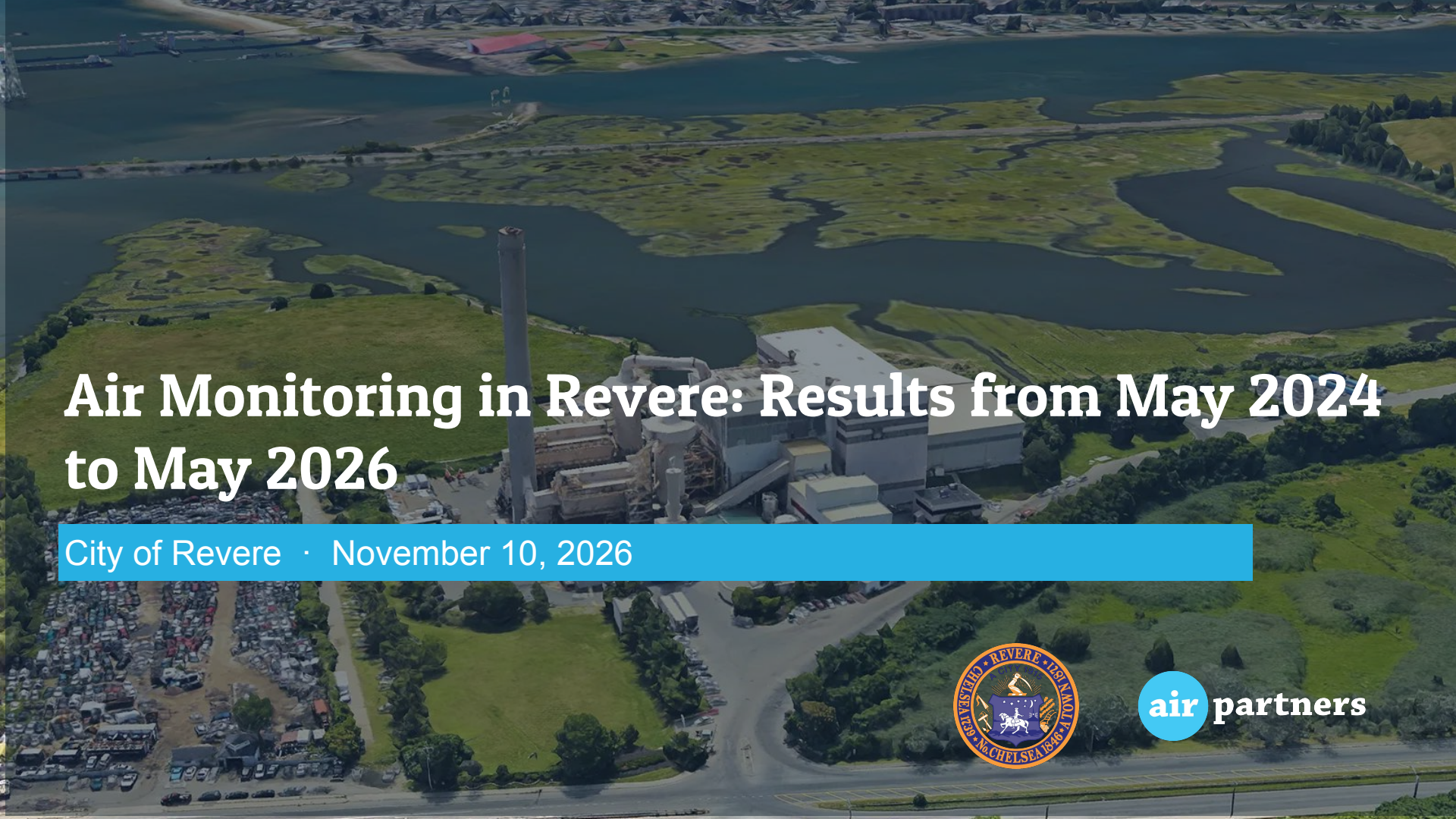

Air Monitoring in Revere: Results from May 2024 to May 2026

City of Revere · November 10, 2026

air partners

The short version

1

Revere met the federal standards for particles, nitrogen dioxide and carbon monoxide.

Ozone, corrected for sensor drift, went just above the federal 8-hour standard on two regional ozone days: Northern Strand on June 18, 2024 and Maggi Rd on August 12, 2025. Exceedance days, not a violation.

2

Nitrogen dioxide (NO_2) is the pollutant to watch, then ozone.

Nitrogen dioxide is above the World Health Organization (WHO) 24-hour guideline on 32 to 44% of days. Ozone is above its WHO 8-hour guideline on 9 to 10% of days, similar during the summers of 2024 and 2025.

3

The WIN facility impacts air quality, but rarely and briefly.

Incinerator: fresh nitrogen oxides from the direction of the incinerator reach Gibson Park; nitrogen dioxide there stayed below 43 ppb, compared with the federal standard of 100 ppb.
Ash areas: short-duration dust plumes on 19.2 days per year (4.6 dry days), adding 0.4% or less to the yearly mean of coarse particles.

4

Most fine particles come from outside Revere.

The three monitors have shared maxima and minima, and the 2020-2023 network found the same picture.

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How we measured

Two phases of lower-cost sensors, and one airport weather station

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The City has measured the air in Revere in two phases



Filled: 2020-2023 monitors. Open: 2024-2026 monitors.

