

**Limited Environmental Assessment
Of Mercury (Hg) Vapor
Rio Grande Campus
Austin, TX**

August 16, 2003

**For
Austin Community College
9101 Tuscany Way
Austin, TX 78754**

August 29, 2003

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Introduction & Scope of Work

A follow-up environmental assessment of mercury (Hg) vapor concentrations from a limited area of the Austin Community College (ACC) Rio Grande Campus was conducted on August 16, 2003. The initial investigation was initialized on December 8, 2001 and a follow-up assessment was conducted on May 27, 2002. The testing was performed in a "hot box" environment as recommended by the Texas Department of Health. The building temperature was above 80° F. An ACC representative requested the mercury vapor testing in the laboratories and offices in the vicinity of some of the laboratories. The scope of the assessment includes indoor and outdoor air sampling for mercury in order to assess air quality and the presence of airborne mercury vapors from the areas sampled and background levels. The initial air sampling was conducted on three separate days including December 8, 13 and 14, 2001. Follow-up sampling was performed on May 27, 2002 in several laboratories and rooms in the vicinity of the laboratories. The testing conducted for this assessment was performed on August 16, 2003.

Air Sampling for Mercury

On August 16, 2003 a total of 129 air samples were analyzed to assess air quality in regards to airborne mercury levels at the Rio Grande Campus. The air samples were collected from laboratories and classrooms or offices in the vicinity of the laboratories. The samples were collected from rooms 221, 222.2, 220, 219.0, 318.1, 318, 316, 323.0, 324, 326.0, 325.1, 325.3, 327.0, 328.0, 323.0, 312.1, 312.0, 310.0, 315, 316. Outdoor samples were also collected as background samples. Table 1 – Mercury Vapor Analysis lists sample locations and analysis results in the Results/Conclusion Section of this report.

A Jerome® 431-X™ Gold Film Mercury Analyzer, 110 VAC Serial Number 3132 with Sensor Number 00-11-24-WID, was used to collect and analyze the air samples. The Jerome 431-X is an ambient air analyzer with a range of 0.001 to 0.999 milligrams per cubic meter (mg/m³ Hg) with an accuracy of +/- 5% at 0.1 mg/m³ Hg). Mercury has a unique ability to alter the resistance of gold film. Therefore, this resistance is used to detect mercury in the following manner. The 431-X sensor has two gold films configured in a circuit, which detects very small changes in electrical resistance. One of the gold films is sealed off and not exposed to mercury (reference) while the second film (sensor) is exposed to mercury (air flow from sample pump) resulting in resistance changes, which are measured by the circuit. An internal microprocessor computes the concentration and displays the results.

A sample cycle consists of 12 seconds. The analyzer has an internal pump, which draws the sample air into a scrubber for 2 seconds and then is bypassed to an acidic gas filter, which removes acidic gases, which interfere with the sensor's response to mercury, and then over a gold film sensor. This sensor absorbs and integrates the mercury vapor. The measured concentration of the

analyzer is then displayed in milligrams/cubic meter, mg/m³. The digital display automatically zeroes at the start of each sample.

The instrument also includes a survey mode. The survey mode collects samples every 3 seconds automatically. However, sampling in the survey mode is not as accurate due to the reduced volume of air. The accuracy of the instrument in the survey mode is +/- 20% at 0.100 mg/m³. In addition, the manufacturer's operating procedures indicate to disregard the digital meter's initial momentary readings after pressing the on button and allow one minute of warm up time for the instrument's electronics to stabilize.

A Certificate of Instrument Calibration was obtained with the analyzer from Arizona Instrument where instrument was rented. The certificate certifies that Jerome X-431 was calibrated with standard units traceable to NIST. This certificate is included as Appendix A. Two regeneration runs were performed prior to sampling. The instrument was also tested for calibration upon return to Arizona Instrument and found to still be in calibration.

The temperature outside during the site visit was 95°F with a 48% relative humidity. The temperature and relative humidity inside the building ranged from 85°F to 89°F and 59% to 66%, respectively. The instrument's operating temperature range is 0-40°C (32-104°F).

Potential Interference

The Jerome mercury vapor analyzer interference include chlorine, NO₂, Hydrogen Sulfide (H₂S), most mercaptans (organic sulfur compounds or "thiols". After contacting the manufacturer of the instrument, a representative of technical support indicated that other interference not listed in the operating manual include burning of tobacco products, ammonia compounds and jarring the instrument. All these interference can sometimes cause erroneously high readings. In addition, the filter can become saturated with these highly volatile compounds. In the operating manual it is recommended that if any of the volatile compounds, which may interfere with the instrument, are present the gases be allowed to dissipate before sampling for the less volatile mercury vapor. Water vapor condensation can also cause harm to the sensor.

