

## Monitoring US Recycling for Toxic PM<sub>2.5</sub> Particulate Air Pollution

**Status as of December 31, 2023**

**Summary:** The PM<sub>2.5</sub> monitoring system (details below) has finally been installed surrounding USR and is transmitting data to the cloud. Using our PM<sub>2.5</sub> monitors, we have documented that US Recycling continues to emit extremely dangerous PM<sub>2.5</sub> levels exceeding 100-150 µg/m<sup>3</sup>. Our future plans are to program a local pc so that we can collect and cross-correlate the PM<sub>2.5</sub> measurements with time-coded video of USR operations and wind speed/direction.

**Project Goal:** Obtain “hard scientific evidence” of PM<sub>2.5</sub> particulate pollution from US Recycling to support community efforts to force USR to run “cleaner” operations with the ultimate objective of pressing USR owners to sell the industrial site for development compatible with the surrounding neighborhood.

**Plan:** Install and operate an array of PM<sub>2.5</sub> monitors surrounding USR operations together with multiple video cameras and a weather station to measure PM<sub>2.5</sub> concentrations regardless of wind direction for correlation with USR activities.

**Equipment:** The equipment for PM<sub>2.5</sub> monitoring system has been purchased and installed with the necessary power and WiFi: 7 PM<sub>2.5</sub> particle monitors, 3 video cameras, 1 multifunction weather station and 1 sound meter.

**Future:** 1 PM<sub>2.5</sub> monitor available to cover USR North; 3 IR flood lights available to enhance night surveillance.

**Data Collection and Analysis:** The data is currently being streamed by WiFi to the cloud for public viewing on maps at PurpleAir (<https://map.purpleair.com>) and Ambient Weather Network (<https://ambientweather.net/dashboard>). This allows us to observe daily PM<sub>2.5</sub> peaks.

**Future:** Full analysis with cross-correlation requires capturing the data locally. Efforts are underway in collaboration with the Sarasota County Air & Water Quality team to capture and save the data streams on a local computer so that we can cross-correlate observed PM<sub>2.5</sub> peaks with time-coded video of USR operations and wind speed/direction.

**Representative PM<sub>2.5</sub> Data:** PM<sub>2.5</sub> measurements from Dec. 29-30 (Appendix 1) document that USR is continuing to operate at night after dark generating visible dust clouds with harmful PM<sub>2.5</sub> levels > 25 µg/m<sup>3</sup>. More importantly, we have documented extremely high PM<sub>2.5</sub> peaks exceeding 100-150 µg/m<sup>3</sup> (Appendix 2). These levels are definitely dangerous to the health of our residents. Another attached example (Appendix 3) shows PM<sub>2.5</sub> particles in dust clouds outside will migrate inside to adversely affect the health of residents and workers. The screenshots show an outside peak appearing inside the Robertson’s store after approximately 2 hours.

### PM<sub>2.5</sub> MONITORING SYSTEM EQUIPMENT

#### PM<sub>2.5</sub> Particle Monitors

**PurpleAir PM<sub>2.5</sub> monitors:** 4 of 5 operational & transmitting data to PurpleAir map **5**

- **Robertson’s Billiards & Spa, 1404 Central Ave, Sarasota, FL 34236**  

<u>PurpleAir Map Labels</u>	<u>Status</u>
1. Billiards NW Corner	Operational
2. Billiards NE Corner	Operational
3. Billiards SE Corner	Operational (needs new power cord)
- **H2O Marine, 1461 12th St., Sarasota, FL 34236**  

<u>PurpleAir Map Labels</u>	<u>Status</u>
4. Billiards NW Corner	Operational (power seems to intermittent)
- **15<sup>th</sup> Street – to be finalized in January**  

<u>PurpleAir Map Labels</u>	<u>Status</u>
5. 15 <sup>th</sup> St	to be installed in January

**Ambient Air PM<sub>2.5</sub> Monitors:** 2 of 2 operational & transmitting data to AWN ambientweather.net **2**

- **Robertson’s Billiards & Spa, 1404 Central Ave, Sarasota, FL 34236**  

<u>Ambient Weather Dashboard Label</u>	<u>Status</u>
1. PM <sub>2.5</sub> Outdoor	NE corner; Operational
2. PM <sub>2.5</sub> Indoor	Inside store; Operational (low battery needs to be replaced)

#### Video Cameras

**Video cameras:** 3 of 3 operational and transmitting data to cloud **3**

- **Robertson’s Billiards & Spa, 1404 Central Ave, Sarasota, FL 34236**  

1. Billiards NW Corner	View of corner at Central & Industrial Ct; Operational
2. Billiards NE Corner	View of Industrial Ct weather station & sensors; Operational
3. Billiards SE Corner	Elevated view of Industrial CT including USR; Operational

