Mercury Assessment Report

Gymnasium Weight Room
Sonoma State University
1801 E. Cotati Avenue
Rohnert Park CA 94928

Prepared for:
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FACS Project #PJ30907
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Executive Summary

On August 11, 2016, Forensic Analytical Consulting Services, Inc. (FACS) conducted an assessment for airborne mercury in the Gymnasium Weight Room (PE6) on the Sonoma State University (SSU) campus. The purpose of the assessment was to evaluate the presence of airborne mercury vapor related to flooring materials that reportedly contain mercury.

Mercury vapor concentrations in air throughout the Weight Room were above health-based reference levels (OEHHA RELs). Mercury was not present in air at other locations assessed in the Gymnasium building or adjacent to equipment that had been removed from the Weight Room.

FACS conducted supplemental assessment on September 7, 2016 to evaluate mercury content in porous or semi-porous materials present in the Gymnasium Weight Room. Laboratory analysis indicated that mercury is present in the concrete slab, wall mounted sound absorbing panels and ceiling fireproofing.

Introduction

Forensic Analytical Consulting Services, Inc. (FACS) was retained by Sonoma State University to conduct an airborne mercury vapor assessment in the Gymnasium Weight Room (PE6) on the Sonoma State University campus. The purpose of the assessment was to evaluate the presence of airborne mercury vapor related to flooring materials that reportedly contain mercury. FACS was also retained to conduct a supplemental assessment to evaluate the presence or absence of mercury in porous or semi-porous materials within the Gymnasium Weight Room. The survey was performed by David Brinkerhoff, Certified Industrial Hygienist (CIH) on August 11 and September 7, 2016.

Site History and Characterization

Site History

Reportedly, during flooring removal activities in the Gymnasium Weight Room it was suggested that the base flooring material appeared to be similar to a type known to contain mercury (3M™ Tartan). SSU staff tested the floor and laboratory analysis determined that it contained 32 parts per million (ppm) mercury. Based on these results, FACS was retained to evaluate potential occupant exposure to mercury in air.

Site Characterization

The Weight Room is approximately 3,600 square feet with a 25 foot height ceiling. Construction is characterized by concrete walls, an exposed ceiling deck with spray-applied fire proofing and rubberized flooring. Sound absorbing panels are adhered to the upper portion of each wall. Approximately 100 square feet of the rubberized flooring had been damaged prior to the FACS assessment in an attempt to mechanically remove the floor. Reportedly, the rubberized flooring had been previously covered by carpet and/or foam mats.

Two ceiling-mounted package units provide heat to the space but do not condition other areas of the building. The units were reportedly capable of drawing outdoor air from the roof and recirculating air from within the Weight Room. Recirculating dampers appeared to be partially open at the time of the assessment.
Assessment Methods

Monitoring for airborne mercury vapor was performed using a Jerome J405 Gold Film Mercury Analyzer (serial #40500947). The J405 was factory calibrated and serviced by the manufacturer prior to the survey (within the required 12 month frequency period). The calibration documentation for the meter is provided in Appendix B. A sensor regeneration and “zero” calibration check was conducted in the field prior to the start of the survey. Mercury vapor is measured in units of “ug/m³” (micrograms per cubic meter of air).

During the assessment, emphasis was placed on inspecting for potential mercury vapor at 1) breathing zone level (approximately 5 feet above the floor) as a means of assessing potential occupant exposure to airborne mercury, and 2) potential primary (flooring) and secondary (sound absorbing panels, equipment, etc.) sources of mercury.

The areas assessed included the Gymnasium Weight Room (PE 6), the corridor adjacent to the Weight Room, the Zinfandel building (where equipment removed from PE 6 was being stored) and outdoors.

The Weight Room assessment included the documentation of mercury vapor concentrations during two room conditions. The first round of monitoring was conducted with all doors closed and the heating/ventilation system turned off for at least 24 hours. The temperature during the first assessment averaged 76 degrees Fahrenheit.

The second round of monitoring was conducted after the heating and ventilation system had been allowed to run for approximately 3 hours. In addition, three wall mounted fans were turned on to assist in mixing the air. The temperature during the second round averaged 86 degrees Fahrenheit.

Evaluation of mercury in porous (fire-proofing and sound absorbing panels) and semi-porous (concrete slab) materials was conducted by collecting bulk samples of each material and submitting to an AIHA accredited laboratory for analysis. Samples were analyzed for mercury content using cold-vapor atomic absorption by Environmental Protection Agency (EPA) method 7471A. Sample results are provided in milligrams mercury per kilogram (mg/kg).

