From:	Mason Leavitt
To:	Benton Public Comment
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Please find the attached testimony and supporting documents for the record.

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Mason Leavitt
GIS Analyst and Programs Coordinator
Beyond Toxics
mleavitt@beyondtoxics.org
(541) 645-5972

BEYOND TOXICS

OREGON'S SECRET CLIMATE KILLERS

PULLING BACK THE CURTAIN ON HIDDEN LANDFILL METHANE EMISSIONS

March 2025

MASON LEAVITT
LISA ARKIN

BRIEF PURPOSE STATEMENT

In 2022, the Oregon Department of Environmental Quality implemented new rules which regulate landfill gas emissions. The rules require Oregon landfills with greater than 200,000 tons of waste-in-place to obtain an Air Contaminant Discharge Permit to submit data on the landfill characteristics and potentially monitor, collect and/or control landfill gas emissions. The DEQ's purpose was to reduce methane emissions to meet former Governor Kate Brown's directive provided in Executive Order No. 20-04 to give state agencies the authority to establish science-based greenhouse gas emissions reduction goals. Typically, landfill gas is made up of around 50% methane. Methane is a very strong greenhouse gas, more than 80 times as potent as carbon dioxide in the short-term.

In 2024, Beyond Toxics conducted an analysis of landfill operator compliance with Oregon's new landfill methane regulations which went into effect in October 2022. We examined 32 Surface Emissions Monitoring (SEM) reports submitted by eight Municipal Solid Waste (MSW) landfills out of a total of 11 MSW landfills that are required to follow the new rules. Our report is limited to eight landfills because three of the 11 large landfills received exemptions from the Department of Environmental Quality or did not comply with the new rules. Our investigation resulted in the following findings.

KEY FINDINGS

Three out of 11 of Oregon's large, currently operating landfills did not follow the state's surface emissions monitoring rules in 2023, one year after the rules went into effect in 2022. As a result, three of Oregon's largest landfills are completely unmonitored for potent methane emissions. This is important because 90% of the methane emissions produced by industries in Oregon come from its largest landfills.[1]

[1] Industrious Labs (2025). Don't Waste Our Future. Based on U.S. EPA Greenhouse Gas Reporting Program (GHGRP) 2022, U.S. EPA Landfill Methane Outreach Program (LMOP) (July 2023), and U.S. EPA GHG Equivalency calculator.

Our examination of maps submitted by the remaining eight largest MSW landfills reporting to regulators found that privately owned landfills (five out of eight)– all owned by large corporations– on average, excluded 48.6% of the landfill surface area from monitoring for methane emissions. While minor portions of these exemptions are legally justified, for example the open area of the landfill's working face where trash is being dumped, most of these exemptions are ambiguous. The high rate of exemptions calls into question how compliant landfill owner-operators are with Oregon's laws. Notably, it coincides with the U.S. EPA's recent nationwide enforcement alert noting "widespread" noncompliance with surface emissions monitoring rules including exempting substantial portions of landfills from SEM without sufficient justification.[2]

Compared to privately owned landfills, publicly owned landfills managed by local governments excluded, on average, just 10% of the surface area. The difference demonstrates significant disparities in methane emission data between privately owned landfills that are managed for profit, and publicly owned landfill operations that are managed for the benefit of local taxpayers and businesses.

There are key gaps regarding what surface emissions monitoring data is required to be reported to state regulators, which leaves the Oregon Department of Environmental Quality unable to review results. Most Oregon landfills required to conduct monitoring are not reporting their surface emissions monitoring locations using verifiable GPS tracking, making it impossible to verify that owner-operators are monitoring every 25 feet as required by law. As a result, there could be significant gaps in methane detection. There is also no way for state regulators to verify integrated monitoring results because landfills are not required to report basic information such as their 50,000 square foot grids and the average surface emission reading in each of those grids.[3]

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[2] Environmental Protection Agency. (2024, September 25). Enforcement Alert: EPA Finds MSW Landfills are Violating Monitoring and Maintenance Requirements. EPA Investigations Find Municipal Solid Waste Landfill Operators Are Failing to Properly Conduct Compliant Monitoring and Maintenance of Gas Collection and Control System. https://www.epa.gov/enforcement/enforcement-alert-epa-finds-msw-landfills-are-violating-monitoring-and-maintenance

[3] Integrated monitoring results are derived from the averaging of all surface emissions monitoring measurements in a given 50,000 square foot grid.

RECOMMENDATIONS

The state of Oregon Department of Environmental Quality (DEQ) should immediately move to integrate the mandatory use of remote sensing technologies into Surface Emission Monitoring (SEM) rules to detect and pinpoint methane leaks at landfills.[4] One available technology is deploying methane detection equipment mounted on drones. The State can also require third party satellite methane detection systems, which provide comprehensive and more accurate measurements of the concentration of methane plumes, the direction of methane plumes moving off the landfill property, and the exact location of emission exceedances from landfills. DEQ can also require fixed monitors for real-time methane tracking. Gathering this comprehensive data set will lead to rapid mitigation of super-emitter leaks, improved methane capture for use in local energy generation or methane destruction through enclosed flaring.

DEQ should update their regulations to require SEM on all areas of landfills including steep slopes, closed cells, locations with covering vegetation and unspecified exemptions. Combining actionable emissions data from these areas along with mitigation strategies such as horizontal gas collection is critical for reducing greenhouse gas impacts and associated air toxics such as volatile organic compounds (VOCs), hydrogen sulfide, forever chemicals and fine particulate matter thereby improving air quality for local communities and climate mitigation to follow state climate action mandates.

Close reporting loopholes to ensure landfill owner-operators are adequately monitoring for methane. DEQ should immediately update its regulations to require that any owner or operator who conducts surface emissions monitoring must:

1. Report the areas exempted from monitoring and report the reasons for requesting those exemptions. This would address the current issue of exemptions being granted on a de facto basis.

[4] Throughout this report we emphasize Oregon because these are the arenas at which Beyond Toxics focuses its advocacy. Our findings could be replicable in other states or at the federal level.

2. Report measured concentration of methane in ppm for each SEM reading.

3. Report the SEM path walked by owner-operators.

4. All the above data should be in a spatial data format such as a shapefile, which makes for more efficient analysis of data gathered through surface emissions monitoring.

To prevent future potent methane emissions, governments at all scales can introduce mandatory organics diversion policies requiring consumers and haulers to separate and sort organic waste so that food and yard waste can be sent to facilities other than landfills to make compost and other products thereby preventing future generation of methane in landfills.

EXECUTIVE SUMMARY

Beyond Toxics conducted an analysis of 32 Surface Emissions Monitoring (SEM) reports submitted by eight MSW landfill operators to the Oregon Department of Environmental Quality for the year of 2023.[5] Per state rules, SEM is currently performed at landfills with over 200,000 tons of total lifetime waste and modeled methane emissions greater than 664 tons. We analyzed open landfills currently accepting municipal solid waste (variations of these rules apply to other landfills that are closed and/or accept only industrial waste). According to records from the DEQ, a total of 11 currently operating municipal solid waste landfills in Oregon meet the waste-in-place and methane emissions thresholds for the state's surface emissions monitoring rules. Three of those landfills were not following the new rules; two due to exemptions granted by the DEQ and one did not comply. SEM is performed quarterly by walking portions of the landfill surface with a handheld gas analyzer in a grid pattern to detect methane leaks. Individual leaks detected measuring over 500 parts per million (ppm) require remediation within 10 days. Operators are also required to divide their landfill into 50,000 square foot grids and average their SEM results within each grid, referred to as integrated monitoring. If a grid has an average of 25 ppm or higher, then the operator is required to conduct mitigation efforts to bring it below 25 ppm.

[5] (See OAR 340-239-0100).

These reports were qualitatively and spatially assessed to determine transparency, compliance, completeness and quality of submitted reports and gaps with landfill emissions regulations.

Across eight landfills, five are privately owned and three are publicly owned and managed by a local government. We found that an average of 33.1% of landfill surface area was excluded from surface emissions monitoring. These exemptions include permitted exemptions, such as the working face where garbage is actively being deposited, and exemptions that are more questionable such as final grading (the slopes of landfill sections that are closed and no longer having waste deposited into them).

Although on average 33.1% of landfill surface area was excluded from emissions monitoring, the data revealed that private landfill operators are excluding an average of 48.6% of landfill surface area from SEM. Methane leaks in those areas are going undetected. The result of data omission is accelerated climate damage, dangerous conditions for workers, and air pollution and odors burdening nearby residential neighbors who are exposed to hazardous byproducts escaping along with methane. While some of these areas are too dangerous to be monitored by workers, substantial portions of landfills could have been safely monitored, such as areas with some vegetation or moderately sloped sides. Instead, they were excluded and listed as exempted on the report to the DEQ. Additionally, all of these areas could have been safely monitored with unmanned aerial equipment or fixed sensor systems. For example, owner-operator Waste Connections in Medford argued 69% of Dry Creek Landfill was too steep to monitor despite there being readily available methane detection technology that could fly over these areas.

We observed that, in comparison, public operators excluded only an average of 10% of landfill surface areas from monitoring. The stark difference in the comprehensiveness of surface emissions monitoring calls for further investigation of how landfill operators request exemptions, how transparent they are about their operating procedures, and the frequency and duration of exemption approvals on the part of the DEQ.

Our findings come in tandem with the U.S. Environmental Protection Agency's recent public release of draft white papers that delineate how advanced methane detection technology such as fixed methane sensors and satellites could address serious deficiencies in finding and fixing methane leaks.[6] In fall of 2024, the EPA issued a nationwide enforcement alert, stating, in part, "While the regulations allow MSW landfills to exclude certain areas from the SEM (e.g., areas with steep slopes or other dangerous areas), the EPA observed during recent inspections that areas that are not dangerous are improperly excluded from monitoring. If a MSW landfill excludes areas from the SEM, the facility should document and explain the basis for excluding each area from monitoring in the surface emission design plan and SEM reports. The regular side slopes of the landfill may not be excluded from monitoring per the regulations."[7] Excluding the working face and a few other time-limited activities,[8] state and federal rules require that all areas of landfills should be monitored during SEM. In Oregon, DEQ air pollution permit writers approve or deny exemptions from SEM proposed by operators (referred to as "alternative monitoring plans").[9]

State regulatory agencies need to use their authority to ensure the exceptions they permit are ultimately demonstrated to be necessary. Additionally, requiring operators to use advanced monitoring systems for SEM in difficult to monitor areas could fill this regulatory gap.

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[6] USEPA, Office of Air and Radiation. (2024). White Paper Series: Municipal Solid Waste Landfills – Advancements in Technology and Operating Practices. USEPA, Office of Air and Radiation. https://www.epa.gov/stationary-sources-air-pollution/non-regulatory-public-docket-municipal-solid-waste-landfills

[7] Environmental Protection Agency. (2024, September 25). Enforcement Alert: EPA Finds MSW Landfills are Violating Monitoring and Maintenance Requirements. EPA Investigations Find Municipal Solid Waste Landfill Operators Are Failing to Properly Conduct Compliant Monitoring and Maintenance of Gas Collection and Control System. https://www.epa.gov/enforcement/enforcement-alert-epa-finds-msw-landfills-are-violating-monitoring-and-maintenance

[8] Or. Admin. R. 340-239-0330, "The requirements of OAR 340-239-0200 do not apply to the working face of the landfill or to areas of the landfill surface where the landfill cover material has been removed and solid waste has been exposed for the purpose of installing, expanding, replacing, or repairing components of the landfill gas, leachate, or gas condensate collection and removal system, for conducting a remedial action, or for law enforcement activities requiring excavation; as long as these areas are kept to the minimum size and time duration as possible." [4] Throughout this report we emphasize Oregon because these are the arenas at which Beyond Toxics focuses its advocacy. Our findings could be replicable in other states or at the federal level.

[9] Or. Admin. R. 340-239-500(1)(c) "Alternative walking patterns to address potential safety and other issues, such as: steep or slippery slopes, monitoring instrument obstructions, and physical obstructions;"

We also found that landfill operators are omitting key pieces of data gathered from SEM, which, while legal, is an outcome of weak regulatory requirements and enforcement. For example, Oregon rules require that operators monitor every 25 feet of a landfill's surface area every year. This can be accomplished by monitoring every 25 feet every quarter or by monitoring every 100 feet each quarter but offsetting that path by 25 feet each quarter.[10] However, Oregon rules do not require operators to share their SEM path, so regulators are not able to verify the rule is being followed. Additionally, SEM data that is reported comes in print format, which requires regulatory staff hundreds of hours to translate to a spatial file storage format that provides comprehensive and more accurate data for analysis. This labor to convert the data, despite the existence of accessible Geographic Information Systems (GIS) technology for data analysis, is inefficient and a burden on regulatory agency resources.

Furthermore, landfill operators are only required to report methane leaks over 200 ppm or integrated monitoring exceedances 25 ppm and greater; they do not report all measured SEM values. This is particularly problematic for integrated monitoring results because those results are based on averaging all SEM measurements within a 50,000 square foot section, not just the values over 200 ppm. For example, there could be a series of SEM measurements between 100 ppm and 199 ppm in a concentrated area that would suggest a problem. However, if it were grouped in a 50,000 square foot cell where there were a substantial amount of measurements near 0 ppm, the problem area could be masked through the averaging process. Enhancing the specificity of data reporting and transparency would provide regulatory agencies with a stronger ability to identify problematic areas of methane escaping from landfills and require targeted remediation. Critical to this would be requiring landfill operators to report data in spatial data formats that are usable by widely available GIS software.

Policymakers can act to address data gaps and upgrade methane reporting standards to ensure a healthy climate, protect worker safety and public health and to reduce greenhouse gas emissions and related air pollutants.

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[10] Or. Admin. R. 340-239-0400(2)(a) "The walking grid in OAR 340-239-0800(3)(a)(B) may be reduced to 100-foot spacing so long as the walking grid is offset by 25-feet each quarter so that by the end of one year of monitoring, the entire surface area has been monitored every 25 feet"

BACKGROUND

Mitigating short-term methane emissions, a climate pollutant about 80 times more powerful than CO2,[11] is critical to preventing the world from reaching climate tipping points. Climate tipping points are thresholds at which the climate systems would irrevocably change and upend local weather systems, supply chains, and global food productions. Currently landfills are the third leading cause of methane emissions in Oregon and the United States, and the second leading globally.[12]

Methane emissions are a byproduct of disposing of organic waste into landfills. As organic waste (food scraps, wood, paper, textiles) decomposes in an oxygen deprived environment, methane gas is generated over the course of decades. Most landfills can be thought of as giant plastic bags containing waste (although some landfills have waste in direct contact with the ground). These cells are lined next to and on top of each other in a pyramid-like structure. Pipes line the bottom of cells in horizontal rows to extract liquid byproducts, referred to as leachate. Gas extraction wells are drilled vertically and sometimes horizontally into landfill cells to capture continually generated methane gas before it escapes to the atmosphere.

Currently, federal rules require certain landfills in the United States to implement gas collection and control systems (GCCS), which use gas wells to extract methane from about 600 U.S. landfills, excluding the working face (where waste is deposited on a daily basis).[13] While GCCS are intended to extract and capture methane, several challenges exist regarding their successful and efficient operation.

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[11] United Nations Environmental Programme. (2022, October 18). What's the deal with methane? Climate Action: Chemicals & Pollution Action. https://www.unep.org/news-and-stories/video/whats-deal-methane
[12] Saunois, M., Martinez, A., Poulter, B., Zhang, Z., Raymond, P., Regnier, P., Canadell, J. G., Jackson, R. B., Patra, P. K., Bousquet, P., Ciais, P., Dlugokencky, E. J., Lan, X., Allen, G. H., Bastviken, D., Beerling, D. J., Belikov, D. A., Blake, D. R., Castaldi, S., … Zhuang, Q. (2024). Global Methane Budget 2000–2020. Earth System Science Data Discussions, 2024, 1–147. https://doi.org/10.5194/essd-2024-115
[13] Rocky Mountain Institute, Ebun Ayandele, Tom Frankiewicz, & Ellie Garland. (2024). Deploying Advanced Monitoring Technologies at US Landfills.
https://rmi.org/wp-content/uploads/dlm_uploads/2024/03/wasteMAP_united_states_playbook.pdf

Primary failures include insufficient gas collection coverage, holes in the plastic-lined cells, poorly or non-operating pipe systems, badly calibrated extraction wells, and leachate liquids clogging gas extraction pipelines.[14] Notably, when methane is escaping landfills, other hazardous air pollutants are being released to the air as well. These include hydrogen sulfide, other volatile organic compounds, and airborne PFOAs (aka “forever chemicals”).[15] These chemicals harm quality of life and pose public health risks for nearby residents and landfill workers. It is critical to consider landfill air emissions as a public health threat and a significant environmental justice challenge.

SURFACE EMISSIONS MONITORING (SEM)

Certain landfill operators are required to implement and comply with Surface Emissions Monitoring (SEM) requirements. SEM requirements were first introduced by the federal government and administered by the EPA. Federal regulations require that these landfills perform SEM quarterly and follow the EPA’s Method 21 guidance,[16] to detect and mitigate emissions greater than 500 parts per million.[17] SEM involves technicians walking the surface of the landfill at regular intervals of 30 meters looking for distressed vegetation, holes in tarps, protruding equipment, and other signs of potential methane leaks. Technicians use hand-held methane gas monitoring equipment to measure methane concentrations in the air just above the surface of the landfill. If a leak above 500 ppm is detected, the operator is required to remediate the cause of the leak.[18]

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[14] Preet Brains, Haley Lewis, Keene Kelderman, & Leah Kelly. (2023). Trashing the Climate: Methane from Municipal Landfills. Environmental Integrity Project. https://environmentalintegrity.org/wp-content/uploads/2023/05/Trashing-the-Climate-report-5.18.23-updated.pdf
[15] Ashley M. Lin, Jake T. Thompson, Jeremy P. Koelmel, Yalan Liu, John A.. Bowden, & Timothy G. Townsend. (2024). Landfill Gas: A Major Pathway for Neutral Per- and Polyfluoroalkyl Substance (PFAS) Release. Environmental Science & Technology, 11(7), 730–737. https://doi.org/10.1021/acs.estlett.4c00364
[16]40 C.F.R. §§ 63.1958(d) and 63.1960(c)-(d)
[17] U.S. Environmental Protection Agency, https://www.govinfo.gov/content/pkg/FR-2021-05-21/html/2021-10109.htm
[18] U.S. Environmental Protection Agency, https://www.govinfo.gov/content/pkg/FR-2021-05-21/html/2021-10109.htm

States including California, Oregon, Maryland, and Washington have promulgated state regulations strengthening various aspects of SEM to detect and reduce methane emissions. However, they are still reliant on a quarterly walking survey grid pattern monitoring, which still allows areas of the landfill to be skipped altogether leading to insufficient detection of leaks (see more in our discussion).