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The City has measured the air in Revere in two phases



Filled: 2020-2023 monitors. Open: 2024-2026 monitors.

Phase 1, 2020 to 2023: a citywide network (partnered with Air Partners).

Seven sensors from late 2020 to 2023: particles at Gibson Park, Griswold Park, and Susan B. Anthony Middle School; gases at Point of Pines, Beachmont, and Chelsea (GreenRoots, outside Revere). One slide of results near the end.

Phase 2, 2024 to 2026: around the WIN facility (monitoring by the City).

Three sensors at Gibson Park, Maggi Rd, and Northern Strand, installed by a contractor February 26, 2024, with steady data from May 29, 2024. Most of tonight's results.

Different sensors, so we compare patterns, not concentrations, between the two phases.

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Phase 2: three sensors monitored the air around the WIN facility for two years

Revere monitors and mapped sources

Blue dots: the three monitors. Outlined: the WIN waste-to-energy incinerator and the ash tailing areas (the active dump and the historical, mostly capped area), mapped by Air Partners from aerial imagery in October 2026.



Gibson Park is closest. The ash areas are 0.7 to 1.2 km to the west, and the incinerator is 1.1 km to the northwest: separate wind directions.

Maggi Rd is to the south, across the marsh from the ash tailing areas. **Northern Strand** is to the west.

Wind data comes from Boston Logan Airport, 7.6 to 9.5 km south-southwest of the monitors.

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What the sensors measure

$PM_{2.5}$ **Fine particles ($PM_{2.5}$).** Mostly regional.

PM_{10} **Coarse particles (PM_{10}).** Including ash, dust and sea spray. More local.

NO_x **Nitrogen oxides (NO and NO_2, together NO_x).** From high-temperature burning (vehicles, incineration). Fresh exhaust is mostly NO, which turns into nitrogen dioxide (NO_2) downwind.

O_3 **Ozone (O_3).** Formed in sunlight.

CO **Carbon monoxide (CO).** From traffic and heating.

Gas sensors of this kind are indicative, not regulatory.

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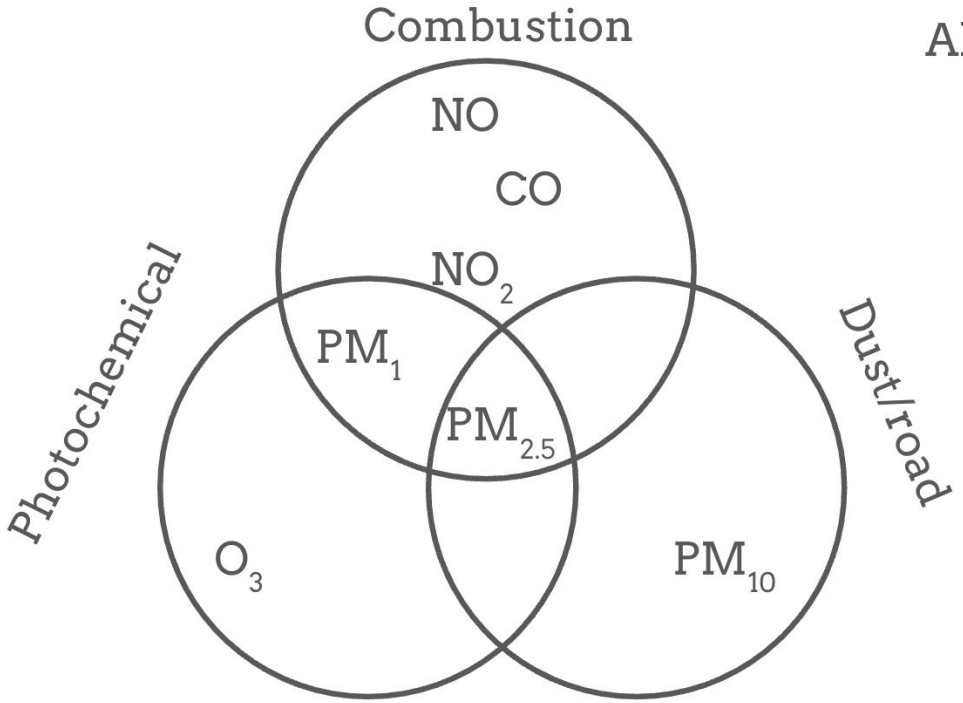
What the sensors measure



Also: NO_x:CO ratio

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Data quality control

90.2%

Sensors reported most of the time: 90.2% of minutes at Northern Strand, 89.3% at Gibson Park, 81.1% at Maggi Rd.

8

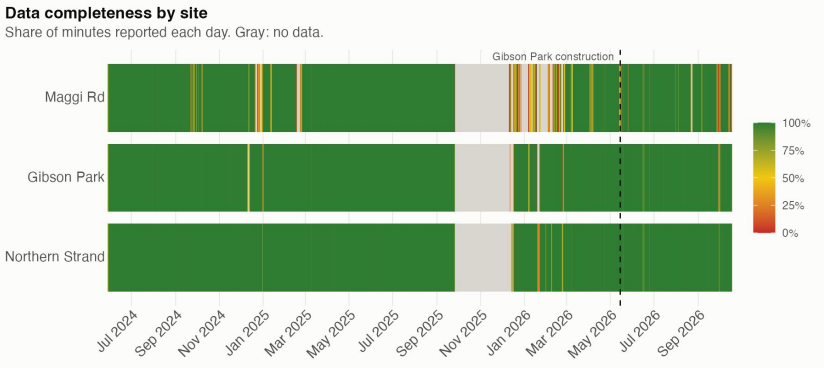
Wildfire smoke days removed, all with a public record of Canadian wildfire smoke over Boston.

