

Report On
Ambient Air Quality Testing

at

Oak Trace Elementary
16504 Oak Ridge Rd, Westfield, IN 46074
and
Cool Creek Elementary
(Formerly Westfield Intermediate)
17710 Shamrock Blvd, Westfield, IN 46074

Prepared on behalf of:

Mr. Brian Kelly CEM, LEED^{AP}
Director of Construction
Westfield Schools
19500 Tomlinson Road, Suite B
Westfield, IN 46074

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pH2 Project 434001

Prepared by:

Andrew A. Havics, CIH, PE, FAIHA
pH2, LLC
5250 East US 36, Suite 830
Avon, IN 46123
(317) 718-7020

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1.0 Introduction

Mr. Andrew Anthony “Tony” Havics of pH2, LLC (pH2) was contacted by Mr. Brian Kelly of Westfield Schools to conduct sampling in order to assess the Air Quality Index (AQI) at two schools: Oak Trace Elementary, 16504 Oak Ridge Rd, Westfield, IN 46074, and Cool Creek Elementary (Formerly Westfield Intermediate), 17710 Shamrock Blvd, Westfield, IN 46074. Cool Creek Elementary will be referred to as Intermediate in this report. Mr. Kelly indicated that parents of the children attending, or about to attend, these schools expressed concerns over the outdoor air quality at the schools, especially with regard to playground areas. The focus was on the closeness of the Intermediate school to Highway 31, compared to lesser vehicle traffic adjacent to Oak Trace. Mr. Havics prepared a proposed scope of work to assess the AQI designations for each school and the concentrations of the pollutants used to generate the AQI on March 9, 2026. Based on that proposal, Mr. Havics conducted an on-site visit the evening of March 23, 2026, to evaluate exact locations for sampling. The sampling was started on March 25, 2026 and completed on April 3, 2026. The meters were downloaded and processed. A preliminary table of the pollutant results and corresponding AQIs was prepared April 10, 2026. Mr. Havics presented on the sampling, results, and conclusions at the Westfield Board Meeting on April 20, 2026. After consideration of questions from the board at this meeting, this report was prepared.

2.0 Background

2.1 Buildings

There are two facilities that were assessed in this study: Oak Trace Elementary, 16504 Oak Ridge Rd, Westfield, IN 46074, and Cool Creek Elementary (Formerly Westfield Intermediate), 17710 Shamrock Blvd, Westfield, IN 46074.

Cool Creek Elementary will be referred to as Intermediate in this report. It is our understanding that the Intermediate School was constructed in 1962 and the main building has been renovated since then. The Intermediate facility is located just west of US highway 31 (see Figures 1 & 3, Appendix A - Maps, and Photo 6, Appendix B - Photos). In 2012, traffic volumes on US 31 were reported to be approximately 27,000 vehicles per day on the section between SR 32 and 146th Street¹. The sampling location is within 40 feet of US 31 and adjacent to the playground (see Figures 1 & 3, Appendix A - Maps, and Photographs 5 & 6, Appendix B - Photos).

The Intermediate facility includes temporary structures (portable classrooms) between the main building and US 31 (not pictured on the maps but shown in Photograph 7, Appendix B - Photos). The playground is located on the northwest corner of the building (See Figure 3, Appendix A - Maps).

It is our understanding that Oak Trace Elementary was opened in the Fall of 2000. The facility is just west of Oak Ridge Road (See Figure 1, Appendix A - Maps), but sports large parking areas on the north, east, and south sides. The parking area on the south side is not far from the sampling location (see Figure 2, Appendix A - Maps). The playground is located on the west side of the building (See Figure 2, Appendix A - Maps and Photograph4, Appendix B - Photos).

2.2 National Ambient Air Quality Standards (NAAQS)

The Clean Air Act (CAA) of 1970 and subsequent amendments (CAAA) require EPA to set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, called "criteria pollutants," that are common in outdoor air, considered harmful to public health and the environment, and that come from numerous and diverse sources. These pollutants are Carbon Monoxide (CO), Lead (Pb), Ozone (O3), Nitrogen Dioxide (NO2), Sulfur Dioxide (SO2), and Particulate Matter (PM). The Particulate Matter has historical considered Total Suspended Particulate (TSP) [1971], Particulate Matter less than 10 micrometers (um) in size (PM10) [1987], and Particulate Matter less than 2.5 micrometers in size PM2.5 [1997]. For perspective, a human hair is about 100 um in diameter. The EPA currently assesses PM10 and PM2.5 as the

¹ Indianapolis Metropolitan Planning Organization: *Red Rapid Transit Line Westfield Connection Analysis*, 2015.

most relevant indicators of public health.

The CAA & CAAA statutes created two types of national air quality standards: primary standards (for human health) and secondary standards (to protect public welfare, including animals, crops, vegetation, visibility, and buildings from environmental damage). EPA provides airborne limits for specified time periods, such as 1 hour, 24 hours, a maximum of every 24 hour period of a year, etc., which will depend on the adverse health effect being protected against. NAAQS for the pollutants used in the AQI are provided in the table below.

Table 2.1 Relevant NAAQS

Agent	NAAQS
Carbon Monoxide [CO]	9 ppm for a 24 hr period
Nitrogen Dioxide [NO ₂]	0.1 ppm for a 1 hr period 0.053 ppm for 1 year
Ozone [O ₃]	0.07 ppm for an 8 hr period
PM2.5	35 µg/m ³ for 24 hr 9 µg/m ³ for 1 year
PM10	150 µg/m ³ for 24 hr
Sulfur Dioxide [SO ₂] (ppm)	0.075 ppm for 1 hr 0.010 ppm for 1 year

ppm = parts per million

2.3 Air Quality Index (AQI)

The Air Quality Index (AQI) is a color-coded system used to report daily air quality. It indicates how clean or polluted your air is and warns of associated health concerns. The scale runs from 0 to 500; higher AQI values indicate greater air pollution and higher health risks (see <https://www.airnow.gov/aqi/aqi-basics/> for more details). The Air Quality Index (AQI) is focused on the primary NAAQS for CO, O₃, NO₂, SO₂, PM2.5, and PM10.

The EPA's 40 CFR 58.50 regulation states that Metropolitan Statistical Areas (MSAs) with a population of more than 350,000 are required to report the AQI daily to the general public. The AQI values and descriptions (e.g., good, moderate, unhealthy for sensitive individuals, etc.) are set forth in Appendix G of this regulation. There are a number of AQI testing sites in Indiana, many of which are not required. A map showing those AQI stations in central Indiana is provided in Figure 4 in Appendix A - Maps. One note the closest to Westfield is in Noblesville,

IN.

