

**Met One Instruments**  
1600 Washington Blvd.  
Grants Pass, OR 97526  
Tel. 541 471 7111  
Fax 541 471 7116

***FAX***  
***TRANSMITTAL***

**To: Mr. Bhachu**  
**U.S. Nuclear Regulatory Commission**  
**Date: 2/7/02 No. pages 13**  
**Fax 301 415 5369**

**From: Ron Siebert      rsiebert@metone.com**

**----- Message -----**

Mr. Bhachu,

This fax and the attachments within address the issues your office has regarding the Met One Instruments registration request for the model E-BAM beta attenuation mass monitor.

Issue #1:

The Met One Instruments E-BAM is designed to be operated, and should only be operated, in the temperature range of -30 to 40 Degrees C. This is a limiting condition.

Issue #2:

The drawing for the O-Ring, Part# 720202 has been added to the Appendix A (Detailed Drawings) of the application. The O-Ring drawing calls out the material and characteristics of the O-Ring. Furthermore, page 2 of the Assembly procedure in Appendix C of the application has been modified to include step 3 and 4. These steps prevents over tightening and hold the source securely in place.

**Issue #3:**

Met One Instruments recommends to its customers that whenever the E-BAM is to be installed at a height greater than 3 meters that it should be securely bolted in place. This is now reflected in 2.2.7, Page 4 "Likely Accident Conditions" of this application, and page 6 of the E\_BAM Operation Manual in Appendix F of the application.

**Issue #4:**

Section 2.3.1.2, Page 6 (Safety Features) of the application has been modified to further define "is somewhat accessible". The slot between the source holder and the detector is only .1 " and this gap is small enough to prevent even a finger to be inserted, thus preventing exposure.

**Issue #5:**

An assembly drawing of the important containment parts has been added to Appendix A (Detailed Drawings) of the application. Overall dimensions are included.

**Issue #6:**

The Met One Instruments Radiation Safety Program has been modified to include 100% leak testing of the product before distribution.

**Issue #7:**

The reference to 10 CFR 20.205 in the Met One Instruments Radiation Safety Program has been changed to 10 CFR 20.1906 to reflect the latest regulation.

**Issue #9:**

The label dimensions have been added to the drawing in Appendix D of the application.

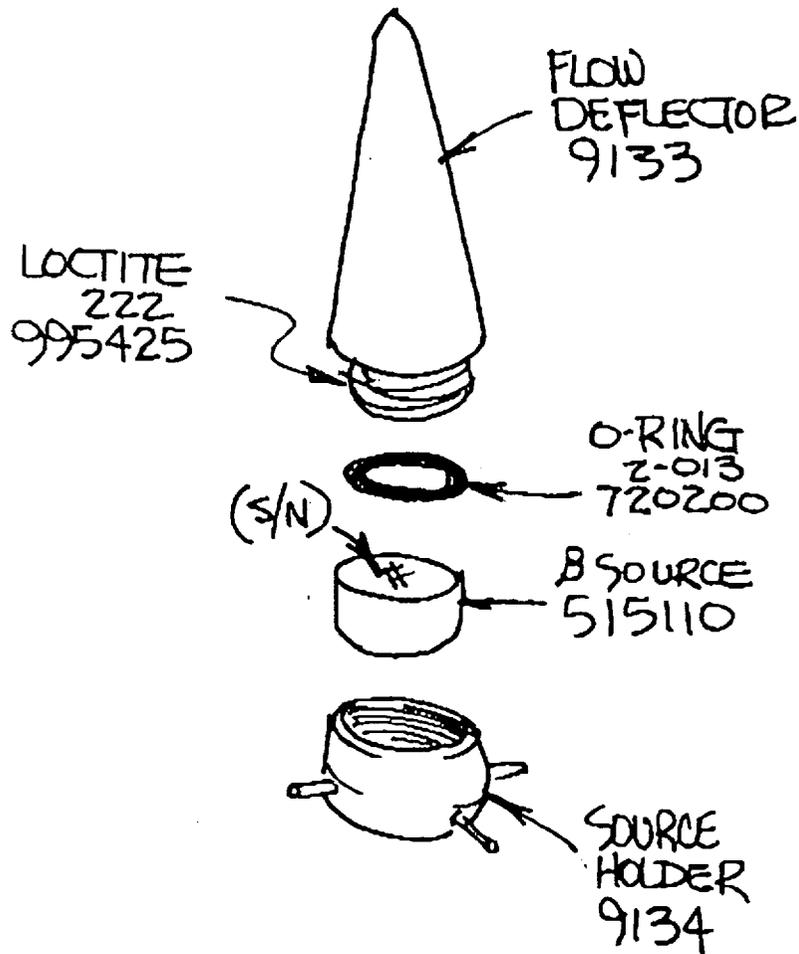
The last two statements in Table 1, page 9 of Attachment 2 have been deleted because they are not applicable. In 2.4 Labeling (section 10.4), page 8, of the application, "Met One Instruments will place the appropriate labels on the E-BAM before shipping according to 10 CFR 32.29", has been added. The label is attached with rivets. Page 10, Section 2.43 has been changed to reflect this.