808

Fog screened out: 808 of the 818 minutes with PM_{10} above 5,000 µg/m³ were fog droplets, removed by a fog screen.

Fall 2025

All three offline together from September 27, 2025 until December 11 to 14, 2025, because the data subscription lapsed.



Ozone corrected for drift: the ozone sensors drifted over time, so we calibrated them based on monthly comparison to the state monitor in Lynn.

Results shown are from May 29, 2024 to May 14, 2026, before construction began next to Gibson Park on May 15, 2026.

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The regional background

What everyone in Revere breathes

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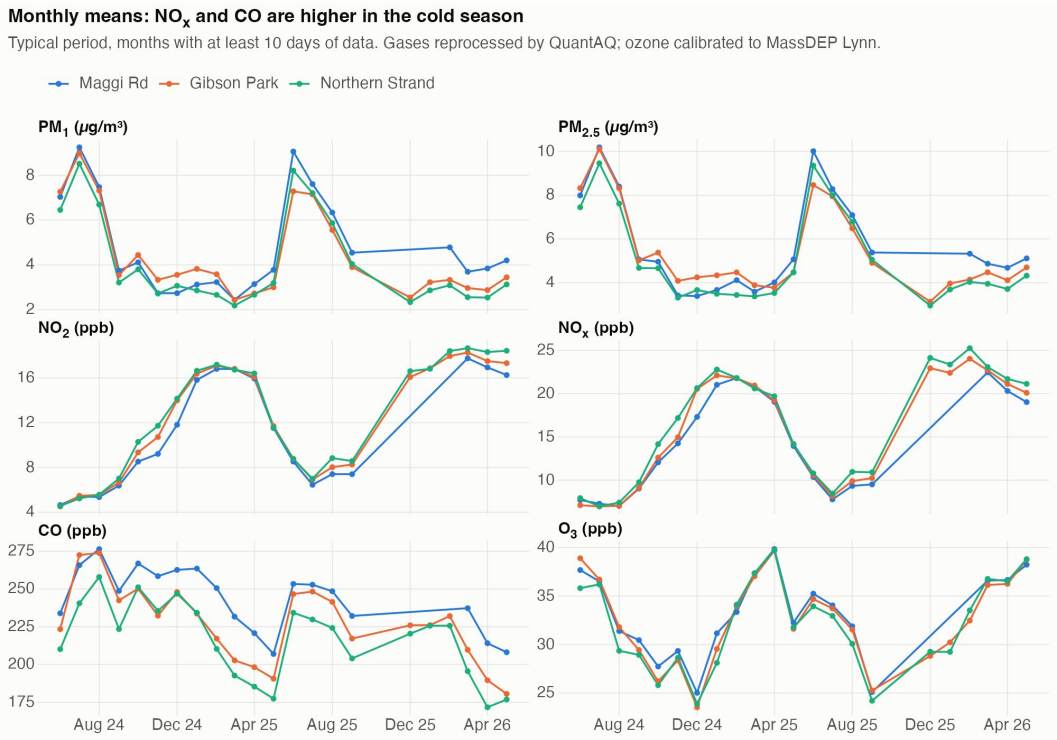
Most fine particles come from outside Revere, and rise and fall together at all three sensors



Mean $PM_{2.5}$ of 5.1 to 5.8 µg/m³: below the federal annual standard (9 µg/m³), just above the WHO guideline (5 µg/m³).

Higher during summer: 6.6 to 7.2 µg/m³ from May to October, compared with 3.6 to 4.1 from November to April, mostly regional haze.

The highest days are regional: every monitor high together, during early summer.

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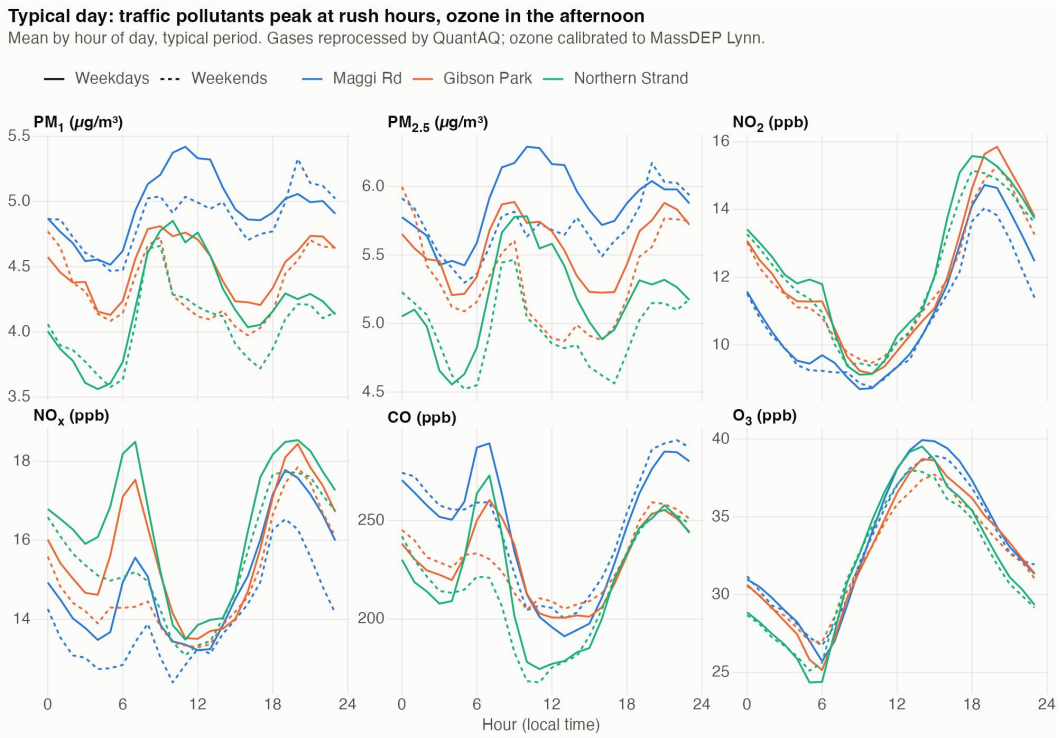
Traffic sets the daily rhythm of the air in Revere