Results/Conclusions

Table 1 – Mercury Vapor Analysis shows sample locations and analysis results collected from the Jerome 431-X Mercury Vapor Analyzer on August 16, 2003. The analyzer has a sampling range of 0.001 to 0.999 milligrams per cubic meter (mg/m³ Hg) with an accuracy of +/- 5% at 0.1 mg/m³ Hg and a sensitivity of 0.003 mg/m³ Hg. The instrument includes a survey mode. The survey mode collects samples every 3 seconds automatically. However, sampling in the survey mode is not as accurate due to the reduced volume of air. The accuracy of the instrument in the survey mode is +/- 20% at 0.100 mg/m³. All samples were recorded and are listed in Table 1 – Mercury Vapor Analysis. Table 2 indicates

temperature and relative humidity readings collected during the site visit. There were no error readings during testing. Error readings would include High Level Indicator (in excess of 0.999 mg/m³, Sampling Sensor Saturated, Sensor needs Regeneration (clean mercury from gold film), Power, Low Battery, Perform Re-Zero, and Sampling Sensor 50%-75% Saturated. The samples were collected from about 5:00 p.m. to 8:45 PM with temperatures varying from 95 °F outdoors to 85-89 °F indoors. The relative humidity ranges from 48% to 66%.

**Table 1 – Mercury Vapor Analysis
(08/16/03)**

Reading #	Location	mg Hg/m³ Air
01.	Outside (95°F and 48% RH)	0.000
02.	Outside	0.000
03.	Outside	0.000
04.	Outside (Rio Grande)	0.000
05.	Outside (Rio Grande)	0.000
06.	2 nd floor Hallway (re-zeroed) hallway near room 223	0.000
07.	Hallway near room 223 (87 °F 61% Humidity)	0.000
08.	Hallway near room 223	0.000
09.	221 office (survey mode for several minutes throughout the room at 1'-4' (all zero)	0.000
10.	221 SE corner above ceiling (plaster ceiling) between plaster ceiling and sub-floor 3 rd floor) (hole in foam /plaster ceiling)	0.000
11.	221 above plaster ceiling near door	0.000
12.	221 above ceiling tile in office (central)	0.000
13.	221 NE corner, 4'	0.000
14.	221 SE corner, 4'	0.000
15.	221 SW corner, 4'	0.000
16.	221 Center, 2'	0.000
17.	221 NW office, 4'	0.000
18.	222.2 center, 4'	0.000
19.	Women's Rest Room sample mode, 4'	0.000
20.	220 SW corner, hole above ceiling plaster	0.000
21.	220 NW corner above ceiling plaster (87°F 65%RH)	0.000
22.	220 Central above ceiling plaster	0.000
23.	220 NW corner, 2'	0.000
24.	220 SW corner, 4'	0.000
25.	220 NE corner, 4'	0.000
26.	220 SW corner, 4'	0.000
27.	220 central, 2'	0.000

**Table 1 – Mercury Vapor Analysis
-continued-**

Reading #	Location	mg Hg/m³ Air
28.	219.0 NE corner above ceiling plaster	0.000
29.	219.0 NW corner above ceiling plaster	0.000
30.	219.0 central, 2'	0.000
31.	219.0 NE, 4'	0.000
32.	219.0 SE, 4'	0.000
33.	219.0 SW, 4'	0.000
34.	318.1 outside storeroom door in hall (87°F 62% RH)	0.000
35.	318.1 survey mode (front to back) at 1' to 4'	0.000
36.	318.1 center, 4'	0.000
37.	318.1 back, 1'	0.000
38.	318.1 back, 4'	0.000
39.	318.1 by door 1'	0.000
40.	318 Chem lab Survey mode throughout room including laboratory sinks and benches, 1' to 4' all values	0.000*
41.	318 zero filter	0.000
42.	318 desk near sink, 1'	0.000
43.	318 back bench	0.000
44.	318 E wall at teacher's desk, 1'	0.000
45.	318 west side of teacher's desk, 1'	0.000
46.	318 center of room, 4'	0.000
47.	318 at sink floor drain at 1 st sink	0.000
48.	318 between two lab tables, 4'	0.000
49.	318 drain in sink	0.000
50.	318 lab table near sink trough	0.000
51.	318 east end lab table (1 st table)	0.000
52.	318 at desk	0.000
53.	318 at desks, 1'	0.000
54.	318 center room	0.000
55.	318 floor drain at sink #1	0.000
56.	318 floor drain at sink #2	0.000
57.	318 sink drain at sink #1	0.000
58.	318 sink drain at sink #2	0.000

