

<b>BROOKHAVEN NATIONAL LABORATORY</b> Safety & Health Services Division	NUMBER <b>IH 75520</b>
	REVISION <b>Final Rev0</b>
<b>INDUSTRIAL HYGIENE GROUP</b> Standard Operating Procedure	DATE <b>06/30/06</b>
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Subject: INSTRUMENT OPERATION	
<b>TVA-1000 PID/FID Portable Toxic Vapor analyzer</b>	

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### **1.0 PURPOSE & SCOPE**

The purpose of this document is to provide a simple field procedure for operating the Thermo Electron® Corporation (Foxboro) TVA-1000 PID/FID portable toxic vapor analyzer to capture environmental data and download all data collected for analysis. The procedure for operating the Thermo Electron® TVA-1000 PID/FID is based on the information provided in the operator guide.

This procedure provides a standardized method for monitoring toxic vapor in workplace environments to detect the presence of various gases. It should be used in conjunction with SOP IH 75180 Direct Reading Instruments, IH 60300 Chain of Custody Policy and Procedures and IH 60660 Program Procedures: Instrument Calibration and Maintenance Program.

### **2.0 RESPONSIBILITIES**

- 2.1 This program is implemented through the SHSD Industrial Hygiene Group Leader. Use of this SOP shall be limited to persons who act under the direction of a competent hazard assessment person.

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- 2.2 Persons using this procedure must have demonstrated competency to satisfactorily use this procedure and instrument to the criteria set in Section 7. Personnel that perform monitoring with this procedure are responsible to follow all steps indicated.
- 2.3 Persons conducting testing are responsible to document results of the testing in compliance with these SOPs. The data collected using this instrument must have appropriate evaluation of the hazard and risk by a cognizant professional.
- 2.4 Persons using this method and their supervisor are responsible to ensure that the appropriate personal protective equipment is determined and worn while performing this procedure. In addition, the person performing the procedure and his/her supervisor are responsible to ensure that all required training and qualification for hazards that may be present in areas where this procedure will be used (such as respiratory protection or radioactive contamination) have been met.
- 2.5 The persons performing the procedure and their line supervisor are responsible to comply with all work planning and work permit system requirements.
- 2.6 The IH Group shall maintain the equipment used in this procedure.

### **3.0 DEFINITIONS**

- 3.1 ***Occupational Exposure Limit (OEL):*** The maximum time weighted average (TWA) exposure permitted for employee exposure, based on the lesser of the OSHA Permissible Exposure Limits (PEL) or ACGIH Threshold Limit Value (TLV). BNL follows the most protective OEL.
- 3.2 ***Program Administrator:*** A person designated by the IH Group Leader or SHSD management to administer this procedure and the associated program of data management.
- 3.3 ***Qualified Sampler:*** A person who has demonstrated competency, in accordance with Section 7, to perform this field procedure.

### **4.0 PREREQUISITES**

- 4.1 Do not perform work using this procedure without meeting the training and qualification requirements.

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4.2 Training for entry into restricted areas may be required (check with ESH coordinator or FS Representative for the facility). Use appropriate PPE for the area.

## 5.0 PRECAUTIONS

- 5.1 **Hazard assessment:** The actual task of using the instrument typically does not cause significant employee health risks. The TVA analyzer is intrinsically safe. It is incapable of causing ignition of a mixture of flammable or combustible material in air in its most easily ignitable concentration (as per NFPA Standard Number 493: *Intrinsically Safe Apparatus for use in Division 1 Hazardous Locations* 1978). This apparatus is suitable for use in Division 1 locations.
- 5.2 **Risk Assessment:** The planning and operational controls for this SOP are evaluated in [SHSD-JRA-05](#).
- 5.3 **Personal Protective Equipment:**
- The operation of this analyzer does not require personal protective equipment.
  - When the potential for exposure to airborne contaminants above the ACGIH TLV or STEL or OSHA PEL (which ever is lower) may occur in the area being sampled, the person collecting the sample must use appropriate respiratory protection in compliance with the BNL Respiratory Protection Program.
  - When the potential for exposure to surface or airborne contaminants exist in the area being sampled, appropriate PPE for hands, feet, skin, head, or eyes may be needed for the area being entered. Check with your FS Representative or IH Group Supervisor.
- 5.4 **Radioactive Contamination:** It is possible that some areas to be tested may have radioactive contamination as well as other contamination. In these cases, personal protective equipment and administrative controls must be implemented for the radiological contaminant hazard in addition to the other hazards
- 5.5 **Work Planning:** All requirements of work permits and work planning system reviews must be met in performing this procedure.
- 5.6 **Environmental Impact and Waste Disposal:** This analyzer does not have adverse impact on the environment or generate hazardous wastes.