Oregon updated its landfill emissions rules, finalized October 2021, as a result of Executive Order 20-04 initiated by Governor Kate Brown in 2020 to direct state agencies to reduce greenhouse gases to at least 80% below 1990 emissions levels by 2050. The state's 2022 rules differ from federal rules in significant ways. The new regulations require landfill operators to conduct SEM following a walking pattern with no more than 25-foot intervals annually across the landfill's surface area, as opposed to the federally mandated 100 foot intervals. It also requires integrated monitoring for landfills, which averages SEM measurements across 50,000 square foot gridded sections. If a section has an average of 25 ppm or higher, then the landfill operator is required to take action to bring methane levels down.[19] The working face of the landfill is excluded from surface emissions monitoring along with areas under construction for gas collection.[20] Regulations also reduced the size and emissions threshold at which landfills are required to install a GCCS and conduct SEM.[21] The DEQ also added additional requirements to boost methane capture, including stronger GCCS leak component monitoring and data reporting requirements for GCCS equipment indicators and down time, which we did not evaluate in this report.

Our research questions were as follows, for those MSW landfill operators that fall subject to Oregon's regulatory parameters:

1. Which currently operating Oregon landfills accepting municipal solid waste are subject to implementing the updated rules?

2. How much landfill surface area is being included and excluded from SEM?

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[19] Oregon Department of Environmental Quality, Heather Kuoppamaki. (2021, October 1). Landfill Gas Emissions Rulemaking DEQ Presentation. Landfill Gas Emissions Rules Advisory Committee. https://www.oregon.gov/deq/EQCdocs/100121_I_Slides.pdf
[20] https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=6533
[21] Ibid.

3. Are the MSW landfill operators monitoring in a walking 25-foot grid pattern over the course of a year, per state regulatory requirements?

4. Are the MSW landfill operators conducting and reporting integrated monitoring results per a 50,000 sq. ft. grid, per state regulatory requirements?

5. Are reports complete, accurate, easy to analyze and useful to ODEQ to help regulators determine compliance and effective methane mitigation?

METHODS

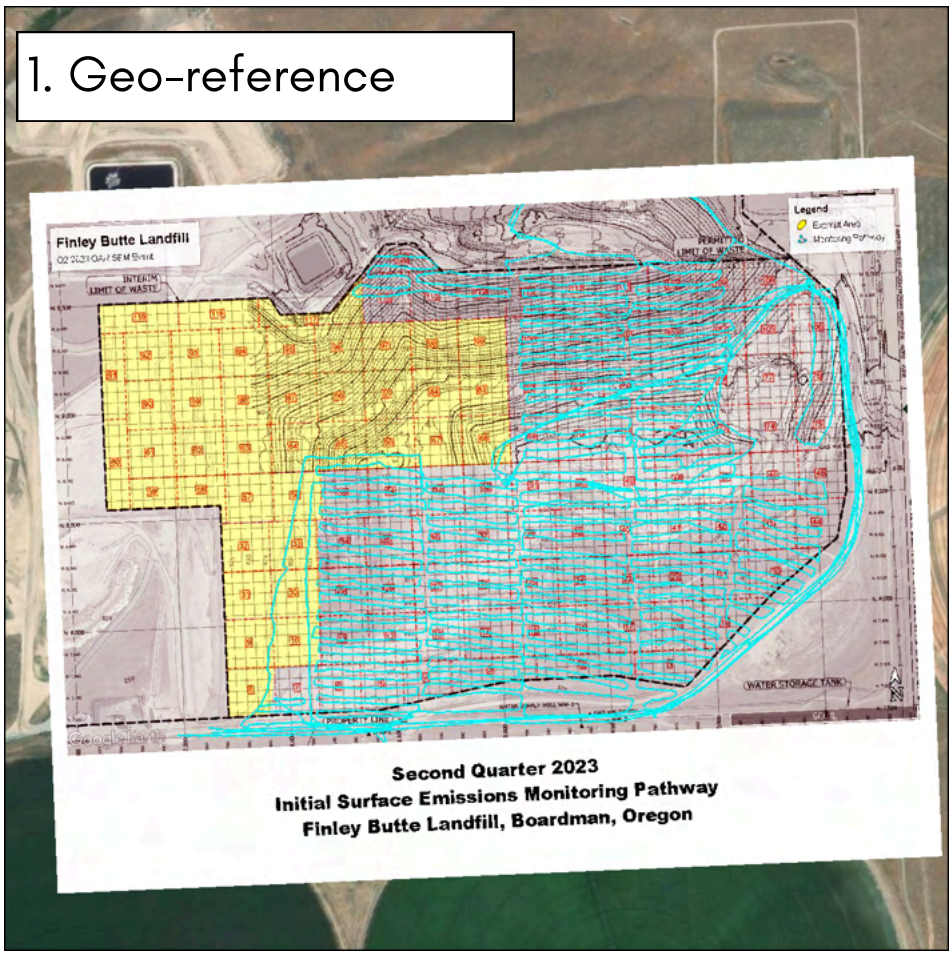
Beyond Toxics procured annual and semiannual reports, which certain landfills are required to file,[22] through a public records request to the Oregon DEQ filed in January 2024. We asked for reports filed by currently operating landfills accepting municipal solid waste that are known to exceed 200,000 tons of waste-in-place and 664 tons of methane a year since those are the thresholds at which Oregon's stricter SEM procedures go into effect.

Records were released in June 2024, and included SEM reports from eight of 11 qualifying Oregon landfills in 2022 and 2023. The other three landfills did not conduct SEM, which we inquired further about and will be discussed later. We analyzed solid waste landfills and we excluded landfills exclusively accepting construction and demolition waste, landfills that take only waste from industrial facilities, and all closed landfills. We performed a records analysis of SEM reports included in semiannual and annual reports to DEQ from 2023 for the eight of 11 currently operating municipal solid landfills required to adhere to stricter SEM requirements. In these reports, we analyzed the reporting of integrated monitoring results, 50,000 square foot grids, SEM exclusions, and SEM walking paths. We did not differentiate between SEM exclusions for the working face, asbestos pits, storage piles, steep slopes, overgrown vegetation, etc. because this information is not consistently available in reports compiled by operators. Operators often listed where they did not monitor without a specific justification.

[22] OAR 340-239-700(3)(c).

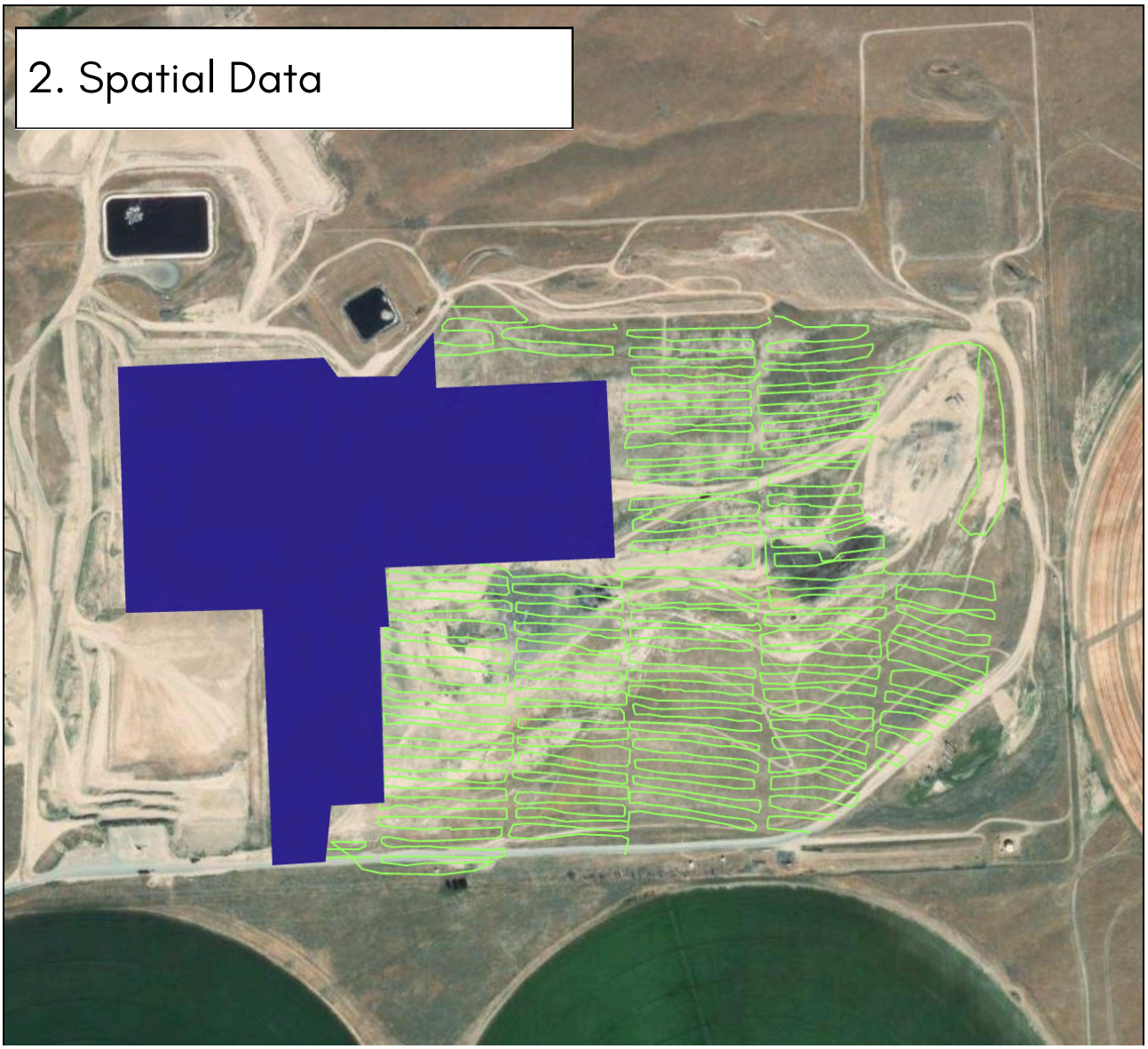
For research questions that required a spatial analysis, we georeferenced SEM report maps using ArcGIS Pro software. We then traced mapped features into vector data, which are GPS synchronized shapes that can be spatially analyzed. This allows us to do a few additional modes of analysis. For example, we can calculate the total area of a landfill and the SEM exempted areas. We can also create buffers around SEM paths to see if operators monitored every 25 feet. For the total area of landfill and areas of landfills excluded from SEM, we calculated their surface area in acres. For SEM paths, we created a 12.5 foot buffer around the walking path so we could visualize where gaps larger than 25 feet occurred between walking paths.

Figure 1: Frame 1, Frame 2, Frame 3, Frame 4

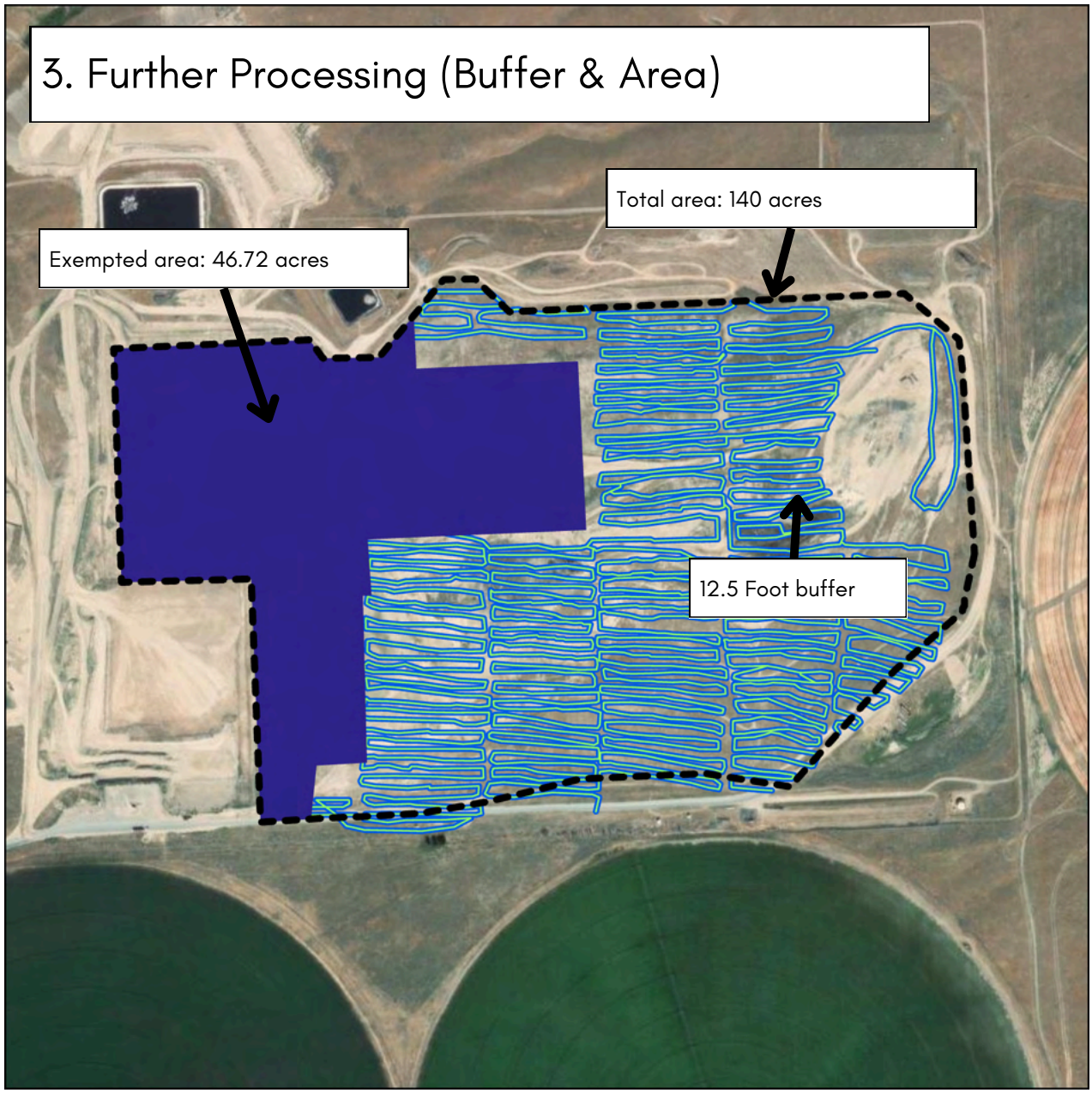


Frame 1: Overall, figure 1 shows our process of spatial data analysis for SEM reports using Finley Butte Landfill managed by Waste Connections in Boardman, Oregon as an example.

First we take the report graphic provided to the DEQ by the operator, which features a yellow polygon showing the area exempt from monitoring and a blue line showing where operators monitored. The first step is attaching the "paper" graphic to its GPS location. This is referred to as georeferencing. Now the graphic is overlaying its current satellite location.

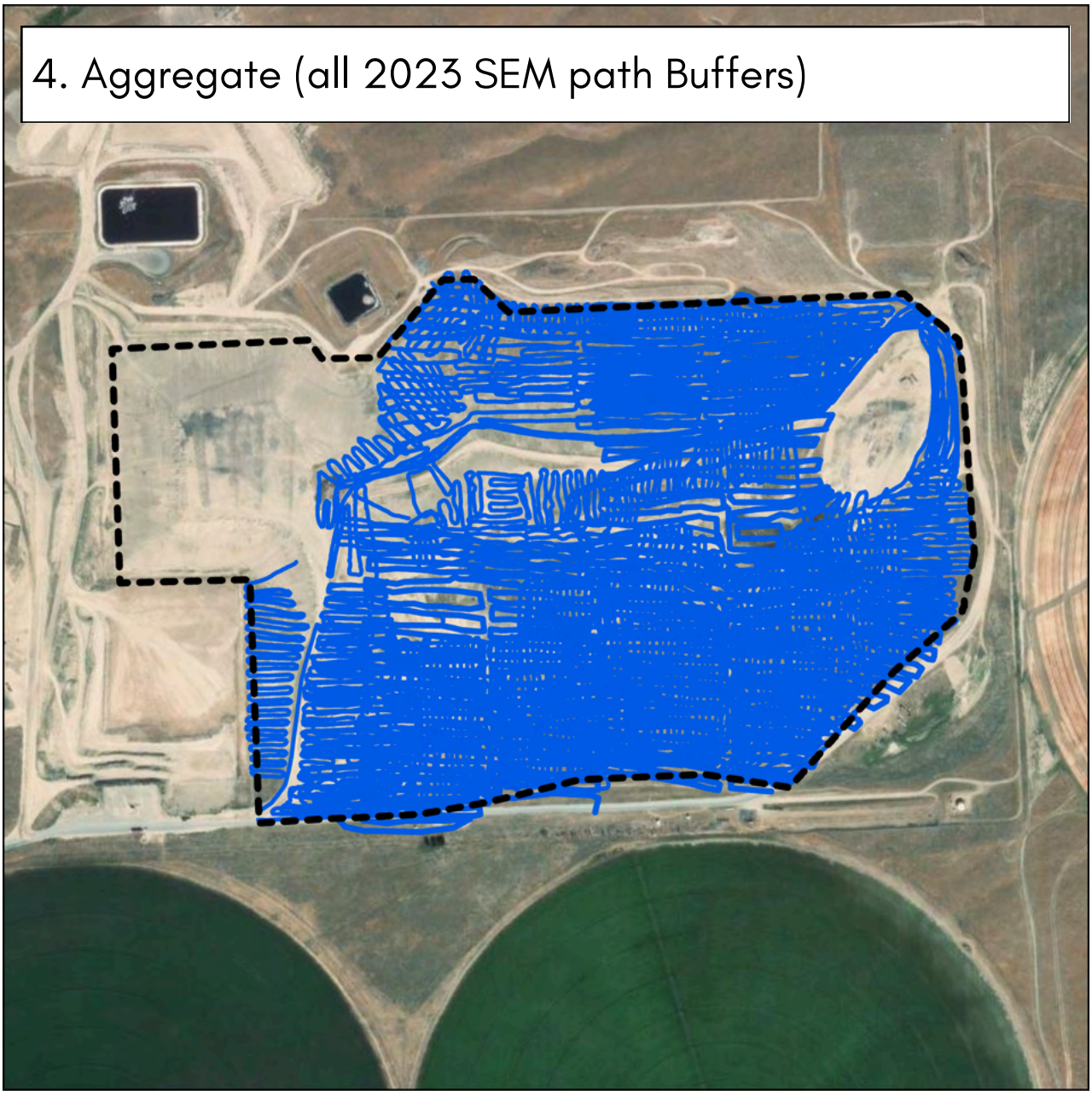


Frame 2: Next we build a shapefile, which is a file storage format used by GIS software. This is accomplished by tracing the exempt area into a polygon and the path into lines. Now, the area the operator exempted from SEM, formerly in yellow, is now in dark blue and the SEM monitoring path, formerly in blue and now depicted in green.