**Table 1 – Mercury Vapor Analysis
-continued-**

Reading #	Location	mg Hg/m³ air
59.	316 Instructor's desk, 4' (87°F and 61% RH)	0.000
60.	316 west wall, 1"	0.000
61.	316 center of room, 4'	0.000
62.	316 center of room, 1'	0.000
63.	316 1 st sink at drain in sink	0.000
64.	316 center between lab table, 1'	0.000
65.	316 inside drain trough at second lab table	0.000
66.	316 SE corner near door, 1'	0.000
67.	316 SW corner near ice machine, 4'	0.000
68.	316 office/store room by computer	0.000
69.	316 floor drain penetration SW lab table	0.000
70.	316 floor drain penetration at 1 st sink	0.000
71.	316 West over lab bench by windows, 4'	0.000
72.	316 East, base of lab bench 1" above floor	0.000
73.	316 West, base of lab bench 1" above floor	0.000
74.	316 Survey mode at 1' to 4' above floor level throughout room all values	0.000
75.	323.0 Office survey mode 1' to 4' throughout room all values	0.000
76.	323.0 center, 4'	0.000
77.	323.0 center, 1'	0.000
78.	323.0 center, 4'	0.000
79.	323.0 center, 4'	0.000
80.	324 Store Room survey mode 1' to 4' throughout room all values	0.000
81.	324 back, 4'	0.000
82.	324 elbow of "L", 1'	0.000
83.	324 front, 4'	0.000
84.	326.0 Survey mode 1' to 4' throughout room all values (85 °F and 66% RH)	0.000
85.	326.0 Sink at N end of room	0.000
86.	326.0 SW corner, 4'	0.000
87.	326.0 NW corner, 4'	0.000

**Table 1 – Mercury Vapor Analysis
-continued-**

Reading #	Location	mg Hg/m³ air
88.	326.0 NE corner, 4'	0.000
89.	326.0 SE corner, 4'	0.000
90.	326.0 Center, 1'	0.000
91.	325.1 Survey mode 1' to 4' throughout room all values (87 °F and 60%RH)	0.000
92.	325.1 Center, 4'	0.000
93.	325.3 Survey mode 1' to 4' throughout room all values	0.000
94.	325.3 center, 4'	0.000
95.	327.0 Survey mode 1' to 4' throughout room (including sink drain area) all values	0.000
96.	327.0 NW corner, 4'	0.000
97.	327.0 NE corner, 1'	0.000
98.	327.0 SW corner, 1'	0.000
99.	327.0 SE corner, 4'	0.000
100.	327.0 Center, 4'	0.000
101.	328.0 Survey mode 1' to 4' throughout room all values	0.000
102.	328.0 SE corner, 4'	0.000
103.	328.0 NE corner, 4'	0.000
104.	328.0 NW corner, 1'	0.000
105.	328.0 SW corner, 1'	0.000
106.	328.0 Center, 4'	0.000
107.	323.0	0.000
108.	312.1 Survey mode 1' to 4' throughout room all values	0.000
109.	312.1 Center, 1'	0.000
110.	312.0 SW corner, 1' (89°F and 59% RH)	0.000
111.	312.0 NW corner above sink drain, 4'	0.000
112.	312.0 NE corner, 4'	0.000
113.	312.0 SE corner, 1'	0.000
114.	312.0 Center, 4'	0.000

**Table 1 – Mercury Vapor Analysis
-continued-**

Reading #	Location	mg Hg/m³ air
115.	312.0 SW above sink drain	0.000
116.	312.0 SW at floor drain	0.000
117.	310.0 Survey mode 1' to 4' throughout room (including sink drains) all values	0.000
118.	310.0 SW corner at floor near sink drain	0.000
119.	310.0 SW corner above sink drain	0.000
120.	310.0 SE corner, 4'	0.000
121.	310.0 NE corner, 1'	0.000
122.	310.0 NW corner, 4'	0.000
123.	310.0 Center, 4'	0.000
124.	315 Survey mode 1' to 4' throughout room all values	0.000
125.	315 center, 4'	0.000
126.	316 near floor at drain #1 sink	0.000
127.	316 near floor at drain #2 sink	0.000
128.	Outside (8:45 PM) East entrance	0.000
129.	Outside East at street	0.000

*Electrical spike of 0.003 mg Hg/m³ was encountered during the restarting of survey mode after the instrument power was interrupted due to jarring the instrument. Testing in the same area, immediately after spike, gave results of 0.000 mg Hg/m³. Sample mode also gave value of 0.000 mg Hg/m³. Furthermore, the manufacturer's Operating Procedures Manual of February 2003 indicates to disregard the digital meter's initial momentary readings after pressing the on button and allow one minute of warm up time for the instrument's electronics to stabilize.