Survey Findings

Airborne mercury vapor was present throughout the Weight Room at concentrations greater than the California Office of Health Hazard Assessment (OEHHA) Reference Exposure Levels (REL) for acute exposures of approximately 1 hour.

Results of air monitoring are summarized in Table 1 below.

Additional information about the health-based environmental reference levels used for comparison is presented in Appendix A.

It should be noted that airborne mercury concentrations may increase if temperature increases in the Weight Room (e.g. on a warmer day) or decrease if additional dilution ventilation is provided. In addition, mercury concentrations in air prior to disturbance of flooring materials cannot be evaluated using the methods employed.
### Table 1: Summary of Direct Reading Mercury Vapor Results
Jerome J405, August 11, 2016

<table>
<thead>
<tr>
<th>Location</th>
<th>Average Mercury Concentration (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ventilation off, 76°F, 9:30am</strong></td>
<td></td>
</tr>
<tr>
<td>Weight Room (PE6), breathing zone, west</td>
<td>1.10</td>
</tr>
<tr>
<td>Weight Room (PE6), breathing zone, center</td>
<td>1.15</td>
</tr>
<tr>
<td>Weight Room (PE6), breathing zone, east</td>
<td>1.25</td>
</tr>
<tr>
<td>Weight Room (PE6), floor level, west</td>
<td>1.00</td>
</tr>
<tr>
<td>Weight Room (PE6), floor level, center</td>
<td>1.12</td>
</tr>
<tr>
<td>Weight Room (PE6), floor level, east</td>
<td>1.22</td>
</tr>
<tr>
<td>Weight Room (PE6), floor level, center at damaged area</td>
<td>0.96</td>
</tr>
<tr>
<td>Weight Room (PE6), at sound absorbing panels, northeast</td>
<td>1.11</td>
</tr>
<tr>
<td>Weight Room (PE6), at sound absorbing panels, northwest</td>
<td>0.89</td>
</tr>
<tr>
<td>Weight Room (PE6), at sound absorbing panels, south</td>
<td>0.96</td>
</tr>
<tr>
<td><strong>Ventilation on, Fans on, 86°F, 2:30pm</strong></td>
<td></td>
</tr>
<tr>
<td>Weight Room (PE6), breathing zone, west</td>
<td>0.96</td>
</tr>
<tr>
<td>Weight Room (PE6), breathing zone, center</td>
<td>0.97</td>
</tr>
<tr>
<td>Weight Room (PE6), breathing zone, east</td>
<td>1.22</td>
</tr>
<tr>
<td>Weight Room (PE6), floor level, west</td>
<td>0.97</td>
</tr>
<tr>
<td>Weight Room (PE6), floor level, center</td>
<td>0.99</td>
</tr>
<tr>
<td>Weight Room (PE6), floor level, east</td>
<td>1.11</td>
</tr>
<tr>
<td>Weight Room (PE6), floor level, center at damaged area</td>
<td>0.95</td>
</tr>
<tr>
<td>Weight Room (PE6), at sound absorbing panels, northeast</td>
<td>1.08</td>
</tr>
<tr>
<td>Weight Room (PE6), at sound absorbing panels, northwest</td>
<td>0.97</td>
</tr>
<tr>
<td>Weight Room (PE6), at sound absorbing panels, south</td>
<td>0.977</td>
</tr>
<tr>
<td>Outdoors, north of Gymnasium</td>
<td>0.0</td>
</tr>
<tr>
<td>Zinfandel building, breathing zone, various areas</td>
<td>0.0</td>
</tr>
<tr>
<td>Zinfandel building, adjacent to equipment, various areas</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>OEHHA REL Acute</strong></td>
<td>0.6</td>
</tr>
<tr>
<td><strong>OEHHA REL 8-hour</strong></td>
<td>0.06</td>
</tr>
<tr>
<td><strong>OEHHA REL Chronic</strong></td>
<td>0.03</td>
</tr>
</tbody>
</table>

**NOTES:**
- **OEHHA REL** – Office of Environmental Health Hazard Assessment, Recommended Exposure Limit
Bulk samples of the concrete slab, sound absorbing panels and spray-applied fireproofing were collected from the Gymnasium Weight Room and analyzed for mercury content. Results are summarized in Table 2 below. Laboratory reports and chain of custody documents are presented in Appendix D.

