

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401  
400 Chestnut Street Tower II

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February 24, 1983

70-1622

#21988

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Mr. Frank C. Davis  
Material Licensing Branch  
Division of Fuel Cycle and  
Material Safety  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Davis:

In the Matter of  
Tennessee Valley Authority

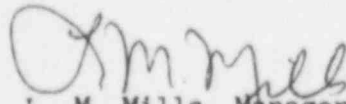
) Docket No. 070-1622

This is in response to your December 8, 1982 letter to me concerning additional questions to SNM-1476 amendment application, Control No. 21345. Enclosed is our response to each question.

If you have any questions regarding our response or if we can be of any assistance, please get in touch with P. J. Hammons of my staff at FTS 858-2736.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

  
L. M. Mills, Manager  
Nuclear Licensing

Enclosure

8508130367 850723  
REG2 LIC70  
SNM-1476 PDR

COPY SENT REGION 03/03/83

## ENCLOSURE

### 1. Question:

With respect to the use of the licensed material requested, please describe all uses of this material in more clear, specific, and concise terms. For instance, in your present submission, it is not clear exactly what new authorized uses you desire nor does the request seem to identify which presently authorized uses are to be retained.

### Response:

TVA's use of the license material is as samples for quality assurance testing of the fuel pellets. The material is used for chemical and spectra-chemical analysis, visual and dimensional inspection, density determination, and inspection of pellet microstructure and pore morphology. In addition, we test to determine the oxygen to uranium ratio, water content, F- content, and the trace elements Ca, Al, B, and Fe. The material is low enriched uranium dioxide ( $\text{UO}_2$ ) powder and pellets enriched to less than four percent in the U-235 isotope.

SNM-1476 authorizes such testing; therefore, we request no new authorized use of the license material.

### 2. Question:

Identification by manufacturer and model number of the survey and measuring instruments that shall be used with your radioactive material program.

### Response:

- (a) Eberline - Radiation Monitor RM-15 equipped with interchangeable alpha and beta/gamma detectors.
- (b) Eberline - Scintillation Alpha Counter SAC-4.

### 3. Question:

A description of your calibration procedures that shall be followed when calibrating both the measuring and survey instruments and identify the frequency at which they shall be calibrated. With respect to your survey instruments, please confirm your commitment to calibrate the instruments to within  $\pm 10$  percent of the calculated or known values for each point checked on each range of the survey meters or that the instruments will be calibrated to  $\pm 20$  percent of the calculated or known values at each point on each range provided a calibration chart or graph is prepared and attached to the instrument. Please note that this criteria is that stated in section 4.5 of Regulatory Guide 10.3 (copy enclosed).

Response:

TVA's Laboratory Services calibrates an RM-15 in the following manner:

(a) Eberline

1. An instrument/probe curve of count rate vs. high voltage dial setting is determined with a  $^{99}\text{Tc}$  source. The correct operating voltage is selected from the curve.
2. With a standard calibrated pulser, the count rate meter of the instrument is adjusted to match the pulse rate of the pulser. This is in accordance with the manufacturer's recommended methods.
3. If a counting efficiency for the probe is required, it is calculated from data obtained by counting an NBS traceable  $^{99}\text{Tc}$  source at the operating voltage.
4. A calibration record (attached) is filled out and a calibration sticker is attached to the instrument and/or probe. Calibration records (and repair records) are kept by Laboratory Services for the life of the instrument.

Accuracy must be  $\pm 10$  percent of full scale for each range.

(b) Eberline - Scintillation Alpha counter SAC-4

This will be checked for efficiency before each period of use with a thorium-230 source measured by TVA's Laboratory Services at 7,664 disintegrations per minute. A period of use is one of the intermittent 3- to 4-week periods that we work with fuel pellets. These periods occur at irregular intervals about twice a year.

4. Question:

Identify the manufacturer and model number, if any, of the glove box used with your radioactive material program and provide technical specifications for this device. A picture of the glove box would be helpful. Also, provide a diagram of the ventilation system associated with the glove box and describe the individual operations performed in the glove box under both open and closed process conditions. Also, describe the airborne contamination created by such operations and identify the filtration system used to collect particle effluents, if any.

Response:

The glove box is manufactured by Labconco Corporation, Model 50000. It is essentially as shown in the attachments except that it does not have a transfer chamber in the door. Airflow through the glove box is as shown in the sketch and then exhausts outside the building through a wall that is immediately behind the glove box.

