source capsules. The holes are angled to permit the sources to properly irradiate the sample area. The source holder will rotate through 30 degrees around the central axis of the detector, and an aperture plate located in front of the source holder serves as a radiation shutter. The source holder is held in the closed position by a spring. To emit radiation, the source holder is rotated to align the source axis with the holes in the aperture plate. A fixed annular assembly is mounted in front of the source shutter. This assembly is mounted on the end of the shroud and serves as the main housing for the detector and source holder assembly. The opening in the detector assembly is covered by two Mylar windows with O-ring seals. The Mylar of the internal window is 0.001 inch (0.25 mm) thick and the external Mylar window is 0.004 inch (0.10 mm) thick. A moisture detector is mounted between the two windows to detect when the external window is leaking.

The entire cryostat and source-detector assembly is surrounded by a tubular housing (shroud) seven inches (17.78 cm) in diameter and is constructed of 316 stainless steel. This housing protects the assembly from process fluids and provides space in which to mount a pre-amplifier, electrical connections, shutter actuator cable, etc.

LABELING:

The analyzer has a standard tag containing the company's name, trademark and symbol, and the model number, isotope, date of assay, the statement "CAUTION - RADIOACTIVE MATERIAL" and the statement "DO NOT REMOVE". The tag is stainless steel and the radiation symbol has the required colors. For those devices distributed to general licensees, another tag is added which specifies all details and conditions of the general license and requirements as set out in Title 25 Texas Administrative Code (TAC) Chapter 289.252(l)(C). These tags are manufactured using a second surface printed polyester laminated with pressure sensitive adhesive.

DIAGRAM:

See Attachment.

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-147-B

DATE: April 24, 2006

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DEVICE TYPE: X-ray Fluorescence Analyzer

CONDITIONS OF NORMAL USE:

The INSCAN probe is an in-stream element analyzer. Such systems may use any of several different types of excitation sources (X-ray tubes, isotopes, or isotopes and secondary targets). The choice of source will depend upon the elements to be measured, desired efficiency of detection, economy of fabrication and upkeep, and required resolution of the various fluorescent X-ray energies. In-stream analyzers find greatest use in the ore processing industries. Typical users include processors of copper, lead, zinc, molybdenum and uranium ores. Analyzers may be placed in the feed, concentrate, or tail portions of the process and multiple probe systems are often required.

The phrase "in-stream" indicates that the detector assembly of the element analyzer is placed directly in an industrial process stream. The process stream is a liquid with high solids content, known as a carrier fluid. The solids are mineral ores ground to a relatively small particle size. The slurry is handled in troughs, tanks, or chambers and may be pumped through these or stirred as the manufacturing process progresses. The measuring device is placed at a point in the process at which the process operators wish to monitor element concentration in the slurry. The dynamic characteristics of the slurry, such as element and material segregation, material suspension, or solids content make it desirable to measure element concentration directly in the process in order to obtain representative sampling.

Using the principles of X-ray fluorescence, signals from the probe are transmitted to a remote data processor (a computer base data acquisition system). The various indications may be used to effect manual or automatic changes in the process.

PROTOTYPE TESTING:

Prototypes of this instrument have been tested by field installation for six years in very rugged minerals beneficiation applications. During this time there were no ruptured windows during use of the device, no incidents involving radioactive material and no problems with shutter failure. Research and development testing will continue as these devices are distributed.

EXTERNAL RADIATION LEVELS:

Radiation levels are insignificant. During use, this instrument is immersed into a slurry and there are no radiation levels of concern. The only time radiation levels would be of concern would be if the probe is removed from the slurry for some reason. A combination of the shutter mechanism and the size of the device makes it unlikely that the instrument would be outside the slurry loop for any time with the shutter open. The user has two clear indications, mechanical and electrical, of the shutter position. Assuming the worst case of the probe outside the slurry with the shutter open, the radiation levels at any point will not exceed 60 mR/hr (600  $\mu$ Sv) at one foot (30.48 cm) with a maximum source load. The neutron dose (< 1.0 mRem/hr or 10  $\mu$ Sv/hr) from Pu-238 and Cm-244 does not contribute significantly at this distance, however.

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-147-B

DATE: April 24, 2006

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DEVICE TYPE: X-ray Fluorescence Analyzer

QUALITY ASSURANCE AND CONTROL:

Construction of this device follows established quality principles and the existing quality assurance program of the manufacturer. The prototypes are being tested in the field under operating conditions to ensure their integrity. The maximum physical stress to which they would be subjected are those during shipping and installation. The unit has been evaluated to withstand those conditions.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- This device may be distributed to either generally or specifically licensed persons. **Devices containing Pu-238 may be distributed as specifically licensed devices only.**
- A six-month leak test interval has been granted.
- The device is designed and supplied with sufficient information for an individual to unpack and safely mount both the source head and detector following the manufacturer's instructions. Initial radiation survey and leak testing should be done by someone specifically authorized to do so.
- All applicable services are provided by the manufacturer including training. However, training beyond that routinely provided by the manufacturer during installation is not necessary to safely possess and use this device in the manner intended.
- A single unit may have multiple source head assemblies. Certain applications may require a combination of isotopes in a single source head assembly. This may be allowed with a maximum of six sources per source head assembly. Also, certain applications require only one I-125 source. This is also allowed.
- Routine cleaning of windows, reference calibration, replacement of liquid nitrogen, servicing electronics, replacement of O-rings, gaskets and windows, and moving the unit from process vessel to process vessel are actions that any licensee may perform safely without additional training.
- Physical damage or risk of physical damage or suspicion of chemical attack to the sources should be reported to the manufacturer.
- Some replacement or repair to the detector pre-amplifiers, certain seals, gaskets, etc. require access to the area within the probe housing. The probe housing can be safely removed by all users for this level of repair by simply removing the probe from the slurry, closing the shutter and moving the probe assembly to a clean environment.
- Periodic replacement of the radioactive sources may be required due to half-life considerations. This source replacement must be performed by the manufacturer or other persons specifically authorized for this service. A specific licensee with sufficient training and radiation detection instrumentation, following the manufacturer's procedures could safely receive the source replacement assembly and proceed to remove the old source assembly, install the new source assembly and transfer the old source assembly to the manufacturer or other persons specifically authorized to receive sources for disposal. Source replacement should require survey and leak testing authorizations.

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

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DEVICE TYPE: X-ray Fluorescence Analyzer

SAFETY ANALYSIS SUMMARY:

Sources are protected from the abrasiveness of the slurry and significant Ph differences by Mylar windows, O-ring seals and moisture sensors and indicators. If a leak occurs, the moisture indicators warn the operator to remove the system from the slurry loop before moisture or slurry could get through the inner window or to the sources. The likelihood of damage by fire is remote due to the location of the instrument package in process areas that do not contain anything flammable.

An evaluation of source replacement has indicated that in the worst case the extremity exposures have been less than 20 mRem (200  $\mu$ Sv) /exchange to the hand area. The entire source assembly is replaced in a single action and at no time are the sources themselves either uncovered or unshielded.

REFERENCES:

The following supporting documents for Model 9800 from Thermo MeasureTech (TN Technologies) are hereby incorporated by reference and are made a part of this registry document.

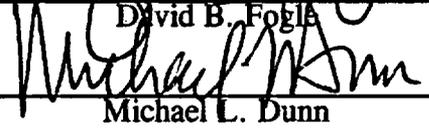
- letter dated May 6, 1983, and all associated drawings, documents and procedures,
- letter dated May 19, 1986, and all associated drawings, documents and procedures,
- letter dated March 22, 1989, and all associated drawings, documents and procedures, and
- letter dated January 13, 2006, and all associated documents.