There are numerical AQI values, generally 0-300, categorical descriptions (good, moderate, etc.), for each pollutant. These values are scaled to the appropriate NAAQS value for that pollutant as listed in Table 2.1 above. The reported AQI, both numerical and categorical descriptor, are based on the maximum concentration of *any* of the pollutants for that day. Thus, one pollutant may be “Unhealthy to Sensitive Individuals” and all other pollutants may be ‘Good’, but the overall reported AQI would be “Unhealthy to Sensitive Individuals” with the corresponding number for that category. An example of the corresponding pollutant concentration, AQI value, category description, and color are provided in the table below. If the PM_{2.5} value were 23 ug/m³, then the AQI value would be 77 in the moderate category and a have corresponding yellow color. Since the AQI is an index, it is best to view it in terms of the categorical designation, e.g., good, moderate, etc..

Table 2.2 AQI data for PM_{2.5}

PM_{2.5}	AQI	Category Descriptor	Color
0 - 9	0 - 50	Good	Green
9.1 - 35.4	51 - 100	Moderate	Yellow
35.5 - 55.4	101 - 150	Unhealthy to Sensitive Individuals	Orange
55.5 - 125.4	151 - 200	Unhealthy	Red
125.5 - 225.4	201 - 300	Very Unhealthy	Purple
225.5+	301+	Hazardous	Maroon

3.0 Sampling & Analysis

3.1 Ozone (O3)

pH2 used Draeger PAC 8000 Personal Ozone data-logging meters to measure Ozone (O3) at one minute intervals over 1-hr and 24 hour periods. The Draeger PAC 8000 uses an electrochemical sensor to measure Ozone (O3).

3.2 Sulfur Dioxide (SO2)

pH2 used MultiRAE Lite data-logging meters to measure Sulfur Dioxide (SO2) at one minute intervals over 1-hr and 24 hour periods. The MultiRAE Lite uses an electrochemical sensor to measure Sulfur Dioxide (SO2).

3.3 Nitrogen Dioxide (NO2)

pH2 used MultiRAE Lite data-logging meters to measure Nitrogen Dioxide (NO2) at one minute intervals over 1-hr and 24 hour periods. The MultiRAE Lite uses an electrochemical sensor to measure Nitrogen Dioxide (NO2). Ozone is known to interfere with the NO2 sensor, resulting in higher reported values².

3.4 Carbon Monoxide (CO)

pH2 used TSI Q-Trak XP 7585 data-logging meters to measure Carbon Monoxide (CO) at one minute intervals over 1-hr and 24 hour periods. The TSI Q-Trak XP 7585 uses a non-dispersive infrared (NDIR) sensor to measure Carbon Monoxide (CO).

3.5 Particulate Matter [PM2.5 and PM10]

pH2 used optical particle counters (OPC) to measure the average particle count and corresponding Particulate Matter 2.5 um or less (PM2.5) and Particulate Matter 10 um or less (PM10) equivalents. This required 24 hour sampling periods, during which 1 minute averages were recorded. These instruments were powered by electrical connections. The OPCs were integrated into the TSI Q-Trak XP 7585. The general conversion to mass from particle relies

² Duvall, Rachele, et al.: Performance Evaluation and Community Application of Low-Cost Sensors for Ozone and Nitrogen Dioxide, *Sensors* 16(1698):1-14, 2016.; Leston, A. R., & Ollison, W. M.: Field evaluations of newly available “interference-free” monitors for nitrogen dioxide and ozone at near-road and conventional National Ambient Air Quality Standards compliance sites. *JAWMA* 67(11):1240-1248, 2017.

upon an assumption for particle density and a spherical shape³. In general, over the past 20+ years we have found these meters to estimate the mass concentration higher than corresponding gravimetric samplers⁴.

3.6 General Sampling Protocol

Monitoring was conducted using data logging instruments concurrently at the two locations (oak Trace and Intermediate) so that they could be compared under the same ambient conditions. These instruments were placed under a 10 ft by 10 ft canopied area outside each school as indicated in Figures 2 & 3 of Appendix A - Maps. See also Photos 1 & 2 in Appendix B - Photos. Westfield schools providing the secure (fenced-in) area in which to place the instruments. pH2 selected the two physical locations to be close to the playgrounds, and in the case on the Intermediate school, close to Highway 31. Given the vehicle usage on Highway 31, for AQI monitoring, EPA requires the monitors to be 30-40 meters (98- 131 feet) from the highway. We chose to place the meters closer to the highway to evaluate a more worst case scenario (see Photo 6 in Appendix B - Photos). Our measurements are thus expected to be higher for certain pollutants than an official AQI monitoring arrangement.

The monitoring probes were set at about 1.5 meters off the ground (adult breathing height). EPA requires AQI monitoring to be 2 meters or greater in height (40 CFR 58, Appendix E). We chose to set them lower to be closer to student heights. This can produce higher concentrations than sampling at greater heights⁵.

³ Gorner, Peter, et al.: Workplace aerosol mass conc meas using optical particle counters, *JEM* 14(2):420-428, 2012; Thorpe, Andrew: Assessment of personal direct-reading dust monitors for the measurement of airborne inhalable dust, *Ann Occ Hyg* 51(1):97-112, 2007; Ramachandran, Gurumurthy, et al.: Comparison of Short-Term Variations (15-Min Avg) in Outdoor and Indoor PM2.5 Concentrations, *JAWMA* 50(7):1157-1166, 2000; Lianou, Maria, et al.: Dependence of Home Outdoor Particle Mass and Number Concentration on Residential and Traffic Features in Urban Areas, *JAWMA* 57(12):1507-1517, 2007; Binning, J., et al.: Calibration of an optical particle counter to provide PM2.5 mass for well-defined particle materials, *J Aero Sci* 38(3):325-332, 2007; Tittarelli, A., et al.: Estimation of particle mass concentration in ambient air using a particle counter, *Atmos Env* 42(36):8543-8548, 2008; Hoek, Gerard, et al.: Indoor-outdoor relationships of particle number and mass in four European cities, *Atmos Env* 42(1):156-169, 2008; Cyrys, Josef, et al.: Relationship between indoor and outdoor levels of fine particle mass, particle number, *J Exp Anal Env Epi* 14:275-283, 2004; Heitbrink, William A., et al.: Relationships Among Particle Number, Surface Area, and Respirable Mass Conc in Auto Engine Manuf, *JOEH* 6,(1):19-31, 2009;

⁴ Havics, A: Nearly Real-Time Particulate Counting During Remediation Projects in Podium Session PO120 "Advances in Aerosol Technology", American Industrial Hygiene Conference & Exposition (AIHCE), 2016, May 21-May 26, 2016, Philadelphia, PA.