Frame 3: Now that we have a shapefile, we can do further forms of analysis. In this case, we want to know the area of the landfill, which we also traced into a shapefile, and the area of the exempt section. Since the data has been tied to GPS locations, we can calculate those features. The total area of the landfill is 140 acres and 46.72 acres were exempt. We can now calculate that for this quarter, Finley Butte excluded 33.4% of its surface area from monitoring.

We also need to know how well they followed the 25 foot rule. By calculating a 12.5 foot buffer on either side of the path, we can see where the buffers from all paths meet. 12.5 x 2 is 25 feet. We need to put all the paths from the year together to evaluate how well Finley Butte complied with this rule, which we will see in the next graphic.



Frame 4: In this graphic, we have compiled all of the SEM path buffers from each of the four quarters into one graphic. Areas that are in blue are where operators complied with Oregon's 25 foot rule. Areas where we can see the satellite imagery are where paths aren't offset by 25 feet, which means the operator failed to comply with the law. The only way we can evaluate this is through the ability to view all four paths/buffers around paths from each of the quarterly reports. This underscores how GIS analysis makes compliance monitoring more efficient.

WHY THIS METHODOLOGY?

By translating all of this data into a format that is usable in GIS software, we have the ability to look at data from across quarterly reports, or even years, in one environment. This allows us to see if areas have been repeatedly excluded from SEM each quarter, if the landfill operator has indeed monitored every 25 feet of the landfill over the course of a year, or if there are areas that repeatedly have high emissions for integrated monitoring.

Furthermore, we can plug in more spatial data for further exploration. Possibilities we didn't examine in this report, but are possible include: adding data on gas extraction wells, data on landfill cover infrastructure, or pulling in third party methane detection data such as Carbon Mapper, which detects methane plumes from space. The ability to see where landfills are experiencing methane exceedances from different sources of detection alongside their gas collection system infrastructure could generate effective insights on weaknesses in landfill gas systems, areas that need better or more frequent monitoring, or areas that DEQ needs to prioritize inspecting.

RESULTS AND DISCUSSION

Which Oregon landfills accepting municipal solid waste are complying with the DEQ rules adopted in 2021?

Oregon landfills are required to adhere to stricter DEQ requirements for methane management if they exceed 200,000 tons or more of lifetime waste-in-place and if their projected methane generation reaches 664 or more tons a year. Currently 11 Oregon landfills that are open and accepting municipal solid waste meet these metrics based on DEQ provided data (Table 1). Once a landfill reaches these thresholds, they are required to conduct surface emissions monitoring for four consecutive quarterly monitoring periods, with differing requirements thereafter if there is no measured concentration of methane of 200 ppm or greater are discovered during SEM.

Seven of the 11 MSW landfills are privately owned and operated while the other four are owned and operated by a county government. In total, all 11 landfills have a combined modeled methane generation of 169,943 tons in 2023, equivalent to the emissions of 1.6 billion gallons of gasoline burned.[23] The DEQ stated, “In 2017, six of the twenty-five largest stationary sources of GHG emissions in Oregon were landfills.”[24] The seven private landfills were typically larger, occupying the top five ranked positions by total waste. On the other hand, the four public landfills held three of the bottom four slots by total waste. All 11 landfills are currently in operation and accepting municipal waste as of 2024.

Based on the numbers in Table 1 from Oregon DEQ, we would expect that all 11 Oregon MSW landfills would be subject to the stricter requirements of the state’s current landfill emissions rules pertaining to conducting quarterly surface emissions monitoring. Through analyzing records and conversations with DEQ, we found that three landfills are not held to those higher standards. Each of these three landfills claimed unique circumstances specified below.

Examples of limited or non compliance:

1. Hillsboro Landfill, managed by Waste Management, Inc., was granted an exception to conducting surface emissions monitoring in its Title V operating permit by the DEQ, and does not have to comply with SEM requirements until April 2025. DEQ did not specify why.

2. Roseburg Landfill, managed by Douglas County, has not complied, and, as of May 2024, DEQ has stated they are looking into enforcement. We have not heard any developments since.

3. Baker Sanitary Landfill, managed by a local private company, claimed that its facility is two separate landfills, enabling it to divide its methane emissions between the two facilities and fall below the 664 tons threshold. DEQ has accepted this explanation although its own records present the landfill as one facility.

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[23] [22] OAR 340-239-700(3)(c). We first converted methane to a co2 equivalent of 84.
[24] [22] OAR 340-239-700(3)(c). , page 3

Table 1: Open Oregon MSW Landfills waste-in-place and Annual Methane Generation

Landfill, Owner-Operator	Owner-Operator Type	Total Lifetime Waste In Place (Tons)	Annual Methane Generation (Tons)
Columbia Ridge Landfill, WM	Private	64,358,280	43,497
Coffin Butte Landfill, Republic Services	Private	18,269,157	34,777
Hillsboro Landfill, Waste Management	Private	13,158,408	13,933
Finley Butte Landfill, Waste Connections	Private	13,158,408	13,933
Short Mountain Landfill, Lane County	County Government	11,750,975	13,042
Dry Creek Landfill, Waste Connections	Private	9,075,149	14,090
Wasco County Landfill, Waste Connections	Private	6,006,973	6,138
Knott Landfill, Deschutes County	County Government	4,642,663	3,826
Roseburg Landfill, Douglas County	County Government	3,696,825	35,058
Crook County Landfill, Crook County	County Government	1,116,102	739
Baker Landfill, Baker Sanitary Service	Private	766,113	778

Caption: The table features waste-in-place and methane generation rates for Oregon landfills accepting municipal solid waste while DEQ finalized rulemaking in 2021. Landfills highlighted in green were held to the updated SEM standards in 2023 and included in our analysis.

How much landfill surface area is being excluded from SEM?

We found that Oregon private landfill operators have excluded landfill areas from basic monitoring much more frequently than their publicly operated counterparts. During 2023 private landfills in Oregon exclude an average of 48.6% of landfill surface area from SEM each quarterly monitoring. On the other hand, county government operated landfills exclude an average of 10% surface area from SEM. We documented all exclusions, whether those exclusions have been shown to comply with Oregon rules or are more ambiguous.

Some landfills chose to give a reason for an exemption, and in other cases we were able to speculate a reason based on the design of the landfill. For example, we noticed Short Mountain, operated by Lane County, continuously did not monitor their asbestos pit, but did not specify that reason. In other cases, the landfill simply stated areas were exempt without providing a description and how a claimed exemption complies with the requirements, and we were unable to determine the criteria used to comply with exemption requests. Given this pattern, it was difficult to ascertain which exceptions were for working faces or other reasons consistently across all landfills. For this reason, we combined all exemptions to get a higher level view.

Table 2

Landfill, Operator	Private/Public	Quarter	Total Area (acres)	Exempted areas	% Excluded
Finley Butte, Waste Connections	Private	2023 - 1	140.08	37.52	26.78%
Finley Butte, Waste Connections	Private	2023 - 2	140.08	46.72	33.36%
Finley Butte, Waste Connections	Private	2023 - 3	140.08	80.92	57.77%

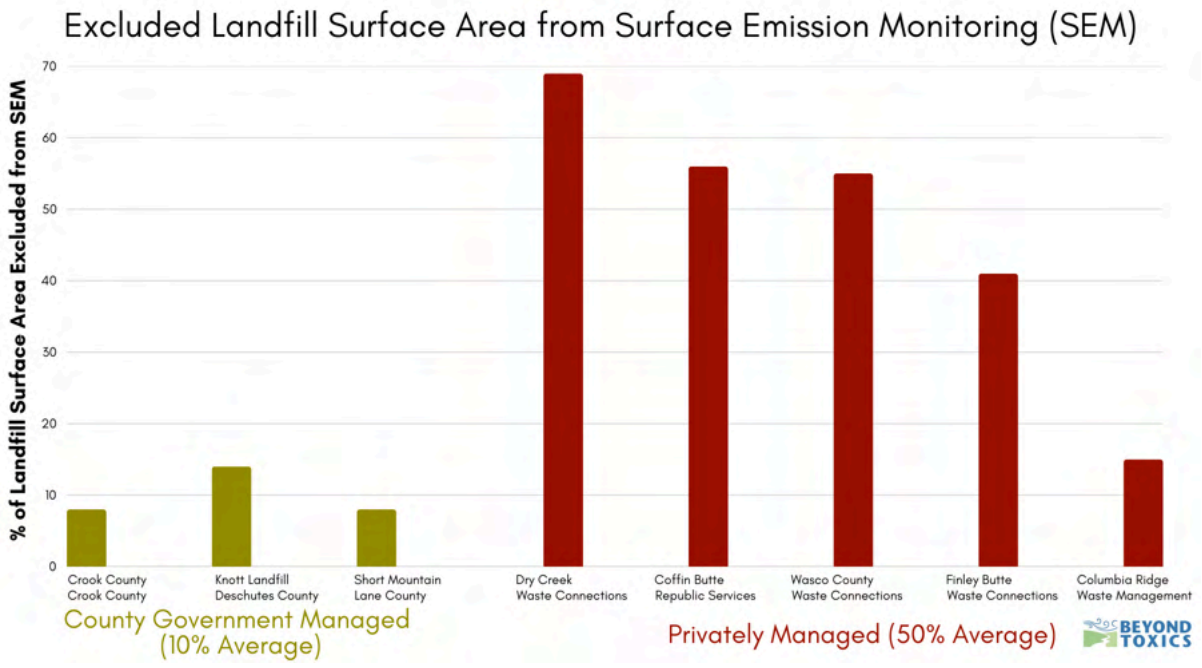
Finley Butte, Waste Connections	Private	2023 - 4	140.08	63.23	45.14%
Dry Creek, Waste Connections	Private	2023 - 1	85.86	59.62	69.45%
Dry Creek, Waste Connections	Private	2023 - 2	85.86	59.62	69.45%
Dry Creek, Waste Connections	Private	2023 - 3	85.86	59.62	69.45%
Dry Creek, Waste Connections	Private	2023 - 4	85.86	59.62	69.45%
Wasco County, Waste Connections	Private	2023 - 1	176.27	109.50	62.12%
Wasco County, Waste Connections	Private	2023 - 2	176.27	81.89	46.45%
Wasco County, Waste Connections	Private	2023 - 3	176.27	89.41	50.72%
Wasco County, Waste Connections	Private	2023 - 4	176.27	100.22	56.86%
Coffin Butte, Republic Services	Private	2023 - 1	136.34	84.21	61.77%
Coffin Butte, Republic Services	Private	2023 - 2	136.34	74.04	54.31%

Coffin Butte, Republic Services	Private	2023 - 3	136.34	74.04	54.31%
Coffin Butte, Republic Services	Private	2023 - 4	136.34	71.87	52.71%
Columbia Ridge, Waste Management	Private	2023 - 1	335.53	41.13	12.26%
Columbia Ridge, Waste Management	Private	2023 - 2	85.86	46.96	14.00%
Columbia Ridge, Waste Management	Private	2023 - 3	85.86	45.83	13.66%
Columbia Ridge, Waste Management	Private	2023 - 4	176.27	64.26	19.15%
Knott Landfill, Deschutes County	Public	2023 - 1	107.48	14.91	13.88%
Knott Landfill, Deschutes County	Public	2023 - 2	107.48	12.92	12.02%
Knott Landfill, Deschutes County	Public	2023 - 3	107.48	16.05	14.93%
Knott Landfill, Deschutes County	Public	2023 - 4	107.48	17.14	15.95%
Short Mountain, Lane County	Public	2023 - 1	111.34	9.30	8.35%
Short Mountain, Lane County	Public	2023 - 2	111.34	9.30	8.35%
Short Mountain, Lane County	Public	2023 - 3	111.34	9.30	8.35%

Short Mountain, Lane County	Public	2023 - 4	111.34	9.30	8.35%
Crook County. Crook County	Public	2023 - 1	84.52	5.82	6.88%
Crook County, Crook County	Public	2023 - 2	84.52	6.29	7.44%
Crook County, Crook County	Public	2023 - 3	84.52	6.96	8.23%
Crook County, Crook County	Public	2023 - 4	84.52	6.50	7.69%

The table above features the eight landfills following stricter SEM protocols and the data we were able to derive from their reports. Note that the working face is included in exemptions for SEM because most landfills did not specify the location and why an area of land was exempt. Total acres for landfills did not change over the course of a year because operators did not add any landfill surface area.

Figure 2.



Caption: The bar graph shows the average percentage of landfill surface area omitted from SEM by landfill site. Privately operated landfills for the most part excluded far more surface area than their government operated counterparts.

Our study found that the five private MSW landfills we analyzed on average omit nearly half (48.6%) of surface area from SEM every quarter (as opposed to the whole year together), leaving operators and regulatory agencies blind to vast portions of the landfill and the emissions emanating from them. While some of these exemptions might be intended to keep workers safe or are legally permissible, the large amount of surface area excluded raises questions as to whether private landfill operators are improperly excluding land from SEM. We found that 75% ofpublic landfills specified their exemptions for the working face, asbestos pits, or gravel and soil stockpiles, which totaled to an average of 10% of landfill surface areas. We were able to cross reference the fourth landfill based on other information they included in their report. On the other hand no private landfills specified the reason for exemptions in 2023 reports. The wide gap between private and public facilities may be an indication of non or limited compliance on the part of private waste corporations.

Examples of reasons given for not conducting surface emissions monitoring on certain areas

1. Waste Connections in Medford exempted 69% of its landfill, Dry Creek, from SEM monitoring without explanation. These areas all had final grade slopes, which could possibly be argued are too steep for monitoring. However, the EPA has stated that regular final grade side slopes of a landfill are not to be exempted.[25]

2. Owner-operator Waste Connections in Boardman, Oregon, chose not to monitor portions of the Finley Butte landfill that the U.S. EPA had monitored in June 2022. Waste Connections repeatedly denied the need to monitor anywhere they had placed waste in the last five years, even if that section of the landfill had waste older than five years. (Five years after waste is placed is the federal regulatory requirement to start SEM monitoring). Owner-operators then argued that the EPA should have never inspected that area due to safety concerns, even though they had never warned EPA of any safety concerns while accompanying them during their inspection. In 2023, Finley Butte Landfill continued to exclude those areas from monitoring.[26]

[25] Environmental Protection Agency. (2024, September 25). Enforcement Alert: EPA Finds MSW Landfills are Violating Monitoring and Maintenance Requirements. EPA Investigations Find Municipal Solid Waste Landfill Operators Are Failing to Properly Conduct Compliant Monitoring and Maintenance of Gas Collection and Control System. https://www.epa.gov/enforcement/enforcement-alert-epa-finds-msw-landfills-are-violating-monitoring-and-maintenance

[26] Environmental Protection Agency & Daniel Heins. (2022). Clean Air Act Inspection Report Republic Services Waste Connections Finley Buttes Landfill, Boardman Oregon. EPA Region 10.

3 Republic Services, the owner-operator of Coffin Butte landfill near Corvallis, Oregon, argued 30-40 acres[27] of its landfill had too much vegetation to monitor. We would emphasize the owner-operators chose not to maintain the vegetation, which means this is a problem they created. Vegetation breaks through the upper cover material which would be highly prone to methane leakage (figure 3).

Caption: The EPA found multiple instances of vegetation growing through the tarp of the Coffin Butte landfill in both 2022 and 2024. The picture is one such example. The EPA measured methane at 1,000 ppm, twice the regulatory limit, near the base of the plant. Operators are supposed to constantly monitor the tarp integrity to ensure that there are no areas where methane could be leaking.

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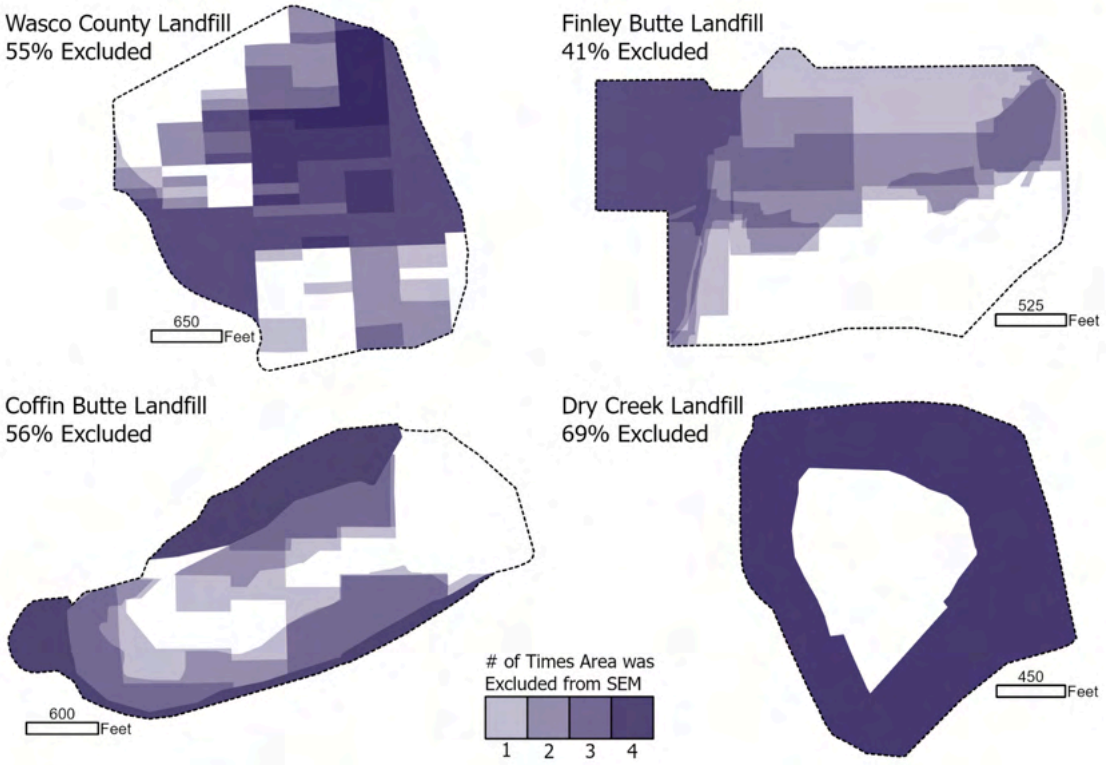
[27] Coffin Butte specifically exempted 40 acres in quarter 3 2022 and 30 acres in quarter 4 for high vegetation (both outside of our study). However, they continued to exempt the same areas in 2023, which spans the duration of our study, but they decline to specify the reason. We assume they are exempting those areas for the same reason based on satellite imagery from the times of inspection in 2023.

Figure 2



Caption: The maps feature four privately operated Oregon landfills with waste deposits outlined in black dotted lines. Each exempted area for the four quarterly reports in 2024 is layered and features where operators did not conduct SEM. The darker the shade of violet, the more frequently the area of the landfill went unmonitored. Oregon's private landfills excluded an average of 48.6% of landfill surface area from each quarterly monitoring.