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## 6.0 PROCEDURE

6.1 Before starting the unit, perform the following steps:

- 6.1.1 Charge battery.
- 6.1.2 Connect sample probe.
- 6.1.3 Fill/install hydrogen tank (FID versions)

6.2 To begin, connect the sample probe (electrical and sample line connections) to the appropriate receptacles on the TVA-1000B.

6.3 Power on the meter by pressing the ON/Off button.

6.4 PID Detector: This sensor automatically is activated on turn on. Allow 15 minutes for warm-up.

6.5 FID Detector: Open the hydrogen valve (FID versions). To start the unit, execute the following procedure:

- Press ON.
- Press Control.
- Press 3 to ignite.

6.6 Calibration:

- If the meter is to be as a survey meter to generically detect the presence of gases without the expectation of quantification of airborne concentrations, then calibration is not necessary.
- If the TVA-1000 is to be used to measure compliance with occupational exposure limits, it needs to be calibrated to a known concentration of chemicals. See [IH75900 Calibration Method for Chemical Monitors/Meters](#) for the preparation of an appropriate standard or use a NIST traceable calibration gas from a cylinder. Refer to the TVA-1000B instruction manual for additional information.

6.6.1 Enter the Calibration Mode:

- Press 2 = Setup
- Press 1 = Calibrate
- Press 2 = Span Concentration.
- Enter Span Concentration for calibration gas being used.

Note: If PID only, enter concentration of isobutylene. If FID only, enter concentration of methane. If dual, enter concentration of both gases.

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6.6.2 Zero the meter:

- Press 3 = Zero.
- Press 1 = both.
- Challenge analyzer with zero gas sample.
- Press ENTER = start.
- Wait to stabilize.
- Press ENTER = start

6.6.3 Calibrating the meter with

- Press 4 = Span
- (PID 1<sup>st</sup>) Press 2 = PID.
- Press ENTER = start.
- Challenge analyzer with methane span gas and wait for readings to stabilize.
- Press ENTER to accept.
- Press 4 = Span.
  
- Press 3 = FID.
- Press ENTER = Start.
- Challenge analyzer with methane span gas and wait for readings to stabilize.
- Press Enter = Accept.
- Press 5 = Response Factor.
- Confirm that Response Factor says “RF0: DEFAULT”
- Press Exit 2 times to main menu.
- Press 1 = Run.

6.7 **Survey mode.** The meter remains in the survey mode and will draw air into the meter at the tip of the sample probe. If needed a short length of tubing may be added to the front of the probe, but it should be limited to 10 feet (3.3 meters) or less.

6.8 **Interpreting Results:**

- 6.8.1 If the meter has been calibrated with the chemical in question, the results can be read from the probe or meter LCD display.
- 6.8.2 If the meter has been calibrated with the standard calibration gases for each sensor, then the results from the probe or meter LCD display must be adjusted for the RESPONSE FACTOR of the detector to the chemical in

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question. Refer to the instrument manual for the following link for [TVA-1000 Response Factors](#).

- 6.8.3 If the meter has not been calibrated, then the meter response can be relied on for only relative levels of the presence of chemicals and the ppm units displayed on the meter can not be used for compliance purposes.

## 6.2 Turning off the meter:

- 6.3.1 Press the On/Off Button.
- 6.3.2 Turn the FID Hydrogen Gas value OFF.
- 6.3.3 Disconnect the electronic and sample line form the meter.