⁵ Rowell, Alex, et al.: Comp of diffusion tube-measuring NO2 concentrations at child and adult breathing heights, *Air Qual Atmos Health* 14(1):27-36, 2021; Nyayapathi, Priyanka Priyadarshini, et al.: A comprehensive rev of vertical profiling of ambient air qual-PM, *Air Quality Atmos Health* 18(5):1569-1595, 2025.

We noted the weather at the time of site visits and secured the temperature, relative humidity (RH), wind speed, and precipitation records from the area post testing. Upon completion of sampling, the logged instrument data was downloaded and values evaluated and reviewed.

All meters were calibrated for their respective pollutant prior to use. We observed that both ozone meters developed low battery warnings during the testing and one failed during the testing. We replaced both meters with new meters (calibrated as well) and observed no further issues.

4.0 Sample Results

4.1 Ozone (O3)

Ozone at the Oak Trace Elementary varied from below detection to 0.08 ppm, averaging 0.04 ppm for the whole study period. Ozone at the Intermediate school varied from 0.02 ppm to 0.08 ppm, averaging 0.05 ppm for the whole study period. There were no 8 hr exceedances of the NAAQS at either sites, nor was there a statistically significant difference between the two sites.

4.2 Sulfur Dioxide (SO2)

All data for Sulfur Dioxide at both sites was below detectable values during the whole sampling period for both sites, thus below the NAAQS.

4.3 Nitrogen Dioxide (NO2)

Nitrogen Dioxide at the Oak Trace Elementary varied from below detection to 0.50 ppm, averaging 0.09 ppm for the whole study period. Nitrogen Dioxide at the Intermediate school varied from below detection to 0.70 ppm, averaging 0.21 ppm for the whole study period. These results nominally exceed the annual values for NO2 for both sites. However, the results only reflect a much shorter period than a year. There were 1 hr exceedances for both sites, but there was a statistically significant difference between the two sites with the Intermediate school being higher. See Figure 1 in Appendix D -for a box-whisker statistical plot of the data from both sites that includes 1 year and 24 hour maximum NAAQS values.

4.4 Carbon Monoxide (CO)

All data for Carbon Monoxide at both sites was below detectable values during the whole sampling period for both sites, thus below the NAAQS.

4.5 Particulate Matter [PM2.5 and PM10]

PM2.5 at the Oak Trace Elementary varied from below detection to 0.91 $\mu\text{g}/\text{m}^3$, averaging 23.06 $\mu\text{g}/\text{m}^3$ for the whole study period. Nitrogen Dioxide at the Intermediate school varied from below detection to 90 $\mu\text{g}/\text{m}^3$, averaging 21.70 $\mu\text{g}/\text{m}^3$ for the whole study period. These results nominally exceed the annual values for PM2.5 for both sites, but not the 24 hr limits. However, in regards to comparing these values to annual limits, the results only reflect a much shorter period than a year. There was a statistically significant difference between the two sites with the Oak Trace Elementary school being higher. See Figure 2 in Appendix D -for a box-whisker statistical plot of the data from both sites that includes 1 year and 24 hour maximum NAAQS

values.

4.6 AQI

From an AQI perspective CO, SO₂, O₃, and PM₁₀ would have been considered categorically *Good*.

From an AQI perspective NO₂ would have been considered *unhealthy to sensitive individuals* for the Intermediate school and *moderate* for the Oak Trace Elementary. However, this should not be considered evidence these effects are currently occurring at the schools.

From an AQI perspective PM_{2.5} would have been considered *moderate* for the Intermediate school and *moderate* for the Oak Trace Elementary.

As noted above, because the AQI algorithm uses the worst result of any pollutant, the overall AQI would be would have been considered *unhealthy to sensitive individuals* for the Intermediate school and *moderate* for the Oak Trace Elementary.

4.7 Discussion

A summary of all the pollutants is provided in the table below.

Table 4.1 Summary of Pollutant Results

Agent	Criteria	NAAQS	Entire Sampling Time with 1 minute sampling periods			Projected AQI
			Intermediate	Oak	Difference (Int - Oak)	Intermediate Oak
Carbon Monoxide [CO] (ppm)	Min		0.0	0.0	0.0	
	Mean	9 for 24 hr period	0.0	0.0	0.0	Good Good
	Max		0.0	0.0	0.0	
Nitrogen Dioxide [NO ₂] (ppm)	Min		0.00	0.00	0.00	

Agent	Criteria	NAAQS	Entire Sampling Time with 1 minute sampling periods			Projected AQI
			Intermediate	Oak	Difference (Int - Oak)	Intermediate Oak
	Mean	0.1 for 1 hr period 0.053 for 1 year	0.21	0.09	0.12	Unhealthy for Sensitive Groups‡ Moderate
	Max		0.70	0.50	0.20	
Ozone [O ₃] (ppm)	Min		0.02	0.00	0.02	Good Good
	Mean	0.07 for 8 hr period	0.05	0.04	0.01	
	Max		0.08	0.08	0.00	
PM2.5 (µg/m ³)	Min		0.00	0.00	0.00	Moderate Moderate
	Mean	35 for 24 hr 9 for 1 year	21.70	23.06	-1.36	
	Max		90.00	91.00	-1.00	
PM10 (µg/m ³)	Min		0.00	1.00	-1.00	
	Mean	150 for 24 hr	23.11	24.19	-1.08	Good Good
	Max		95.00	95.00	0.00	
Sulfur Dioxide [SO ₂] (ppm)	Min		0.0	0.0	0.0	
	Mean	0.075 for 1 hr 0.010 for 1 year	0.0	0.0	0.0	Good Good
	Max		0.0	0.0	0.0	

‡ This should not be considered evidence any health effects are currently occurring at the schools.

We feel it important to discuss some of the limitations as well as modifying factors in the study.

The first would be the effect of using 1.5 meter (m) versus 2 m or higher for the sampler heights. As noted earlier in section 3.6, EPA requires AQI monitoring to be 2 meters or greater in height (40 CFR 58, Appendix E). We chose to set them lower to be closer to student heights. This can produce higher concentrations than sampling at greater heights. In particular, we believe there is some increased values in the PM_{2.5} and PM₁₀ as a result.