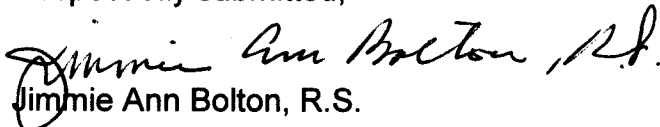
The relative humidity and temperature was collected from several areas during the sampling procedure. Table 2 indicates the relative humidity and temperature readings collected during the site visit.

Table 2 – Relative Humidity and Temperature

Location	Temperature °F	% Relative Humidity
Outside (5:05 p.m.)	95	48
223	87	61
220	87	65
3 rd floor hall outside of 318.1	87	62
316	87	61
326.0	85	66
312.0	89	59
325.1	87	60

A total of 129 readings were collected utilizing the Jerome 431-X mercury analyzer on August 16, 2003. As indicated in Table 1, there was no mercury detected in the areas/rooms surveyed (221, 222.2, 220, 219.0, 318.1, 318, 316, 323.0, 324, 326.0, 325.1, 325.3, 327.0, 328.0, 323.0, 312.1, 312.0, 310.0, 315, 316).

Respectfully submitted,


Jimmie Ann Bolton, R.S.

Appendix



Certificate of Instrument Calibration

1912 W. 4th Street • Tempe, AZ 85281 • (602) 470-1414 • (800) 528-7411 • Fax (480) 804-0656 • www.azic.com

Arizona Instrument

Manufacturers of Computrac® Moisture Analyzers and Jerome® Toxic Gas Analyzers

Company Arizona Instrument
Address 1912 W. 4th Street

Tempe AZ 85281

This is to certify that the JEROME X431-0001 Gold Film Mercury Analyzer, 110 VAC Serial Number 3132 with Sensor Number 00-11-24-WID, was calibrated with standard units traceable to NIST

Calibration Status as Received: Out of Calibration

Incoming:	Actual	Calibration Gas	Allowable Range
Level 1		0.104 mg/m ³ Hg	.0988-.1092 (+/-5%)
RSD			<3%

Outgoing:	Actual	Calibration Gas	Allowable Range
Level 1	.1027	0.104 mg/m ³ Hg	.0988-.1092 (+/-5%)
RSD	.87		<3%
Level 2	N/A	0.025 mg/m ³ Hg	0.020 - 0.030 mg/m ³
SD	N/A		<0.005 mg/m ³
Level 3	N/A	0.010 mg/m ³ Hg	0.005 - 0.015 mg/m ³
SD	N/A		<0.005 mg/m ³

Calibration Status as Left: In Calibration

Estimated Uncertainty of Calibration System: 3.5%

Ambient conditions during calibration:

Temperature degrees F: 72.6 % Relative Humidity: 54.3

Calibration Date 7/21/03

Re-Calibration Date 7/20/04

Approved By: *V. Dorr*

Date: 7/28/03

Title: Vince Dorr - Tech Support/Quality Control

Equipment Used

Permeation Tube	S/N: 498-3663	NIST: 153337-1
Calibration Date: 2/4/03	Calibration Date Due: 2/4/04	
DynaCalibrator	S/N: M978	NIST: 255085,95;NBS Buret #81 and #K10
Calibration Date: 1/16/03	Calibration Date Due: 1/17/04	
Flowmeter	S/N: 1243	NIST: 821/263310-00, 821/256504-97.
Calibration Date: 10/1/02	Calibration Date Due: 10/1/03	
Digital Multimeter	S/N: 2895005	NIST: 13238001013
Calibration Date: 8/9/02	Calibration Date Due: 8/9/03	

Calibration Procedure Used: 3J09-0005

Arizona Instrument certifies that the above listed instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracy is traceable to the NATIONAL INSTITUTE OF STANDARDS TECHNOLOGY within the limitations of the Institute's calibration services, or have been derived from accepted values of natural physical constants, or have been derived by the ratio type of self-calibration techniques. Arizona Instrument has reviewed MIL STD 4562A and believes to comply.
DISCLAIMER: Any unauthorized adjustments, removal or breaking of QC seals, or other customer modifications on your Jerome Analyzer WILL VOID this factory calibration certification. Because any of the above acts could affect the calibration and readings of the instrument, their certificate will no longer be valid and, further, Arizona Instrument Corporation WILL NOT be responsible for any liabilities created as a result of using the instrument after such adjustments, seal removal, or modifications.
Specific adjustments detailed in the User's Manual may be performed according to the directions, and within the limits, set by the manual. As long as a functional test is within range, according to the procedure outlined in the Operator's Manual, the instrument is performing correctly. Factory Calibrations are recommended at least yearly. This document shall not be reproduced, except in full, without the written approval of Arizona Instrument.