ISSUING AGENCY: Texas Department of State Health Services  
Radiation Safety Licensing Branch

Date: April 24, 2006

Reviewer:   
David B. Fogle

Date: April 24, 2006

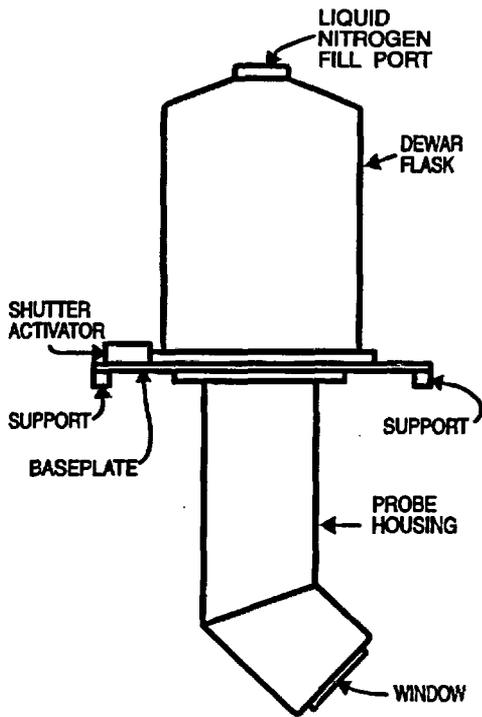
Concurrence:   
Michael L. Dunn

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

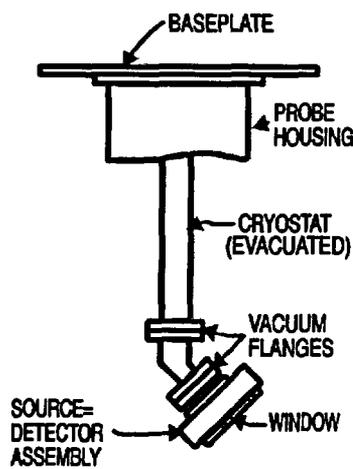
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DATE: April 24, 2006

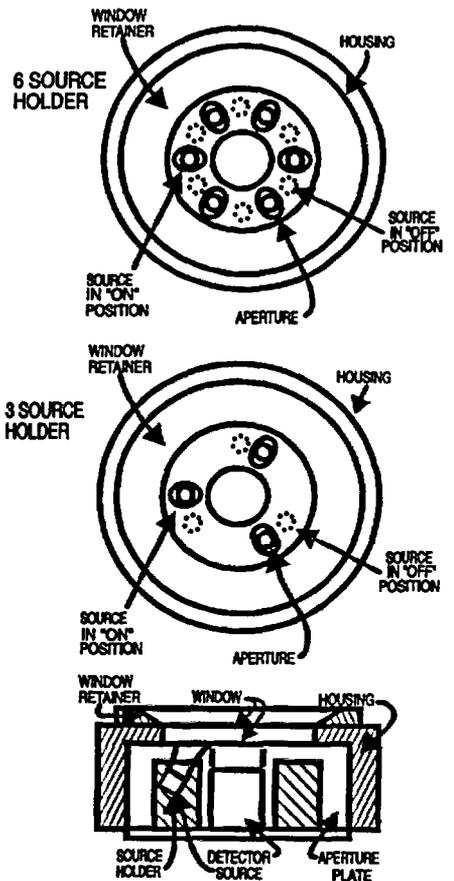
ATTACHMENT



SIDE VIEW OF PROBE



STRUCTURE VIEW WITHIN PROBE HOUSING



SOURCE-DETECTOR DETAIL

**IN-STREAM PROBE -- GENERAL ARRANGEMENT**

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-128-B

DATE: April 24, 2006

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DEVICE TYPE: X-ray Fluorescence Analyzer

MODEL: 9254 (source housing for 9200 series analyzer)

MANUFACTURER/DISTRIBUTOR: Thermo MeasureTech  
(formerly TN Technologies)  
1410 Gillingham Lane  
Sugar Land, Texas 77478

SEALED SOURCE MODEL DESIGNATION: See Table 1

RADIONUCLIDE:

See Table 1

MAXIMUM ACTIVITY:

See Table 1

LEAK TEST FREQUENCY:

6 Months

PRINCIPAL USE:

(U) X-Ray Fluorescence

CUSTOM DEVICE:

\_\_\_\_\_ YES  X  NO

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-128-B

DATE: April 24, 2006

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DEVICE TYPE: X-ray Fluorescence Analyzer

DESCRIPTION: The 9200 Series X-ray Fluorescence Analyzer is of the same basic design and has the same function as its prototype, the Model 465. The principal difference lies in the electronics and the design of the source housing. The analyzer consists of two units; the probe, which can be hand-held and contains a radioactive source, two filters, and a detector; and the electronic unit, which contains the power supply and output display.

