



## **INDOOR AIR QUALITY PID INVESTIGATION REPORT**

*Conducted for:*

Glen Rock Board of Education  
620 Harristown Road  
Glen Rock, New Jersey 07452

*Conducted at:*

Glen Rock High School-Media Center  
400 Hamilton Avenue  
Glen Rock, New Jersey 07452

*Submitted by:*

McCabe Environmental Services, L.L.C.  
464 Valley Brook Avenue  
Lyndhurst, New Jersey 07071

**DATE:** October 31, 2016

**MES PROJECT NO.:** 16-03071

*Prepared by*

*&*

*Signed for The Company by:*

A handwritten signature in blue ink, appearing to read "John H. Chiaviello", is written over a white background.

**John H. Chiaviello  
Vice President**

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**1.0 INTRODUCTION**

McCabe Environmental Services, L.L.C. (McCabe) was retained by Glen Rock Board of Education to conduct an indoor air quality investigation at the High School Media Center in order to determine the source of the slightly elevated Volatile Organic Compounds (VOCs) detected in McCabe’s previous TO-15 testing.

The project information is as follows:

Client Name: Glen Rock Board of Education  
Contact Person: Ms. Sandy Marinos

Project Name: Indoor Air Quality Investigation  
Project Location: Glen Rock High School  
400 Hamilton Avenue  
Glen Rock, New Jersey 07452

Date(s) of Service: October 3, 2016

McCabe Investigator: Lauren C. Adrion and John H. Chiaviello

**2.0 SCOPE OF WORK**

This indoor air quality investigation took place at the Glen Rock High School located at 400 Hamilton Avenue, Glen Rock, New Jersey 07452. The area of concern included the Media Center where employee complaints have originated and previous testing was performed by McCabe. Previous testing included USEPA TO-15 sampling on August 18, 2016 and NJDEP Low Level TO-15 sampling on September 16, 2016. The results of the previous testing were included in McCabe’s initial reports dated September 2, 2016 and October 3, 2016 respectively.

The Media Center includes a large open room that contains books, computers, tables and chairs, as well as several other smaller rooms such as the Media Office, Viewing Room, Computer Lab A and several storage closets. Upon first entry into the Media Center there is an Upper Lobby with a small pipe chase below the false floor. There is a middle level located down a small staircase or ramp that includes high ceilings and a skylight as well as a lower level located down a second set of stairs where additional books are stored on shelves. The Media Center and associated rooms have low pile commercial carpeting glued to a concrete slab floor, gypsum board walls, suspended acoustic ceiling tiles and normal library furnishings. The heating, air conditioning and ventilation (HVAC) consists of a forced air system with ducted supply vents and an open return plenum. The air handlers are located on the roof directly above the Media Center. No new materials have been installed in the Media Center in the recent past.

The day of the investigation had fair weather; about 70-75°F, 55% humidity, light to no wind and barometric pressure was about 30.0 inches of mercury (“Hg).

To conduct the indoor air quality investigation, McCabe completed the following:

- Collected direct measurements of VOCs in the Media Center, adjacent Nurse’s Office, nearby hallways, proximate Old Rifle Range as well as outside the building.
- Inspected the ceiling plenums and storage areas of the Media Center to potentially identify source of VOCs.
- Reviewed Safety Data Sheets (SDSs) for all products used within the Media Center.

### **3.0 PROCEDURES**

The following procedures and methods were utilized during this indoor air quality investigation:

#### Volatile Organic Compounds (VOCs)

Direct readings of VOCs were recorded with a photoionizing detector (PID) ppbRAE 3000 digital instrument (Model PGM-7340, Serial# 594-905035). This particular PID comes standard with a 10.6eV lamp that measures total VOCs. The instrument has a range of one part per billion (1 ppb) to ten thousand parts per million (10,000 ppm). The PID was pre-calibrated by the supplier, Pine Environmental, on September 30, 2016 using a zero and standard reference gas (10 ppm of isobutylene).

The concentration of VOCs can be read directly in the field and can either be logged manually or logged by the instrument. During this investigation McCabe manually logged the VOC concentration as a survey of the areas was performed. A total of seventy-three (73) readings were collected between 1:00PM and 5:00PM.

Readings were collected from within the breathing zone (5 feet off floor), along the carpet and inside the ceiling plenum. The locations throughout the High School that were tested include the following:

- Media Center
- Small Storage Closet
- Viewing Room
- Media Office and Rear Storage Room
- Computer Lab A
- Hallway by Media Center
- Nurse's Office
- Hallway by Attendance Office
- Attendance Office
- Old Rifle Range
- Outside (front of building)
- Outside (main courtyard)
- Outside (near old oil tank)

### **4.0 RESULTS AND DISCUSSION**

#### Visual and Sensory Inspection

Visual inspection of the interior spaces of the Media Center found that the area was generally well kept and clean. The main areas of the Media Center did not contain any items that would increase airborne VOCs. However, inspection of the storage closets found book bindings, glues, inks and other general-use items that may produce VOCs. However, it is not believed that these materials would result in an overall VOC level as detected during the previous air testing.