Issue #10:

The statement on page 3 of Attachment 2 has been changed to show that Tom Pottberg is not acting in private capacity, rather he is acting as the president of the cooperation. And in that capacity, he is authorized to make binding commitments and to sign official documents on behalf of Met One Instruments.

Issue #11:

An amendment is being made to our Oregon License No. ORE-90941 to reflect a maximum activity of 75 microcuries. I should have verbal confirmation of this by tomorrow and a hard copy within a week. Our contact at the Oregon Dept of Health is Terry Lindsey 503 731 4014, X660.

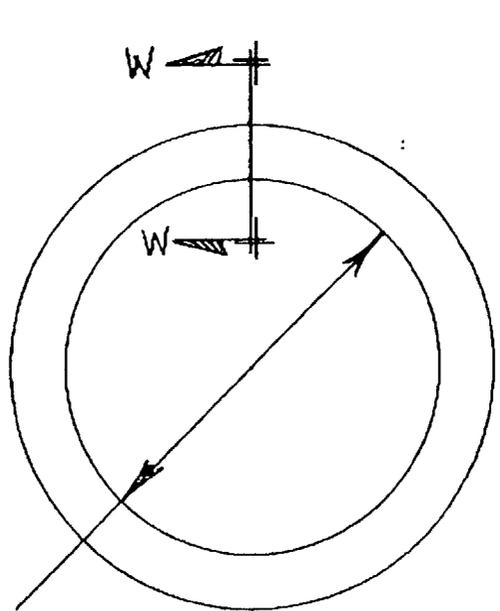


### Beta Holder Assembly

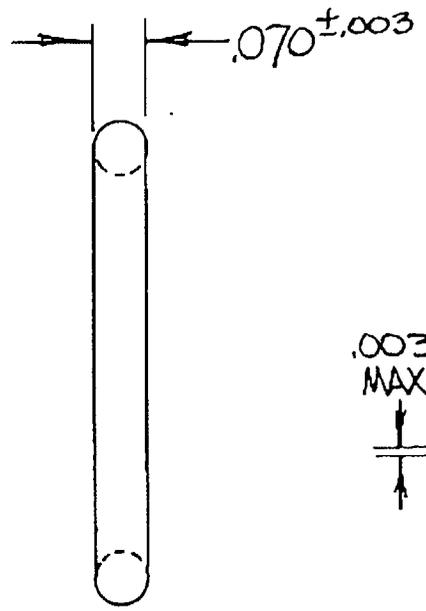
NOTE: See Standard Operating Procedure 175 for all radioactive source handling and safety requirements.

- ISSUE #2 <
- STEP 1 Place BETA SOURCE (515110) into SOURCE HOLDER (9134) with source serial number label UP.
  - STEP 2 Place O-RING (720200) upon source. (This o-ring is used to prevent any source movement in assembly.)
  - STEP 3 Apply LOCTITE 222 (995425) to threads of FLOW DEFLECTOR (9133).
  - STEP 4 Thread FLOW DEFLECTOR onto SOURCE HOLDER. Finger tighten FLOW DEFLECTOR until it is seated against SOURCE HOLDER. Do not tighten beyond part contact.

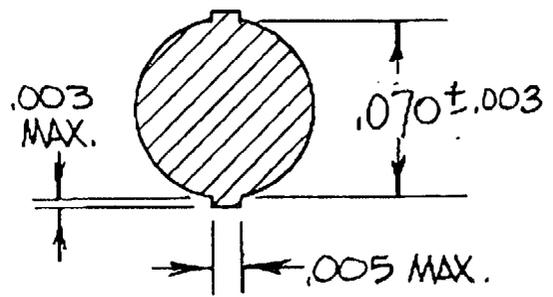
REV.	DESCRIPTION	DATE	BY
A	RELEASE	4 FEB 02	LDW



4.26 ± .005  
I.D.