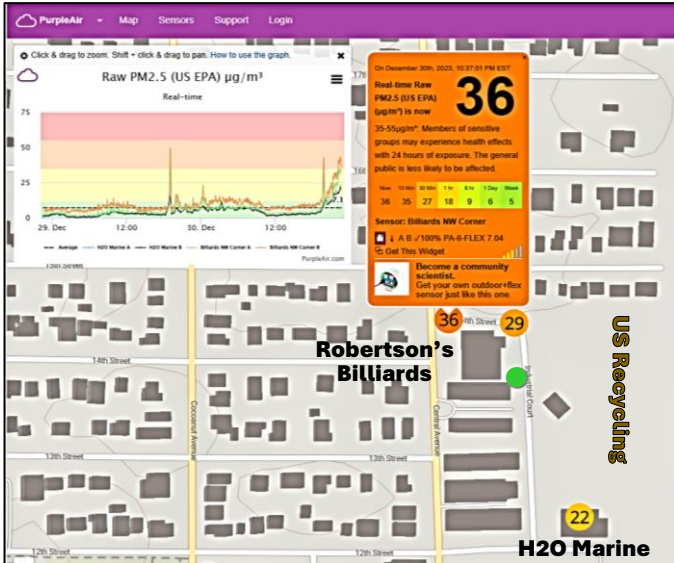
#### Weather Station

**Ambient Weather Station:** Operational & & transmitting data to AWN ambientweather.net **1**

Functions: Temperature, Wind Speed & Direction, Dew Point, Humidity; Rainfall, UV index, 2 PM<sub>2.5</sub> Monitors (1 Outdoor, 1 Indoor), 1 Video Camera

December 29-31, 2023  
 Multiple High PM<sub>2.5</sub> Peaks > 25 µg/m<sup>3</sup>  
 Including nighttime operations