The instrument is designed for "rapid, nondestructive, in-situ elemental analysis in mining, geology, metallurgy, engineering and process control." A radionuclide is used to excite characteristic x-rays in the sample. The radiation from the sample is detected with a NaI (TI) scintillation counter. Coarse energy discrimination is afforded by the detector and a single channel pulse height analyzer. Individual characteristic x-rays are isolated using balanced x-ray filters in the form of thin foils placed over the detector window. By adjustment of the thickness of the filters, x-ray transmissions can be made equal over a wide range of energies, except for the pass band between their absorption edges, where the transmission will differ greatly.

In operation as a hand-held unit, the probe is pressed against the sample. One of the "feet" on the probe is automatically depressed and this causes the source shutter to open and expose the source to the sample. As soon as the probe and sample are separated, the shutter springs back to cover the source. A second mode of operation is as a bench-mounted instrument, when small samples are placed over the aperture. In this mode, the shutter is actuated when the sample is covered by a cap which depresses the "feet."

All sources are low-energy gamma or x-ray emitters and are encapsulated in a stainless steel cup so that the radiation is emitted in only one direction. For sources with an emission greater than 5 KeV, the window is covered with 0.012 inches (0.3 mm) stainless steel and the source is usually bound in the form of a ceramic enamel. For lower energy sources a 0.005 inches (0.125 mm) aluminum window is necessary. The radioactive material is deposited as a ceramic layer.

Some versions may contain a one-half microcurie (18.5 kBq) americium-241 source in the probe head located between the photo-multiplier tube and the NaI (TI) crystal. The 60 KeV gamma rays from the americium-241 provide a means of stabilizing the electronic gain for measurements where high sensitivity is required. The source is contained in a silver matrix (Amersham/Searle AMM.4 foil) and is hermetically sealed in the light pipe of the probe head. Versions that contain this source have a standard radiation symbol and label on the probe head indicating the 0.5 microcurie (18.5 kBq) americium source. Leak testing this source is not required.

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DEVICE TYPE: X-ray Fluorescence Analyzer

DESCRIPTION (Cont'd.):

Radioactive Material	Maximum Activity Ci	TABLE 1		Source Models	
		Maximum Activity Bq	Amersham/Searle	Tex. Nucl. Dwg. No.	
Am-241	10 mCi	340 MBq	AMC	696-696782 or 696-696280	
Cd-109	5 mCi	185 MBq	CUC	696-696782 or 570-057371B	
Cd-109	10 mCi	340 MBq	CUC	570-57242B	
Co-57	5 mCi	185 MBq	CTC	696-696280	
Fe-55	50 mCi	1850 MBq	IEC	696-696782	
Gd-153	5 mCi	185 MBq	GDC	696-696280	
H-3/Zr	4.5 Ci	166.5 GBq	TRX		
Pm-147/Al	2 Ci	74 GBq	PHX		
Pu-238	30 mCi	1110 MBq	PPC		
Pu-238	50 mCi	1850 MBq	PPC-X	570-57242B	
Cm-244	30 mCi	1110 MBq		696-696782	
Cm-244	50 mCi	1850 MBq		570-57242B	

The Model 9254 may contain any of the above sources and two filters. The Am-241 stabilization source will be included as needed.

**LABELING:** In addition to the conventional radiation symbol and "CAUTION-RADIOACTIVE MATERIAL" on the probe head, the source holder in the probe head is scribed with the isotope, the activity, and assay date. Also, the same information is placed on a tag on the outside of the source housing. If an additional source is supplied with the device, the source holder and the container in which it is stored will also be labeled. The source will always be supplied in its holder, since each type of source requires its own type of filters which come with the source holder. For devices distributed to general licensees, an additional tag is added which details the requirements and conditions of the general license.