Inspection of the ceiling plenum found excessive amounts of debris (mostly foam insulation), likely left over from the roof replacement that occurred several years prior. This insulation debris was evident at and below roof drains and suspected of being disturbed during the roof replacement that occurred in 2011. No obvious sources of VOCs were visually observed in the ceiling plenum.

The interior surfaces of the supply ducts and air handler were not inspected during this site visit. However it was reported by the maintenance personnel that at the time of our testing the air handler was set at 100% return air; or minimal outside air. It was also reported that the entire system was professionally cleaned and disinfected in June 2011.

### Volatile Organic Compound Measurements

Air testing was conducted from approximately 1:00PM to 5:00PM. Upon first arrival to the Media Center and Media Office (when the HVAC system had been off) VOC concentrations ranged from 0 - 47 ppb. The HVAC system was then turned on and several additional readings were collected from the Media Center and ceiling plenum as well as the Storage Closets, Viewing Room, and Computer Lab A. Measurements in the breathing zone of the Media Center ranged from 44 – 112 ppb with the HVAC system on. Measurements within the ceiling plenum of the Media Center ranged from 60 – 155 ppb.

The Small Storage Closet near the Upper Lobby had ambient concentrations of 96 – 103 ppb. The highest reading collected in this room was directly inside a box of book jackets and tape (121 ppb). This Small Storage Closet also had a hatch that leads to a pipe chase below the floor of the Upper Lobby. VOC readings within this pipe chase were 0 ppb. The Viewing Room had an ambient VOC reading of 71 ppb. The Computer Lab A had a reading of 108 – 116 ppb. The Computer Lab A has a separate air handler than the remaining areas of the Media Center and associated rooms.

Other miscellaneous readings were collected from various contents and furnishings. While holding the PID's sensor near an old (1950s) book and flipping the pages, a reading of 123 ppb was detected. When the PID's sensor was put near the electrical outlet holes in the concrete slab floor of the Media Center, a reading of 119 – 124 ppb was detected. While investigating a press-board cabinet located in the Media Center, the PID detected 105 ppb within the cabinet with the doors closed resulting in minimal air flow.

Other areas of the High School were also investigated. In three (3) different locations outside the building (front near road, main courtyard, and near old oil tank) the VOC readings were all 0 ppb. Measurements collected from within the Nurse's Office, Hallway by Media Center, Hallway by Attendance Office, inside Attendance Office, and the Old Rifle Range all detected 0 ppb of VOCs.

There are no accepted standards available for total VOCs. However, the concentration of total VOCs measured in the Media Center with the PID were similar to the concentration of total VOCs measured during both TO-15 samplings (110 – 130 ppb). These results suggest that the majority of compounds detected during the TO-15 sampling were also detected by the PID. Since the results were all in the part per billion level, it can be concluded that all readings were well below any Occupational Safety and Health Administration (OSHA) Permissible Exposure Levels (PELs) which are typically measured at the part per million level.

### Review of the Safety Data Sheets

No Safety Data Sheet (SDS) or Material Safety Data Sheet (MSDS) provided to McCabe for review contained the compound 1,2,4-Trimethylbenzene (1,2,4 T). This compound was of particular concern due to its elevated concentration during both TO-15 sampling events. However, there were several products that contained petroleum distillates or other petroleum-based products which may also produce a gasoline- or kerosene-like odor. These products included: Baseboard Stripper and Cleaner, Solvent Based Stainless Steel Cleaner, and Yield.

Additionally, several products contain isopropyl alcohol which was another compound that had elevated concentrations during the TO-15 sampling. These products included: Encapsulation Cleaner ES93+, BioShine, CaviWipes, and Blue Wizzard.

No SDS or MSDS contained any known carcinogens or mutagens.

## **5.0 DISCUSSION & RECOMENDATIONS**

This indoor air quality investigation confirmed that the total VOCs present in the Media Center were at the range detected during the previous testing. We have also identified that the concentrations are higher in the Media Center than in other locations of the High School or outdoors. These results suggest that there may be a hidden source of VOCs within the Media Center or there may not be enough fresh air being delivered to the Media Center via the HVAC system.

The direct reading measurements within the Media Center were not able to identify the exact source of the ambient VOCs. However, readings were slightly higher in the areas where book binding materials, such as spines, tapes, glues, and inks were stored. These readings were on the part per billion level and do not suggest a health threat. Additionally, a review of the SDSs and MSDSs provided to McCabe by Glen Rock Facilities failed to find any products with especially hazardous ingredients or the target compound of concern 1,2,4-Trimethylebenzene.