SECTION W-W



NOTES:

- 1.) MATERIAL - NITRILE (BUNA N)  
DUROMETER 70 ± 5 SHORE A
- 2.) MFR/PN - PARKER 2-013-N674-70  
(SIZE PER AS568A-013)

Issue # 2

TOLERANCES (EXCEPT AS NOTED)			MET ONE INSTRUMENTS, INC. GRANTS PASS, OREGON	
DECIMAL		E-BAM	O-RING, 2-013	
FRACTIONAL		MATERIAL NOTED	DRAWN BY LDW	DATE 4 FEB '02
ANGULAR		FINISH CLEAN & DRY	DATE 5 Feb '02	SCALE NONE
			DATE 5 Feb '02	DRAWING NUMBER 720200
				REV. A

### 2.2.3 Locations of Use

The Model E-BAM would typically be installed near the ambient aerosol that is to be monitored. It is also possible that the Model E-BAM would be installed inside of an environmentally controlled structure or a custom built shelter.

### 2.2.4 Occasions of Use

The Model E-BAM is typically installed and operated on a continuous basis. Once it is installed, it is usually operated without any attendants present. The device is self-calibrating and typically needs brief service only once every two months.

### 2.2.5 Possibility of Use as a Component in Another Device

It is possible that the E-BAM could be installed inside of a transportable trailer for use in air quality studies. There are no other practical uses for the Model E-BAM as part of another device.

### 2.2.6 Likely Environments for Use

The Model E-BAM is designed to operate near the ambient aerosol that is to be sampled. The Model E-BAM is contained in a weatherproof enclosure and can operate over a temperatures range of -30 °C to 40°C.

The vast majority of locations in which the Model E-BAM would be installed would be stationary air quality monitoring sites. These sites are typically operated by state and local air quality monitoring districts and are usually unattended.

### 2.2.7 Likely Accident Conditions

The most likely accident condition would be dropping the Model E-BAM while it is being installed or transported for service. Under normal service the Model E-BAM would never be subjected to extreme conditions of corrosion, vibration, impact, puncture, compressive loads, explosion, flooding, excessive high or low temperatures, thermal cycling or significant cycling on or off. When the E-BAM is to be installed at a height greater than 3 meters it is recommended that it be securely bolted in place. The Model E-BAM is designed to monitor poor air quality and as such is constructed of materials that should allow it to operate for more than 10 years.

Issue  
#3

## 2.2 Selecting the Sampling Site

Assemble the E-BAM in the area where the aerosol is to be sampled. The most desirable height for TSP and PM10 monitoring is near the breathing zone. However, practical considerations such as prevention of vandalism, security, accessibility, availability of electricity, etc., generally require the sampler to be elevated. Therefore, a range of acceptable heights will need to be used. In addition, the type of source, i.e., elevated or ground level, predominantly influencing the area of impact must be considered when locating the monitor. For purposes of determining elevated source impact, the sample air intake must be located 2-15 meters above ground level. For ground level sources with steep vertical concentration gradients, the air intake must be as close to the breathing zone as practical.

Spacing from Obstructions If the sample is located on a roof or other structure then there must be a minimum of 2 meters separation from walls, parapets, penthouses, etc. Trees provide surfaces for particulate deposition and also restrict airflow. Therefore the sampler should be placed at least 20 meters from the drip line of trees and must be 10 meters from the drip line when trees act as an obstruction.

Obstacles such as buildings must be also avoided so that the distance between obstacles and the sampler is at least twice the height that the obstacle protrudes above the sampler. In addition, there must be unrestricted airflow in an arc of at least 270 degrees around the sampler, and the predominant direction for the season of greatest pollutant concentration potential must be included in the 270 degree arc.