**DIAGRAM:** See Attachment.

**CONDITIONS OF NORMAL USE:** The 9200 series x-ray fluorescence analyzer is designed to operate in the laboratory environment or in the field. This equates to use with a human present and at ambient temperatures and pressures. If this device were involved in a fire or explosion, it would most certainly be destroyed.

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
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DEVICE TYPE: X-ray Fluorescence Analyzer

PROTOTYPE TESTING: As stated previously, the 9200 series analyzer has the same basic design and function as its prototype, the Model 465. The design of the source housing and changes in the electronics of the Model 465 produced the 9200 series analyzer. These design change did not affect the radiological safety design of the original instrument.

EXTERNAL RADIATION LEVELS: The radiation levels about the device are negligible.

QUALITY ASSURANCE AND CONTROL: Strict adherence to original design specifications and close inspection and testing of each completed device are required by the manufacturer's procedures. Any deviation below those specifications or inadequate performance during testing will cause the device to be rejected.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- If the radioactive source decays below a useful activity, the licensee (specific only) may replace the source by following instructions provided by the manufacturer. This should be specifically authorized on the license. The device source holder may also be returned to the manufacturer for source replacement.
- Leak tests performed at six month intervals should be analyzed by the device manufacturer or other leak test service with liquid scintillation counting capability, necessary to detect the low energy radiations emitted by most of the sources used in this device. Normal leak test sample counting equipment will not be adequate for many of the sources authorized. The manufacturer will provide a leak test kit (Model QT/2S) and instructions for its use.
- The manufacturer will provide all servicing required. It is recommended that the manufacturer provide all servicing except source exchange and performance of leak tests.
- Specific radiation safety training is not necessary to operate this instrument. An instruction manual with a section devoted to radiation safety is provided with each device.
- This device may be distributed to either generally or specifically licensed persons. Devices containing Pu-238 may be distributed as specifically licensed devices only. The Am-241 stabilization source may be included with any of the above named sources.

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
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NO.: TX-0634-D-128-B

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DEVICE TYPE: X-ray Fluorescence Analyzer

REFERENCES: The following supporting documents for Model 9254 from Thermo MeasureTech (TN Technologies) are hereby incorporated by reference and are made a part of this registry document.

- Letter dated June 10, 1969 and all associated drawings, documents and procedures,
- Letter dated July 30, 1970 and all associated drawings, documents and procedures,
- Letter dated February 7, 1972 and all associated drawings, documents and procedures,
- Letter dated December 4, 1973 and all associated drawings, documents and procedures,
- Letter dated July 30, 1974 and all associated drawings, documents and procedures,
- Letter dated May 7, 1975 and all associated drawings, documents and procedures,
- Letter dated April 28, 1978 and all associated drawings, documents and procedures,
- Letter dated May 23, 1978 and all associated drawings, documents and procedures,
- Letter February 17, 1987 dated and all associated drawings, documents and procedures,
- Letter April 28, 1987 dated and all associated drawings, documents and procedures,
- Letter dated and all associated drawings, documents and procedures, and
- Letter dated January 13, 2006 and associated documents.

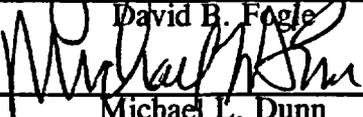
ISSUING AGENCY: Texas Department of State Health Services  
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Reviewer:   
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David B. Fogle