PurpleAir PM<sub>2.5</sub> Sensors



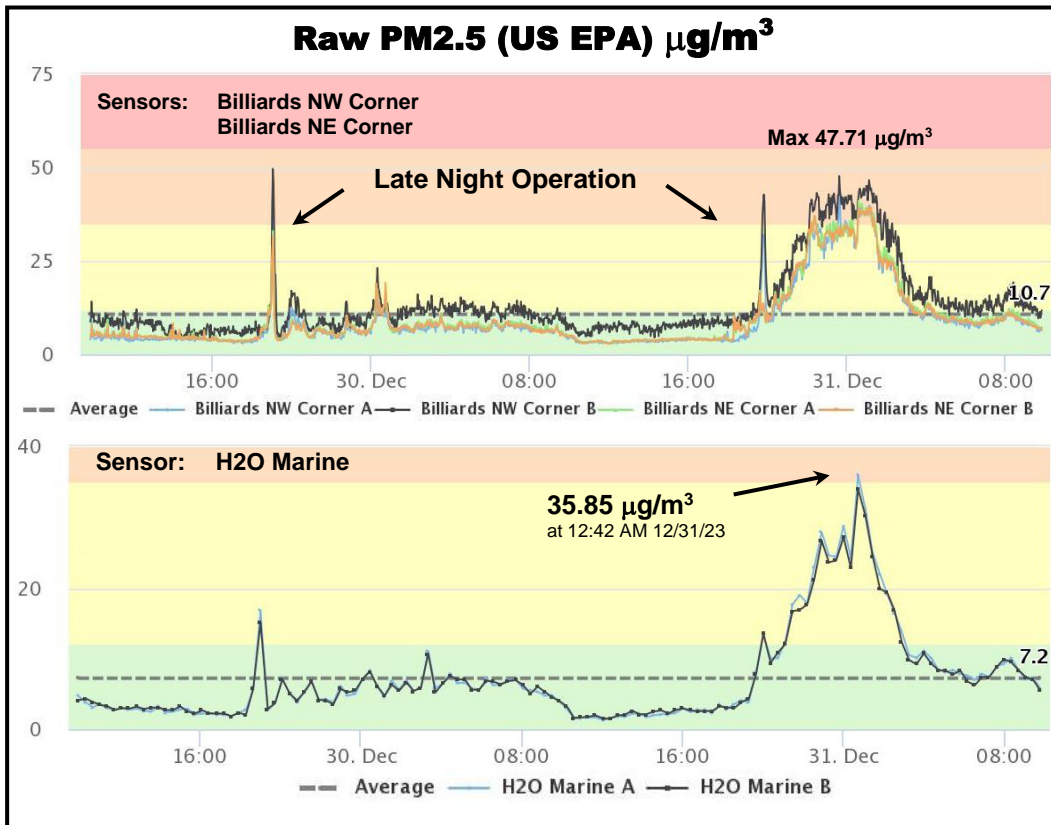
Selected Peak PM<sub>2.5</sub> Data

Billiards NE Corner			Billiards NW Corner		
Time	Sensor A	Sensor B	Time	Sensor A	Sensor B
Dec. 29					
19:03:13	33.03	31.96	19:02:48	46.19	49.64
Dec. 30					
19:45:23	13.32	13.75	19:45:00	32.07	40.45
23:33:25	32.99	31.66	23:35:01	42.68	47.71
Dec. 31					
00:33:25	41.08	39.29	00:37:02	36.83	44.34
01:01:25	38.86	39.28	01:05:02	39.83	46.61

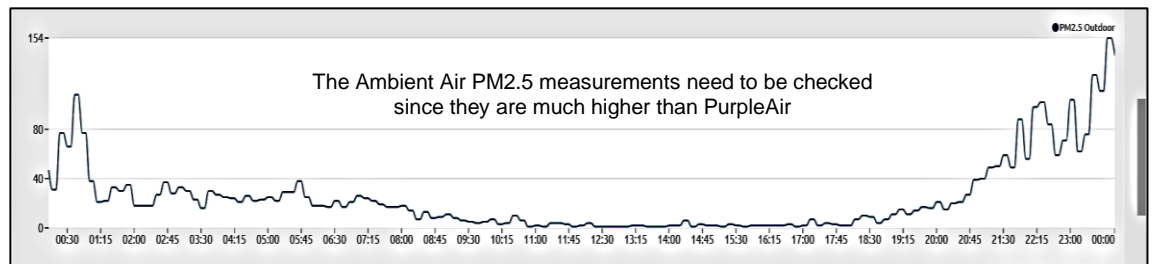
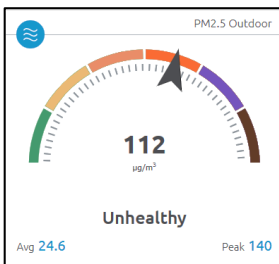
USR nighttime operation on Dec. 30 past midnight into Dec. 31.

Dust clouds & operating noise observed after 11 pm.

Why is USR operating after dark? So neighbors can't see dust clouds to complain?



Ambient Air PM<sub>2.5</sub> Outdoor Sensor



Tue., Dec. 19, 2023 from 8:00-10:18 pm

Multiple PM<sub>2.5</sub> peaks → **79.3 to 181.7** µg/m<sup>3</sup>

**Any PM<sub>2.5</sub> measurement above 100-150 µg/m<sup>3</sup> extremely dangerous to one's health**

NOTE: Published standards refer to PM<sub>2.5</sub> averaged over time. There is no agreement on the relative health danger from short-term maximum PM<sub>2.5</sub> peaks lasting a few minutes. However, any PM<sub>2.5</sub> greater than 100-150 µg/m<sup>3</sup> is extremely dangerous to one's health. PM<sub>2.5</sub> peaks such as the 181.67 µg/m<sup>3</sup> at 8:01pm shown below barely affect the average PM<sub>2.5</sub> over 1 or 24 hours. It adds less than 7 µg/m<sup>3</sup> to a base PM<sub>2.5</sub> = 3 resulting in supposedly "safe" air quality using the 1-hour average.