Spacing from Roads Ambient monitors for TSP and PM-10 should be located beyond the concentrated particulate plume generated by traffic, and not so close that the heavier re-entrained roadway particles totally dominate the measured ambient concentration. Roads with lower traffic (less than approximately 3,000 vehicles per day) are generally not considered to be a major source of vehicular related pollutants. In this case the monitor must be located greater than 5 meters from the edge of the nearest traffic lane and 2 to 15 meters above ground level. In the case of elevated roadways where the monitor must be placed below the level of the roadway, the monitor should be located no closer than approximately 25 meters from the edge of the nearest traffic lane. This separation distance applies for those situations where the road is elevated greater than 5 meters above the ground level, and applies to all traffic volumes.

**Note: Whenever the E-BAM is to be installed at a height greater than 3 meters it is recommended that it be securely bolted in place.**

Other Considerations Stations should not be located in an unpaved area unless there is vegetative ground cover year around so that the impact of re-entrained or fugitive dusts will be kept to a minimum.

Additional Information More detailed information instrument siting can be found in EPA Document EPA-450/4-87-007 May 1987 "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). Information specific to PM10 monitoring can also be found in EPA Document 40 CFR-58 Appendix E.

## 2.3 CONSTRUCTION OF MODEL E-BAM (Section 10.3)

### 2.3.1 Brief Description and Summary of Construction

#### 2.3.1.1 Basic Operation

The E-BAM beta attenuation mass monitor is an air quality monitor that will continuously provide air quality measurements of particulate matter concentrations in ambient aerosols. The measurement cycle of the Model E-BAM is automatic and continuous. After a roll of filter tape is loaded, the Model E-BAM can collect data unattended for up to two months. For further details regarding the principal of operation of this device, please refer to the Model E-BAM manual in Appendix F.

#### 2.3.1.2 Safety Features

The beta radiation emanating from  $^{14}\text{C}$  source is completely attenuated in air after traversing only several feet. Indeed, particulate matter impregnated on the filter tape at a density of around only several milligrams per square centimeter almost completely attenuates the beta radiation to the detector, located only 1/10 inch from the source.

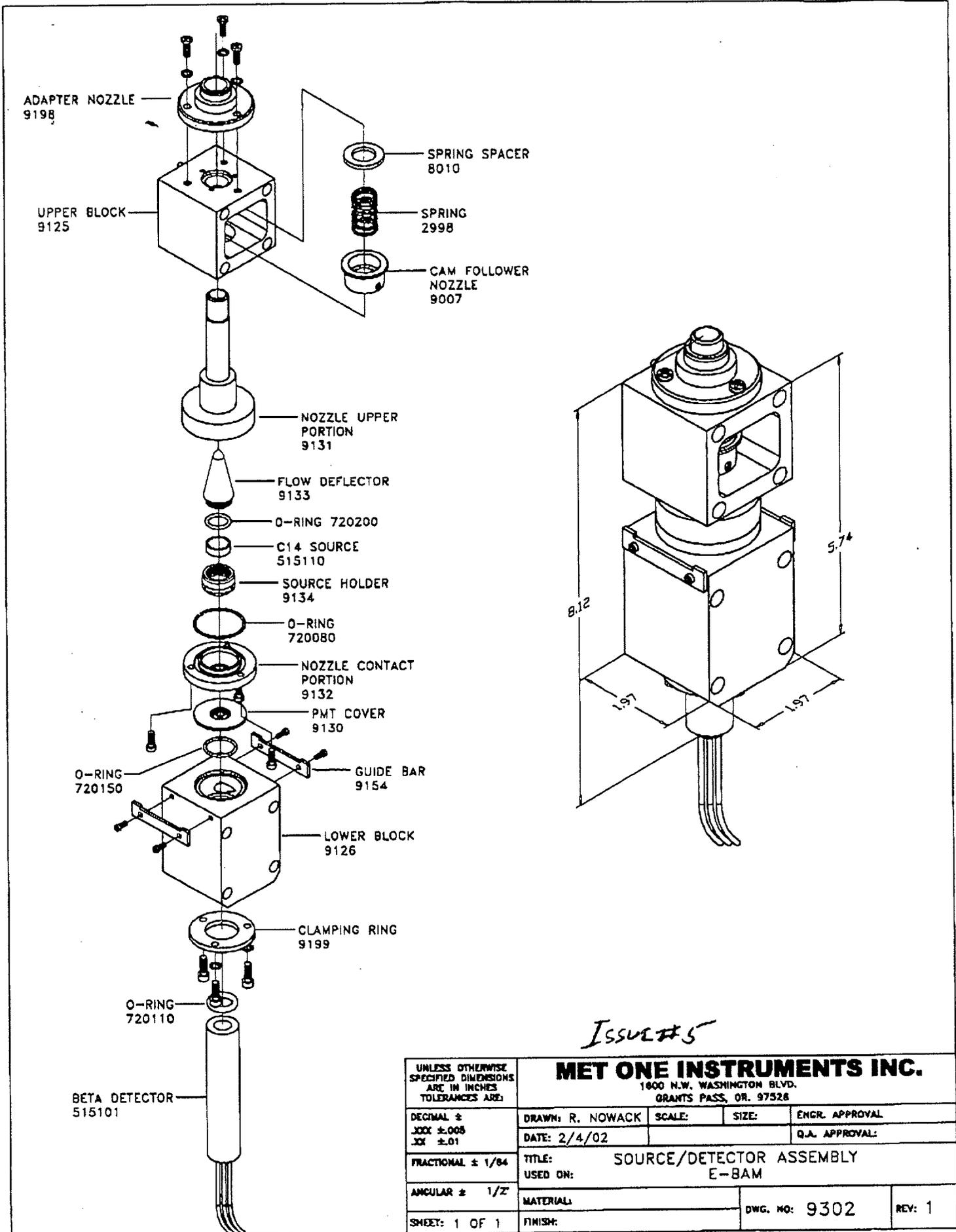
The front panel of the Model E-BAM is made out of aluminum. When it is closed, the output from the  $^{14}\text{C}$  source is sufficiently blocked to preclude detection of the beta radiation. As such, there are no specific safety interlocks installed on the Model E-BAM. There are no shutters that open or closed depending upon whether or not the Model E-BAM is powered.

