



**McCABE**  
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## INDOOR AIR QUALITY INVESTIGATION REPORT

***Conducted for:***

Green Brook Township Public Schools  
132 Jefferson Avenue  
Green Brook Township, New Jersey 08812

***Conducted at:***

Irene E. Feldkirchner  
105 Andrew Street  
Green Brook Township, New Jersey 08812

***Submitted by:***

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

**REPORT DATE:** July 28, 2023

**MES PROJECT NO.:** 23-04566

***Prepared by:***

**Gerard D'Alessio**  
**Environmental Scientist**

***Signed for the Company by:***

**John H. Chiaviello**  
**Vice President**

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Carbon Dioxide, Carbon Monoxide,  
Temperature, & Relative Humidity

**1.0 INTRODUCTION**

McCabe Environmental Services, L.L.C. (McCabe) was retained by Green Brook Township Public Schools (Client) to conduct an indoor air quality general investigation at Irene E. Feldkirchner in order to determine the general air quality of the school.

The project information is as follows:

Client Name: Green Brook Township Public Schools  
Contact Person: Mr. Jason Weber

Project Name: Irene E. Feldkirchner - Indoor Air Quality General Investigation  
Project Location: Irene E. Feldkirchner  
105 Andrew Street  
Green Brook Township, New Jersey 08812

Date(s) of Service: June 23, 2023 & June 28, 2023

McCabe Investigator: Gerard D’Alessio

**2.0 SCOPE OF WORK**

This indoor air quality investigation took place at the Irene E. Feldkirchner located at 132 Jefferson Avenue, Green Brook Township, New Jersey. The Irene E. Feldkirchner is a one-story structure with a layout that consists of separate rooms and facilities connected by hallways. The school is separated into 100, 200 and 300 labeled wings. The weather at the time of the first investigation date of June 23, 2023 was 74.2°F, raining, with light winds, and a barometric pressure of 30.01 inches, and June 28 was 78.2, Cloudy, and a barometric pressure of 29.78 inches.

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

- Collected direct measurements of carbon monoxide, carbon dioxide, relative humidity, and temperature throughout Irene E. Feldkirchner.
- Performed a visual inspection of classrooms, offices, hallways, and other special purpose rooms.

**3.0 PROCEDURES**

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

Carbon Dioxide, Carbon Monoxide, Temperature, and Relative Humidity

Direct readings of carbon dioxide, carbon monoxide, temperature, and relative humidity were recorded with a TSI IAQ-Calc digital instrument (Model 7545, Serial# T75450852006). The level of each tested parameter is read directly in the field and can either be logged manually or logged by the instrument. Elevated levels of carbon dioxide can be an indication that a room or group of rooms is receiving an adequate exchange of air throughout the day and that other chemicals may also be building up over the course of the day. Elevated levels of carbon monoxide usually occur as a result of inadequate exhausting of a combustion source.

#### **4.0 RESULTS AND DISCUSSION**

##### Carbon Dioxide and Carbon Monoxide

Air testing was conducted on June 23, 2023 & June 28, 2023. The carbon dioxide levels taken in the Irene E. Feldkirchner School were below the Occupational Health and Safety Association (OSHA) health-based permissible exposure limit of 5,000 parts per million (ppm), and therefore do not pose a serious occupational health risk. However, individuals in offices with elevated carbon dioxide, above 800 ppm, often report drowsiness, lethargy, and a sense of stale air. Because the elevated carbon dioxide concentrations are indicative of inadequate exchange of fresh air, other compounds may also be accumulating in the air causing occupant reactions and symptoms. It is the accumulation of these other, unidentified, contaminants which can result in air quality complaints by occupants. The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) recommend that indoor office air carbon dioxide concentrations be maintained at or below 800 ppm. The main source of carbon dioxide in an indoor office environment is human respiration. Therefore, the concentration will tend to rise throughout the day while the office is occupied then decrease overnight.