The box is used closed (with gloves) and three operations are performed in it:

1. Crushing (not pulverizing) pellets in a tool steel mortar and pestle. Particles formed in this operation are large and are not likely to become airborne.
2. Sectioning pellets with a diamond saw. This is done 'wet' and, again, airborne contamination is unlikely.
3. Transferring uranium oxide powder (e.g., from the O/U oxidation test) back to storage vials. There is no significant cause for airborne loss in this operation, but any material so carried will be caught in the HEPA filters before the air is exhausted.

5. Question:

Discuss the wet polishing operations that will be performed in the sample preparation room and discuss any airborne contamination that may be created by the operation and its containment.

Response:

After a pellet is sectioned (see response 4), the wafer is mounted in a plastic mount and the surface wet polished on a slow speed metallurgical polishing wheel. Successively finer grit abrasive is used to effect a scratch-free surface.

The polishing wheel used is reserved for this operation; and all of the coolant/lubricant (water) drains to a seamless, stainless steel bucket. The water is filtered through a 1-micron membrane filter and discarded to drain. The membrane and any residue are disposed of according to section VIII-F-1 of the application.

No airborne contamination is generated by this operation.

6. Question:

With respect to your radiation survey program, please specify the frequency at which both smear and survey instrument surveys will be conducted in your laboratory and unrestricted areas.

Response:

Analysis of nuclear fuel pellets is an intermittent operation that occurs during a 3- to 4-week period at irregular intervals. The radiation survey program applies only to the controlled laboratory area. Upon receipt of the samples, shipping boxes and sample containers are surveyed as outlined in section VIII-D-1 and 2 of the application. When a given period of work is completed, the controlled laboratory area is surveyed as outlined in section VIII-1-4 and 5 of the application.

## EDT RADIATION MONITOR CALIBRATION RECORD

PROCEDURE: \_\_\_\_\_ S/N \_\_\_\_\_ TVA \_\_\_\_\_

MFG: Eberline \_\_\_\_\_ DATE: \_\_\_\_\_

MODEL: RM-15 \_\_\_\_\_ SIGNED: \_\_\_\_\_

PREVIOUS CAL. DATE: \_\_\_\_\_ NEXT CAL. DUE: \_\_\_\_\_

High Voltage \_\_\_\_\_ Probe Number \_\_\_\_\_

Pulse Amplitude > 10 Millivolts	Pulse Width 2 Microseconds	Pulse Rise Time 0.2 Microseconds	Pulse Polarity Negative
Pulse Standard PPM	Range	Instrument As Found	As Left
400	X1		
4K	X10		
40K	X100		
400K	X1K		