If the front panel is opened, the 60  $\mu\text{Ci}$  source is somewhat accessible. This refers to the .1" slot between the upper block containing the source and the lower block containing the detector. The .1" slot is small enough that a finger could not be pushed into it. Please refer to the mechanical parts drawings in Appendix A and the Assembly Procedures in Appendix C for further details. After the safety critical parts are assembled, the only radiation detectable is through the .1" slot between the upper and lower blocks where the filter tape is positioned. The measured radiation at this slot was measured to be less than .05 mR/hour. See the Model E-BAM radiation profile in Appendix F.

Issue #4

Mounting and the integrity of the check source can be seen from the mechanical drawings shown in Appendix A and the Assembly Procedures in Appendix C. It is Met One Instrument's intention to supply a Model E-BAM for evaluation to NRC (without the source) for evaluation if necessary.

Unauthorized access to the check source is prevented by the use of tamper-resistant screws that hold the upper and lower blocks to the chassis plate. Removal of these screws requires a special tool. See the E-BAM assembly procedure in Appendix C.

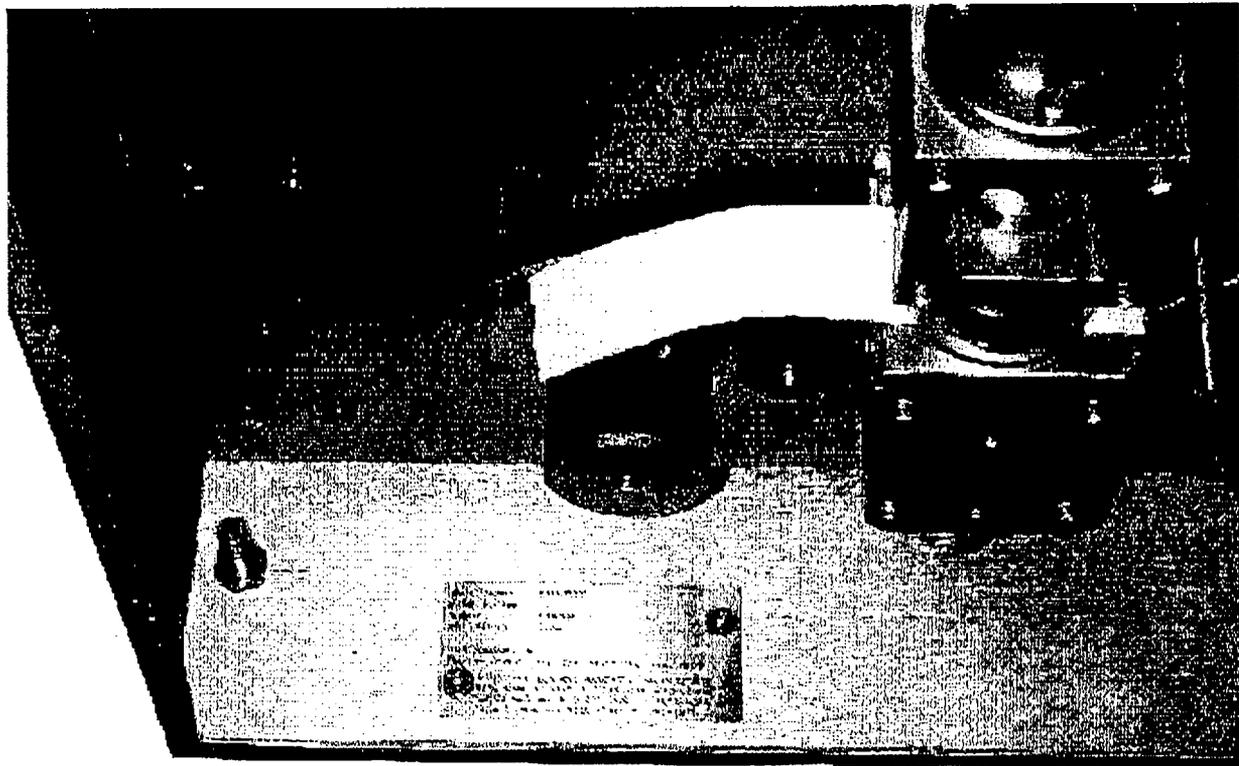
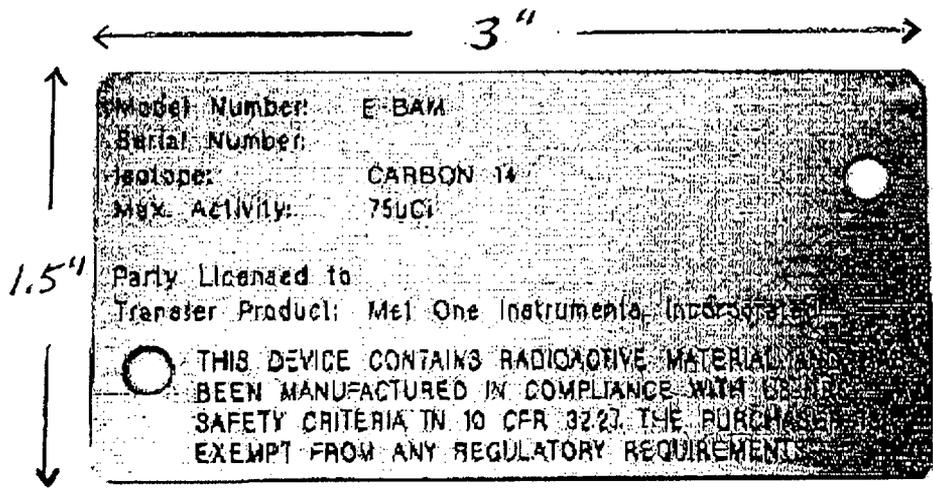


*Issue #5*

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		<b>MET ONE INSTRUMENTS INC.</b>			
		1600 N.W. WASHINGTON BLVD. GRANTS PASS, OR. 97526			
DECIMAL ±	XXX ±.005	DRAWN: R. NOWACK	SCALE:	SIZE:	ENGR. APPROVAL:
	XX ±.01	DATE: 2/4/02			Q.A. APPROVAL:
FRACTIONAL ± 1/64		TITLE: SOURCE/DETECTOR ASSEMBLY E-BAM			
ANGULAR ± 1/2°		MATERIAL:		DWG. NO: 9302	REV: 1
SHEET: 1 OF 1		FINISH:			

ISSUE #9

The label is an etched stainless steel plate and it is attached to the E-BAM transport with two rivets



Issue #9

Table 1: Contents of First Label on E-BAM

Parameter	Information on Label
Model Number	E-BAM
Serial Number	As manufactured and shown
Isotope	$^{14}\text{C}$
Maximum activity	75 $\mu\text{Ci}$
Distributor	Met One Instruments
Date of Assay	As provided by supplier
Trefoil Symbol	Provided
"CAUTION - RADIOACTIVE MATERIAL"	Provided
Additional Information	As Required