## 6.4. Documenting Sampling Results

- 6.4.1. Record readings on a BNL [Direct Reading Sampling Instrument](#) Form.
- 6.4.2. Plan and conduct hazard assessments and exposure monitoring using the procedure outlined in [IH 60500 Planning, Sampling, & Reporting Personnel Exposure Monitoring Results](#) for:
  - Exposure Assessment Sampling Strategy,
  - Initial Notification of Employee Monitoring Results, and
  - Preparation of a formal report on the exposure monitoring or hazard assessment.
- 6.4.3. Return meter and original copy of the sampling form to the SHSD IH Laboratory.
- 6.4.4. Send a copy of the hazard evaluation report written on the sampling to the IH Laboratory, OMS, and employee(s) monitored, and the employee's supervision.

## 7.0 IMPLEMENTATION AND TRAINING

- 7.1 Training prior to using this meter includes a demonstration of proper operation of the instrument based on training, education, and experience. All persons must have met the qualification criteria for IH75 Chemical Hazard Assessor set in *IH50300 BNL IH Program and IH Group Training & Qualification Matrix*.
- 7.2 Personnel are to document their training using Attachment 9.0, the Job Performance Measure Completion Certificate. Qualification on this JPM is required on a 3-year

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basis, providing the professional is monitoring sources frequently.

## 8.0 REFERENCES

8.1 TVA-1000B Analyzer Instruction Manual.

8.2 TVA-1000 Response Factors:

[http://www.thermo.com/eThermo/CMA/PDFs/Various/156File\\_13448.pdf](http://www.thermo.com/eThermo/CMA/PDFs/Various/156File_13448.pdf)

## 9.0 ATTACHMENTS

9.1 Attachment 9.1 Job Performance Measure

## 10.0 DOCUMENTATION

Document Development and Revision Control Tracking		
Prepared By:  <i>J. Allen 05/21/06</i> <i>SUNY-SB Intern</i>	Reviewed By / Date: <i>(signature/date on file)</i> Robert Selvey 05/12/06 Certified Industrial Hygienist	Approved By / Date: <i>(signature/date on file)</i> Robert Selvey 06/30/06 IH Group Leader
ESH Coordinator/ Date:  <i>none</i>	Work Coordinator/ Date:  <i>none</i>	SHSD Manager / Date  <i>none</i>
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Facility Support Rep. / Date:  <i>none</i>	Environ. Compliance Rep. / Date:  <i>none</i>	Effective Date:  <b>06/30/06</b>
ISM Review - Hazard Categorization <input type="checkbox"/> High <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Low/Skill of the craft	Validation: <input type="checkbox"/> Formal Walkthrough <input type="checkbox"/> Desk Top Review <input type="checkbox"/> SME Review Name / Date:	Implementation: Training Completed: Tracked in BTMS Procedure posted on Web: 06/30/06 Hard Copy files updated: 06/30/06

Revision Log
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input type="checkbox"/> none of the above Section/page and Description of change:

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SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:
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Safety & Health Services Division  
Industrial Hygiene Group

**HP-IHP-75520**  
IH75520 Attachment 9.1

**TVA-1000B**  
**Job Performance Measure (JPM) Qualification Certificate**

Candidate's Name	BNL#	Date of Qualification
		Expires (3 years)

Topic	Criteria	Qualification Status		
		field	Not Quali-	Recov- ered
<b>Personal Protective Equipment</b>	Understands the need to be aware of the potential surface contamination and airborne levels of contaminants and knows how to determine the need for PPE and how to obtain the correct PPE for the hazard.			
<b>Sampling Equipment</b>	Shows where equipment needed for the procedure is located and how to properly sign it out.			
<b>Sampling Protocol</b>	Understands the exposure monitoring logic necessary to appropriately select sampling locations to accurately measure worker, public and environmental exposure potential.			
<b>Meter Operation</b>	Demonstrates turning on and off, warming up, and zeroing			
	Demonstrates selecting the appropriate response factor for the chemical for the FID and PID sensors.			
	Demonstrates reading and interpreting the concentration			
<b>Record forms</b>	Shows how to correctly and completely fill all forms associated with this SOP.			
<b>Analysis of data</b>	Shows how to perform (or who to request to perform) the data analysis on the sampling data to assess potential exposure to the sampler, worker, public and environment.			

I accept the responsibility for performing this task as demonstrated within this JPM and the corresponding SOP.

Candidate Signature:	Date:

I certify the candidate has satisfactorily performed each of the above listed steps and is capable of performing the task unsupervised.

Evaluator Signature:	Date: