December 13, 2017

Clemson University
310 Klugh Avenue
Clemson, South Carolina 29634

Attn: Mr. W. Robert Newberry, IV
E-mail: wnewber@clemson.edu

Re: Limited Mercury Vapor Screening Report
Long Hall – Rooms B25 and B36
Clemson, South Carolina
Terracon Project No. 86127158 – Task 117

Dear Mr. Newberry:

Terracon Consultants, Inc. (Terracon) conducted a limited mercury vapor investigation in rooms B25 and B36 in Long Hall on the main campus of Clemson University, Clemson, South Carolina. The rooms are vacant and may be renovated in the near future. This service was conducted in general accordance with our Master Service Agreement with Clemson University.

PROJECT DESCRIPTION

Scope of Services

At the request of Clemson University, Terracon representatives Mr. Stephen Ellis and Mr. Benjamin Hestir conducted a limited mercury vapor investigation in Rooms B25 and B36 on the southeastern corner of Long Hall on December 1, 2017. The rooms are approximately 20' by 25' and 27' by 42', respectively. Access to the rooms, both of which are partially below ground, is via a doorway within a small stairwell on the southeast corner of the U-shaped building.

The rooms have reportedly been used as laboratories for several decades by the Clemson University Entomology Department.

Standard of Care

This limited mercury vapor investigation was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. Terracon did not attempt to identify every potential exposure or hazard present in the subject building. The results, findings, conclusions and recommendations expressed in this report are based on conditions observed during our sampling. Many factors,

such as weather conditions, building occupancy and ventilation patterns, can affect the conditions observed. The information contained in this report should not be relied upon to represent conditions that existed prior to or after this sampling. Terracon does not warrant the services of regulatory agencies, laboratories or other third parties supplying information that may have been used in the preparation of this report.

INVESTIGATION CRITERIA AND METHODS

Mercury Vapor Sampling

Mercury vapor in air concentrations were measured using a Jerome J405-0007 (Jerome) mercury vapor analyzer provided and calibrated by Pine Environmental equipment rentals of Lilburn, Georgia. The Jerome instrument has a detection limit for mercury vapor of 0.5 micrograms per cubic meter of air (µg/m^3). The Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for mercury vapor is 100 µg/m^3 and the National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL) is 50 µg/m^3. In addition, the American Congress of Governmental Industrial Hygienists (ACGIH) has established a threshold limit value (TLV) for elemental mercury of 25 µg/m^3.

The purpose of this sampling is to determine if mercury contamination exists in the rooms. Sampling conducted in two phases. In the first phase, the rooms were screened for mercury vapor starting at the entry door and then proceeding on a grid pattern in each room to determine if mercury vapor was present at levels exceeding the PEL, REL or TLV limits. Screening was performed at both breathing zone height and at floor level.

Once the initial air screening was complete, surface samples of dust and dirt accumulations were screened for mercury by wiping a two square foot area on the tile flooring using Ahlmstrom qualitative filter papers in effort to determine contamination. The water dampened filter papers were placed in a clean Pyrex container and closed with a plastic lid and heated on a hot plate until water vapor was observed. The container was then removed from the hot plate and a measurement was made with the Jerome instrument of the vapor in the headspace of the Pyrex container. This heating process was performed to liberate mercury vapor to determine if mercury contamination existed.

FINDINGS

General Observations

- The two rooms being investigated appear to have been vacant for an extended period.
- The walls of the rooms are brick with the remaining flooring consisting of 1’ by 1’ floor tile on a concrete slab.

- Various pieces of old lab/office equipment remain in the rooms (desks, storage cabinets, sterilizers, chairs).
- Based on damage to the flooring, water infiltration appears to be an issue, although no standing water was observed. Soil was also observed in the room, most likely from water infiltration at the exterior stair entrance.
- One area on the south side of Room B25 which was partitioned from the rest of the room was not part of our scope of work for this screening.
- Two smaller rooms located immediately adjacent to Rooms B36 were not part of our scope of work for this screening.
- Photographs from the assessment are attached.

Initial Air Screening Results

Air screening readings were made at breathing zone and floor levels in each grid within the two rooms being assessed. Results in Grids 2 and 4 ranged from 0.55 to 0.72 ug/m^3 in Room B25. Results in Grids 1 and 3 did not detect mercury.

All of the initial air screening measurements in Room B36 did not detect airborne mercury. The grids in both rooms are shown on the attached Exhibit 1.

Mercury Floor Wipe Vapor Sampling Results

The results of the mercury vapor sampling from the floor wipes are presented in Table 1 below. Please note the wipe samples were heated in a controlled manner to liberate mercury vapor to determine if mercury contamination existed. The results are not an indicator of true mercury concentration, but an indicator to screen for contamination. These results were recorded from the Jerome instrument as previously described. The grids and floor wipe sample locations are shown on the attached Exhibit 1.

Table 1 – Mercury Floor Wipe Vapor readings – December 1, 2017

Location/Sample #	Result (ug/m3)
Room B25 – Grid 1	2.91
Room B25 – Grid 2	40.90
Room B25 – Grid 3	11.72
Room B25 – Grid 4	0.87
Room B36 – Grid 1	4.31
Room B36 – Grid 2	<0.5
Room B36 – Grid 3	15.92
Room B36 – Grid 4	93.06
Room B36 – Grid 5	0.88
Room B36 – Grid 6	<0.5

Mercury vapor was detected in eight of the ten readings made.

CONCLUSIONS

The following conclusions are provided based on our investigation:

- Based on current air testing in the breathing zone and at floor levels, the mercury vapor levels do not exceed the OSHA PEL or ACGIH TLV.
- Based on our screening from surface samples, the floors of these two rooms are contaminated with mercury from their long term usage as laboratories.

RECOMMENDATIONS

The following recommendations are provided based on our investigation:

- Access to this space should be limited and a remediation plan should be developed. Remediation of the mercury contamination should be conducted prior to additional work by untrained or unprotected workers in these rooms. Adjacent rooms should be included in the plan to determine any tracking.
- Post-remedial testing and testing during remediation efforts should be conducted with an Ohio Lumex RA15+ to achieve better detection limits (i.e. – in the nanograms/m^3 range).
  - Surface mercury vapor levels for items to remain must be less than 1000 nanograms/m^3.
  - Surface mercury vapor levels for items to be disposed must be less than 10,000 nanograms/m^3.
- The wastestream should be tested via Toxicity Characteristic Leaching Procedure (TCLP) to determine if the material meets the definition of a hazardous waste.
  - Screening levels; anything with surface mercury vapors over 10,000 nanograms/m^3 must be cleaned and retested. Items testing above 15,000 nanograms/m^3 will generally fail TCLP.
- All wastes generated should be handled according to the waste disposal policies of Clemson University.

Terracon appreciates the opportunity to provide this service to Clemson University. If you have any questions regarding this limited mold investigation report, please contact the undersigned at 864-292-2901.

Sincerely,
Terracon Consultants, Inc.