Item Number	Required Label	Supplied	Relevant Section of This Application
A-1	"CONTAINS RADIOACTIVE MATERIAL"		
A-2	Name and quantity and activity of BPM		
A-3	Identification of person licensed to transfer the product		
B	Label or marking is located where it will be readily visible when the detector is removed from its mounting		
C	The external surface of the point-of-sale package has a legible, readily visible label or marking containing		
	Name and quantity of activity of BPM		
	Identification of the person licensed to transfer the product		
	THIS DETECTOR CONTAINS RADIOACTIVE MATERIAL AND HAS BEEN MANUFACTURED IN COMPLIANCE WITH US - NRC SAFETY CRITERIA IN 10 CFR 32.27. THE PURCHASER IS EXEMPT FROM ANY REGULATORY REQUIREMENTS		

### 2.4.2 Label Location

The label described above will be mounted on the enclosure of the Model E-BAM, as shown in the photograph in Appendix D.

*Issue # 9*

### **2.4.3 Label Construction Material**

The label described above shall be constructed out of metal. All required information shall be engraved or etched onto the label. The label shall be attached to the Model E-BAM with rivets.

### **2.5 PROTOTYPE TESTING (Section 10.5)**

Prototype testing was performed on an E-BAM. The tests represented conditions of normal use and accident conditions. The Met One Instruments Product Qualification Test Procedure and test results are in Appendix H. The sealed source that is used in the E-BAM has been tested to meet ISO2919, classification C.34242. See Appendix B.

### **2.6 RADIATION PROFILE (Section 10.6)**

Met One Instruments has provided a radiation profile for the Model E-BAM. It is appended to this application in Appendix E.

### 2.1.5 Radionuclides Used in This Product

The 60  $\mu\text{Ci}$   $^{14}\text{C}$  check source, provided to Met One Instruments by AEA Technology is not registered with NRC. As such, Met One would like to have the sealed source registered as part of the device. Met One acknowledges that the registration certificate for the Model E-BAM, once issued will note that the sealed source is not registered separately but is registered as part of the device and is approved for use by Met One Instruments only as part of the Model E-BAM.

Each Model E-BAM beta attenuation mass monitor contains a single check-source containing 60  $\mu\text{Ci}$  of  $^{14}\text{C}$  in the form of barium carbonate ( $\text{BaCO}_3$ ). Barium carbonate is virtually insoluble in water and has a melting point of 1300  $^\circ\text{C}$ . This temperature exceeds that of a typical structure fire. See information in Appendix B. The tolerance provided to Met One Instruments by the manufacturer of the check source, AEA Technology is  $\pm 25\%$ . This means that these  $^{14}\text{C}$  sources range in activity from 45 to 75  $\mu\text{Ci}$ . Met One Instruments is including the documentation, including ISO classification, on these sources as provided by AEA Technology in Appendix B of this Application.

### 2.1.6 Leak Test Frequency

Before shipment to Met One Instruments by AEA Technology, the 60  $\mu\text{Ci}$   $^{14}\text{C}$  check source is leak tested. Since the source is a beta-radiation emitter and contains less than 100  $\mu\text{Ci}$  of radiation, it is exempt from periodic leak testing.

### 2.1.7 Certification and Signature of a Management Representative

Thomas Pottberg, President and CEO of Met One Instruments, is signing this Application. He is authorized to make binding commitments and to sign official documents on behalf of Met One Instruments – the applicant. Mr. Pottberg acknowledges Met One Instruments' Management's commitment and responsibilities for the radiation protection program.

## 2.2 CONDITIONS OF USE (Section 10.2)

### 2.2.1 Intended Use

The Met One Instruments Model E-BAM is a beta attenuation mass monitor that is intended to be used to measure and quantify ambient aerosol particulate concentrations.

### 2.2.2 Types of Users

The Met One Instruments Model E-BAM beta attenuation mass monitor is generally used by government bodies interested in monitoring the level of certain airborne particulate and aerosol matter in ambient air. Day to day users include air quality technicians, air quality engineers, environmental scientists, environmental engineers, etc. In addition, certain individuals in private industry who are interested in monitoring particulate air quality parameters in and around their physical plants could use the Met One Instruments Model E-BAM. Finally, environmental consultants are the third possible category of user for the Model E-BAM.

Issue  
#10