With respect to carbon monoxide (CO), the compound was not detectable in the air of Irene E. Feldkirchner School. The OSHA Worker Permissible Exposure Limit for CO is 50 ppm time weighted average (TWA) over an 8-hour day. The acceptable level for indoor air quality in an environment for an 8-hour exposure period as established by the World Health Organization is 9.0 ppm. Finally, the EPA's National Ambient Air Quality Standard (Outdoor Air) for CO is also 9.0 ppm. EPA also reports that the average level within a home without a gas stove is between 0.5-5.0 ppm, and levels within homes with gas stoves are often 5-15 ppm and can occasionally be higher.

##### Temperature & Relative Humidity

Relative humidity was also measured with the readings taken on June 23, 2023 & June 28, 2023 at the new Purchasing Department and Procurement Office. ASHRAE Standard 62.1-2013 requires that relative humidity levels be designed to be limited to 65% or less for mechanical systems with dehumidification capabilities. ASHRAE recommends indoor temperatures of between 68.3°F and 74.2°F, the relative humidity level comfortable for 80% of people engaged in largely sedentary activities is between 30-60%. The levels of relative humidity in the four offices were higher than the recommended 30%. Elevated levels of relative humidity can lead to surface mold growth. Mold growth can then lead to indoor air quality complaints.

#### **5.0 CONCLUSION**

Standard IAQ parameters tested include carbon dioxide, carbon monoxide, temperature and relative humidity. Based on the data collected during our site visit the carbon dioxide and carbon monoxide levels were both within acceptable ranges. The temperature and relative humidity readings were close to or slightly above the recommended ASHRAE/ANSI Standards and should be corrected.

In conclusion, based on our visual inspection, along with the data collected, we believe Irene E. Feldkirchner School is safe for occupancy. However prolonged elevated relative humidity can lead to mold growth and mold related air quality complaints.

**APPENDIX A**

**Carbon Dioxide, Carbon Monoxide,  
Temperature, & Relative Humidity**

<b>McCabe Environmental Services, L.L.C</b>	<b>Phone (201) 438-4839</b>
<b>Client: Green Brook Public School</b>	<b>Project No. 23-04566</b>
<b>Project Name: - Irene E. Feldkirchner Radon Testing</b>	<b>Date- 06/23/2023</b>
<b>Property Address: 105 Andrew St, Green Brook Township, NJ 08812</b>	

<b>Indoor Air Quality Testing</b>						
Room/Location	Time	Temperature (°F)	RH %	CO (PPM)	CO <sub>2</sub> (PPM)	Instrument
Outdoor	1400	70.7	79.4	0	250	IAQ-Calc
Entrance hallway	1407	72.4	67.7	0	306	IAQ-Calc
Main office 100	1407	72.6	68.0	0	315	IAQ-Calc
Media Center	1408	72.0	72.2	0	299	IAQ-Calc
Room 102	1409	72.1	65.9	0	265	IAQ-Calc
Room 103	1410	71.8	68.2	0	283	IAQ-Calc
Room 104	1411	72.0	72.0	0	273	IAQ-Calc
Room 106	1411	71.7	68.3	0	266	IAQ-Calc
Room 108	1411	71.7	69.5	0	255	IAQ-Calc

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<b>Indoor Air Quality Testing</b>						
<b>Room/Location</b>	<b>Time</b>	<b>Temperature (°F)</b>	<b>RH %</b>	<b>CO (PPM)</b>	<b>CO<sub>2</sub> (PPM)</b>	<b>Instrument</b>
Room 105	1413	71.7	71.5	0	297	IAQ-Calc
Room107	1414	71.6	71.7	0	263	IAQ-Calc
Janitors	1415	70.5	57.3	0	324	IAQ-Calc
Room 117	1415	71.8	61.8	0	275	IAQ-Calc
Room 119	1416	70.9	72.0	0	296	IAQ-Calc
Room 121	1416	70.6	69.0	0	274	IAQ-Calc
Hallway 2	1417	70.1	70.1	0	265	IAQ-Calc
Room 110	1419	70.2	71.2	0	261	IAQ-Calc
Room 111	1420	70.7	74.0	0	276	IAQ-Calc