Another factor that should be considered is that the NO₂ sensor is adversely affected by ozone. We expect the NO₂ readings to be higher due to the ozone, but cannot state a specific amount. We did note that at the Intermediate school there was a compressor (for a pressure washer) running adjacent to the sampling instrument (See Photo 7 in Appendix B) on the last day. One would expect this to have slightly increased the NO₂ readings during the time it was operating. It is possible that the PM_{2.5} and PM₁₀ readings might also have been slightly affected.

We chose to place the meters closer to the highway to evaluate a more worst case scenario (see Photo 6 in Appendix B - Photos). Our measurements are thus expected to be higher for certain pollutants (NO₂, PM_{2.5} and PM₁₀) than an official AQI monitoring arrangement. However, we cannot quantify this amount. EPA found that data from the U.S. near-road monitoring network indicate that near-road sites tend to have higher NO₂ concentrations on average but do not always have the highest 1-hour NO₂ concentration within an urban area⁶.

As mentioned in section 3.5, there is a conversation from particle counts and sizes to mass based on some assumptions. In general, over the past 20+ years we have found these OPC meters to estimate the mass concentration higher than corresponding gravimetric samplers. Thus the PM_{2.5} and PM₁₀ are expected to be higher than gravimetric measurements. For comparison, EPA Reported the average levels of PM_{2.5} from about 13 to 30 µg/m³ in the U.S. cities⁷.

There was an unusual amount of wind during the sampling period. This is expected to have elevated the PM_{2.5} and PM₁₀ readings. For instance, Schwartz⁸ reviewed the period from 1990 to 1997 period, and identified 17 dust-storm days for Spokane Washington. The PM₁₀ levels during those storms averaged 263 µg/m³, compared to 42 µg/m³ for the same days on other years.

⁶ EPA: *Integrated Science Assessment (ISA) for Oxides of Nitrogen - Health Criteria*, EPA 600-R-15-068, 2016.

⁷ EPA: *Air Quality Criteria for Particulate Matter, Vol I of II*, EPA-600-P-99-002aF, 2004.

⁸ Schwartz, J., Norris, G., Larson, T., Sheppard, L., Claiborne, C., & Koenig, J.: Episodes of high coarse particle concentrations are not associated with increased mortality. *Environmental Health Perspectives*, 107(5), 339-342, 1999.

Ostro⁹ noted that in Coachella Valley, CA from 1989-1998, > 90% of PM10 was from wind episodes throughout the year.

In general, NO2 shows more of a regional source effect, as does PM2.5. By contrast, PM10 is expected to be a combination of regional and local sources.

The NAAQS are not fine lines between healthy and unhealthy air for individuals, but rather targets to reduce health effects (generally to those over 65 and under 2 years of age) seen in populations. For example, for NO2, there is evidence indicating that NO2 short term exposure can trigger asthma attacks. EPA's 1993 air quality criteria for Oxides of Nitrogen concluded that there were two key health effects of greatest concern at ambient or near-ambient levels of NO2, increased airway responsiveness in asthmatic individuals after short-term exposures (30 min to 3 hours) and increased occurrence of respiratory illness in children with longer-term exposures¹⁰. There is some evidence relating short-term NO2 exposure to chronic obstructive pulmonary disease and respiratory mortality but uncertainty as to whether the effects of NO2 exposure are independent of other traffic-related pollutants (are they from NO2 alone or whether they require other pollutants to be significant as well)¹¹. For instance, EPA estimated that in a 100,000 person population, one might expect 9,900 emergency medical visits at 0.2 ppm versus 5,100 at 0.1 ppm (based on a 3-day average study in Atlanta)¹². Thus, the presence of certain levels should not be considered evidence these effects are currently occurring in the exposed population. However, because these effects might occur, it would be beneficial to reduce these levels.

Nevertheless, the NO2 and PM2.5 observed here for this short (~ 1 week) would not be desired over extended periods (e.g., years). Again, given this sampling period was short, a much longer observational period would be necessary to draw a broader conclusion. The most at risk groups would be children under 2 years of age and adults 65 years and over. Fortunately, these are not typical populations occupying these schools. The second most at risk group would be those with asthma, COPD, or similar health impairments. These individuals might experience trouble breathing or irritation after extended daily breathing of elevated NO2 or PM2.5 values, that

⁹ Ostro, B. D., Broadwin, R., & Lipsett, M. J.: Coarse and fine particles and daily mortality in the Coachella Valley, California: a follow-up study. *Journal of Exposure Science & Environmental Epidemiology* 10(5):412-419, 2000.

¹⁰ EPA: *Risk and Exposure Assessment to Support the Review of the NO2 NAAQS*, EPA 452-R-08-008a, 2008.

¹¹ EPA: *Integrated Science Assessment (ISA) for Oxides of Nitrogen - Health Criteria*, EPA 600-R-15-068, 2016.

¹² EPA: *Risk and Exposure Assessment to Support the Review of the NO2 NAAQS*, EPA 452-R-08-008a, 2008.

would be reversible (return to normal after exposure). For these individuals, one would not expect short time periods such as 30 min to cause a significant response. However, as a precautionary measure, the school could notify the student (or staff) or their parents, and make a joint determination on whether it was in the student's best interest to play outside on a particular day. This would best be accomplished using an on-site low cost meter.

5.0 Conclusions & Recommendations

Based on this limited air quality testing, we conclude:

1. **There is not a substantial overall difference in Air Quality between the two schools:**

Oak Trace is approximately the same as Intermediate for CO & SO₂

Oak Trace is less than Intermediate for NO₂ & O₃

Oak Trace is greater than Intermediate for PM_{2.5} & PM₁₀

2. O₃, CO, SO₂ and PM₁₀ are *good* in terms of the AQI for that sampling period.

3. NO₂ & PM_{2.5} are (in our opinion) higher than one would like for that sampling period, but a longer sampling period would be necessary to thoroughly evaluate these pollutants, especially given the limitations and site specific factors and weather conditions noted above in section 4.7.

From an AQI perspective NO₂ would have been considered by EPA to be potentially be *unhealthy to sensitive individuals* for the Intermediate school and *moderate* for the Oak Trace Elementary. However, this should not be considered evidence these effects are currently occurring at the schools.

From an AQI perspective PM_{2.5} would have been considered by EPA to be *moderate* for the Intermediate school and *moderate* for the Oak Trace Elementary.

Based on these findings, we believe that parents, staff and students might benefit from a year long trial of a low-cost monitoring system at each facility. We will prepare a few options for this under a separate cover. However, we do not believe a more sophisticated system would not be cost effective, and would require more expertise to install, calibrate, manage, and interpret any monitoring results.