Oregon rules exempt "the working face of the landfill to areas of the landfill surface where the landfill cover material has been removed and solid waste has been exposed for the purpose of installing, expanding, replacing, or repairing components of the landfill gas, leachate, or gas condensate collection and removal system, for conducting a remedial action, or for law enforcement activities requiring excavation. Rules specify this exclusion should be kept to the minimum size and time duration as possible."[28]

However, Oregon rules also allow for an alternative monitoring plan for "Alternative walking patterns to address potential safety and other issues, such as: steep or slippery slopes, monitoring instrument obstructions, and physical obstructions" approved by DEQ.

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[28] https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=6533

The reports we analyzed did not include information or details on alternative monitoring plans approved by DEQ, so it's difficult to evaluate exactly what agreements are made between private owner-operators and DEQ. Regardless, the large disparity between private and public owner-operators calls for further scrutiny by the DEQ for how and when they allow exceptions to SEM. As of now, the agency and public are completely blind to what is happening on 48.6% of private landfill surface areas. Large swaths of preventable methane leaks may be and likely are going undetected and unrepaired.

Further Limitations of SEM

Excluding large portions of landfills from any SEM is one demonstrated method of reducing the efficacy of methane monitoring. Not only can operators avoid conducting SEM over vast swaths of landfills, the EPA has repeatedly observed poor practices of operating SEM equipment. The EPA recently stated there is a massive gap in the monitoring methodology used by private operators and regulatory agency staff.[29] When conducting limited SEM, as part of inspections of several Oregon MSW landfills in 2022 and 2024, U.S. EPA inspectors found glaring issues with private operators including failing to use SEM equipment at a proper height leading to underrepresented emissions, ignoring protruding waste piercing through landfill cover, not monitoring leachate clean outs and gas wells, and more.[30] These led to landfills filing reports appearing to have fewer methane leaks of lesser severity. For example, at the Coffin Butte landfill owned and operated by Republic Services, a 2022 EPA inspection report stated that "despite Republic having seen no more than six exceedances in the recent SEM reports supplied ahead of the inspection that included penetration monitoring, including reports with zero exceedances, the EPA identified 61 points in exceedance of legal limit of 500 ppm, including 21 points above 10,000 ppm."[31]

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[29] Environmental Protection Agency. (2024, September 25). Enforcement Alert: EPA Finds MSW Landfills are Violating Monitoring and Maintenance Requirements. EPA Investigations Find Municipal Solid Waste Landfill Operators Are Failing to Properly Conduct Compliant Monitoring and Maintenance of Gas Collection and Control System. https://www.epa.gov/enforcement/enforcement-alert-epa-finds-msw-landfills-are-violating-monitoring-and-maintenance

[30] Environmental Protection Agency & Daniel Heins. (2022). Clean Air Act Inspection Report Waste Connections Finley Butte Landfill, Boardman Oregon. EPA Region 10.

[31] Environmental Protection Agency & Daniel Heins. (2022). Clean Air Act Inspection Report Republic Services Coffin Butte Landfill, Corvallis Oregon. EPA Region 10.

Coffin Butte was not alone. The EPA also found glaring issues at Finley Butte landfill and Wasco County landfill both operated by Waste Connections. EPA inspectors found multiple large pieces of waste protruding through the cover, including wind turbine blade parts and tires, compromising the integrity of Finley Butte's landfill tarp cover.[32] At Wasco County, inspectors noted that the landfill operator had failed to keep adequate records of organic waste, which artificially reduced the projected methane emissions from LandGEM modeling.[33] These are three of the 100 landfills the EPA inspected across the nation before the agency put out an alert of widespread noncompliance with SEM rules.[34]

Recommendation: There are a variety of ready-to-go solutions that Oregon's regulatory agency can leverage to improve SEM and methane emissions prevention. For the immediate future, state regulators should immediately follow-up with MSW landfill operators, require explanations for areas excluded from monitoring and ensure that operators are following state regulations. Further, there are available advanced sensing technologies such as fixed methane sensors and drones that can comprehensively monitor large areas with greater frequency, including steep slopes and areas with vegetation, to provide Oregon operators and regulators with the missing information they need to find and mitigate methane leaks.

Are landfill operators monitoring in a walking 25-foot grid pattern, per state regulatory requirements?

Oregon requires that operators conduct SEM every 25 feet of a landfill over the course of a year. An operator can accomplish this by monitoring every 25 feet every quarter. Or, they can monitor every 100 feet every quarter, then offset that path by 25 feet for each consecutive quarter, so that by the end of the year every 25 feet has been covered. Notably, this rule was not followed in areas that were marked as exempt one or more times in a year.

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[32] Environmental Protection Agency & Daniel Heins. (2022). Clean Air Act Inspection Report Republic Services Waste Connections Finley Buttes Landfill, Boardman Oregon. EPA Region 10.
[32] Environmental Protection Agency & Daniel Heins. (2022). Clean Air Act Inspection Report Republic Services Waste Connections Wasco County Landfill, The Dalles Oregon. EPA Region 10.
[33]Environmental Protection Agency. (2024, September 25). Enforcement Alert: EPA Finds MSW Landfills are Violating Monitoring and Maintenance Requirements. EPA Investigations Find Municipal Solid Waste Landfill Operators Are Failing to Properly Conduct Compliant Monitoring and Maintenance of Gas Collection and Control System. https://www.epa.gov/enforcement/enforcement-alert-epa-finds-msw-landfills-are-violating-monitoring-and-maintenance
[34] Environmental Protection Agency. (2024, September 25). Enforcement Alert: EPA Finds MSW Landfills are Violating Monitoring and Maintenance Requirements. EPA Investigations Find Municipal Solid Waste Landfill Operators Are Failing to Properly Conduct Compliant Monitoring and Maintenance of Gas Collection and Control System. https://www.epa.gov/enforcement/enforcement-alert-epa-finds-msw-landfills-are-violating-monitoring-and-maintenance

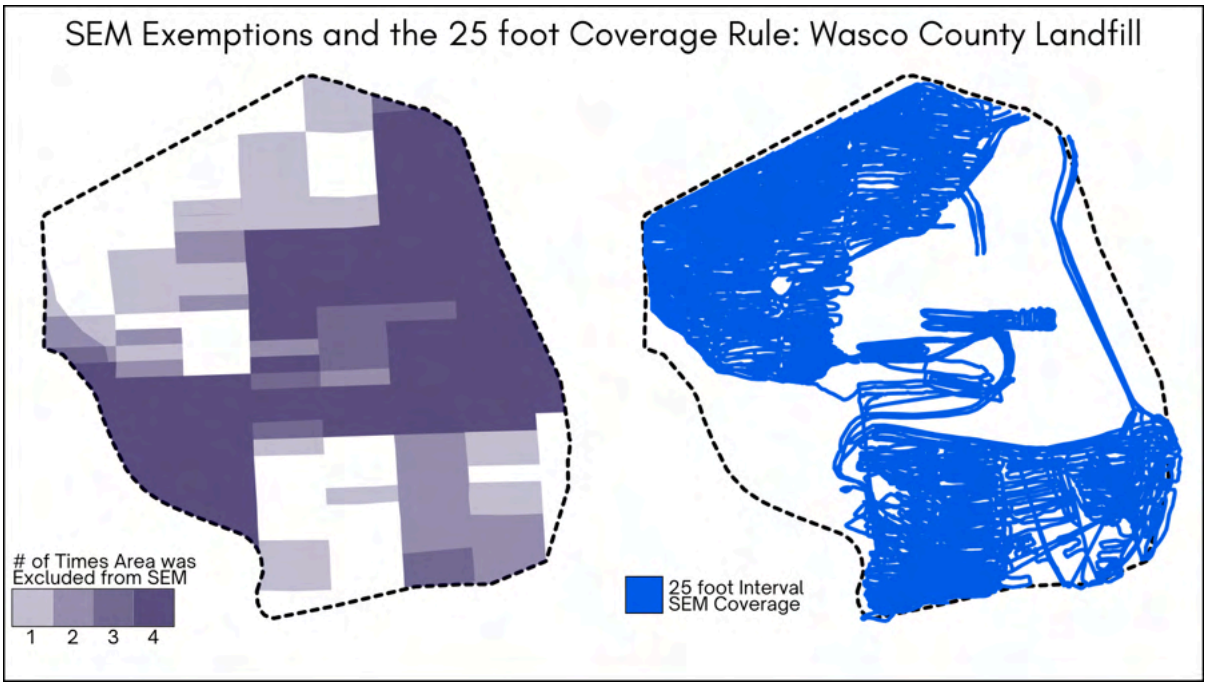
Five of the eight landfill operators did not report the GPS route they took to conduct SEM. Unfortunately, they are not required to report this information by Oregon rule. In our analysis of walking 25-foot grid patterns, we focused on landfill reports that provided actual monitoring paths because actual monitoring each quarter differs substantially from planned monitoring paths (see Figure 4).

Figure 4 - Planned SEM route Differs Greatly from Actual SEM route

Caption: The first frame of the figure features a planned SEM path that the Coffin Butte Landfill operator submitted to the DEQ. The second frame is a map of the actual GPS tracked SEM route. We can see far less of the landfill was actually monitored with the GPS path than the estimated route. These GPS referenced paths are much more accurate than planned routes when evaluating the comprehensiveness of SEM.

Only three out of eight MSW landfills (Coffin Butte, Finley Butte, and Wasco County) that conducted SEM voluntarily reported the GPS tracked SEM monitoring path. Our analysis found that, for the most part, those landfill operators that shared their SEM traversed path in reports appeared to have followed this rule with some room for improvement and one substantial failure. Given many of these operators excluded substantial surface area of their landfill from any SEM (see above section), the 25 foot rule was often not followed in areas that were excluded one or more times (Figure 5).

Figure 5



Caption: On the left is Waste Connections' exempted areas for Wasco County Landfill in 2023. The darker shade of violet, the more often that area was excluded from SEM over the course of the year. On the right, the graphic shows how the 25 foot rule was followed. If an area is completely blue, the 25 foot rule was followed. Gaps of white show where operators failed to monitor every 25 feet. By comparing the two graphics, we can see that operators most consistently met the 25 foot rule in areas that were monitored all four quarters. We can also observe the inverse relationship. The more often operators excluded an area from SEM, the more that area failed to follow the 25 foot rule.

Recommendation: This can easily be remedied by adding GPS tracked SEM paths to the recordkeeping and reporting requirements in OAR 340-239-0700, and a similar mechanism at the federal level. It would be beneficial to require that this data is not only reported in print form, but also in some spatial data format (shapefile, GeoJSON, etc.). The reason for this is Oregon does not require monitoring every 25 feet every quarter. Rather, they require that over the course of a calendar year, every 25 feet of a landfill is monitored. Having access to the spatial data will allow regulatory agencies to view all quarterly monitoring paths and results at once, and quickly verify the results.

Are landfill operators conducting integrated monitoring and reporting results?

Integrated monitoring is a key early identification monitoring strategy to identify where there are problematic methane emissions. It involves dividing the landfill into an integrated monitoring grid of 50,000 square foot cells, an area slightly smaller than a football field. After conducting SEM looking for individual, instantaneous exceedances of 500 ppm, the operators create an aggravate reading for each 50,000 square foot cell by averaging all individual SEM readings within each grid. If a grid has an aggregate SEM average above 25 ppm, then the landfill needs to perform remediation and do follow up SEM to ensure the average falls below 25 ppm.[35] State regulations require the landfill to report integrated monitoring exceedances over 25 ppm. State regulations do not specifically require the reporting of operators' integrated monitoring grids or non-exceedance integrated monitoring results. The requirements only stipulate that operators must tell DEQ if they have a 50,000 square foot cell exceeding 25 ppm.

Given that, we found that seven out of eight landfills reported at least some integrated monitoring result. Two of those landfills only reported their grid cells that exceeded 25 ppm as legally required. Five out of eight voluntarily shared all of their integrated monitoring results – the average SEM reading for each grid cell including their exceedances of 25 ppm.[36] The last landfill either did not have a 25 ppm integrated exceedance, or it simply did not report any data

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[35] https://www.oregon.gov/deq/EQCdocs/100121_I_Slides.pdf

[36] https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=6533 340-239-0700, 3(c) Semi-Annual Report. A landfill owner or operator subject to this rule, must prepare semi-annual reports for the periods of January 1 through June 30 of each year, unless otherwise approved in writing by DEQ. The Semi-Annual Report will be due on July 30, unless otherwise approved in writing by DEQ. The Semi-Annual Report must contain the following information:

Figure 6

Caption: The above graphic was submitted to DEQ by Waste Management at Columbia Ridge landfill showing how they divided the landfill into 50,000 square foot grids for their integrated monitoring results. In the full report, the operator submitted a table with each grid numbered and the associated average SEM reading result. Ideally, operators should be required to report this information to DEQ. Columbia Ridge is an example of data reporting that should be required by law.

Oregon Administrative Rules do not require operators to report the grid or integrated monitoring results unless a grid exceeds 25 ppm. We strongly recommend regulatory agencies require this basic information and they add a requirement for it to be in a spatial data format. We also recommend agencies require all SEM measurements and the coordinate it was recorded at (also in spatial data). Some landfills already report this information, but it's in a print table, which is too time intensive for a state agency to turn into spatial data.

Recommendation: Given the U.S. EPA's findings of widespread noncompliance, and as the climate crisis intensifies, Oregon DEQ needs to take a stronger stance in monitoring operators. DEQ should require operators to transfer the data they generate for annual and semiannual reports directly into spatial data formats.

We also recommend that regulators require spatial data on the location of gas extraction wells. Oregon DEQ could then visualize all of this data (integrated monitoring, instantaneous monitoring, SEM paths, Gas Collection and Control infrastructure, leaks detected by satellites, etc.) simultaneously using GIS software. This is important because it allows them to efficiently identify gaps in methane gas collection infrastructure and SEM results including exceedances and integrated monitoring measurements. Regulatory agencies need a complete picture of the puzzle, and allowing operators to spread those puzzle pieces across different reports and in unusable formats wastes public agencies' resources and hinders their ability to conduct oversight.

The Limits of SEM: Additional Solutions to Mitigating and Preventing Landfill Methane

SEM is a critical tool for identifying and mitigating methane leaks from landfills. However, there are more solutions already in use that operators and regulators can leverage to more effectively prevent harmful air emissions. Remote sensing, both passive (solar spectrometer) and active (Lidar), are promising avenues to enhance methane monitoring. Sensors are mounted on planes, satellites, and even drones, which then fly over landfills and detect methane plumes and concentrations at various scales depending on the air/spacecraft and instrument.

The White House National Strategy to Advance an Integrated U.S. Greenhouse Gas Measurement, Monitoring, and Information System notes that remote sensing has found many preventable methane leaks that are currently going undetected by traditional SEM.[37] Recent findings from remote sensing technology have demonstrated that methane emissions are much higher than formula estimates by the EPA.[38] Remote sensing technology has been used to reduce methane emissions and associated environmental justice burdens posed by other air pollutants associated with methane leaks.[39]

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[37] Greenhouse Gas Monitoring and Measurement Interagency Working group. (2023). National Strategy To Advance an Integrated U.S. Greenhouse Gas Measurement, Monitoring, and Information System. The White House. https://www.whitehouse.gov/wp-content/uploads/2023/11/NationalGHGMMISStrategy-2023.pdf
[38] Daniel H. Cusworth et al., Quantifying methane emissions from United States landfills.Science383,1499-1504(2024).DOI:10.1126/science.adi7735
[39] Daniel H Cusworth et al 2020 Environ. Res. Lett. 15 054012

There are readily available advanced methane detection technologies that can detect and pinpoint methane leaks at landfills, as illustrated in EPA's draft White Papers issued in Fall 2024, EPA's Landfill Methane Emissions Workshop in April 2021, EPA's Methane Detection Workshop in August 2021, CARB's Public Workshop on Landfill Methane Emissions in California in December 2022, and EPA's LMOP Webinar on Detecting Landfill Methane Emissions with Drones in September 2023.[40] Technology providers with drone surveying capabilities at landfills include ABB, Aerometrex, Bridger Photonics, Project Canary, Scientific Aviation, SeekOps, and SnifferDrone, among others. Airborne and satellite remote sensing are currently offered by Carbon Mapper and GHG Sat. Drones can survey a full landfill footprint with precision using point sensing or active imaging, measuring methane concentration in parts per million (ppm) or parts per million per meter (ppm-m). One drone provider has its technology deployed at over 150 landfills nationwide.[41] Stationary and land-based methane sensors can be placed strategically to support rapid and ongoing leak detection and repair on the active working face. These methods are the next wave in "smart" landfill design and can identify methane hot spots via always-on sensors on low towers or tripods on the landfill surface – meaning a methane spike can be found and dealt with quickly.

Recommendation: Oregon policymakers should ensure landfills move into the 21st century by requiring advanced methane sensing technology deployment that makes methane emissions visible, accurate and actionable. Both California and Colorado are building out programs that require owner-operators to respond to methane leaks detected by satellites orbiting the earth operated by third party institutions such as Carbon Mapper and GHG Sat.[42]

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[40]Greenhouse Gas Monitoring and Measurement Interagency Working group. (2023). National Strategy To Advance an Integrated U.S. Greenhouse Gas Measurement, Monitoring, and Information System. The White House. https://www.whitehouse.gov/wp-content/uploads/2023/11/NationalGHGMMISStrategy-2023.pdf
[41]Greenhouse Gas Monitoring and Measurement Interagency Working group. (2023). National Strategy To Advance an Integrated U.S. Greenhouse Gas Measurement, Monitoring, and Information System. The White House. https://www.whitehouse.gov/wp-content/uploads/2023/11/NationalGHGMMISStrategy-2023.pdf
[42] https://carbonmapper.org/ and https://www.ghgsat.com/en/

Diverting Organic Waste

Given that methane generation is the byproduct of placing organic waste in landfills, an obvious solution is to stop placing organic waste into landfills. Food rescue, food waste as an animal feedstock, composting food waste, placing synthetic organics (inorganic/organic hybrids for example carpet) in anaerobic digesters, and other forms of waste sorting are desirable alternatives to landfilling or incineration. These strategies preserve space in landfills for other uses, preventing or significantly delaying the need for landfill expansions and, depending on the policy, make progress towards zero-waste circular economies.

It's critical to note that methane is generated over the course of decades. Therefore, while organic diversion is an important solution to implement, we will need to monitor and mitigate methane from active and closed landfills decades into the future regardless.