Date: April 24, 2006

Concurrence:   
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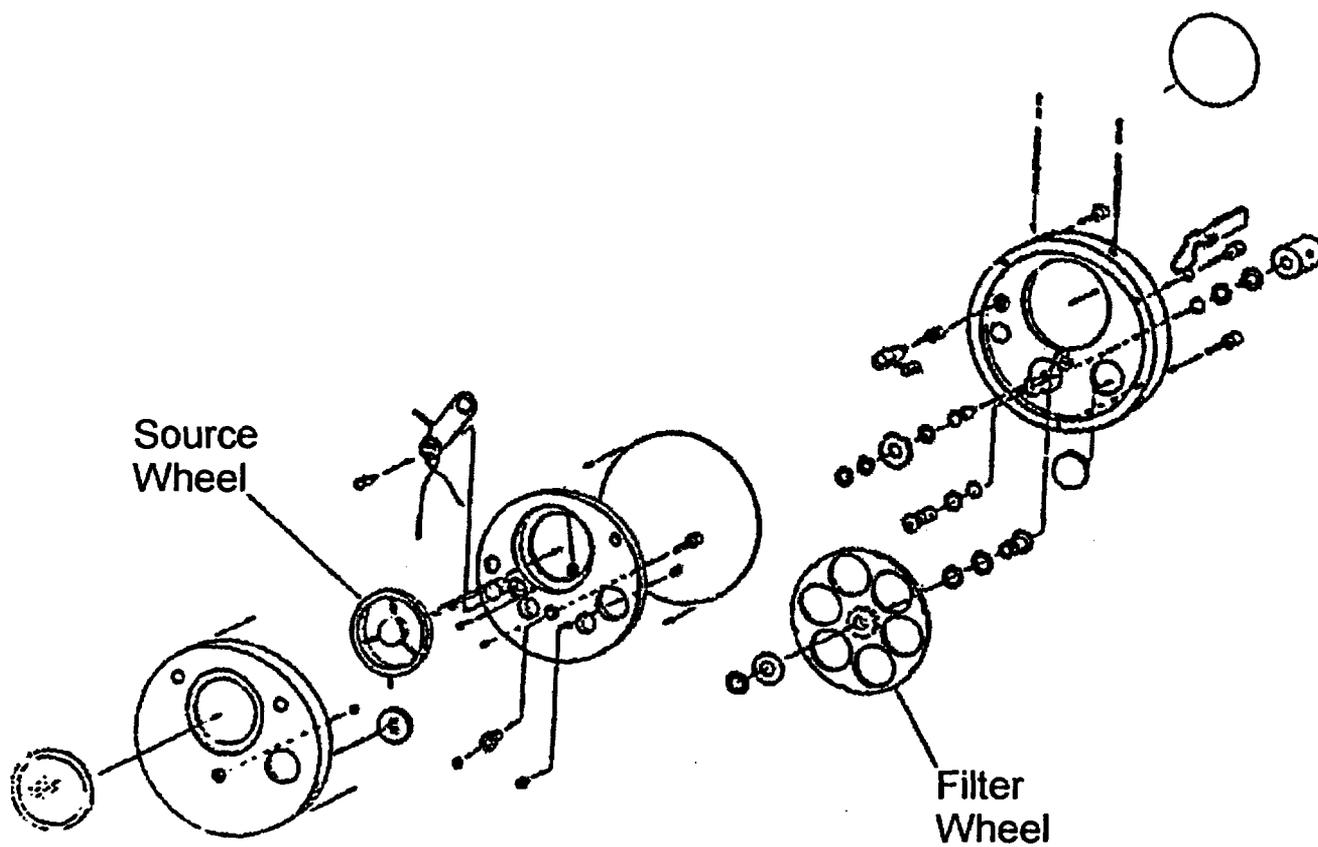
Michael L. Dunn

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
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(AMENDED IN ITS ENTIRETY)**

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ATTACHMENT



**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-113-B

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DEVICE TYPE: X-ray Fluorescence Analyzer

MODEL: 9256 (source housing for 9200 series analyzer)

MANUFACTURER/DISTRIBUTOR: Thermo MeasureTech  
(formerly TN Technologies)  
1410 Gillingham Lane  
Sugar Land, Texas 77478

SEALED SOURCE MODEL DESIGNATION: See Table 1

RADIONUCLIDE:

See Table 1

MAXIMUM ACTIVITY:

See Table 1

LEAK TEST FREQUENCY:

6 Months

PRINCIPAL USE:

(U) X-Ray Fluorescence

CUSTOM DEVICE:

\_\_\_\_\_ YES  NO

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
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NO.: TX-0634-D-113-B

DATE: April 24, 2006

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DEVICE TYPE: X-ray Fluorescence Analyzer

DESCRIPTION: The 9200 Series X-ray Fluorescence Analyzer is of the same basic design and has the same function as its prototype, the Model 465. The principal difference lies in the electronics and the design of the source housing. The analyzer consists of two units; the probe, which can be hand-held and contains a radioactive source, two filters, and a detector; and the electronic unit, which contains the power supply and output display.