Appendix A

Maps

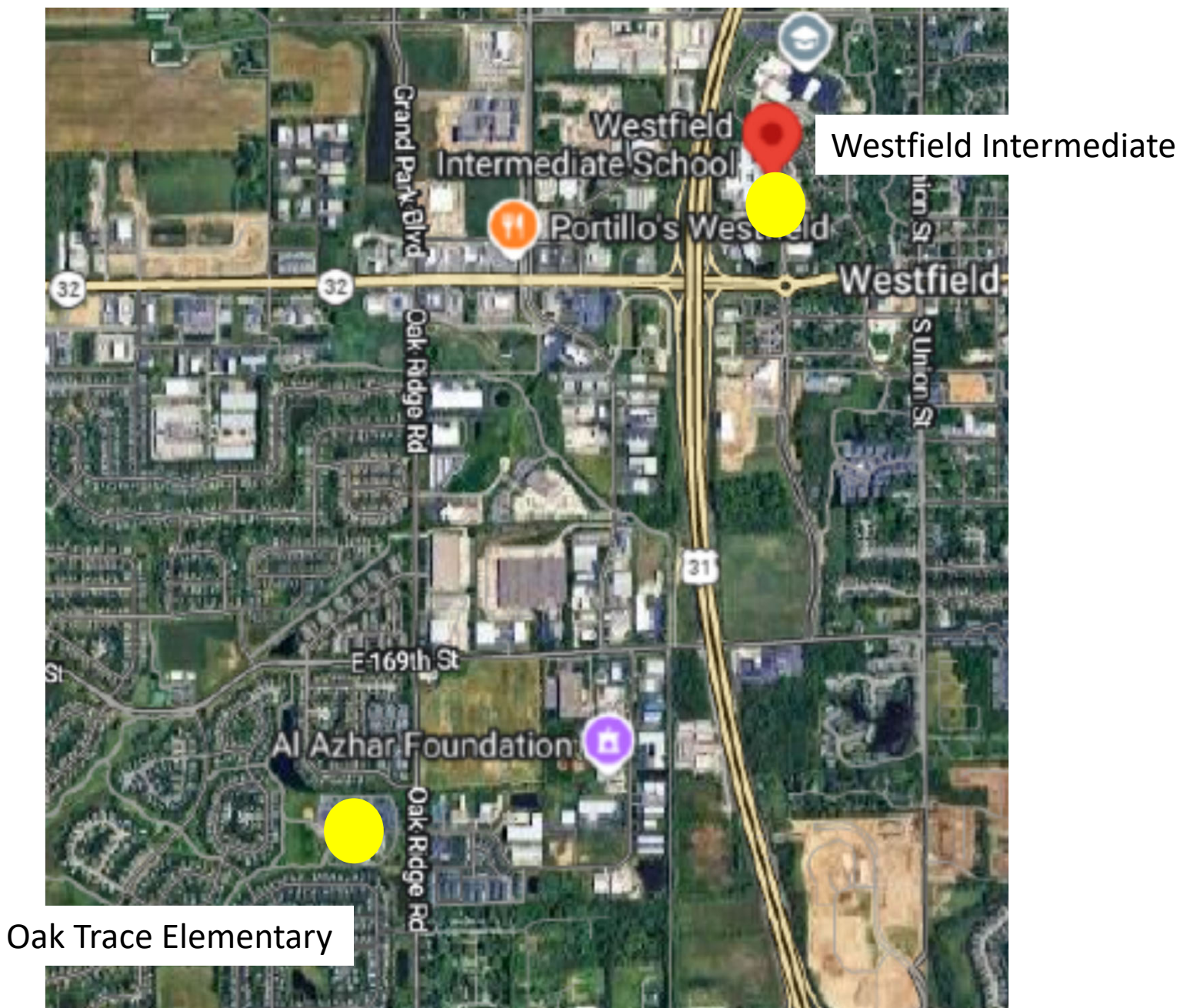


Figure 1. Map of locations of two school relative to one another and US 31.

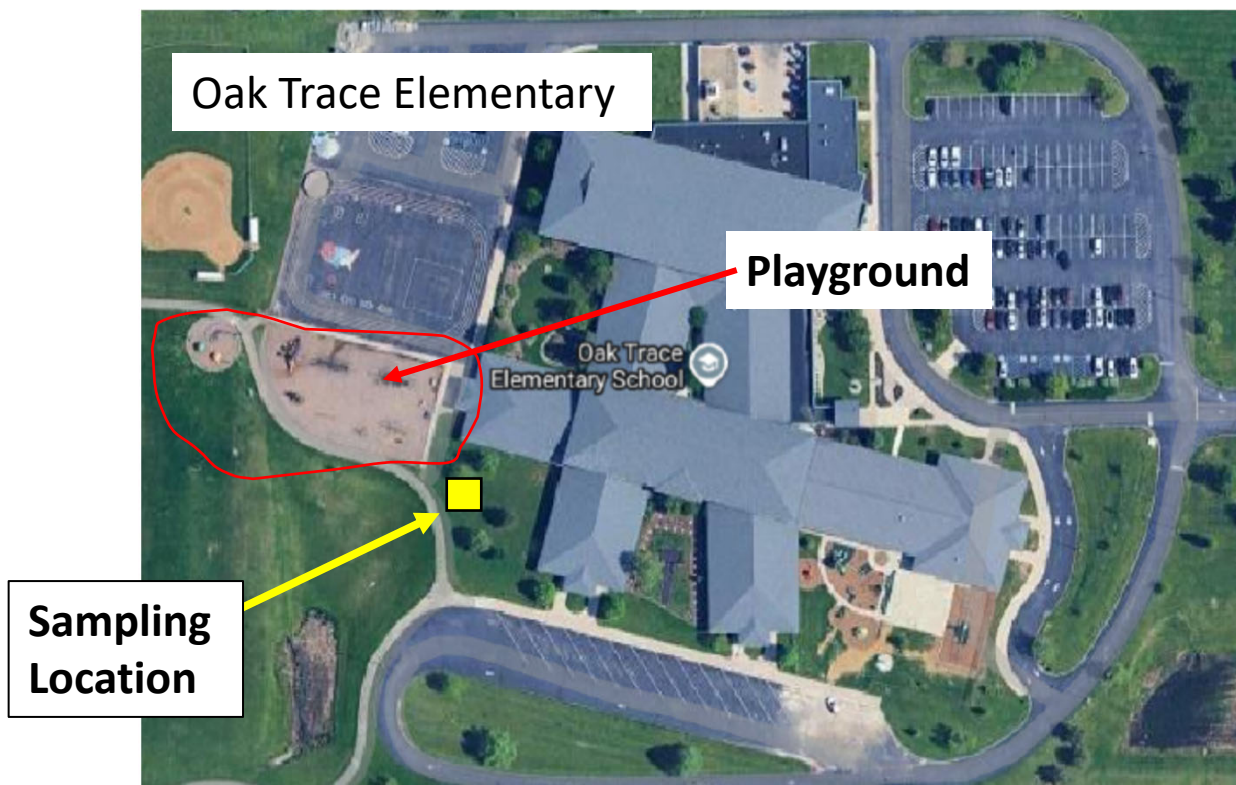


Figure 2. Map of sampling location and playground location relative to Oak Trace Elementary.