CONCLUSION

In this report, we analyzed 36 Surface Emissions Monitoring (SEM) reports from eight currently operating municipal solid waste landfills in Oregon. We found that landfills in Oregon have varying levels of compliance with state regulations. Additionally, although legal, owner-operators under-report key pieces of information, which make it hard for regulators to ensure full compliance with the law. The Oregon DEQ needs to act quickly to remedy this situation by requiring owner-operators to monitor larger sections of their landfills and use other forms of monitoring when walking SEM is not possible or to support walking SEM with early identification of leaking emissions. Landfills are responsible for 90% of Oregon's industriously produced methane emissions ahead of both enteric fermentation (cattle) and the oil and gas sector. Curbing the pollutant is key to mitigating climate damage in the immediate future. The technology is available, and taking advantage of it is low hanging fruit for fighting the climate crisis.

Recommendations Review:

1. Use Advanced Methane Sensing Technology. Gathering this comprehensive data set will lead to rapid mitigation of super-emitter leaks, improved methane capture for use in local energy generation or methane destruction through enclosed flaring.

- The Oregon Department of Environmental Quality (DEQ)[43] should immediately move to require the use of advanced methane detection technology such as drones.

- Require landfill operators to respond to third party satellite methane detection systems, which provide comprehensive and more accurate measurements of the concentration of methane plumes, the direction of methane plumes off the landfill property, and the exact location of emission exceedances from landfills.

2. Update regulations to require Surface Emissions Monitoring (SEM) on all areas of landfills

    - Require fixed monitors for real time methane tracking in unsafe or other areas to ensure full coverage and to protect workers from hazards of conducting walking SEM. This requirement should also be instituted for landfills with high volumes of odor complaints from nearby communities.

    - Include steep slopes, closed cells, locations with covering vegetation and unspecified exemptions.

    - Actionable emissions data combined with mitigation strategies such as vertical and horizontal gas collection is critical for reducing greenhouse gas impacts and associated air toxics such as VOCs, hydrogen sulfide, forever chemicals and fine particulate matter thereby improving air quality and climate mitigation.

3. Oregon DEQ should immediately address reporting gaps by updating their regulations to require landfill owners and operators who are required to conduct surface emissions monitoring to:

    - Report all data in a spatial data format such as a shapefile, which makes for more efficient analysis of data gathered through surface emissions monitoring.

    - Report and identify the areas exempted from monitoring and report the reasons for those exemptions.

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[43] Throughout this report we emphasize Oregon because these are the arenas at which Beyond Toxics focuses their advocacy. Our findings could be replicable in other states. Thus regulatory recommendations are likely also applicable to other U.S. states.

- Report measured concentration of methane in ppm for each instantaneous SEM reading and integrated monitoring results.
- The SEM path walked by operators.
- Gas Control and Collection System Infrastructure– Gas extraction wells, piping, landfill cover.

4. To prevent future potent methane emissions, advance mandatory organic diversion policies requiring consumers and haulers to sort organic waste so that food waste can be used as a resource that is sent to facilities other than landfills to make compost and other products thereby preventing future generation of methane in landfills.

Acknowledgements

This report was funded by the U.S. Energy Foundation and Meyer Memorial Trust. We would like to thank Industrious Labs for providing funding to cover costs associated with procuring public records. We would like to thank the Rocky Mountain Institute, Carbon Mapper, and Industrious Labs for their technical assistance. We would also like to thank Zoe Kleiner, Leif Lindquist, and Jack Madigan, students at the University of Oregon, for their work in digitizing the spatial data from the 2023 SEM reports.

REPUBLIC SERVICES

28972 Coffin Butte Rd Corvallis, OR 97330
o 541.745.5792 f 541.230.5534 republicservices.com

July 21, 2023

Ms. Suzy Luttrell
Oregon Department of Environmental Quality
Air Quality Division
4026 Fairview Industrial Drive
Salem, OR 97302

Re: Semi-Annual Report
Coffin Butte Landfill
Operating Permit No. 02-9502-TV-01
Project No. 0120-174-50-38-08

Dear Ms. Luttrell:

Pursuant to the State of Oregon Department of Environmental Quality (ODEQ) Oregon Administrative Rule (OAR) 340-239-0700(3)(c), Valley Landfills, Inc. submits the original and two copies of the enclosed Semi-Annual Report for Coffin Butte Landfill. This report is being submitted to cover the period of January 1, 2023 through June 30, 2023.

If you have any questions or comments, please do not hesitate to contact us at 720.529.0132.

Sincerely,
Valley Landfills, Inc.

Bret Davis
General Manager

Attachment

cc: United States EPA, Region X, Air Operating Permits, OAQ1-08
Melissa Green, Weaver Consultants Group *(via email)*

COFFIN BUTTE LANDFILL

SEMI-ANNUAL REPORT

PREPARED FOR

VALLEY LANDFILLS, INC.

July 21, 2023

PREPARED BY

Weaver Consultants Group

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

The Coffin Butte Landfill is a municipal solid waste (MSW) landfill located in Benton County, Oregon and is owned by Valley Landfills, Inc (VLI). The facility is subject to the Semi-Annual Report requirements of Oregon Department of Environmental Quality (ODEQ) Oregon Administrative Rule (OAR) 340-239-0700(3)(c). This Semi-Annual Report covers the period of January 1, 2023 through June 30, 2023.

2 SEMI-ANNUAL REPORTING REQUIREMENTS

Records are prepared and maintained in accordance with OAR 340-239-0700(3)(c). The primary location for records storage is the Coffin Butte Landfill. Coffin Butte Landfill is submitting this Semi-Annual Report in accordance with OAR 340-239-0700(3)(c).

§340-239-0700(3)(c)(A) – Monitoring and Exceedances

> All instantaneous surface readings of 100 ppmv or greater. All exceedances of the limits in OAR 340-239-0100(6)(b), 340-239-0200 and 340-239-0600(2)(c) including the location of the leak (or affected grid), leak concentration in ppmv, date and time of measurement, the action taken to repair the leak, date of repair, any required remonitoring and the remonitored concentration in ppmv, wind speed during surface sampling, the concentration recorded at each location for which an exceedance was recorded in the previous month, and the installation date and location of each well installed as part of a gas collection system expansion.

§340-239-0100(6)(b) – Methane Generation Rate Exceedances

> Demonstrate that after four consecutive quarterly monitoring periods there is no measured concentration of methane of 200 parts per million by volume (ppmv) or greater using the instantaneous surface monitoring procedures specified in OAR 340-239-0800(3). The owner or operator of the landfill must begin quarterly monitoring within 90 days after the Methane Generation Rate Report is required to be submitted under section (1) or (2) of this rule or OAR 340-239-0100(6) and submit Instantaneous Surface Monitoring Reports according to OAR 340-239-0700(3)(l).

Quarterly instantaneous surface emissions monitoring (SEM) was performed at the landfill by SCS Field Services (SCS) personnel.

The first quarter instantaneous SEM monitoring results are included in the SEM Report provided in Appendix A. The second quarter instantaneous SEM monitoring results will be provided in the next semi-annual report.

§340-239-0200 – Compliance Standards

> When required as provided in OAR 340-239-0100 through 340-239-0800, the owner or operator of a landfill must comply with this rule.
>
> (1) Surface Emission Methane Concentration Limits. Except as provided in OAR 340-239-0110(4), 340-239-0110(5), 340-239-0300, and 340-239-0600(1), beginning August 1, 2022, or upon commencing operation of a newly installed gas collection and control system or modification of an existing gas collection and control system pursuant to OAR 340-239-0110(1), whichever is later, no location on the landfill surface may exceed either of the following methane concentration limits:
>
> (a) 500 ppmv, other than nonrepeatable, momentary readings, as determined by instantaneous surface emissions monitoring conducted in accordance with OAR 340-239-0800(3)(b);

(b) An average methane concentration limit of 25 ppmv as determined by integrated surface emissions monitoring conducted in accordance with OAR 340-239-800(3)(c).

Quarterly integrated SEM was performed at the landfill by SCS personnel.

The first quarter integrated SEM monitoring results are included in the SEM Report provided in Appendix A. The second quarter integrated SEM monitoring results will be provided in the next semi-annual report.

§340-239-0200(2) – Wellhead Gauge Pressure Requirement

Operate the collection system with negative pressure at each wellhead

On a monthly basis, operations and maintenance personnel measure the gauge pressure at each wellhead. The gauge pressure taken at the wellhead is used in determining the presence of vacuum at the collector. The wellfield pressure exceedance report is provided in Appendix B.

§340-239-0200(3) – Wellhead Temperature Requirement

Each landfill gas collection and control system interior wellhead in the collection system must be operated with a landfill gas temperature less than 62.8 degrees Celsius (145 degrees Fahrenheit).

Each LFG collector is equipped with an access port for measuring temperature at each wellhead. On a monthly basis, operations and maintenance personnel measure the temperature at each wellhead. All wells operated below 145 °F during the reporting period. Therefore, a temperature wellfield exceedance report is not applicable during this reporting report.

§340-239-0600(2)(c) – Gas Control System Equipment Monitoring

Components containing landfill gas and under positive pressure must be monitored quarterly for leaks. Any component leak over 500 ppmv methane must be tagged and repaired within 10 days. Any component leak over 250 ppmv must be recorded pursuant to OAR 340-239-0700(2)(a)(S). Quarterly component leak testing at landfills having landfill gas-to-energy facilities may be conducted prior to scheduled maintenance or planned outage periods.

SCS performed the first quarter gas control system equipment monitoring on March 8, 2023. No locations exceeding the 500 ppmv threshold were observed during the monitoring event. The gas control system equipment monitoring results are included in the first quarter SEM Report, included as Appendix A.

SCS performed the second quarter gas control system equipment monitoring throughout the second quarter of 2023. The gas control system equipment monitoring results for the second quarter will be provided in the next semi-annual report.

§340-239-0700(3)(c)(B) – Corrective Action Analysis

> For any corrective action analysis for which corrective actions are required in OAR 340-239-0600(3)(a) and 340-239-0600(3)(b) and that take more than 60 days to correct the exceedance, the root cause analysis conducted, including a description of the recommended corrective action(s), the date for corrective action(s) already completed following the positive pressure or elevated temperature reading, and, for action(s) not already completed, a schedule for implementation, including proposed commencement and completion dates.

During the reporting period all exceedances were within 0 to 60 days, except for the wells operating under the site's approved Alternative Monitoring Plan. The corrective action and root cause analysis are not applicable to wells operating under an approved plan.

§340-239-0700(3)(c)(C) – Subsurface Landfill Fire(s)

> All known, prevented, or suspected subsurface landfill fire(s) along with potential causes and any efforts conducted to avoid or put out the fire(s). Any positive pressure readings that may have contributed to the known, prevented, or suspected fire.

During the reporting period, no subsurface landfill fire(s) occurred.

§340-239-0700(3)(c)(D) – Deviations

> The number of times that applicable parameters monitored under OAR 340-239-0110(2) or 340-239-0200, were exceeded and when the gas collection and control system was not operating in compliance with OAR 340-0110(2)(a) including periods of startup, shutdown, and malfunction. For each instance, report the date, time, and duration of each exceedance. Where an owner or operator subject to the requirements of this division is demonstrating compliance with the operational standard for temperature OAR 340-239-0600(3)(b), the owner or operator must provide a statement of the wellhead operational standard for temperature and oxygen the landfill is complying with for the period covered by the report.

During this reporting period, there were no times that applicable parameters monitored under OAR 340-239-0110(2) or 340-239-0200 were exceeded. There were also no times when the gas collection and control system (GCCS) was not operating in compliance with OAR 340-0110(2).

> (i) The number of times each of those parameters monitored under OAR 340-239-0600(3)(b), were exceeded. For each instance, report the date, time, and duration of each exceedance.

During the reporting period, no temperature exceedances occurred.

> (ii) The number of times the parameters for the site-specific treatment system in OAR 340-239-0110(2)(d)(C) were exceeded.
>
> **§340-239-0110(2)(d)(C)** – Route the collected gas to a treatment system that processes the collected gas for subsequent sale or use. Venting of treated landfill gas to the ambient air is not allowed. If the treated landfill gas cannot be routed for subsequent sale or beneficial use, then the treated landfill gas must be controlled according to either subsection (2)(b), (2)(c) or

(2)(d) of this rule. All emissions vented to the atmosphere from the gas treatment system are subject to the requirements of subsection (2)(b) or (2)(c) of this rule.

In accordance with §340-239-0110(2)(d)(C), PNGC Power owns and operates a landfill treatment system at the landfill that processes the collected gas for subsequent sale or beneficial use. There are no vents within the treatment system that allow venting of gas to the atmosphere. The treatment system is not designed nor equipped to bypass the control devices. A calibrated flow meter was installed to measure flow to the treatment system. PNGC Power maintains and operates all monitoring systems associated with the treatment system in accordance with the PNGC Power site-specific treatment system monitoring plan required by §340-239-0700(2)(b)(H)(ii). During this reporting period there were no parameter exceedances of the Treatment Monitoring Plan.

§340-239-0700(3)(c)(E) – Bypass line

Description and duration of all periods when the gas stream was diverted from the control device or treatment system through a bypass line or the indication of bypass flow as specified OAR 340-239-0110(2)(c).

The gas collection system is not designed nor equipped to bypass the control devices; therefore, §340-239-0700(2)(c)(E) is not applicable.

§340-239-0700(3)(c)(F) – Control Device or Treatment System Downtime

Description and duration of all periods when the control device or treatment system was not operating and length of time the control device or treatment system was not operating.

The tables provided in Appendix C summarize all the periods when the control device was not operating.

§340-239-0700(3)(c)(G) – Collection System Downtime

All periods when the collection system was not operating.

The table provided in Appendix D summarizes all the periods when the collection system was not operating.

§340-239-0700(3)(c)(H) – Collection System Expansion

The date of installation and the location of each well or collection system expansion.

During this reporting period, the GCCS was expanded by adding ten new extraction wells. The new wells are adding to the performance of the GCCS. During this reporting period, seven extraction wells were decommissioned. Appendix E contains an updated site layout

showing the approximate locations of the new wells and a table with their installation dates.

§340-239-0700(3)(c)(I) – Enhanced Monitoring

> Each owner or operator required to conduct enhanced monitoring in accordance with OAR 340-239-0800(8) for temperatures exceeding 62.8 degrees Celsius (145 degrees Fahrenheit) must include the results of all monitoring activities conducted during the period.

During the reporting period, no temperature exceedances occurred.

§340-239-0700(3)(c)(J) – Enclosed Combustors

> For enclosed combustors except for boilers and process heaters with design heat input capacity of 44 megawatts per hour (150 million British thermal units per hour) or greater, all three-hour periods of operation during which the average temperature was more than 28 degrees Celsius (82 degrees Fahrenheit) below the average combustion temperature during the most recent performance test.

Coffin Butte Landfill does not own and/or operate an enclosed combustor; therefore, §340-239-0700(3)(c)(J) is not applicable.

§340-239-0700(3)(c)(K) – Boilers or Process Heaters

> For boilers or process heaters, whenever there is a change in the location at which the vent stream is introduced into the flame zone.

Coffin Butte Landfill does not own and/or operate boilers or process heaters; therefore, §340-239-0700(3)(c)(K) is not applicable.

3 ADDITIONAL REPORTING/RECORDKEEPING

The information in this section includes additional recording/reporting within the semi-annual report.

§340-239-0600(3)(b)(E)(5) – Monitoring System Malfunctions

> The monitoring requirements of this division apply at all times, except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities. A monitoring system malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring system failures that are caused in part by poor maintenance or careless operation are not malfunctions. Monitoring system repairs completed in response to monitoring system malfunctions to return the monitoring system to operation must be completed as expeditiously as practicable.

There were no monitoring system malfunctions during this reporting period.

4 LIMITATIONS

This Semi-Annual Report for the Coffin Butte Landfill GCCS has been prepared by WCG, as authorized by VLI. The report was prepared based on WCG's review of information provided by Coffin Butte Landfill. The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. These services were performed consistent with our agreement with our client. Any reliance on this report by a third party is at such party's sole risk. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

APPENDIX A

SURFACE EMISSION MONITORING

FIRST QUARTER 2023

SURFACE EMISSIONS MONITORING

SCS FIELD SERVICES

Environmental
Consultants & Contractors

May 19, 2023
File No. 07222178.00

Mr. Ian MacNab
Republic Services – Coffin Butte Landfill
28972 Coffin Butte Road
Corvallis, Oregon 97330

Subject: Coffin Butte Landfill - Corvallis, Oregon

Surface Emissions Monitoring for First Quarter 2023.

Dear Mr. MacNab:

SCS Field Services (SCS-FS) is pleased to provide the Republic Services, with the enclosed report summarizing the surface emissions monitoring services provided at the Coffin Butte Landfill (Site) during the first quarter 2023. This report includes the results of surface scan, component emissions and blower/flare station emissions monitoring for the Site for this monitoring period.

SCS-FS appreciates the opportunity to be of assistance to Republic Services on this project. As you review the enclosed information, please contact Stephan Harquail (503) 867-2369 or Whitney Stackhouse at (209) 338-7990 if you have any questions or comments.

Sincerely,

Max Polkabla

Max Polkabla
Senior Technician/Data Analyst
SCS Field Services

Stephen Harquail
PNW Region Manager
SCS Field Services

Coffin Butte Landfill

Oregon Landfill Gas Emissions Rule (OAR) and Surface Emissions Monitoring

First Quarter 2023

Presented to:

REPUBLIC SERVICES

Mr. Ian MacNab
28972 Coffin Butte Road
Corvallis, Oregon 97330

SCS FIELD SERVICES

File No. 0722178.00 | May 19, 2023

SCS FIELD SERVICES
15949 SW 72nd Ave
Portland, Or 97224

Coffin Butte Landfill

Oregon Landfill Gas Emissions Rule (OAR) and Surface Emissions Monitoring First Quarter 2023

INTRODUCTION

This letter provides results of the March 8, 14, 17, 24, 26, 30 and April 6, 2023, OAR landfill surface emissions monitoring (SEM) performed by SCS Field Services (SCS) at the Coffin Butte Landfill. All work was performed in accordance with our approved Work Scope dated August 29, 2022, and the OAR requirements.

2022 State Regulatory Applicability

CBL is subject to the Oregon-specific landfill gas emission regulations in OAR Chapter 340 Division 239. These SEM regulations are detailed below. The following requirements are stricter than the NESHAP regulations in previous Sections and require additional compliance:

SURFACE EMISSION METHANE CONCENTRATION LIMITS

> *340-239-0200 (1) Surface Emission Methane Concentration Limits. Except as provided in OAR 340-239-0110(4), 340-239-0110(5), 340-239-0300, and 340-239-0600(1), beginning August 1, 2022, or upon commencing operation of a newly installed gas collection and control system or modification of an existing gas collection and control system pursuant to OAR 340-239-0110(1), whichever is later, no location on the landfill surface may exceed either of the following methane concentration limits:*
>
> *(a) 500 ppmv, other than nonrepeatable, momentary readings, as determined by instantaneous surface emissions monitoring conducted in accordance with OAR 340-239-0800(3)(b);*
>
> *(b) An average methane concentration limit of 25 ppmv as determined by integrated surface emissions monitoring conducted in accordance with OAR 340-239-800(3)(c).*

The 500 ppmv limit is already a requirement in the Federal regulations above, but an average methane concentration limit of 25 ppmv will be adhered to as required.