Alarm Function \_\_\_\_\_

Battery: Test \_\_\_\_\_ Charged \_\_\_\_\_ Replaced \_\_\_\_\_

Made Repairs \_\_\_\_\_ Parts Used \_\_\_\_\_

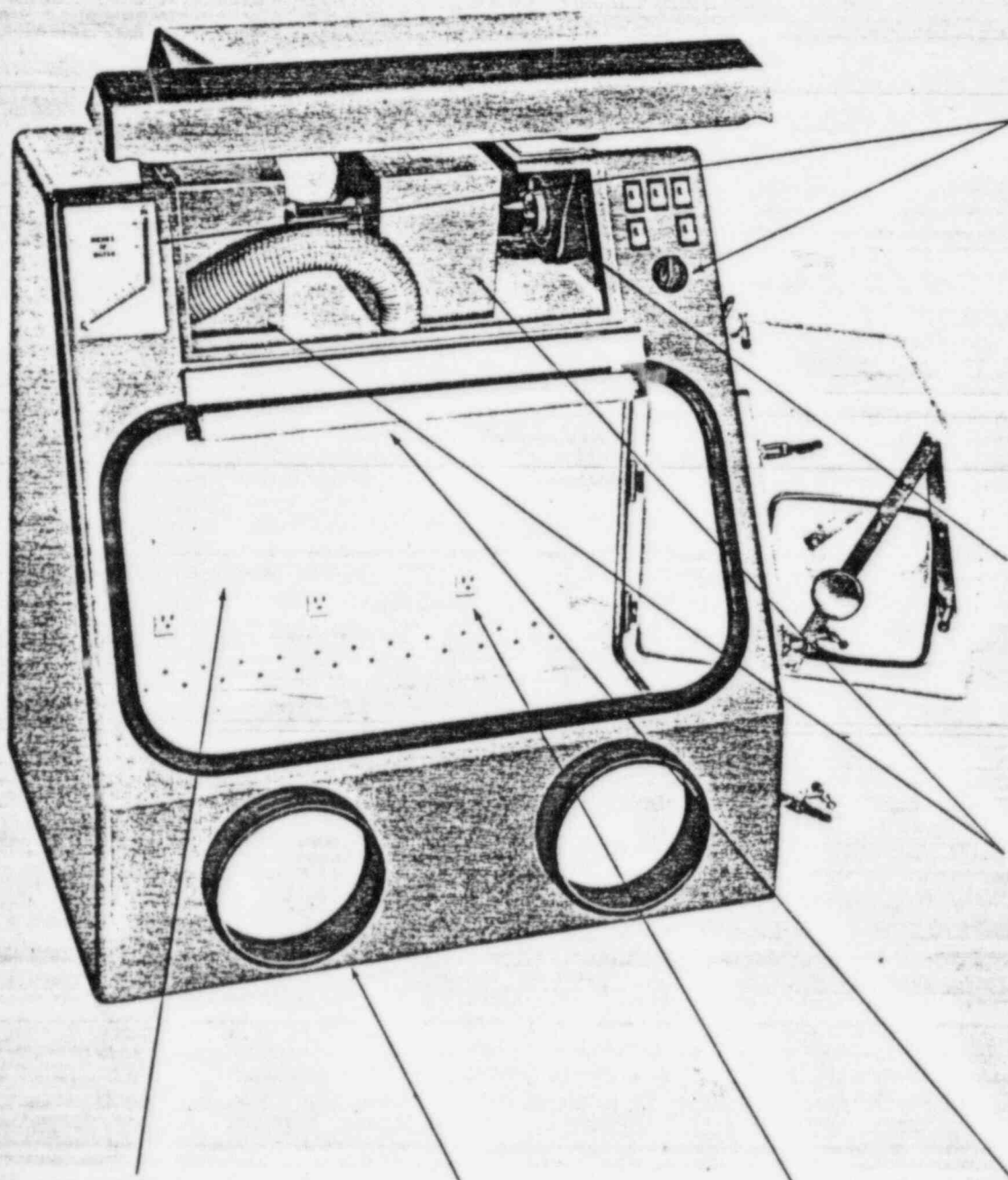
Remarks: \_\_\_\_\_

RETURN SCHEDULE 90 DAYS

ACCURACY MUST BE  $\pm 10\%$  OF FULL SCALE FOR EACH RANGE



# RADIOISOTOPE GLOVE BOX *features*



## LARGE SAFETY GLASS VIEWING WINDOW

Maximum observation area is provided by a large 16" x 31" x 1/4" safety glass window. The glass is tightly sealed in place by a specially designed leak-proof, zipper-type gasket. Window slopes 30° from vertical to eliminate glare and operator discomfort.

## COMFORTABLE PORTS

LABCONCO Glove Boxes are fitted with 8" inert plastic glove rings on 17" centers. The large size and spacing makes it possible for people of differing sizes to work with maximum comfort at the same box. Each port is double grooved so that the gloves may be changed without disturbing the integrity of the box.

## ELECTRICAL OUTLETS

The Radioisotope Glove Box is equipped with 3 conveniently placed 3-wire 115-volt, polarized and grounded electrical outlets. Each outlet is operated by a separate touch operated switch located on the front of the box. Each switch has a built-in light to indicate when the outlet is energized. All switches, outlets and wiring are factory installed.

## MANOMETER, POWERSTAT

Each LABCONCO Glove Box is supplied with an easy to read manometer. After long, continuous use as the filters begin to clog, air flow may be kept constant by simple adjustment of the infinite control powerstat to speed up the motor and blower, thus prolonging the usable life of the filters. Air flow may also be adjusted to overcome air friction in lengthy exhaust duct runs.

## VARIABLE SPEED MOTOR AND BLOWER

The LABCONCO Radioisotope Glove Box is equipped with a 115-volt, 1/25 H.P. variable speed motor and blower. An easy to reach powerstat knob provides infinite speed control from 0 to 75 cfm or up to 3 full air changes per minute. The blower has a 2" diameter exhaust. 40 inches of 2" flexible spiral exhaust tubing, with clamps, is furnished with each glove box.

## FILTERS

The LABCONCO Radioisotope Glove Box is equipped with two outlet filters (Mil. Std. 282). Each filter will remove 99.97% of all particles .3 microns or larger in size. The inlet air filter, both exhaust filters, the motor and blower and all connecting hoses are mounted out of sight under the canopy for a neat uncluttered, dust-free, modern appearance.

## LIGHT, BRIGHT WORKING AREA

A 24" fluorescent light is mounted outside the box at the top of the viewing window. The tube is hooded by the canopy so that all light is directed into the working area. The non-glare interior and adequate light, minimize operator fatigue.

Tighten the knob until it is firm: Overtightening is not necessary to achieve a good seal.