Benjamin Hestir, P.E.
Project Industrial Hygienist

Jeffrey A. Gurrie
Senior Industrial Hygienist

Attachments: Photographs
Exhibit 1 – Sample Location Diagram

Photographs



Photo #1 View of N end of Room B25 from entrance looking E



Photo #2 View of Room B25 looking to SE corner



Photo #3 View of Room B25 looking to SW corner



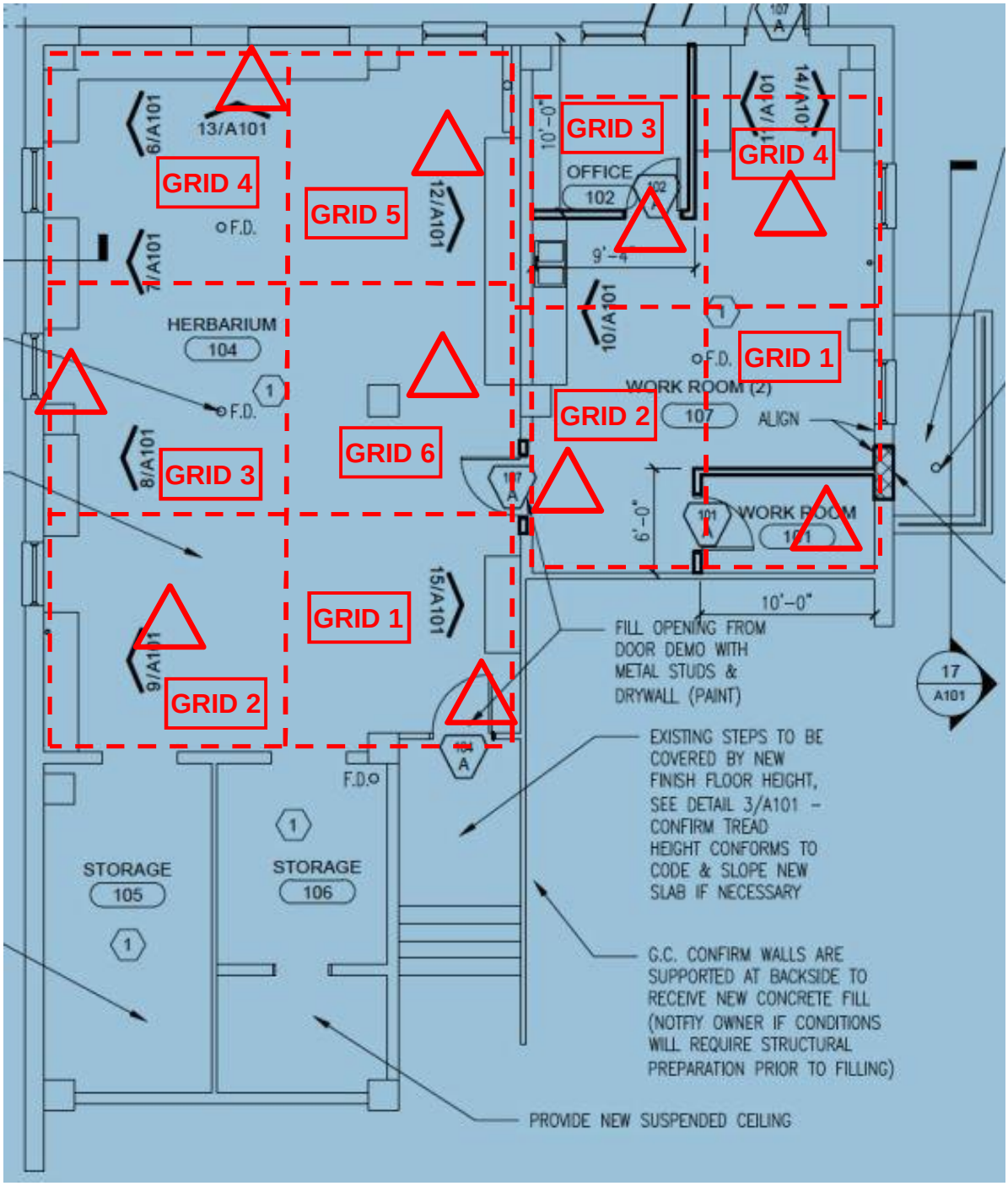
Photo #4 View of Room B36 looking south



Photo #5 View of damaged floor tile in Room B36

Sample Location Diagram

Room B36 Room B25



– – – · = Sampling grid

△ = Mercury vapor sampling location

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mgr. BDH Drawn by: BDH Checked by: JAG Approved by: JAG	Project No. 86127158 – Task 119 Scale: Not to Scale File Name: Exhibit 1 Date: December 13, 2017	Terracon Consulting Engineers & Scientists 72 Pointe Circle Greenville, South Carolina 29615 PH. (864) 293- FAX. (864) 293-6361	SAMPLE LOCATION DIAGRAM Long Hall Rooms B25 and B36 CLEMSON UNIVERSITY CLEMSON, SOUTH CAROLINA	Exhibit 1