SURFACE EMISSION RECORDKEEPING

> *340-239-0700(2)(a)(C) All instantaneous surface readings of 100 ppmv methane or greater. All exceedances of the limits in OAR 340-239-0100(6)(b) and 340-239-0200, including the location of the leak (or affected grid), leak concentration in ppmv methane, date and time of measurement, the action taken to repair the leak, date of repair, any required remonitoring and the remonitored concentration in ppmv methane, wind speed during surface sampling, and the installation date and location of each well installed as part of a gas collection system expansion;*

The Federal regulations only require monitored surface emissions over 500 ppmv to be documented, so all of the above recordkeeping will be performed on emission points 100 ppmv or over. All repeatable instantaneous records of 100 ppm or higher (taken during SEM) must be kept for 5 years AND recorded in the semi-annual reports.

SUMMARY AND CONCLUSIONS

As stipulated in OAR, if uncorrectable exceedances within the 10-day limitation are detected or emissions are discovered during an inspection by Regulatory Agencies, the landfill must perform monitoring on a 25-foot pathway on a quarterly basis for active disposal sites. Upon completion of four consecutive SEM events without an uncorrectable exceedance of the 25 ppmv or 500 ppmv standards, other than non-repeatable momentary readings, the landfill may perform the monitoring on a 100-foot spacing on an annual basis for closed landfills or quarterly for active disposal sites. In accordance with the provisions of the OAR, the monitoring of the landfill was done on 25 foot pathway based on a prior inspection, in which exceedances were observed.

On March 8, 14, 17, 24, 26, 30 and April 6, 2023, SCS performed first quarter 2023 surface emissions monitoring testing as required by the Oregon Landfill Gas emission Rule. Instantaneous surface emissions monitoring results indicated that six (6) locations exceeded the 500 ppmv maximum concentration on the above-mentioned dates (Table 1 in Attachment 3). The required first/second 10-day (OAR) and 1-month (OAR) follow-up monitoring indicated that all areas had returned to compliance following system adjustments and remediation by SCS and site personnel. Based on these monitoring results no additional follow up testing was required.

Also, during the instantaneous monitoring event, SCS performed integrated monitoring of the landfill surface. As required by the OAR, the landfill was divided into 50,000 square foot areas. The Coffin Butte Landfill surface area was therefore divided into 105 grids, as shown on Figure 1 in Attachment 1. During this monitoring event, several grids were not monitored, in accordance with the regulations, due to ongoing active landfilling activities, unsafe conditions, or there was no waste in place prior to the monitoring event.

During the monitoring event, there were fifteen (15) areas observed to exceed the 25 ppmv OAR integrated average threshold (Table 2 in Attachment 4). The required first and second 10-day OAR follow-up monitoring were unable to be performed due to weather. The required first and second 10-day (OAR) follow-up monitoring indicated that not all areas had returned to compliance. These results are discussed in a subsequent section of this report.

In addition, quarterly monitoring of the pressurized piping or components of the Gas Collection and Control System (GCCS) that are under positive pressure must be performed quarterly. Results of the testing of the landfill gas (LFG) Blower Flare Station (BFS) pressurized pipe and components indicated that all test locations were in compliance with the 500 ppmv requirements.

Further, as required under the OAR, any location on the landfill that has an observed instantaneous methane concentration above 100 ppmv, must be included within the surface emission monitoring report and if any instantaneous location records above 250 ppmv, it must be monitored in a 5 foot grid around the location to determine extents of the methane leak. During this reporting period, thirty-three 33) locations were observed showing elevated concentrations between 100-499 ppmv, of the reporting threshold. When these readings are observed to be repeatable, they are reported to site personnel for tracking and/or remediation and will be reported in the next submittal of the annual OAR report. Finally, to help prevent potential future exceedances, SCS recommends that the landfill surface be routinely inspected and any observed surface erosion be routinely repaired.

BACKGROUND

The Coffin Butte Landfill is an active organic refuse disposal site. By way of background, organic materials buried in a landfill decompose anaerobically (in the absence of oxygen) producing a combustible gas which contains approximately 50 to 60 percent methane gas, 40 to 50 percent carbon dioxide, and trace amount of various other gases, some of which are odorous. The Coffin-Butte/Corvallis property contains a system to control the combustible gases generated in the landfill.

SURFACE EMISSIONS MONITORING

On March 8, 14, 17, 24, 26, 30 and April 6, 2023, the instantaneous and integrated SEM was performed over the surface of the subject site. The intent of the monitoring was to identify any specific locations or areas of the landfill surface with organic compound concentrations exceeding the OAR threshold limit values of 500 ppmv measured as methane for instantaneous monitoring, or an average methane concentration of 25 ppmv for the integrated monitoring in the 50,000 square foot grids as required under the OAR. During this event, SCS performed the monitoring on a 25 and 100-foot pathway in accordance with the rules as required.

EMISSIONS TESTING INSTRUMENTATION/CALIBRATION

Instruments used to perform the landfill surface emission testing consisted of the following:

- Thermo Scientific TVA 2020 portable Flame Ionization Detector (FID). This instrument measures methane in air over a range of 1 to 50,000 ppmv. The TVA 2020 meets the State of California Air Resources Board (CARB) requirements for combined instantaneous and integrated monitoring and was calibrated in accordance with United States Environmental Protection Agency (US EPA) Method 21.

- Weather Anemometer with continuous recorder for meteorological conditions in accordance with the OAR.

Instrument calibration logs and weather information are shown in Attachments 5 and 6.

SURFACE EMISSIONS MONITORING PROCEDURES

Surface emissions monitoring was conducted in accordance with the OAR and SEM requirements. Monitoring was performed with the FID inlet held within 2-inches of the landfill surface while a technician walked a grid in parallel paths not more than 25 or 100-feet apart over the surface of the landfill. Cracks, holes and other cover penetrations in the surface were also tested. Surface emissions readings were monitored continuously and recorded every 5 seconds. Any areas in exceedance of the 100 or 500 ppmv standards (reporting and compliance levels, respectively) would be GPS tagged and stake-marked for on-site personnel to perform remediation or repairs.

The integrated average is based on the readings stored on the instrument, which are recorded every 5 seconds. The readings are then downloaded and the averages are calculated for each grid using SCS eTools®. All readings are maintained in this secure SCS Database. The readings are not provided in the report due to the volume of readings, but can be furnished upon request.

Recorded wind speed results are shown in Attachment 6. Wind speed averages were observed to remain below the alternative threshold of 10 miles per hour, and no instantaneous speeds exceeded 20 miles per hour. No rainfall had occurred within 72 hours of the monitoring events. Therefore, site

meteorological conditions were within the alternatives of the OAR requirements on the above mentioned dates.

TESTING RESULTS

During this event, SCS performed the monitoring on a 25-foot pathway in accordance with the rule as required under the OAR. The intent of the monitoring was to identify any specific locations or areas of the landfill surface with organic compound concentrations exceeding the OAR or NSPS threshold limit values of 500 ppmv measured as methane for instantaneous monitoring, or an average methane concentration of 25 ppmv for the integrated monitoring (OAR).

On March 8, 14, 17, 24, 26, 30 and April 6, 2023, SCS performed first quarter 2023 instantaneous emissions monitoring testing as required by the Oregon DEQ/OAR. During this monitoring, surface emissions results indicated that six (6) locations exceeded the 500 ppmv maximum concentration. The required first 10-day (OAR) follow-up monitoring performed on March 17 & 24 and the 1-month (OAR) follow-up monitoring event performed on April 6, 2023, indicated that all areas had returned to compliance following system adjustments and remediation by SCS and site personnel. Based on these monitoring results no additional follow up testing was required. Results of the monitoring are shown in Attachments 2 and 3 (Table 1).

Additionally, calculated integrated monitoring indicated Fifteen (15) integrated exceedances of the 25-ppmv requirement on March 16, 17 and 21, 2023. The required first and second 10-day OAR follow-up monitoring performed on March 21, 26, and 30, 2023 indicated that four (4) of the fifteen (15) areas had returned to compliance. Calibration logs for monitoring equipment are provided in Attachment 5.

During this monitoring event, several girds were not monitored, in accordance with the OAR, due to active landfilling activities, unsafe conditions, overgrown vegetation or no waste in place. SCS will continue to monitor all accessible locations during the second quarter 2023.

PRESSURIZED PIPE AND COMPONENT LEAK MONITORING

On March 8, 2023, quarterly leak monitoring was performed in accordance with the OAR. SCS performed LFG pressurized pipe and component leak monitoring at the BFS. Monitoring was performed with the detector inlet held one-half of an inch from pressurized pipe and associated components. No locations exceeding the 500 ppmv threshold were observed during our monitoring event. The maximum reading, which was 6.20 ppmv, was well below the maximum threshold (see Table 1 for component results). Therefore, all pressurized pipe and components located at the LFG BFS were in compliance at the time of our testing.

PROJECT SCHEDULE

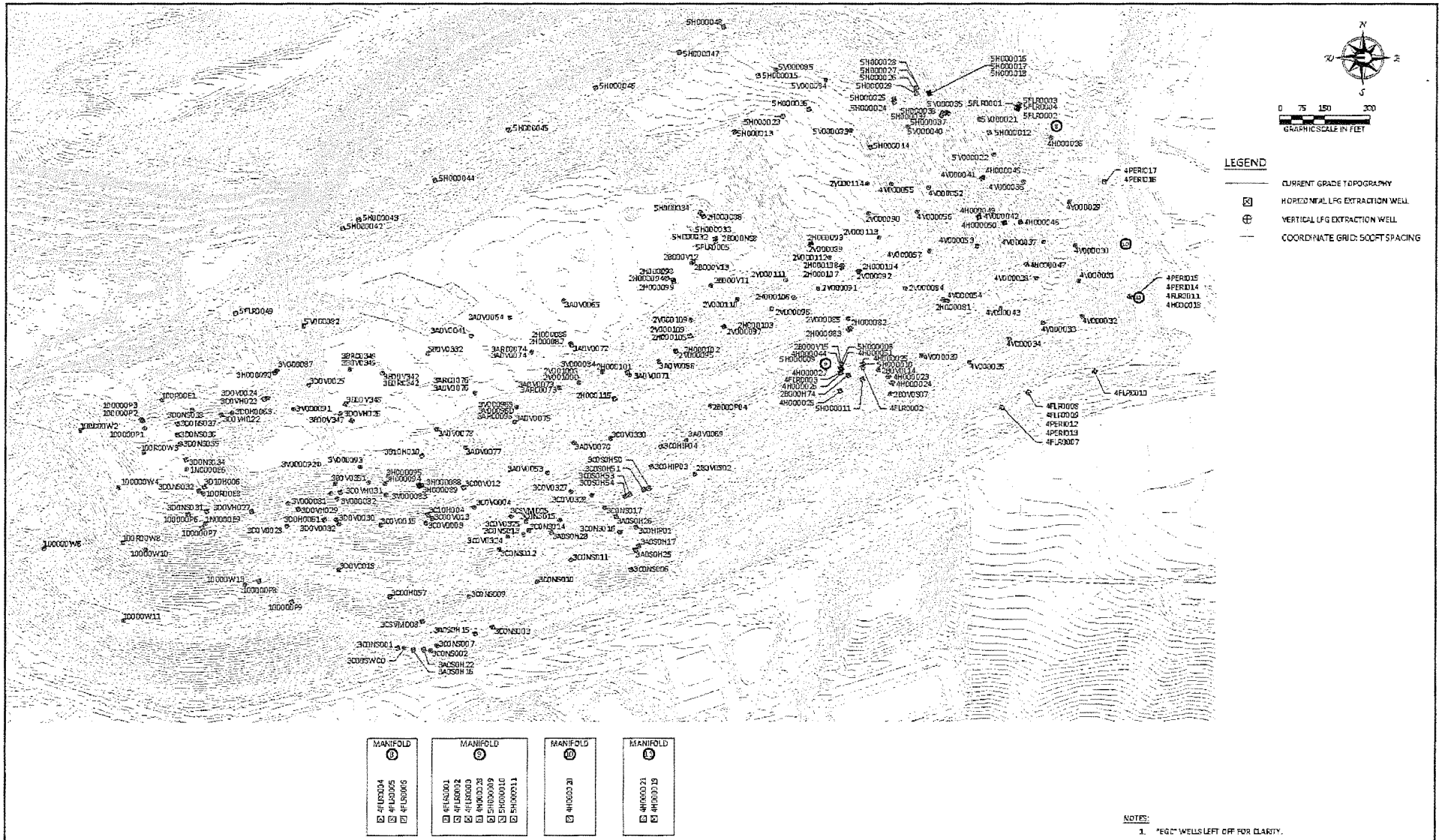
According to the OAR, surface emissions monitoring at active landfills is required to be performed on a quarterly basis. Therefore, in accordance with our approved Work Scope, the second quarter 2023 (April through June) surface emissions testing event is scheduled to be performed by the end of June 2023.

STANDARD PROVISIONS

This report addresses conditions of the subject site during the testing dates only. Accordingly, we assume no responsibility for any changes that may occur subsequent to our testing which could affect the surface emissions at the subject site or adjacent properties.

Attachment 1

Landfill Grid



NOTES:

1. "EGC" WELLS LEFT OFF FOR CLARITY.

REV	DATE	DESCRIPTION	DRN BY	DSN BY	CHK BY
0	07/14/22	AS-BUILT	PD	AH	AH

REPUBLIC SERVICES
22972 COFFIN BUTTE ROAD CORVALLIS OR 97330 PHONE: (541) 745-5792 FAX: (541) 745-3835

ENERGYNEERING SOLUTIONS
15820 BARCLAY DRIVESISTERS, OR 97759 PHONE: (541) 549-8766 FAX: (541) 549-1901

WELLHEAD LAYOUT

2022 WELLFIELD GCCS AS-BUILT
COFFIN BUTTE LANDFILL
CORVALLIS, OR

DRAWING NO.
W1.01
PROJECT NO.
XXXXXX

Attachment 2

Surface Pathway

First Quarter 2023
Initial Surface Emissions Monitoring Pathway
Coffin Butte Landfill, Corvallis, Oregon

Attachment 3

Instantaneous and Component Emissions Monitoring Results

First Quarter 2023

Table 1. Instantaneous Surface and Component Emissions Monitoring Results Coffin-Butte Landfill, Corvallis, Oregon

Instantaneous Data Report for March 8, 14, 17, 24 and April 6, 2023

Location (Surface)	Initial Monitoring Results (ppmv) 3/8/2023	Initial Monitoring Results (ppmv) 3/14/2023	Follow Up Monitoring Results (ppmv) 3/17/2023	Follow Up Monitoring Results (ppmv) 3/24/2023	1-Month Follow Up Monitoring Results (ppmv) 4/6/2023	Latitude	Longitude
3D0VH031	1619	--	375	--	361	44.69793	-123.23417
2V000089	1600	--	296	--	304	44.70056	-123.22847
2V00109	--	5000	--	189	197	44.69979317	-123.2300255
3V0096	--	1600	--	371	382	44.69994371	-123.228961
3V0096D	--	1600	--	434	421	44.69896051	-123.2321997
3V0081	--	2708	--	418	439	44.69799332	-123.235095

Instantaneous Data Report for March 8, 14, 17, 24 and April 6, 2023
Readings between 100-499 ppmv

Location (Surface)	Initial Monitoring Results (ppmv) 3/8/2023	Latitude	Longitude
2H000099	491	44.700149	-123.2302418
2B000V12	481	44.70034	-123.23002
2H000094	476	44.70019	-123.23034
2H000088	462	44.70039	-123.22993
5H000032	437	44.70079	-123.22993

First Quarter 2023

Table 1. Instantaneous Surface and Component Emissions Monitoring Results Coffin-Butte Landfill, Corvallis, Oregon

Location (Surface)	Initial Monitoring Results (ppmv) 3/8/2023	Latitude	Longitude
3V000093	381	44.6983595	-123.234183
2H000086	327	44.69953	-123.23151
3A0V0065	318	44.70002	-123.23163
3A0V0076	285	44.69911	-123.23275
2H000087	268	44.69954	-123.23152
4V000029	240	44.70101	-123.22521
3D0V0025	237	44.69909	-123.23487
3ARC0D26	235	44.6988542	-123.2346213
3D0NS035	230	44.69814	-123.23629
3B0V0351	212	44.69821	-123.23407
3D0VH022	210	44.69886	-123.23597
3A0V0074	207	44.69945	-123.23204
3D0H0061	204	44.69788	-123.23453
3V000087	203	44.6992	-123.23531
3H000095	194	44.6982145	-123.233391
2H000102	171	44.6995335	-123.2302335
3A0V0072	159	44.69954	-123.23152
3V000091	156	44.6988698	-123.2350643
3B10H010	150	44.69819	-123.23331
3H000089	147	44.6982093	-123.233385
3V000082	139	44.69808	-123.23449

First Quarter 2023

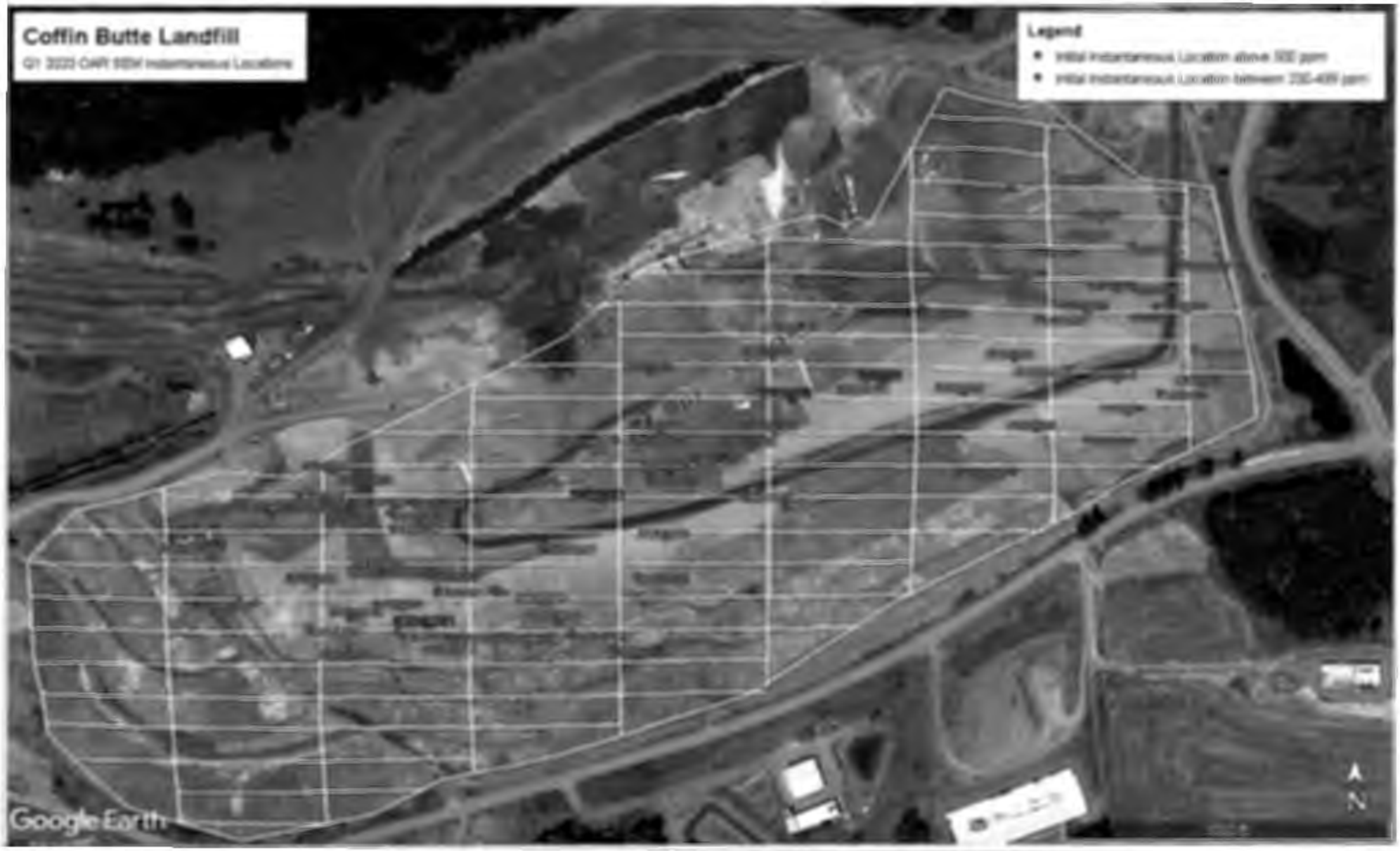
Table 1. Instantaneous Surface and Component Emissions Monitoring Results Coffin-Butte Landfill, Corvallis, Oregon

Location (Surface)	Initial Monitoring Results (ppmv) 3/8/2023	Latitude	Longitude
2V00100D	138	44.699207	-123.2314233
4V000055	137	44.70118	-123.2276
2V00100S	136	44.6992075	-123.2314313
3D0VH023	129	44.69897	-123.23541
3D0V0024	114	44.69895	-123.2354
2V000090	108	44.70084	-123.22802
2B0V0S07	100	44.6992	-123.22738

Pressurized Pipe and Component Results

Route	Date	Concentration (ppmv)
FLARE STATION	3/8/2023	6.20

No other exceedances of the 500 ppmv threshold were observed during the first quarter 2023 monitoring.