McCabe has also contacted both the US EPA and New Jersey Department of Health (NJDOH) regarding the levels of VOC's detected, the 1,2,4T concentration and the EPA's Regional Screening Levels (RSL's). The EPA's RSL's for 1,2,4 T Residential Air Levels are very low at 0.73  $\mu\text{g}/\text{m}^3$  and is based on a Provisional Peer Reviewed Toxicity Value (PPRTV). PPRTV's are a second tier value and specifically developed for the Superfund Program. The PPRTV for 1,2,4 T is based on one very limited inhalation study in humans in 1958 and inhalation studies on animals. All studies were conducted at exposure in the 10-250 parts per million (ppm) range and don't seem to be appropriate for the determination of a level in our setting of a Library. We have posed this question to the EPA's Office of Land and Emergency Management, in Washington DC responsible for the RSLs. We have not yet received an answer but will forward their response if and when we receive one.

We spoke with Keith Bobrowski (609-984-3935) and Gary Centifonti, Acting Director of NJ DOH PEOSH (609-984-1863) regarding the air sample results in the Media Center. They informed us that the compounds we detected (specifically 1,2,4 T) is not uncommon or unusual and they often see that chemical at the levels we detected. They also stated that the USEPA Residential Standard is very aggressive and a bit unrealistic and hard to comply with. However, they did state that they ran the chemical through their risk modeling software and found that at the highest level detected (180  $\mu\text{g}/\text{m}^3$ ) it is predicted that there would be an increased risk of occupants to experience "non-cancer health effects". They also confirmed that the compound is not a carcinogen.

I explained to them what we have done to date, air testing, visual and PID investigation and they agreed we have done what we should have in searching for the source. The NJDOH agrees that the source must be from within the facility but offered no additional suggestions or testing methods. Their recommendations would be exactly what we have suggested; try to find the source and in the meantime ventilate the space.

Based on the testing and investigation work conducted to date, it is prudent and recommended to increase the percent of fresh air to Media Center. By increasing the percent fresh air it should reduce the overall VOC concentrations. Increasing the percent fresh air can also result in an increase cost to heat and/or cool the air. Additionally the relative humidity may have to be addressed. If elevated relative humidity becomes an issue, or the cost to heat/cool is prohibitive the installation of an activated carbon or charcoal filter within the air handler system may be an appropriate solution to reducing VOCs and should be investigated with an HVAC contractor.

**APPENDIX A**

**PID  
CALIBRATION CERTIFICATE**

# INSTRUMENT CALIBRATION REPORT



**Pine Environmental Services, LLC.**

92 North Main St, Building 20  
Windsor, NJ 08561  
Toll-free: (800) 301-9663

## Pine Environmental Services, Inc.

**Instrument ID** 27267  
**Description** PPBRAE 3000  
**Calibrated** 9/30/2016 4:49:42PM

<b>Manufacturer</b> Rae Systems	<b>State Certified</b>
<b>Model Number</b> PGM-7340	<b>Status</b> Pass
<b>Serial Number/ Lot Number</b> 594-905035	<b>Temp °C</b> 23.4
<b>Location</b> New Jersey	<b>Humidity %</b> 51
<b>Department</b>	

### Calibration Specifications

<b>Group #</b> 1		<b>Range Acc %</b> 0.0000					
<b>Group Name</b> Isobutylene		<b>Reading Acc %</b> 3.0000					
<b>Stated Accy</b> Pct of Reading		<b>Plus/Minus</b> 0.000					
<b>Nom In Val / In Val</b>	<b>In Type</b>	<b>Out Val</b>	<b>Out Type</b>	<b>Fnd As</b>	<b>Lft As</b>	<b>Dev%</b>	<b>Pass/Fail</b>
10.000 / 10.000	PPM	10.000	PPM	10.000	10.000	0.00%	Pass
0.000 / 0.000	PPM	0.000	PPM	0.000	0.000	0.00%	Pass

### Test Instruments Used During the Calibration

(As Of Cal Entry Date)

<u>Test Standard ID</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Serial Number / Lot Number</u>	<u>Last Cal Date/ Expiration Date</u>
NJ 10PPM - 460405	NJ ISO 10ppm - 460405	Calgaz	GP11006	460405	9/12/2016 4/24/2017

### Notes about this calibration

**Calibration Result** Calibration Successful  
**Who Calibrated** Silas Saye

All instruments are calibrated by Pine Environmental Services, LLC. according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

**Notify Pine Environmental Services, LLC. of any defect within 24 hours of receipt of equipment  
Please call 866-960-7463 for Technical Assistance**