The instrument is designed for "rapid, nondestructive, in-situ elemental analysis in mining, geology, metallurgy, engineering and process control." A radionuclide is used to excite characteristic x-rays in the sample. The radiation from the sample is detected with a NaI(Tl) scintillation counter. Coarse energy discrimination is afforded by the detector and a single channel pulse height analyzer. Individual characteristic x-rays are isolated using balanced x-ray filters in the form of thin foils placed over the detector window. By adjustment of the thickness of the filters, x-ray transmissions can be made equal over a wide range of energies, except for the pass band between their absorption edges, where the transmission will differ greatly.

In operation as a hand-held unit, the probe is pressed against the sample. One of the "feet" on the probe is automatically depressed and this causes the source shutter to open and expose the source to the sample. As soon as the probe and sample are separated, the shutter springs back to cover the source. A second mode of operation is as a bench-mounted instrument, when small samples are placed over the aperture. In this mode, the shutter is actuated when the sample is covered by a cap which depresses the "feet".

All sources are low-energy gamma or x-ray emitters and are encapsulated in a stainless steel cup so that the radiation is emitted in only one direction. For sources with an emission greater than 5 KeV, the window is covered with **0.012 inches (0.3 mm)** stainless steel and the source is usually bound in the form of a ceramic enamel. For lower energy sources a **0.005 inches (0.125 mm)** aluminum window is necessary. The radioactive material is deposited as a ceramic layer.

Some versions may contain a one-half microcurie (**18.5 kBq**) americium-241 source in the probe head located between the photo-multiplier tube and the NaI (Tl) crystal. The 60 KeV gamma rays from the americium-241 provide a means of stabilizing the electronic gain for measurements where high sensitivity is required. The source is contained in a silver matrix.

The Amersham/Searle Model AMM.4 foil is hermetically sealed in the light pipe of the probe head. Versions that contain this source have a standard radiation symbol and label on the probe head indicating the 0.5 microcurie (**18.5 kBq**) americium-241 source. Leak testing this source is not required.

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
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(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-113-B

DATE: April 24, 2006

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DEVICE TYPE: X-ray Fluorescence Analyzer

TABLE 1

Radionuclide	Maximum Activity (Ci)	Maximum Activity (Bq)	Source Models	
Am-241	10 mCi	340 MBq	Amersham/Searle AMC	Texas Nuclear Dwg. No. 696-696782 or 696-696280
Cd-109	5 mCi	185 MBq	CUC	696-696782 or 570-57371B
Cd-109	10 mCi	340 MBq	CUC	570-57242B
Co-57	5 mCi	185 MBq	CTC	696-696280
Fe-55	50 mCi	1850 MBq	IEC	696-696782
Gd-153	5 mCi	185 MBq	GDC	696-696280
H-3/Zr	4.5 Ci	166.5 GBq	TRX	
Pm-147/Al	2.0 Ci	74 GBq	PHX	
Pu-238	30 mCi	1110 MBq	PPC	570-57242B
Pu-238	50 mCi	1850 MBq	PPC-X	570-57242B
Cm-244	30 mCi	1110 MBq		696-696782
Cm-244	50 mCi	1850 MBq		570-57242B

The Model 9256 may contain any of the above sources and six filters. The Am-241 may be included as it is needed. The Model 9256 also has a larger diameter to accommodate the larger filter tray.

**LABELING:** In addition to the conventional radiation symbol and "CAUTION-RADIOACTIVE MATERIAL" on the probe head, the source holder in the probe head is scribed with the isotope, the activity, and assay date. Also, the same information is placed on a tag on the outside of the source housing. If an additional source is supplied with the device, the source holder and the container in which it is stored will also be labeled. The source will always be supplied in its holder, since each type of source requires its own type of filters which come with the source holder. For devices distributed as generally licensed, an additional tag is added which details the requirements and conditions of the general license.