First Quarter 2023
Initial Emissions Monitoring Results Greater Than 200 ppmv and 500 ppmv
Coffin Butte Landfill, Corvallis, Oregon

Attachment 4

Integrated Monitoring Results

First Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-001	--	--	Exempt Area
CBLF-002	--	--	
CBLF-003	3/21/2023	2.05	
CBLF-004	--	--	Exempt Area
CBLF-005	--	--	Exempt Area
CBLF-006	--	--	Exempt Area
CBLF-007	--	--	Exempt Area
CBLF-008	--	--	Exempt Area
CBLF-009	--	--	Exempt Area
CBLF-010	--	--	Exempt Area
CBLF-011	--	--	Exempt Area
CBLF-012	--	--	Exempt Area
CBLF-013	--	--	Exempt Area
CBLF-014	--	--	Exempt Area
CBLF-015	--	--	Exempt Area
CBLF-016	3/16/2023	9.53	
CBLF-017	3/16/2023	4.14	
CBLF-018	3/16/2023	10.05	
CBLF-019	3/16/2023	8.22	
CBLF-020	3/16/2023	3.76	
CBLF-021	3/16/2023	2.04	
CBLF-022	--	--	Exempt Area
CBLF-023	--	--	Exempt Area
CBLF-024	--	--	Exempt Area
CBLF-025	--	--	Exempt Area
CBLF-026	--	--	Exempt Area
CBLF-027	3/16/2023	26.63	Initial Monitoring
CBLF-027	3/26/2023	27.85	First 10-Day Recheck
CBLF-027	3/30/2023	5.94	Second 10-Day Recheck
CBLF-028	3/16/2023	14.89	
CBLF-029	3/16/2023	5.45	
CBLF-030	3/16/2023	4.59	
CBLF-031	--	--	Exempt Area
CBLF-032	--	--	Exempt Area
CBLF-033	--	--	Exempt Area
CBLF-034	--	--	Exempt Area
CBLF-035	--	--	Exempt Area
CBLF-036	--	--	Exempt Area
CBLF-037	--	--	Exempt Area
CBLF-038	3/21/2023	3.56	
CBLF-039	3/8/2023	4.20	
CBLF-040	3/16/2023	7.24	
CBLF-041	3/21/2023	34.82	Initial Monitoring

First Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-041	3/26/2023	27.17	First 10-Day Recheck
CBLF-041	3/30/2023	1.06	Second 10-Day Recheck
CBLF-042	3/8/2023	6.60	
CBLF-043	3/8/2023	5.43	
CBLF-044	3/8/2023	7.23	
CBLF-045	--	--	Exempt Area
CBLF-046	--	--	Exempt Area
CBLF-047	--	--	Exempt Area
CBLF-048	3/17/2023	113.22	Initial Monitoring
CBLF-048	3/26/2023	95.34	First 10-Day Recheck
CBLF-048	3/30/2023	58.84	Second 10-Day Recheck
CBLF-049	3/17/2023	41.44	Initial Monitoring
CBLF-049	3/26/2023	28.42	First 10-Day Recheck
CBLF-049	3/30/2023	21.70	Second 10-Day Recheck
CBLF-050	3/17/2023	53.56	Initial Monitoring
CBLF-050	3/26/2023	63.84	First 10-Day Recheck
CBLF-050	3/30/2023	71.53	Second 10-Day Recheck
CBLF-051	3/17/2023	61.18	Initial Monitoring
CBLF-051	3/26/2023	57.28	First 10-Day Recheck
CBLF-051	3/30/2023	59.73	Second 10-Day Recheck
CBLF-052	--	--	Exempt Area
CBLF-053	--	--	Exempt Area
CBLF-054	3/21/2023	63.70	Initial Monitoring
CBLF-054	3/26/2023	66.61	First 10-Day Recheck
CBLF-054	3/30/2023	42.37	Second 10-Day Recheck
CBLF-055	3/21/2023	21.99	
CBLF-056	--	--	Exempt Area
CBLF-057	3/21/2023	3.10	
CBLF-058	--	--	Exempt Area
CBLF-059	--	--	Exempt Area
CBLF-060	--	--	Exempt Area
CBLF-061	--	--	Exempt Area
CBLF-062	--	--	Exempt Area
CBLF-063	--	--	Exempt Area
CBLF-064	--	--	Exempt Area
CBLF-065	--	--	Exempt Area
CBLF-066	--	--	Exempt Area
CBLF-067	--	--	Exempt Area
CBLF-068	3/21/2023	28.32	Initial Monitoring
CBLF-068	3/26/2023	26.82	First 10-Day Recheck
CBLF-068	3/30/2023	5.70	Second 10-Day Recheck
CBLF-069	3/21/2023	9.07	
CBLF-070	3/21/2023	16.57	

First Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-071	3/21/2023	52.29	Initial Monitoring
CBLF-071	3/26/2023	48.78	First 10-Day Recheck
CBLF-071	3/30/2023	40.93	Second 10-Day Recheck
CBLF-072	3/17/2023	55.50	Initial Monitoring
CBLF-072	3/21/2023	97.78	First 10-Day Recheck
CBLF-072	3/30/2023	94.60	Second 10-Day Recheck
CBLF-073	3/17/2023	43.80	Initial Monitoring
CBLF-073	3/26/2023	27.99	First 10-Day Recheck
CBLF-073	3/30/2023	61.15	Second 10-Day Recheck
CBLF-074	3/17/2023	79.82	Initial Monitoring
CBLF-074	3/26/2023	69.65	First 10-Day Recheck
CBLF-074	3/30/2023	68.45	Second 10-Day Recheck
CBLF-075	3/17/2023	46.57	Initial Monitoring
CBLF-075	3/26/2023	36.76	First 10-Day Recheck
CBLF-075	3/30/2023	73.00	Second 10-Day Recheck
CBLF-076	3/17/2023	102.34	Initial Monitoring
CBLF-076	3/26/2023	89.12	First 10-Day Recheck
CBLF-076	3/30/2023	117.08	Second 10-Day Recheck
CBLF-077	3/21/2023	14.80	
CBLF-078	3/21/2023	11.03	
CBLF-079	3/21/2023	2.77	
CBLF-080	--	--	Exempt Area
CBLF-081	--	--	Exempt Area
CBLF-082	--	--	Exempt Area
CBLF-083	--	--	Exempt Area
CBLF-084	3/21/2023	39.70	Initial Monitoring
CBLF-084	3/26/2023	37.73	First 10-Day Recheck
CBLF-084	3/30/2023	47.99	Second 10-Day Recheck
CBLF-085	3/17/2023	11.07	
CBLF-086	3/17/2023	2.08	
CBLF-087	3/17/2023	3.20	
CBLF-088	3/17/2023	1.90	
CBLF-089	3/17/2023	2.30	
CBLF-090	--	--	Exempt Area
CBLF-091	3/14/2023	5.20	
CBLF-092	--	--	Exempt Area
CBLF-093	3/17/2023	4.34	
CBLF-094	3/17/2023	4.78	
CBLF-095	3/17/2023	5.10	
CBLF-096	3/17/2023	5.37	
CBLF-097	3/13/2023	21.27	
CBLF-098	3/14/2023	21.90	
CBLF-099	3/14/2023	10.57	

First Quarter 2023

Table 2. Integrated Surface Emissions Monitoring Results

Coffin-Butte Landfill Corvallis, Oregon

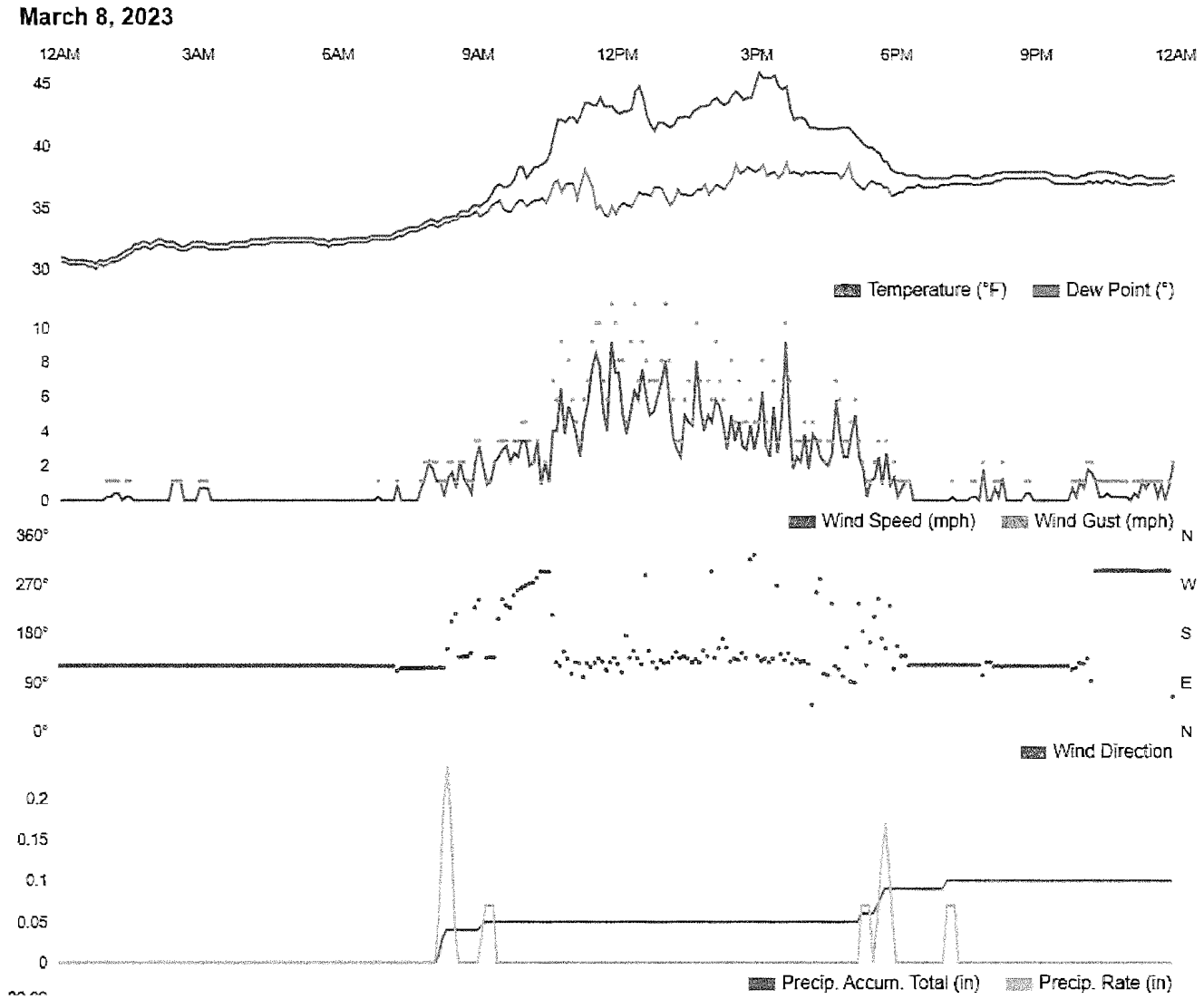
Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-100	3/14/2023	11.12	
CBLF-101	3/12/2023	15.53	
CBLF-102	3/14/2023	10.23	
CBLF-103	3/16/2023	15.10	
CBLF-104	3/16/2023	2.10	
CBLF-105	3/14/2023	2.34	