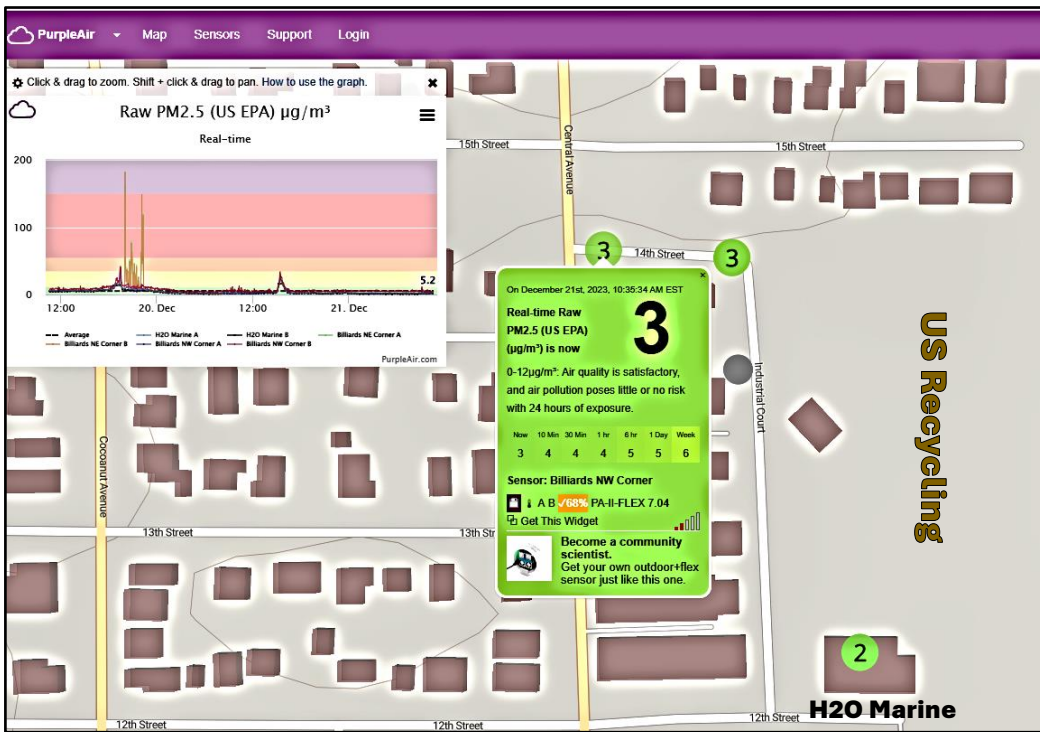
Health Standards for PM<sub>2.5</sub> particulate air pollution

PM <sub>2.5</sub> limits	Annual	24 hr.	1 hr.
EPA	12.0 µg/m <sup>3</sup>	35.0 µg/m <sup>3</sup>	50.0 µg/m <sup>3</sup>
World Health Organization	5.0 µg/m <sup>3</sup>	15.0 µg/m <sup>3</sup>	

Data from USR PM<sub>2.5</sub> Monitors Dec. 21, 2023

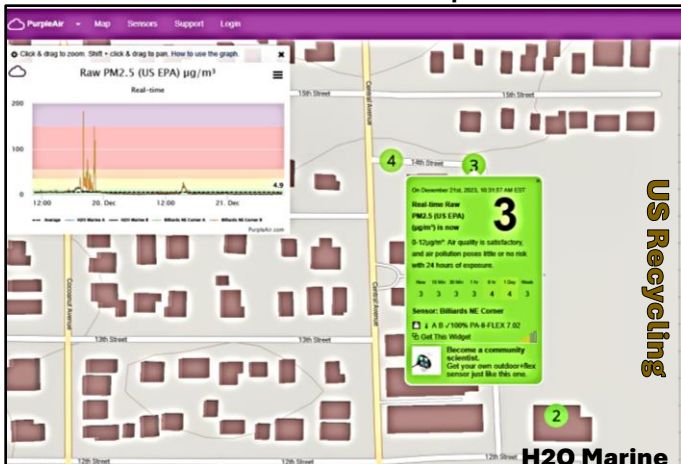
PurpleAir Map: <https://map.purpleair.com/1/lt/mPM25/a0/p0/cC5#16.79/27.349354/-82.542307>

NW Corner Robertson's Billiards & Spa Central & 14<sup>th</sup> St.

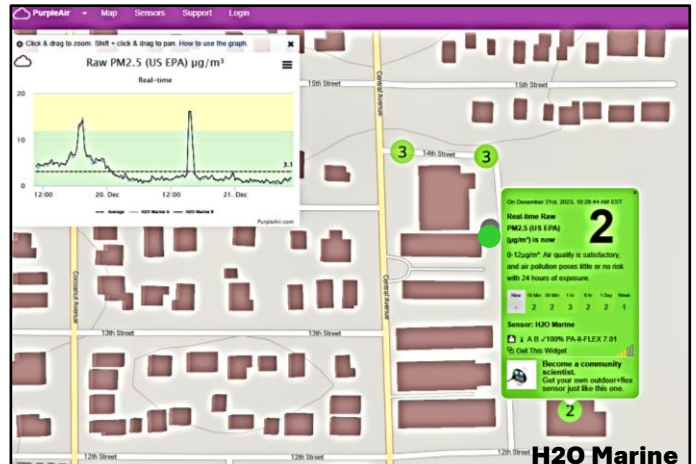


Billiards NW Corner		
2023-12-19		
Time	Sensor A	Sensor B
19:59:42	36.24	33.31
20:01:42	<b>162.98</b>	<b>181.67</b>
20:03:43	54.65	54.62
20:47:42	55.29	58.01
20:49:42	<b>79.32</b>	<b>76.53</b>
20:51:42	43.64	43.52
22:05:42	54.34	53.28
22:07:43	<b>136.95</b>	<b>148.83</b>
22:09:43	50.68	45.42
22:15:42	88.61	91.31
22:17:43	<b>119.64</b>	<b>117.68</b>
22:19:43	42.31	41.47