<table>
<thead>
<tr>
<th>Material / Location</th>
<th>Mercury Concentration (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete slab (below rubberized flooring), Southeast</td>
<td>15</td>
</tr>
<tr>
<td>Concrete slab (below rubberized flooring), Southwest</td>
<td>9.9</td>
</tr>
<tr>
<td>Concrete slab (below rubberized flooring), Northwest</td>
<td>7.8</td>
</tr>
<tr>
<td>Concrete slab (below rubberized flooring), Northeast</td>
<td>20</td>
</tr>
<tr>
<td>Sound absorbing panel, North wall, east side</td>
<td>1.2</td>
</tr>
<tr>
<td>Spray-applied fire proofing, ceiling deck at east wall</td>
<td>14</td>
</tr>
</tbody>
</table>

It should be noted that no applicable regulations currently exist that identify acceptable levels of mercury in the building materials sampled. The analysis of these samples was intended to assist SSU to evaluate the presence or absence of mercury in building materials and to assist in planning for flooring replacement activities.

**Recommendations**

The building owner should consider consulting with an appropriately qualified hazardous materials contractor to remove and dispose of the mercury-containing flooring followed by cleaning and ventilation of the Gymnasium Weight Room prior to reoccupancy. It is unknown at this time what impact, if any, the presence of mercury in porous and semi-porous building materials may have on potential occupant exposure following removal of the rubberized flooring and cleaning/ventilation.

**Limitations**

This investigation is limited to the conditions and practices observed and information made available to FACS. The methods, conclusions and recommendations provided are based on FACS’ judgment, expertise and the standard of practice for professional service. They are subject to the limitations and variability inherent in the methodology employed. As with all environmental investigations, this investigation is limited to the defined scope and does not purport to set forth all hazards, nor indicate that other hazards do not exist.
Please do not hesitate to contact our offices at 916-726-1303 with any questions or concerns. Thank you for the opportunity to assist Sonoma State University in promoting a more healthful environment.

Respectfully,

FORENSIC ANALYTICAL (FACS)

David Brinkerhoff, CIH, CIEC
Director, Sacramento

Reviewed by:

FORENSIC ANALYTICAL (FACS)

Sylvia Fontes, CIH
Senior Project Manager
Appendix A

Summary of Exposure Reference Levels

- California Office of Environmental Health Hazard Assessment (OEHHA) Non-Cancer Reference Exposure Levels (RELs)
  - OEHHA RELs present the concentration at or below which no adverse health effects are anticipated for the specified time in the general human population. These levels were developed as part of the Air Toxics Hot Spots Program. RELs are based on the most sensitive relevant adverse health effect reported in the medical and toxicological literature; they are designed to protect the most sensitive individuals in the population by the inclusion of margins of safety. OEHHA reports three categories of REL: chronic, acute, and inhalation, which are further described below:

  - **Chronic:** intended to protect individuals with low susceptibility for chemical injury as well as identifiable sensitive subpopulations (high-risk individuals) from adverse health over a lifetime of exposure to a particular hazard.

  - **Acute:** intended to protect individuals with low susceptibility for chemical injury as well as identifiable sensitive subpopulations (high-risk individuals) from adverse health due to acute exposure to a particular hazard. The Acute REL is based on the lowest available severity level derived from acute exposure studies. The target exposure averaging time period for evaluation using the Acute REL is 1 hour.

  - **8-hour Inhalation:** intended to protect individuals with low susceptibility for chemical injury as well as identifiable sensitive subpopulations (high-risk individuals) from adverse health due to exposure to a particular hazard. The 8-hour inhalation REL is based on the lowest available severity level derived from exposure studies. The target exposure averaging time period for evaluation using the Acute REL is 8 hours.

  - Source: [http://oehha.ca.gov/air/allrels.html](http://oehha.ca.gov/air/allrels.html)
Appendix B

Calibration Certificate

ARIZONA INSTRUMENT LLC
3375 N. Delaware St, Chandler, AZ 85225
(800) 528-7411 • (602) 470-1414
www.azic.com • customerservice@azic.com

FA00850

Certification of Instrument Calibration

RMA #: 2259206

ECO Rental Solutions LLC
75 Rockwood Street
Rochester, NY 14610

This is to certify that the Jerome J405-0007 Gold Film Mercury Analyzer, Serial Number 40500947, with Sensor Number 12-12-7-52C, was calibrated with standard units traceable to NIST.