Morning rush: carbon monoxide peaks from 6 to 8 am, and again during the evening.

Evenings and overnight: nitrogen oxides build up when the air near the ground is shallow.

Mid-afternoon: ozone peaks in sunlight.

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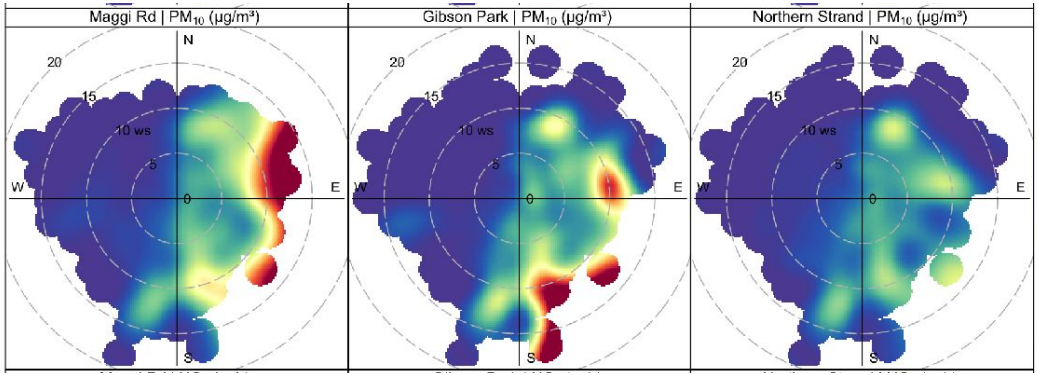
Strong onshore wind brings sea spray: the highest coarse particle concentrations come off the ocean



How to read the circles: each circle shows PM_{10} at one monitor (left to right: Maggi Rd, Gibson Park, Northern Strand). The direction around the circle is where the wind comes from, and the distance from the center is wind speed. Warm colors mark the wind conditions that bring the highest 10% of concentrations.

Coarse particles (PM_{10}) are highest with strong easterly wind off the ocean at Maggi Rd and Gibson Park. We report it as sea spray.

At Gibson Park, nearest the beach, ocean wind brings 45.7% of local PM_{10} episodes while blowing 24.1% of the time (2024-2026).

Sea spray raises PM_{10} across the network for many hours in humid onshore wind. That makes it easy to tell apart from dust, which arrives as short-duration plumes at one monitor.

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The WIN facility

The incinerator and the ash tailing areas, measured at Gibson Park

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From Gibson Park, the incinerator and the ash areas lie in separate wind directions



Incinerator: 1.1 km to the northwest. Wind from 294 to 333° carries air from the incinerator to Gibson Park.

Ash areas: the historical ash area (0.7 km) and the active ash dump (1.2 km) to the west. Wind from 222 to 293° carries air from the ash areas to Gibson Park.

Each wedge is widened by 20° on each side for uncertainty in the airport wind. For gases, which do not come from the ash areas, the full sector of the incinerator (285 to 333°) is used.

So each one can be tested on its own: do the highest concentrations at Gibson Park arrive with wind from that direction more often than the wind blows from there?

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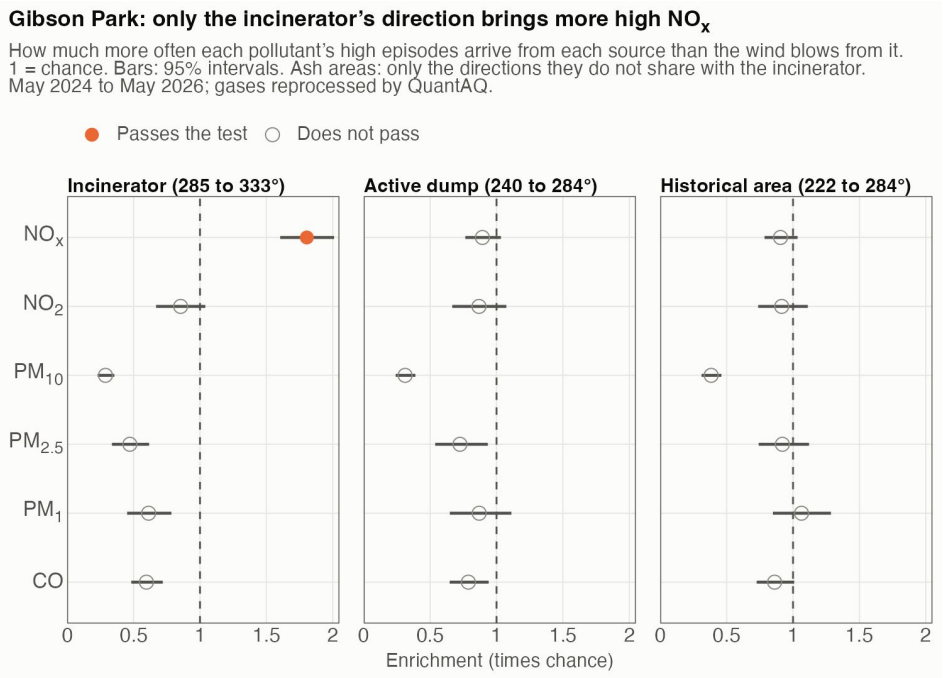
Only the direction of the incinerator brings elevated NOx to Gibson Park: 1.8 times as often as chance