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<b>Indoor Air Quality Testing</b>						
<b>Room/Location</b>	<b>Time</b>	<b>Temperature (°F)</b>	<b>RH %</b>	<b>CO (PPM)</b>	<b>CO<sub>2</sub> (PPM)</b>	<b>Instrument</b>
Room 113	1420	70.7	76.4	0	256	IAQ-Calc
Room 112	1421	70.9	73.2	0	275	IAQ-Calc
Boiler Room	1440	72.8	75.2	0	312	IAQ-Calc
Cafferteria	1441	72.8	72.0	0	349	IAQ-Calc
Kitchen	1441	73.8	70.9	0	417	IAQ-Calc
Kitchen office	1441	73.6	68.1	0	353	IAQ-Calc
Room 213	1458	73.5	63.6	0	278	IAQ-Calc
Room 214	1458	73.5	65.4	0	282	IAQ-Calc
Room 212	1459	73.9	66.9	0	289	IAQ-Calc



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<b>Indoor Air Quality Testing</b>						
Room/Location	Time	Temperature (°F)	RH %	CO (PPM)	CO <sub>2</sub> (PPM)	Instrument
Room 211	1459	73.7	63.2	0	295	IAQ-Calc
Room 209	1459	73.7	68.4	0	281	IAQ-Calc
Room 210	1500	73.5	67.4	0	307	IAQ-Calc
Room 208	1500	73.4	67.8	0	350	IAQ-Calc
Room 207	1500	73.5	68.70	0	318	IAQ-Calc
Room 206	1501	73.3	67.5	0	304	IAQ-Calc
Room 205	1501	73.2	66.8	0	288	IAQ-Calc
Room 204	1501	73.2	65.2	0	302	IAQ-Calc
Room 203	1501	73.2	64.3	0	293	IAQ-Calc

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<b>Indoor Air Quality Testing</b>						
<b>Room/Location</b>	<b>Time</b>	<b>Temperature (°F)</b>	<b>RH %</b>	<b>CO (PPM)</b>	<b>CO<sub>2</sub> (PPM)</b>	<b>Instrument</b>
Room 202	1502	72.9	62.6	0	297	IAQ-Calc
Room 201	1502	72.7	61.2	0	289	IAQ-Calc
Room 216	1503	72.4	70.1	0	329	IAQ-Calc
Room 217	1504	72.4	63.6	0	311	IAQ-Calc
Room 215	1504	73.1	71.3	0	318	IAQ-Calc
Special Services D-100	1508	72.5	69.3	0	327	IAQ-Calc
Guidance Office 304	1509	72.4	71.0	0	345	IAQ-Calc
Computer Lab 306	1509	72.6	69.1	0	312	IAQ-Calc
Room 301	1509	72.4	76.4	0	333	IAQ-Calc

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<b>Room/Location</b>	<b>Time</b>	<b>Temperature (°F)</b>	<b>RH %</b>	<b>CO (PPM)</b>	<b>CO<sub>2</sub> (PPM)</b>	<b>Instrument</b>
Room 308 Music Classroom / Stage	1510	70.5	68.4	0	301	IAQ-Calc
Room 303	1511	71.3	78.3	0	317	IAQ-Calc
Room 305 Art	1512	71.5	78.1	0	287	IAQ-Calc
Gymnasium	1513	71.2	80.2	0	337	IAQ-Calc
Gymnasium Office	1515	71.4	80.7	0	339	IAQ-Calc

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<b>Project Name: - Irene E. Feldkirchner Radon Testing</b>	<b>Date - 06/28/2023</b>
<b>Property Address: 105 Andrew St, Green Brook Township, NJ 08812</b>	

<b>Indoor Air Quality Testing</b>						
Room/Location	Time	Temperature (°F)	RH %	CO (PPM)	CO <sub>2</sub> (PPM)	Instrument
Outdoor	1255	78.2	47.5	0	288	IAQ-Calc
Entrance hallway	1258	72.4	35.5	0	381	IAQ-Calc
Main office 100	1258	72.6	36.4	0	383	IAQ-Calc
Media Center	1303	74.2	48.2	0	352	IAQ-Calc
Room 102	1303	73.6	48.2	0	353	IAQ-Calc
Room 103	1303	72.6	42.2	0	352	IAQ-Calc
Room 104	1304	71.9	63.6	0	344	IAQ-Calc
Room 106	1304	71.7	68.3	0	321	IAQ-Calc
Room 108	1307	71.4	70.5	0	321	IAQ-Calc