Calibration Status as Received: In Calibration

<table>
<thead>
<tr>
<th>Actual</th>
<th>Calibration Gas</th>
<th>Allowable Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>In:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>23.46 ug/m3 Hg</td>
<td>25.00 ug/m3 Hg</td>
</tr>
<tr>
<td>Out:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>24.46 ug/m3 Hg</td>
<td>25.00 ug/m3 Hg</td>
</tr>
<tr>
<td>RSD %</td>
<td>0.90</td>
<td></td>
</tr>
</tbody>
</table>

Calibration Status as Left: In Calibration

Estimated Uncertainty of Calibration System: 3.5%

Calibration Date: 24-Aug-2015 Recalibration Date: 23-Aug-2016

Temperature °F: 73.40 Relative Humidity: 36.30

Approved By: [Signature]
Title: Johnny Padilla • Quality Control

Date Approved: 24-Aug-2015

Equipment Used:
- Permeation Tube: 098-45459 NIST #: INCI127712; 07953-497-00019
  Calibration Date: 09-Dec-2014 Calibration Date Due: 09-Dec-2015
- DynaCalibrator: N-1998 NIST #: 14-2484
  Calibration Date: 10-Nov-2014 Calibration Date Due: 11-Nov-2014
- Digital Multimeter: 7662034 NIST #: 2000010
  Calibration Date: 23-Feb-2015 Calibration Date Due: 23-Feb-2016
- Flowmeter: 256211-2 NIST #: 150011352211_000
  Calibration Date: 11-May-2014 Calibration Date Due: 11-May-2016

Calibration Procedure Used: 73B-0123

Arizona Instrument certifies that the above listed instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracy are traceable to the NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY within the limitations of the instrument's calibration service, or have been derived from accepted values of national physical standards, or have been derived from the above type of self-calibration techniques.

Disclaimer: Any unauthorized adjustments, removal or breaking of QC seals, or other relevant modifications to any Jerome Analyzer WILL VOID this calibration. Because any of the above can affect the calibration and readings of the instrument, their certification will no longer be valid and, for Arizona Instrument LLC, it will not be responsible for any inspection caused as a result of using the instrument after such adjustment, and then removed, or modifications. As long as a functional test is within range, according to the procedure outlined in the Operator’s Manual, the instrument is performing correctly.

This document shall not be reproduced, stored in full, without the prior approval of Arizona Instrument.
Representative Photographs
Appendix D

Laboratory Report and Chain of Custody Document
# Metals Analysis of Bulks - TTLC

Forensic Analytical Consulting Svcs  
David Justin Brinkerhoff  
7625 Sunrise Blvd.  
Suite 104  
Citrus Heights, CA 95610

---

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Lab Number</th>
<th>Analyte</th>
<th>Result</th>
<th>Units</th>
<th>Reporting Limit*</th>
<th>Method Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>30907-01</td>
<td>30748821</td>
<td>Hg</td>
<td>15</td>
<td>mg/kg</td>
<td>0.9</td>
<td>EPA 7471A</td>
</tr>
<tr>
<td>30907-02</td>
<td>30748822</td>
<td>Hg</td>
<td>9.9</td>
<td>mg/kg</td>
<td>0.9</td>
<td>EPA 7471A</td>
</tr>
<tr>
<td>30907-03</td>
<td>30748823</td>
<td>Hg</td>
<td>7.8</td>
<td>mg/kg</td>
<td>0.9</td>
<td>EPA 7471A</td>
</tr>
<tr>
<td>30907-04</td>
<td>30748824</td>
<td>Hg</td>
<td>20</td>
<td>mg/kg</td>
<td>3</td>
<td>EPA 7471A</td>
</tr>
<tr>
<td>30907-05</td>
<td>30748825</td>
<td>Hg</td>
<td>1.2</td>
<td>mg/kg</td>
<td>0.2</td>
<td>EPA 7471A</td>
</tr>
<tr>
<td>30907-06</td>
<td>30748826</td>
<td>Hg</td>
<td>14</td>
<td>mg/kg</td>
<td>0.9</td>
<td>EPA 7471A</td>
</tr>
</tbody>
</table>

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Daniele Siu, Laboratory Supervisor, Hayward Laboratory

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