How to read: each dot shows how many times more often high concentrations arrive from that direction than the wind blows from it (1 = chance); the bar is the 95% range. Orange passes the test.

Incinerator: 35% of the highest NO_x episodes at Gibson Park came with wind from the incinerator, which blows 20% of the time: 1.8× (95% interval 1.60 to 2.01).

Not the ash areas: on the directions they do not share with the incinerator, the ash areas bring no more high NO_x or NO_2 than chance (historical ash area 0.9×). The full wedge of the historical area passes only through the directions it shares with the incinerator.

A fresh-exhaust fingerprint: in the highest NO_x hours at Gibson Park, NO makes up 0.21 of NO_x with wind from the incinerator, compared with 0.12 with other wind.

Confidence: medium, because roads lie in the same direction.

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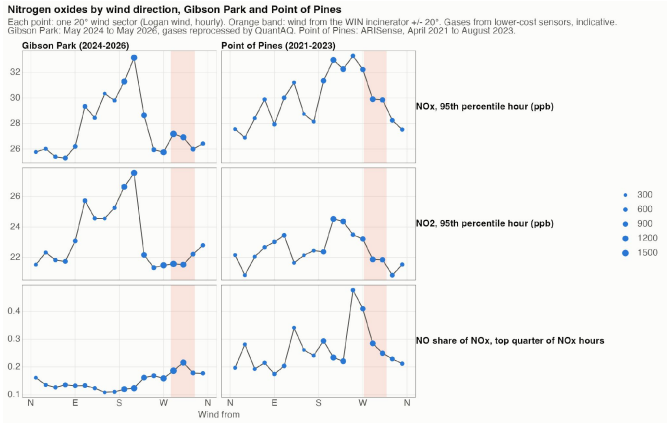
The incinerator adds fresh NO, not NO_2; no NAAQS exceedances

NO_x and NO_2 are not the same measure. NO_x is nitric oxide (NO) plus nitrogen dioxide (NO_2). Combustion emits NO first, and it turns into NO_2 within minutes to hours downwind. The extra NO_x from the incinerator at Gibson Park is fresh NO; NO_2, the gas with a federal standard, is no higher when wind comes from the incinerator.



0 **hours** above the federal 1-hour NO_2 standard, in either period. The highest hour was 42.7 ppb, compared with the standard of 100 ppb.

Gibson Park: days above the WHO 24-hour NO_2 guideline

	With wind from the incinerator	Other days
November to April	77.6%	81.6%
May to October	6.4%	7.7%

Above the WHO guideline on 263 of 619 days (42%), mostly during the cold season: a citywide pattern.

Public record: the 2020 MassDEP approval allows the plant to meet the 150 ppm NO_x limit partly by buying emission reduction credits rather than installing further controls. Our data show fresh NO_x from the plant reaching Gibson Park. They do not show it causing NO_2 exceedances there. **Ultrafine particles:** expected alongside the fresh exhaust, but not measured here.

Sources: MassDEP emission control plan approval; Waste360, 2020

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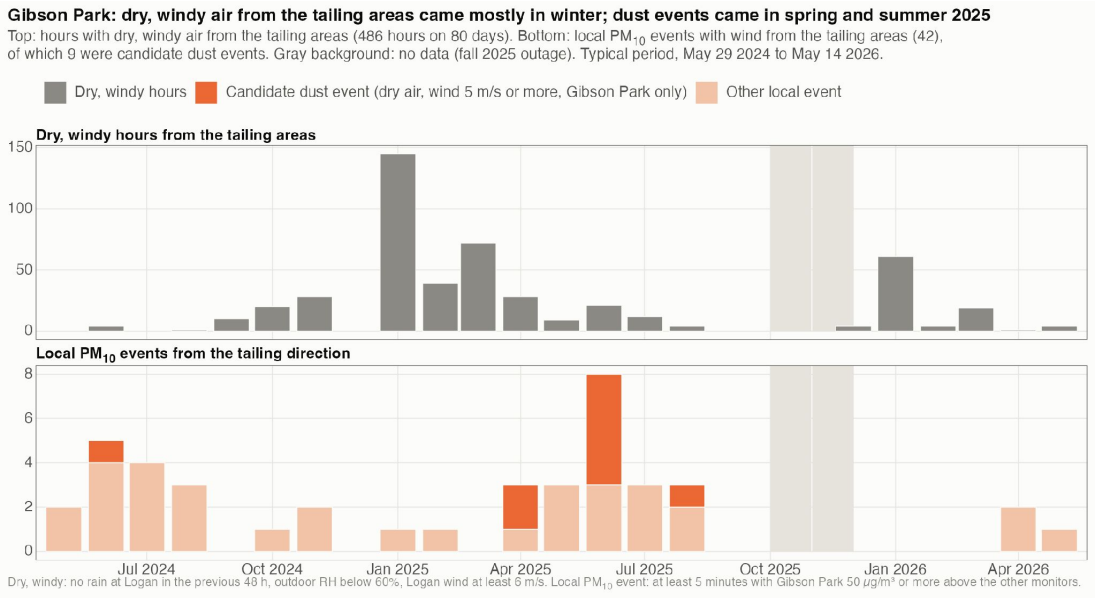
Dry, windy air blew from the ash tailing areas to Gibson Park on 80 days, with no rise in coarse particles