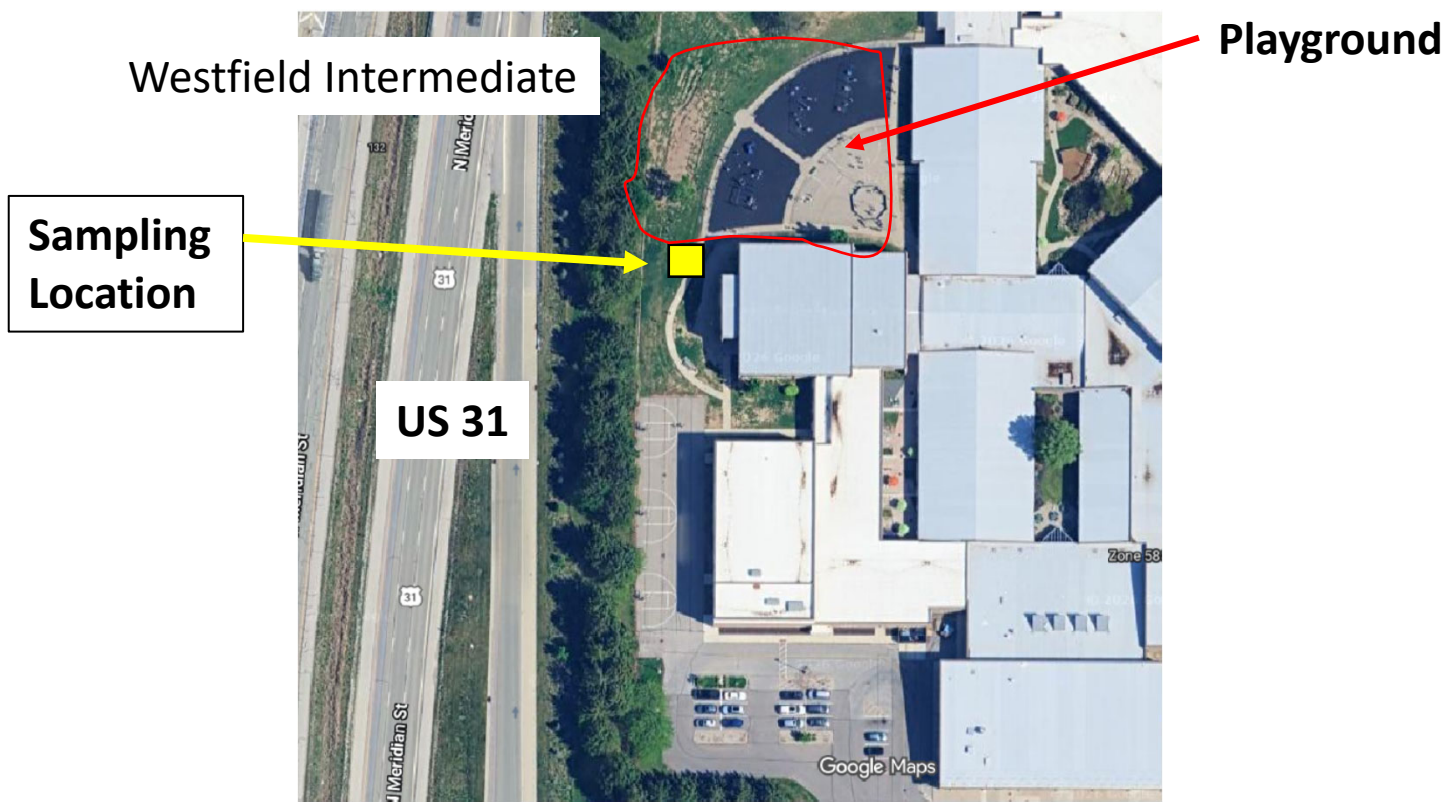


Figure 3. Map of sampling location and playground location relative to Intermediate school.