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<b>Indoor Air Quality Testing</b>						
Room/Location	Time	Temperature (°F)	RH %	CO (PPM)	CO <sub>2</sub> (PPM)	Instrument
Room 105	1307	71.0	69.2	0	312	IAQ-Calc
Room107	1308	70.5	68.7	0	339	IAQ-Calc
Janitors	1309	70.8	50.4	0	340	IAQ-Calc
Room 117	1310	71.7	61.2	0	762	IAQ-Calc
Room 119	1312	71.5	65.3	0	406	IAQ-Calc
Room 121	1314	69.2	64.2	0	333	IAQ-Calc
Hallway 2	1315	69.3	58.3	0	354	IAQ-Calc
Room 110	1316	68.7	66.5	0	372	IAQ-Calc
Room 111	1317	68.3	67.0	0	355	IAQ-Calc

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<b>Room/Location</b>	<b>Time</b>	<b>Temperature (°F)</b>	<b>RH %</b>	<b>CO (PPM)</b>	<b>CO<sub>2</sub> (PPM)</b>	<b>Instrument</b>
Room 113	1318	71.7	76.4	0	337	IAQ-Calc
Room 112	1318	72.0	85.7	0	332	IAQ-Calc
Boiler Room	1322	72.2	68.7	0	335	IAQ-Calc
Cafferteria	1322	72.5	70.5	0	343	IAQ-Calc
Kitchen	1324	72.8	67.5	0	347	IAQ-Calc
Kitchen office	1324	73.0	67.3	0	372	IAQ-Calc
Room 213	1326	73.1	71.3	0	382	IAQ-Calc
Room 214	1326	73.4	70.2	0	328	IAQ-Calc
Room 212	1328	73.3	72.0	0	343	IAQ-Calc

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Room 211	1328	73.5	71.6	0	312	IAQ-Calc
Room 209	1329	73.7	74.2	0	346	IAQ-Calc
Room 210	1330	73.8	75.8	0	352	IAQ-Calc
Room 208	1331	73.5	69.8	0	328	IAQ-Calc
Room 207	1331	71.9	74.3	0	330	IAQ-Calc
Room 206	1332	73.3	70.1	0	308	IAQ-Calc
Room 205	1332	71.8	68.5	0	312	IAQ-Calc
Room 204	1332	73.2	69.8	0	322	IAQ-Calc
Room 203	1334	70.0	54.3	0	322	IAQ-Calc

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Room/Location	Time	Temperature (°F)	RH %	CO (PPM)	CO <sub>2</sub> (PPM)	Instrument
Room 202	1334	69.9	53.8	0	325	IAQ-Calc
Room 201	1334	71.6	53.8	0	335	IAQ-Calc
Room 216	1338	71.4	69.7	0	370	IAQ-Calc
Room 217	1338	71.4	69.6	0	354	IAQ-Calc
Room 215	1338	71.7	75.5	0	378	IAQ-Calc
Special Services D-100	1347	71.9	60.4	0	417	IAQ-Calc
Guidance Office 304	1346	71.4	64.5	0	381	IAQ-Calc
Computer Lab 306	1345	70.9	66.6	0	398	IAQ-Calc
Room 301	1344	69.7	58.9	0	300	IAQ-Calc



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Room 308 Music Classroom / Stage	1343	70.3	61.4	0	295	IAQ-Calc
Room 303	1342	72.1	83.4	0	304	IAQ-Calc
Room 305 Art	1342	69.5	57.1	0	303	IAQ-Calc
Gymnasium	1340	71.6	64.3	0	314	IAQ-Calc
Gymnasium Office	1340	71.7	65.1	0	415	IAQ-Calc