486 hours on 80 days of dry, windy air from the tailing areas. 372 of those hours (77%), on 52 days, were between November and March.

No rise: in those hours, PM_{10} at Gibson Park had a mean of −0.4 µg/m³ compared with the other monitors (95% interval −1.7 to 0.9).

9 short dust events came from that direction, all starting on weekdays between 6 am and 6 pm, all between April and August, and 7 of them between April 17 and June 24, 2025.

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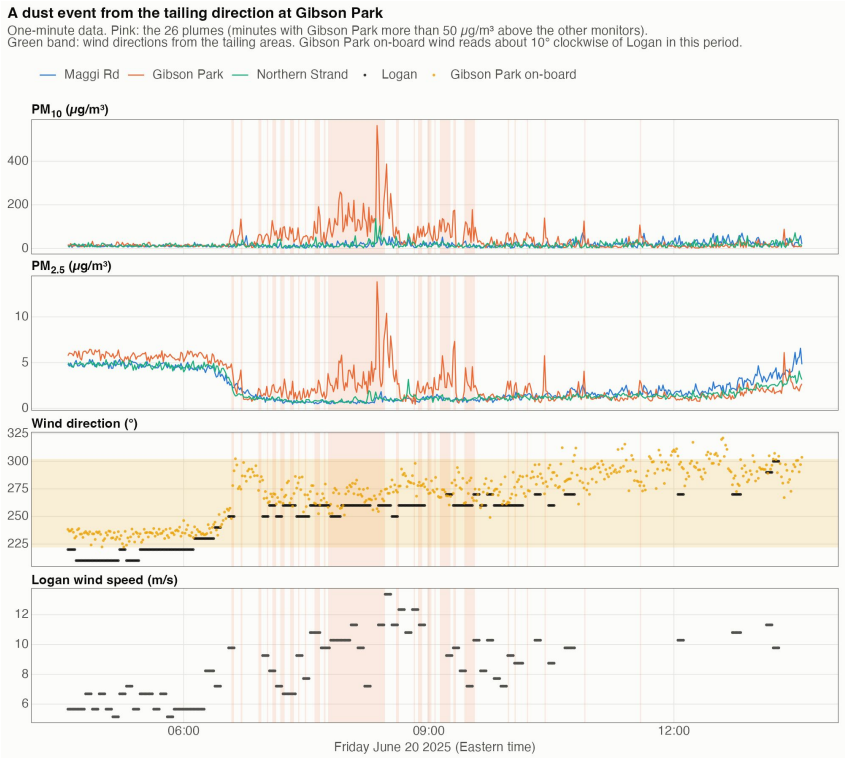
On June 20, 2025, Gibson Park alone recorded five hours of dust plumes with wind from the direction of the active tailing dump



6:33 am: the wind swung west toward the active dump and strengthened to 9.8 m/s, then 10 to 13 m/s.

26 plumes, peak 564 µg/m³ at 8:22 am. 22 minutes were above 150 µg/m³ at Gibson Park; Maggi Rd and Northern Strand had none.

Not fog, not regional: humidity 55 to 69%, 10-mile visibility at Logan, no rain for 59.7 hours; the other monitors stayed near their earlier concentrations.

One of 9 in two years: the largest of 9 candidate dust events from the tailing direction. Only June 12 and June 20, 2025 were this large.

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Dry, windy dust events like June 20 came from the tailing direction 9 times in two years, all between April and August; 19.2 events per year in total

Date	Start to end	Minutes elevated	Plumes	Peak PM_{10} ($\mu g/m^3$)	Wind (m/s, from)	RH
Wed Jun 5 2024	11:20 to 13:25	6	5	166	5.7, 223°	55%
Thu Apr 17 2025	12:06 to 13:38	14	6	191	7.2, 285°	38%
Tue Apr 29 2025	10:50 to 10:57	8	1	2,241	8.2, 230°	33%
Mon Jun 2 2025	08:21 to 09:39	9	4	178	5.7, 262°	56%
Mon Jun 2 2025	11:42 to 13:38	11	7	297	5.7, 259°	51%
Thu Jun 12 2025	08:28 to 14:21	68	25	339	8.2, 262°	52%
Fri Jun 20 2025	06:35 to 11:35	98	26	564	9.8, 261°	59%
Tue Jun 24 2025	13:12 to 13:29	11	3	195	5.7, 276°	44%
Tue Aug 26 2025	11:27 to 13:41	15	6	184	5.1, 258°	46%

Minutes elevated: minutes with Gibson Park 50 µg/m³ or more above the other monitors. Wind from Logan; times Eastern. The other monitors did not rise.