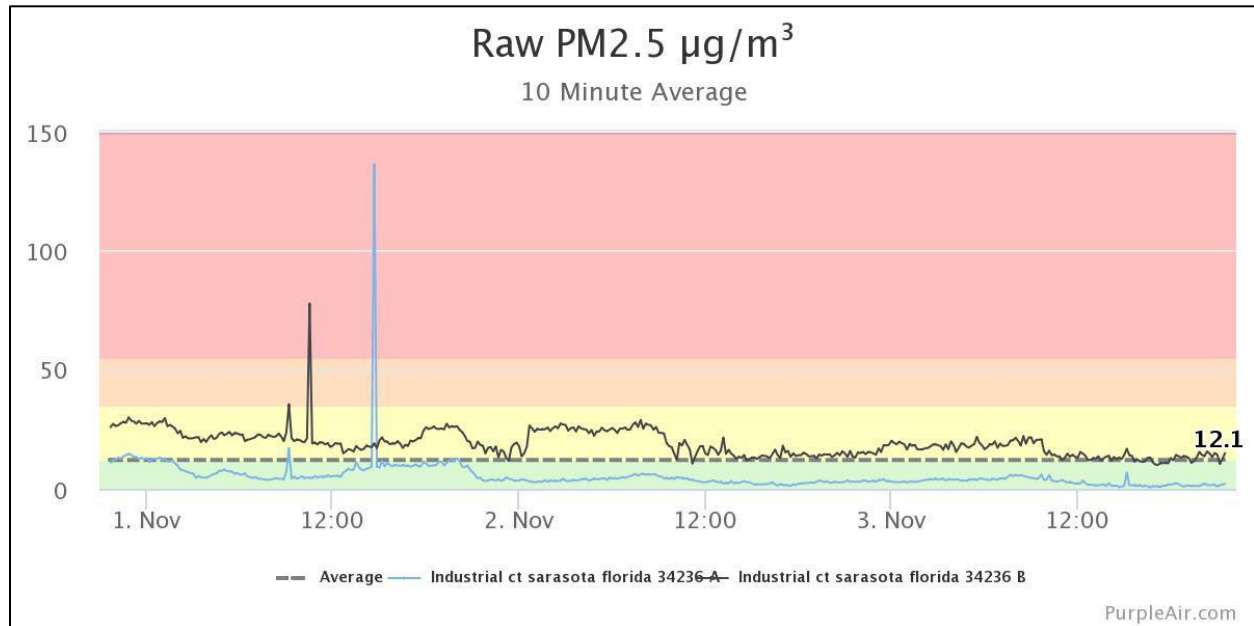
NE Corner Robertson's Billiards & Spa



H2O Marine 1461 12th St



Wed., Nov 1, 2023  
Huge PM<sub>2.5</sub> peak >> 100 µg/m<sup>3</sup>



**Any PM<sub>2.5</sub> measurement above 100-150 µg/m<sup>3</sup> extremely dangerous to one's health**

#### Analysis:

The measured PM<sub>2.5</sub> peak greatly exceeds any health limit. Multiple exposures would definitely be life-threatening.

The actual peak was probably even higher since this is a 10-minute average.

Note that the "Average" PM<sub>2.5</sub> = 12.1 µg/m<sup>3</sup> "obscures" short-term, life-threatening incidents.

Although the PurpleAir monitor measures PM<sub>2.5</sub> concentrations every minute, PurpleAir map offers limited flexibility in seeing the actual measurements. It generally limit 1-minute resolution to one to three days depending on setting.

Lower resolutions of 10-minute and 1-hour averages would underestimate actual PM<sub>2.5</sub> peaks from dust clouds.

#### Recommendation:

Downloading the PM<sub>2.5</sub> data to a local computer is essential for robust analysis.

### Appendix 3 PM<sub>2.5</sub> clouds will affect residents & store staff inside

High PM<sub>2.5</sub> peaks measured outside represent a health threat to store staff since the PM<sub>2.5</sub> particles migrate into the store after approximately 2 hours.

Analysis of the particles at Robertson's Billiards and Spa determine that it contained approximately 40% alpha-silica – the toxic form.