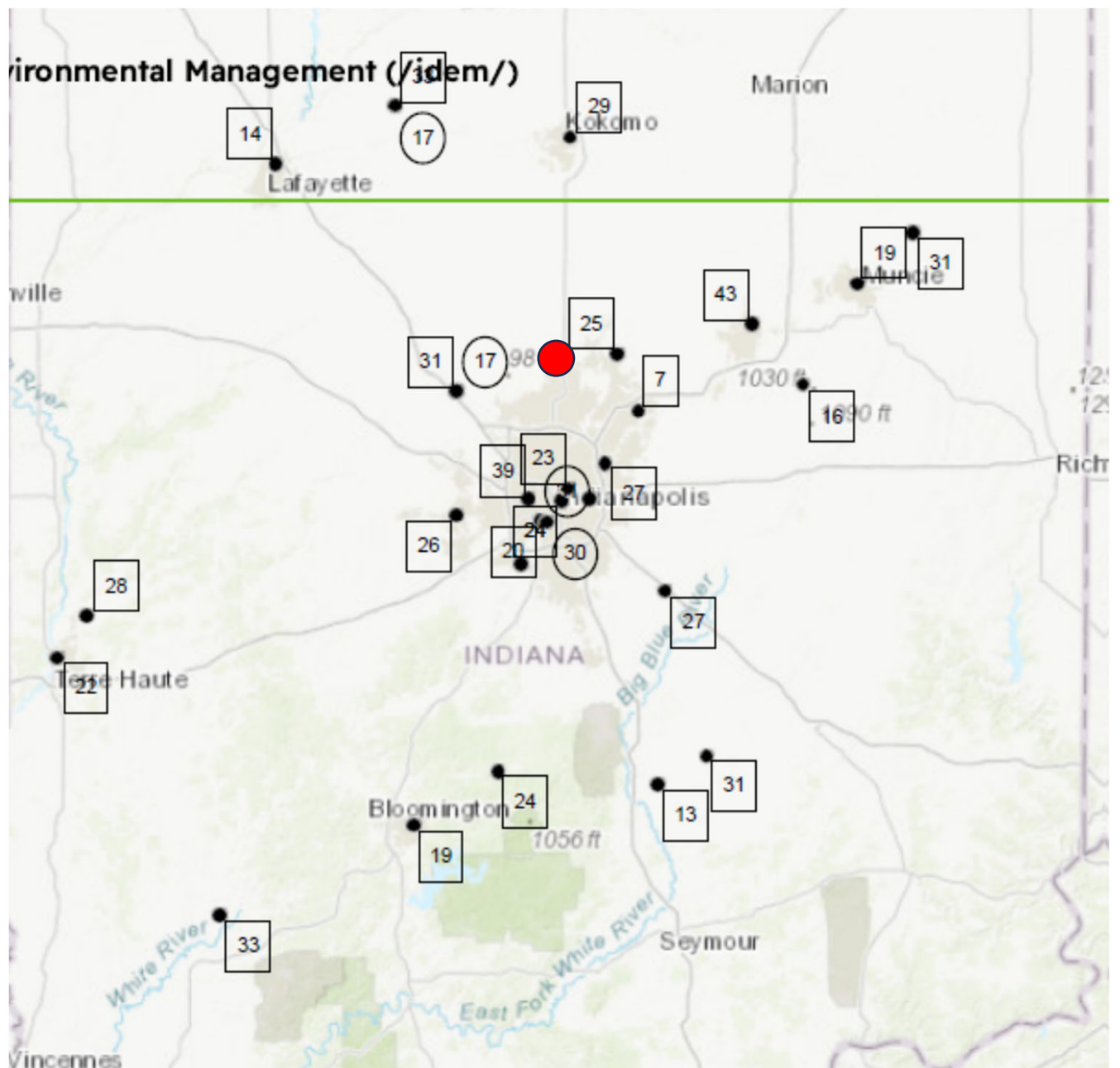


Figure 4. Map of locations of AQI stations in central Indiana and Westfield in comparison.

Appendix B

Photos



Photo 1. Sampling equipment for Oak Trace Elementary.



Photo 2. Sampling equipment for Intermediate School.

Draeger (O3)

RAE (SO2, NO2)

TSI AQ Meter (CO, PM, PM2.5, PM10)

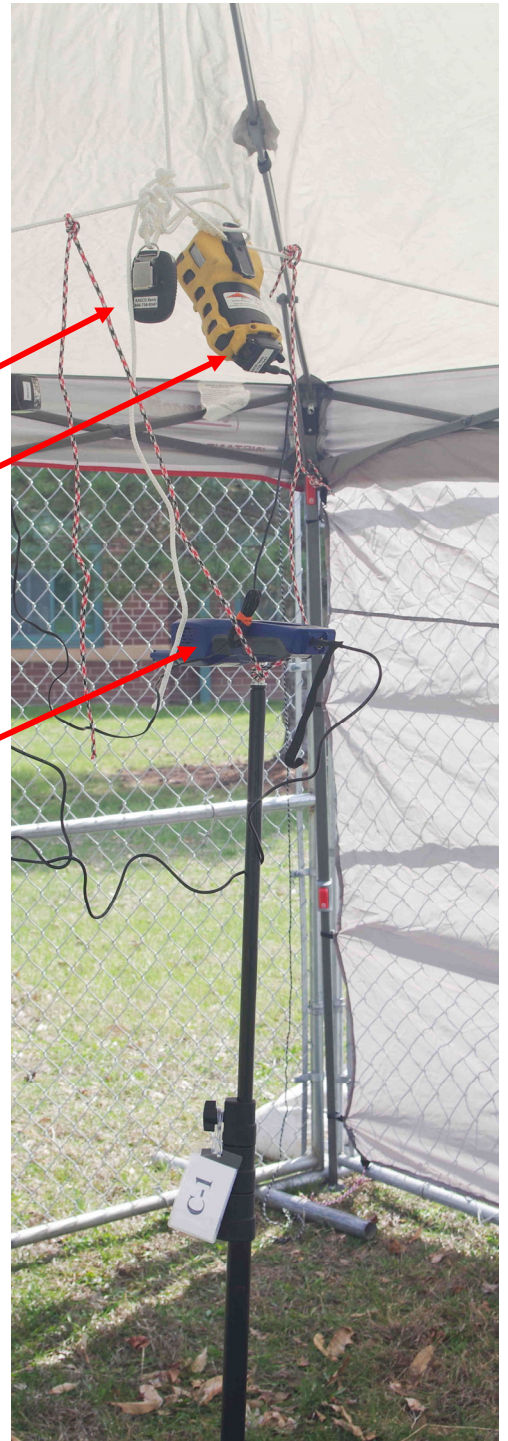


Photo 3. Sampling equipment for Oak Trace School. Note Meter types.



Photo 4. Sampling location showing playground in background at Oak Trace Elementary.



Photo 5. Sampling location showing playground in background at Intermediate School.



Photo 6. Sampling location showing US 31 in background at Intermediate School.