4.6 events per year: 1 during 2024 (from May 29), 8 during 2025, none during 2026 to May 14.

All during spring and summer: 2 during spring, 7 during summer, none from September to February.

Two were large: June 12 and June 20, 2025 brought hours of repeated plumes. The rest lasted minutes.

Why 9: of 42 local events with wind from the tailing areas, these 9 came in dry air (below 60% humidity), with wind of at least 5 m/s, at Gibson Park only.

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Dust from the ash areas arrives at the Gibson Park playground as short-duration plumes on 19.2 days per year

19.2

days per year with a short-duration dust plume from the ash areas (2024-2026)

3.5

hours per year when the hourly mean at Gibson Park is 50 µg/m³ or more above the rest of the network with wind from the ash areas

0.4%

added to the mean PM_{10} at Gibson Park (20.3 µg/m³) by ash-area and incinerator-direction episodes together: 0.08 µg/m³

?

The composition of the dust is not known

During a plume, the median peak excess is 160 µg/m³, 7.9 times the mean PM_{10} at Gibson Park, for minutes.

Over a year, the plumes add 0.4% or less to the mean coarse particle concentration.

The composition of the dust is not known. Ash can be rich in metals, and these sensors do not measure composition or the dust that settles on surfaces, soil and play equipment.

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PM_{10} plumes are not created equal: published studies find incinerator ash rich in metals

What incinerator ash contains

Heavy metals: zinc, lead, copper, chromium, cadmium, typically hundreds to thousands of mg/kg, and chlorides.[1,2]

Fly ash is more contaminated than bottom ash and contains dioxins.[1]

Unburned carbon: loss on ignition of 3 to 13%.[1]

This site: a 2017 notice letter describes lead, mercury, cadmium, arsenic and dioxins in the Saugus ash.[3]

Why it matters

Oxidative potential: transition metals, especially soluble copper and manganese, drive much of the ability of particles to cause oxidative stress.[4]

So, per microgram, a coarse particle plume from the ash areas is expected to be more toxic than a sea spray plume of the same mass.

Not measured here: these sensors measure particle mass, not composition.

Context from published studies, not measured in Revere. [1] Lam et al. (2010), Sustainability 2:1943-1968. [2] Nguyen et al. (2024), RSC Advances 14:16486-16500. [3] Conservation Law Foundation (2017), notice of intent to sue, Wheelabrator Saugus. [4] Charrier et al. (2015), Atmos. Chem. Phys. 15:2327-2340.

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What we can and cannot say about the WIN facility

What we measured

Incinerator: fresh nitrogen oxides from the direction of the incinerator reach Gibson Park (1.8×, and a higher fresh-NO share); the directions of the ash areas bring none.

Incinerator: no federal NO_2 exceedance, and no higher NO_2 with wind from the incinerator.

Ash areas: dust as short-duration plumes on 19.2 days per year; with incinerator-direction episodes, 0.4% of the mean PM_{10}.

Ash areas: no regular dust signal at the two nearest monitors.

What we could not measure

Dust composition, including metals in ash and dust that settles on play equipment and soil.

Ultrafine particles in exhaust from the incinerator.

What activity at the site caused the dust plumes.

Wind at Gibson Park, not yet usable: the monitor measures it, but we are waiting on QuantAQ about a direction offset after a March 2025 restart.

Each "could not" has a concrete next step, on the "Ways to strengthen" slide.

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Air quality standards

How Revere compares with federal standards and WHO guidelines

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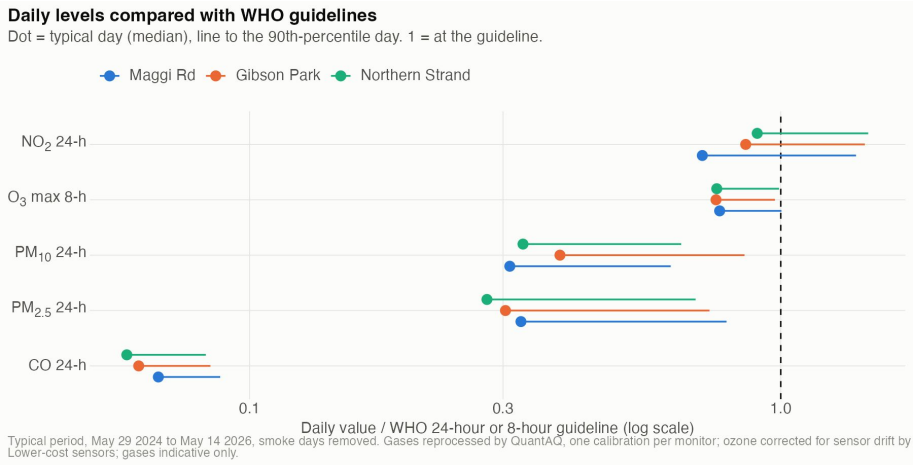
Federal standards met apart from two regional ozone days; nitrogen dioxide, then ozone, is furthest above WHO guidelines



Federal (EPA): particle, NO_2 and CO standards met at every monitor; for ozone, see right.