**DIAGRAM:** See Attachment.

**CONDITIONS OF NORMAL USE:** The 9200 series x-ray fluorescence analyzer is designed to operate in the laboratory environment or in the field. This equates to use with a human present and at ambient temperatures and pressures. If this device were involved in a fire or explosion, it would most certainly be destroyed.

**PROTOTYPE TESTING:** As stated previously, the 9200 series analyzer has the same basic design and function as its prototype, the Model 465. The design of the source housing and changes in the electronics of the Model 465 produced the 9200 series analyzer. These design changes did not affect the radiological safety design of the original instrument.

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-113-B

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DEVICE TYPE: X-ray Fluorescence Analyzer

EXTERNAL RADIATION LEVELS: The radiation levels about the device are negligible.

QUALITY ASSURANCE AND CONTROL: Strict adherence to original design specifications and close inspection and testing of each completed device are required by the manufacturer's procedures. Any deviation below those specifications or inadequate performance during testing will cause the device to be rejected.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- If the radioactive source decays below a useful activity, the licensee (specific only) may replace the source by following instructions provided by the manufacturer. This should be specifically authorized on the license. The device source holder may also be returned to the manufacturer for source replacement
- Leak tests performed at six month intervals should be analyzed by the device manufacturer or other leak test service with liquid scintillation counting capability, necessary to detect the low energy radiations emitted by most of the sources used in this device. Normal leak test sample counting equipment will not be adequate for many of the sources authorized. The manufacturer will provide a leak test kit (Model QT/2S) and instructions for its use.
- The manufacturer will provide all servicing required. It is recommended that the manufacturer provide all servicing except source exchange and performance of leak tests.
- Specific radiation safety training is not necessary to operate this instrument. An instruction manual with a section devoted to radiation safety is provided with each device.
- **This device may be distributed to either generally or specifically licensed persons. Devices containing Pu-238 may be distributed as specifically licensed devices only. The Am-241 stabilization source may be included with any of the above named sources.**

REFERENCES:

The following supporting documents for the Model 9256 from Thermo MeasureTech (TN Technologies) are hereby incorporated by reference and are made a part of this registry document.

- Letter dated June 10, 1969 and associated drawings, documents and procedures,
- Letter dated July 30, 1970 and associated drawings, documents and procedures,
- Letter dated February 7, 1972 and associated drawings, documents and procedures,
- Letter dated December 4, 1973 and associated drawings, documents and procedures,
- Letter dated July 30, 1974 and associated drawings, documents and procedures,
- Letter dated May 7, 1975 and associated drawings, documents and procedures,
- Letter dated April 28, 1978 and associated drawings, documents and procedures,
- Letter dated May 23, 1978 and associated drawings, documents and procedures.,
- Letter dated February 17, 1987 and associated drawings, documents and procedures,
- Letter dated April 28, 1987 and associated drawings, documents and procedures, and
- Letter dated January 13, 2006 and associated documents.

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-113-B

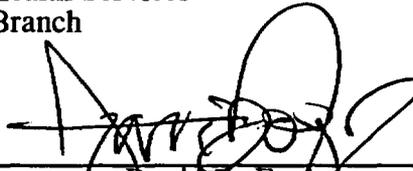
DATE: April 24, 2006

PAGE 5 OF 5

DEVICE TYPE: X-ray Fluorescence Analyzer

ISSUING AGENCY: Texas Department of State Health Services  
Radiation Safety Licensing Branch

Date: April 24, 2006

Reviewer:   
\_\_\_\_\_  
David B. Fogle

Date: April 24, 2006

Concurrence:   
\_\_\_\_\_  
Mike L. Dunn

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES**  
**SAFETY EVALUATION OF DEVICE**  
**(AMENDED IN ITS ENTIRETY)**

NO.: TX-0634-D-113-B

DATE: April 24, 2006

ATTACHMENT