#### BLOWER (Bacteriological and Radioisotope)

The blower is operated on an off by a switch located on the right-hand corner of the switching area. The speed of the blower is regulated from zero to 100, or 100% speed. Normal operation will be in the 50% to 60% area, depending on filter condition. It may be necessary, during continued operation, to increase the blower speed to compensate for possible restrictions to air flow caused by a dirty filter. Negative pressure or positive pressure inside the box can also be controlled by regulating blower speed.

#### NEGATIVE PRESSURE OPERATION (See Fig. 1)

The boxes are normally assembled for the mode of operation. The room air passes through the polyurethane air inlet filter located on the back stack of the glove box. The even flow of air comes out of the holes in the top back and proceeds through to the manifold on the top front of the box. The air then passes through one "absolute" filter in the standard Bacteriological glove box, or two absolute filters in the standard Radioisotope glove box, into the blower intake where it is exhausted either into the room or away through a 2" diameter flexible hose. Additional filters may be coupled to the exhaust. All tubing is 2" internal diameter and all connectors are 2" external diameter, thus making many "set-up" variations possible.

Note: Maximum working pressure 5" vacuum 10" of water.

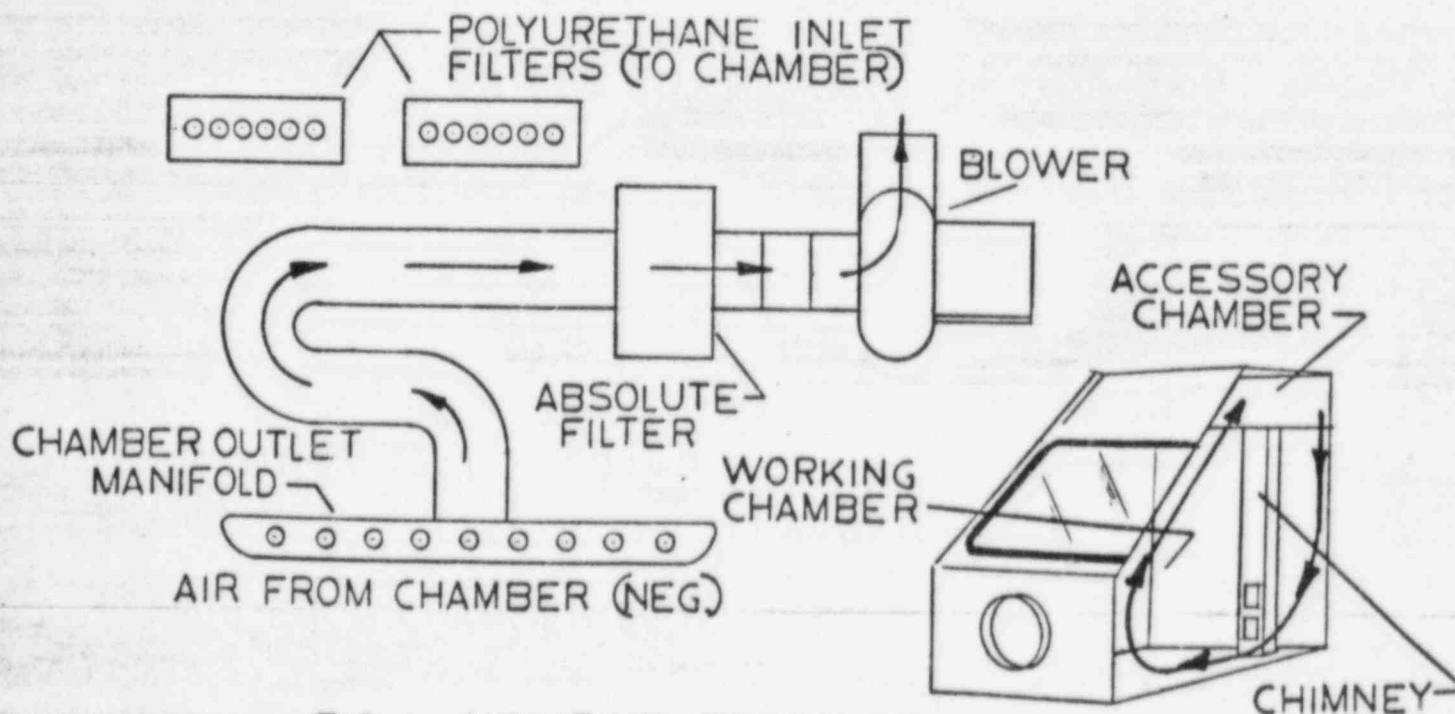


FIG. 1 - NEGATIVE PRESSURE