NO_2: mean of 11.0 to 12.3 ppb, 2.1 to 2.3 times the WHO annual guideline (5.3 ppb).

O_3: above the WHO 8-hour guideline on 9 to 10% of days, similar during the summers of 2024 and 2025.

PM_{10}: most days above the WHO guideline at Gibson Park, nearest the beach (sea spray).

Days above the WHO 24-hour guidelines

	Maggi Rd	Gibson Park	Northern Strand
$PM_{2.5}$ (15 µg/m³)	16 of 539 (3%)	13 of 605 (2%)	11 of 621 (2%)
PM_{10} (45 µg/m³)	5 of 539 (<1%)	36 of 605 (6%)	11 of 621 (2%)
NO_2 (13.3 ppb)	172 of 531 (32%)	263 of 619 (42%)	275 of 626 (44%)
O_3, 8-hour (51 ppb)	53 of 520 (10%)	53 of 619 (9%)	60 of 624 (10%)
CO	0 of 531 (0%)	0 of 619 (0%)	0 of 626 (0%)

Ozone, corrected for sensor drift: above the federal 8-hour standard (70 ppb) at Northern Strand on June 18, 2024 (71.6 ppb, during the June 2024 heat wave and MassDEP ozone alerts) and at Maggi Rd on August 12, 2025 (72.3 ppb; Lynn 81 ppb). Regional ozone days: exceedance days, not a violation.

Sources: MassDEP air quality advisory, June 2024; EPA AirData (Lynn)

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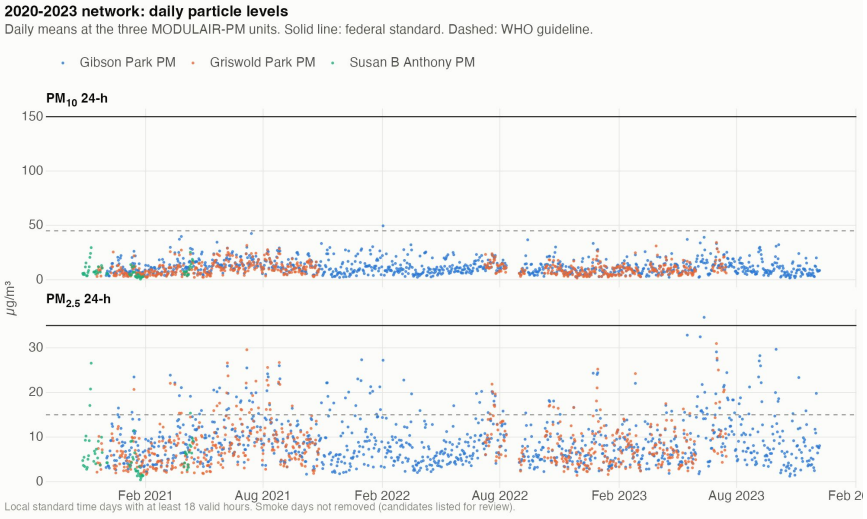
Air Partners and the City measured the air in Revere from 2020 to 2023 too, and found the same picture



No federal particle standard exceeded outside wildfire smoke, except one day at Gibson Park (June 12, 2023, $PM_{2.5}$ 36.8 µg/m³).

Nitrogen dioxide was often above the WHO guideline: on 166 of 525 days (32%) at Point of Pines and 165 of 229 (72%) at Chelsea, with no federal exceedance. Particles were mostly regional, and the daily rhythm matched 2024-2026.

Different sensors, so we compare patterns, not concentrations, between the two periods.

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Sources we investigated that did not show up

Ash

Ash tailing areas as a regular dust source

No regular PM_{10} signal at Gibson Park (0.4×) or Maggi Rd (1.0×), and no extra NO_x or NO_2 from the direction of the ash areas.

NO_2

The incinerator and nitrogen dioxide exceedances

None in either period, and NO_2 no higher with wind from the incinerator.

$PM_{2.5}$

Fine particles and CO

No mapped source passes for fine particles. CO from the north at Maggi Rd is night-time buildup in calm air, not a source (confidence: high).

East

East of Northern Strand

The incinerator, tailing areas, beach, and ocean lie in one direction from 2 to 3 km, so these sources cannot be distinguished with the test. Reported as sea spray for particles, a tailing contribution not excluded (confidence: medium). No mapped direction passes for NO_2.

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Ways to strengthen the next phase of monitoring

UFP

Ultrafine particles

Measure them at Gibson Park for at least one season with a condensation particle counter, to test whether the plume from the incinerator brings more of them.

Metals

Metals

Sample surface dust or soil at Gibson Park (wipe or soil samples), a practical alternative to months of filter sampling.

Logs

Records

Ask MassDEP for the NO_x emission records of the plant and the use of credits; ask for dust-control and hauling records for June 20 and June 12, 2025.

Wind

Use the wind at Gibson Park

Resolve the direction offset with QuantAQ, then use the wind measured by the monitor; if it cannot be resolved, add a monitor with a weather station.

Data

Upkeep and data checks

Keep subscriptions current, service Northern Strand, fix wind offsets, and check incoming data weekly so faults like the failed nephelometer are detected within days.

Alert

Explore a dust alert

A near-real-time alert for ash-tailing dust at Gibson Park, built on the fingerprint, using sensor data and local wind.

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Thank you

Questions and discussion

The full report will have the details behind every slide.

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Air Partners · data analysis and reporting · airpartners.org

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