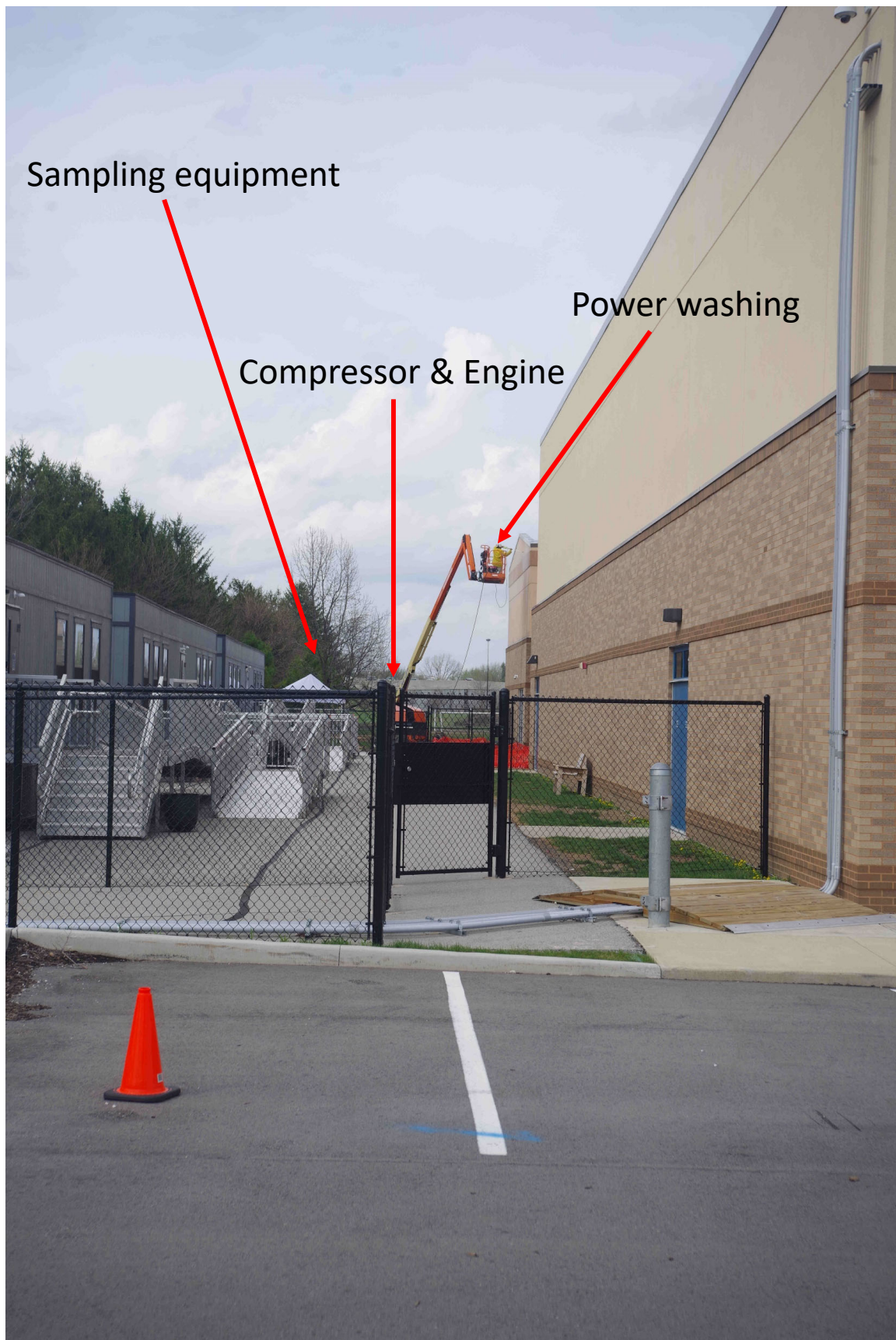


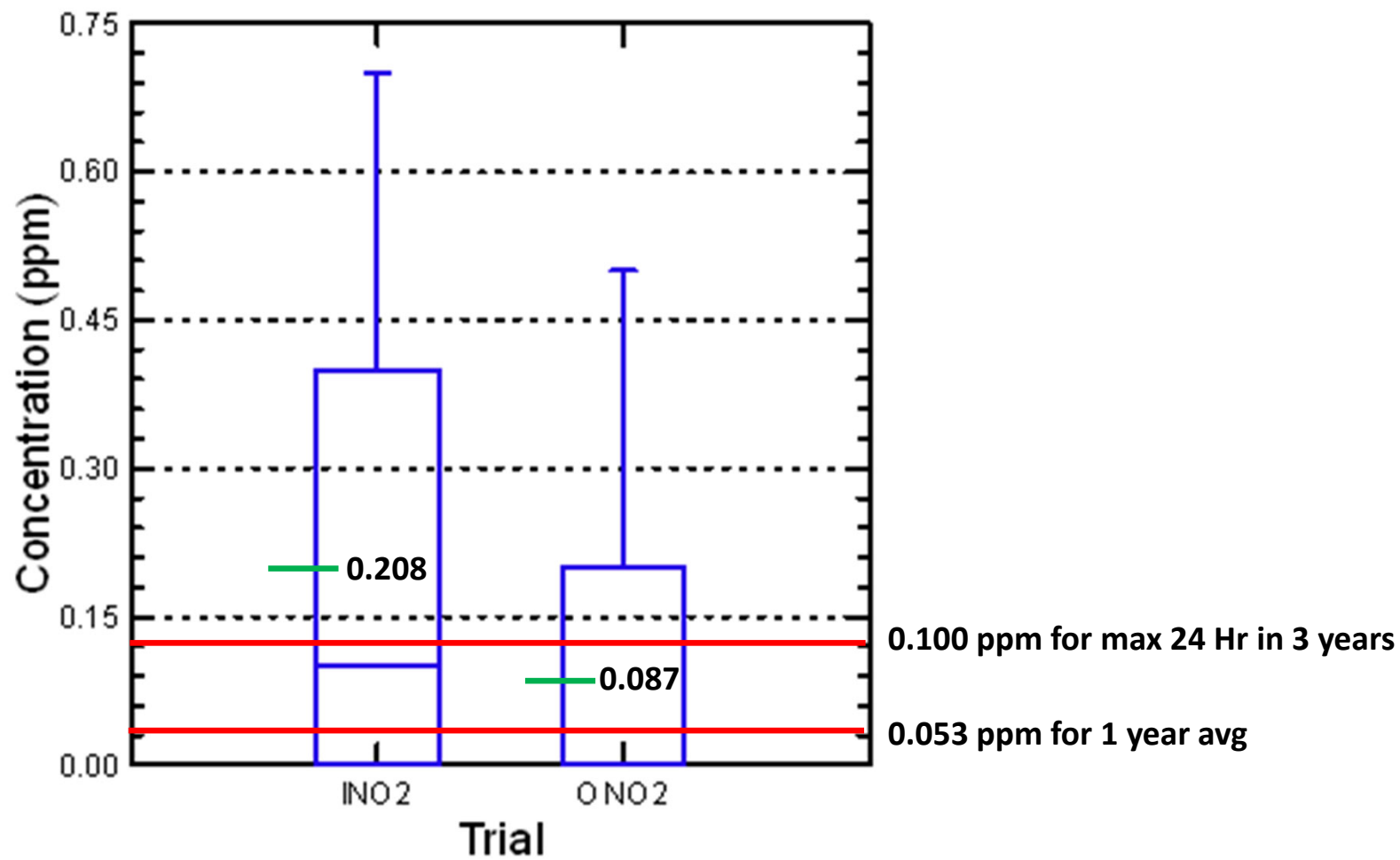
Photo 7. Sampling location showing power washing (including compressor) adjacent sampling equipment at Intermediate School.

Appendix C

Figures

NO₂

1 Minute Readings
~ 1 week



PM2.5

1 Minute Readings