Attachment 5

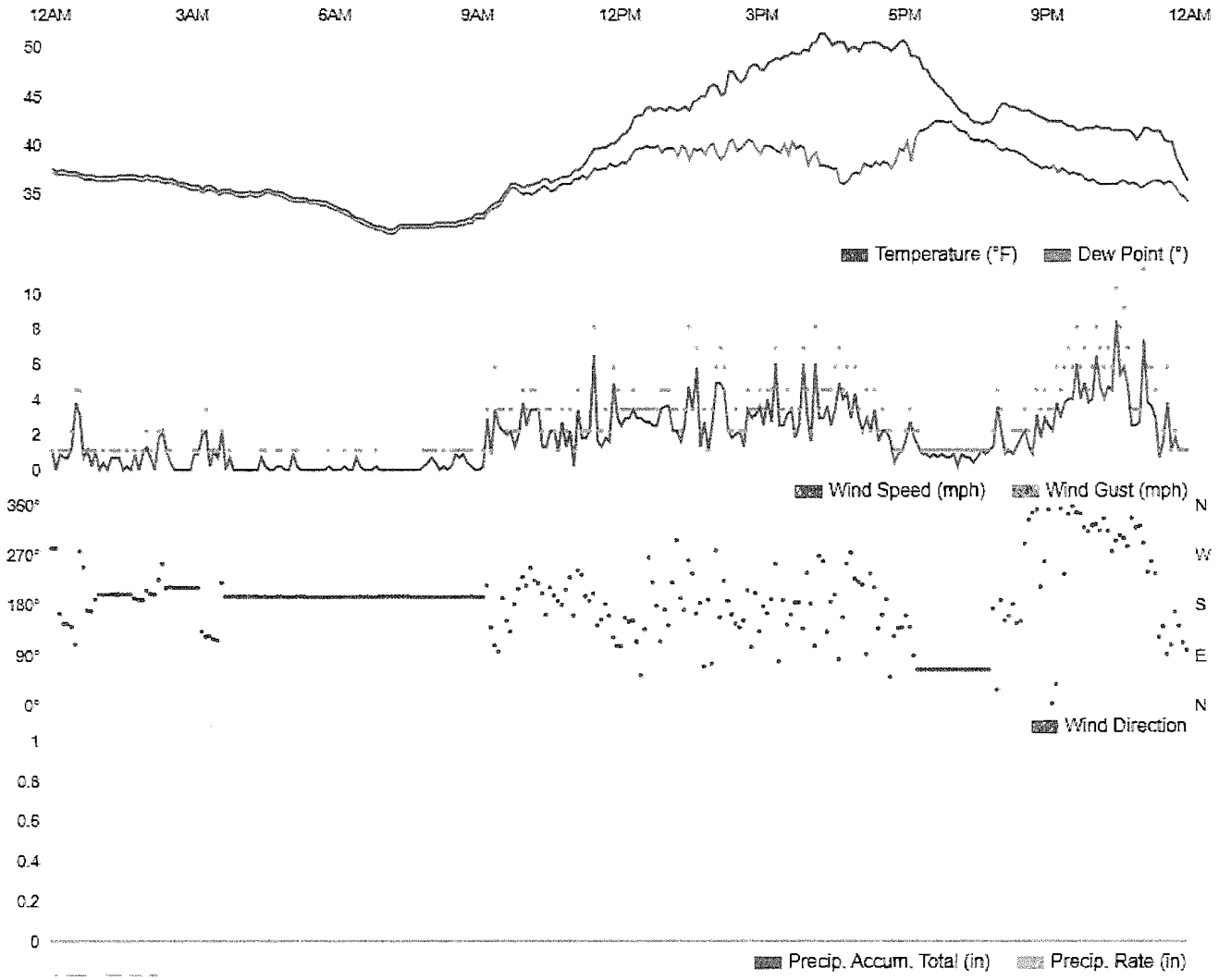
Calibration Logs

Attachment 6

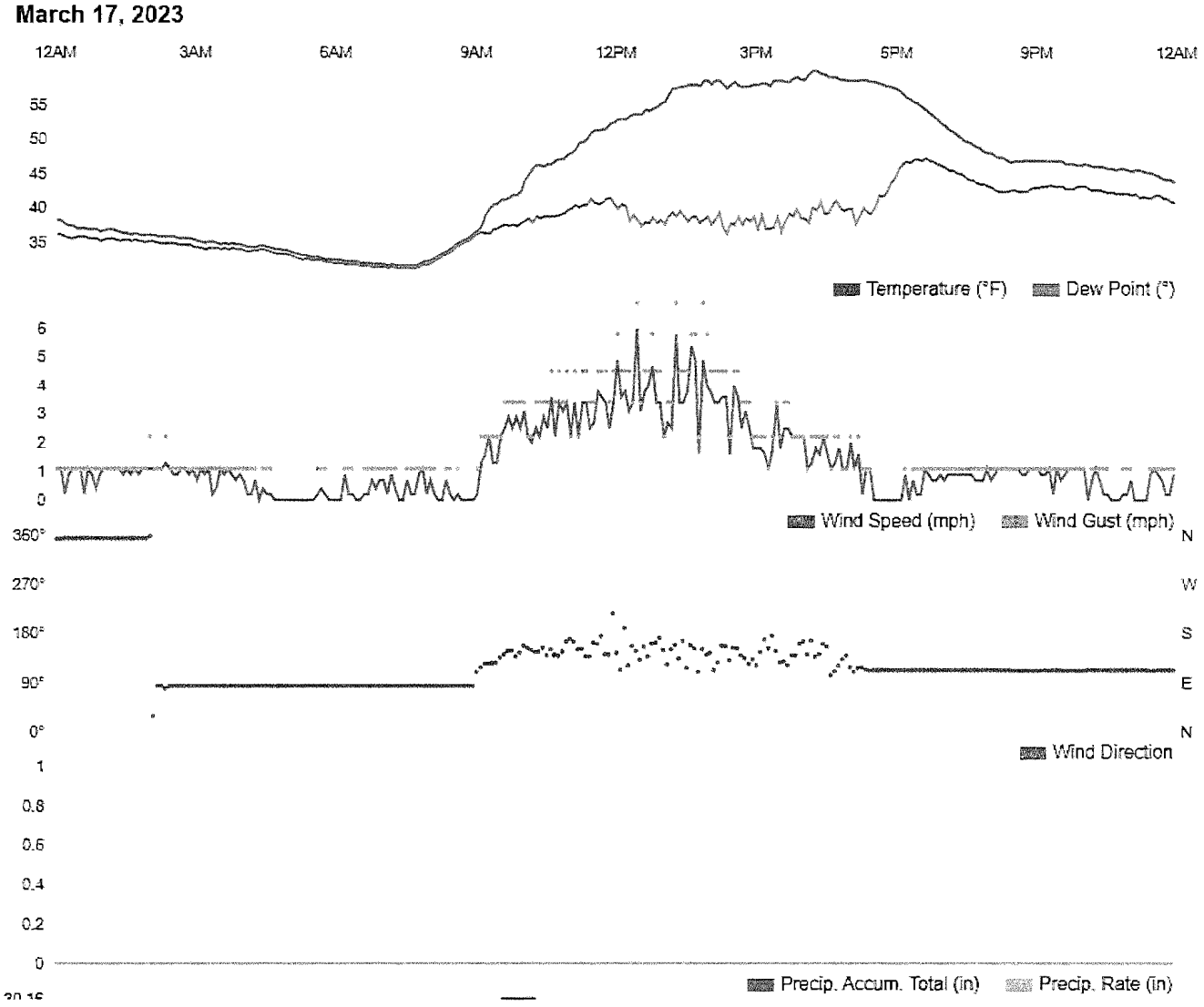
Weather Data



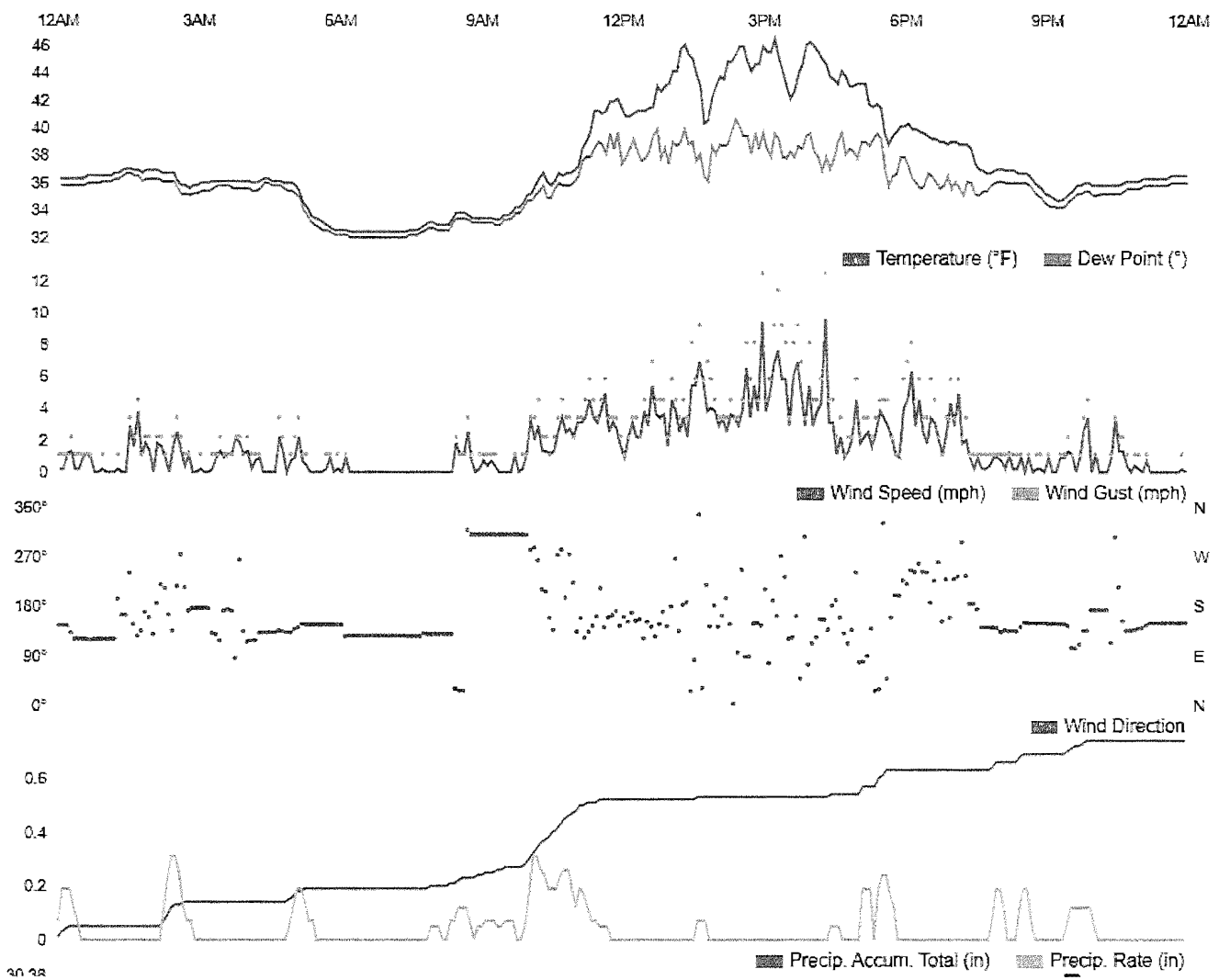
March 8, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



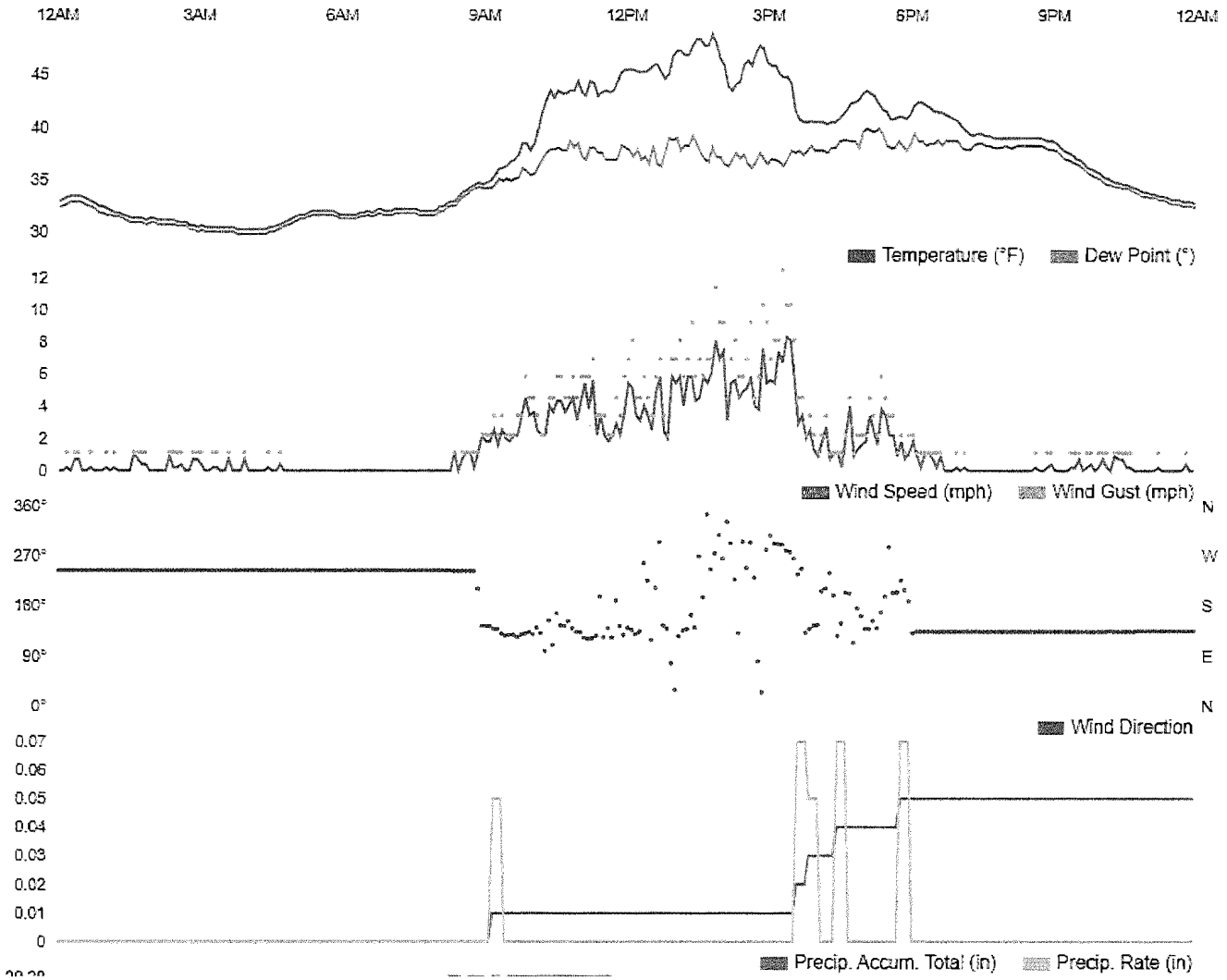
March 14, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



March 17, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon

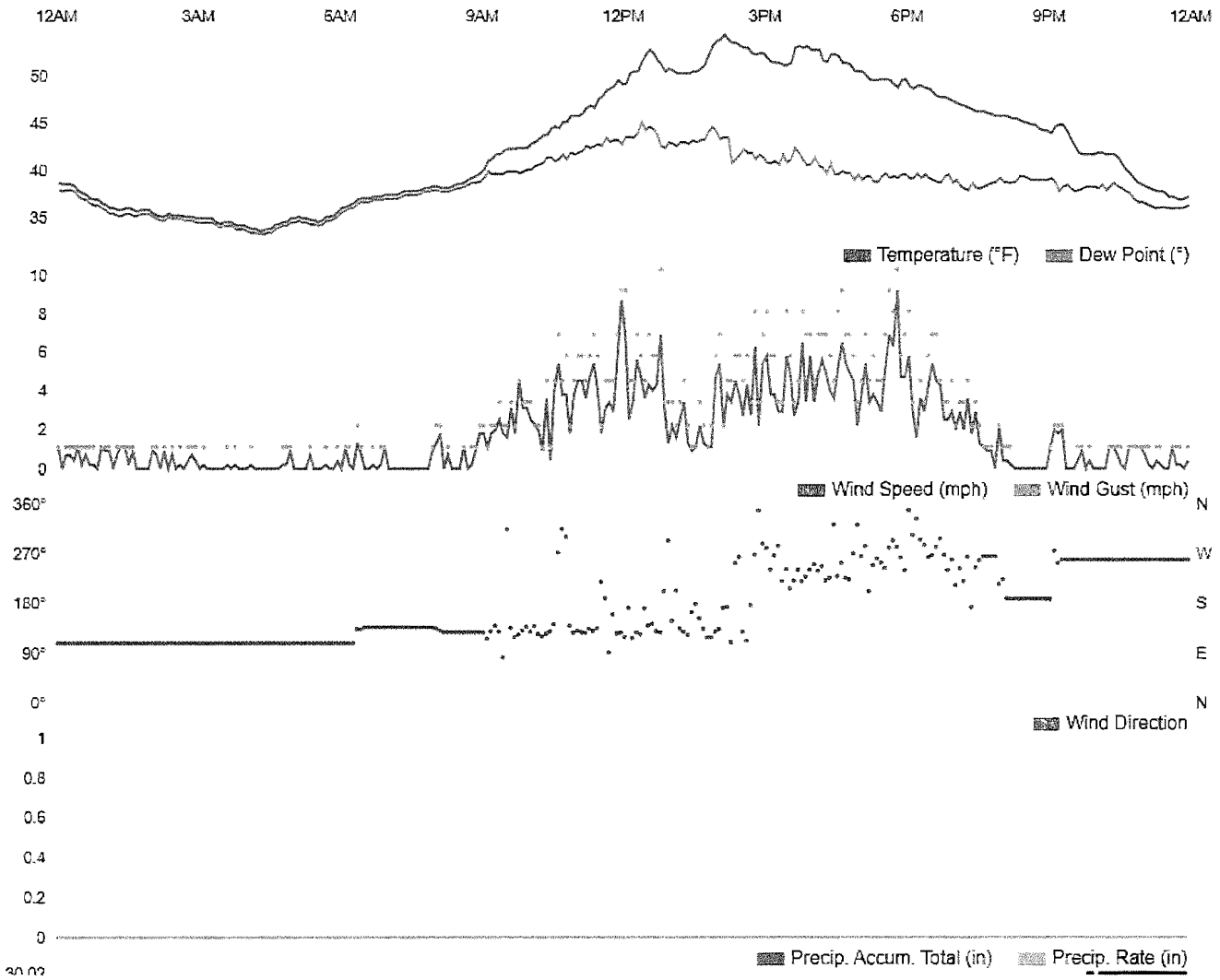


March 24, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon

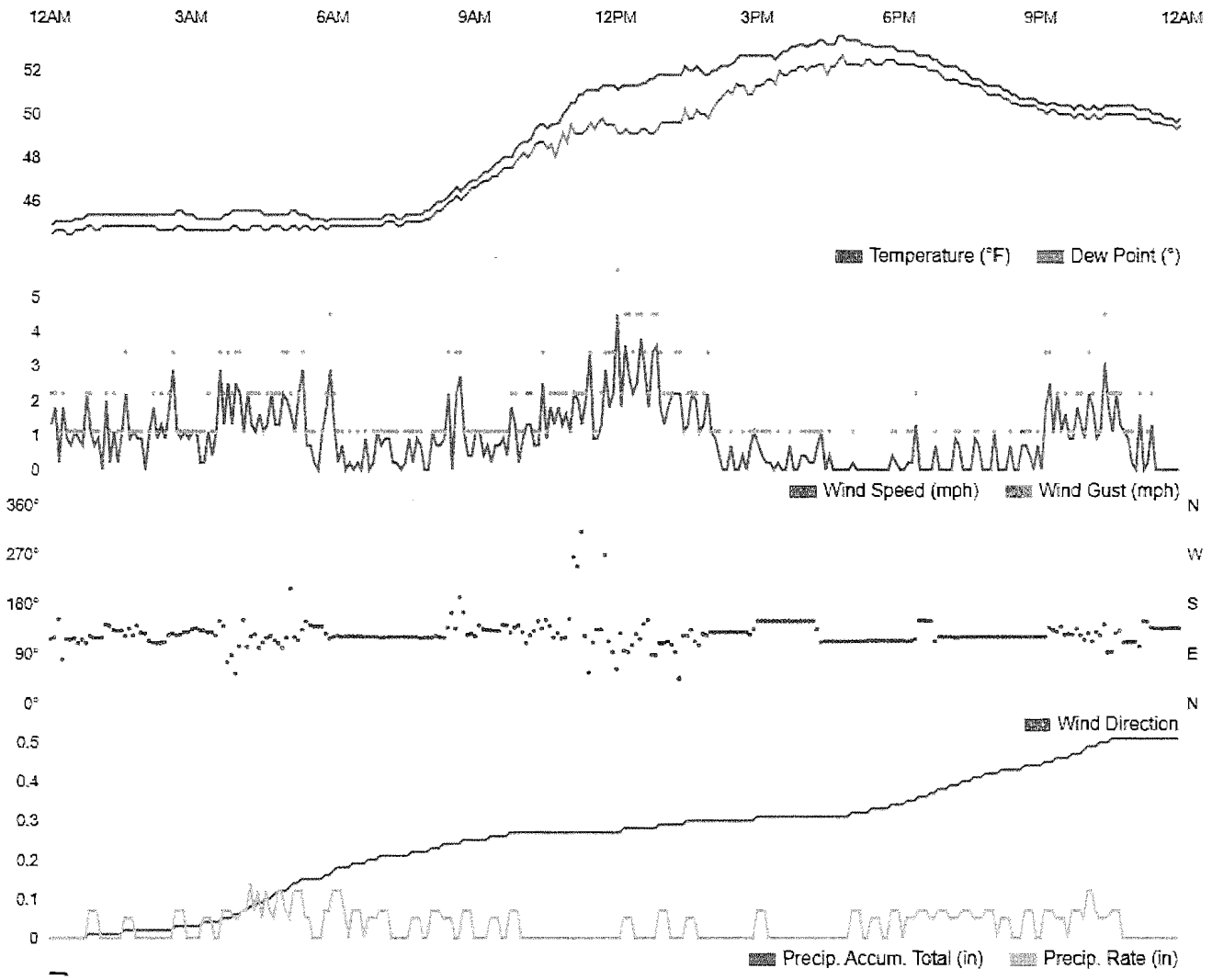


March 26, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon

March 30, 2023



March 30, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



April 6, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon

SECOND QUARTER 2023

SURFACE EMISSIONS MONITORING REPORT TO BE PROVIDED IN FEBRUARY 2024 SEMI-ANNUAL REPORT

APPENDIX B

WELLFIELD PRESSURE EXCEEDANCE REPORT

Coffin Butte Landfill
Wellfield Pressure Exceedance Report
Reporting Period: January 1, 2023 to June 30, 2023

WellName	Date/Time Monitored	Pressure (in. H20)	Temperature (°F)	Date/Time Remediated	Duration Days
2H000088	4/15/2023 14:14	0.02	55.0	4/18/2023 13:54	3
3A0V0076	4/29/2023 13:42	0.00	78.0	5/9/2023 13:52	10
3ARC0076	4/29/2023 13:40	0.00	95.0	5/9/2023 13:50	10
3V000092	5/24/2023 13:47	0.04	80.0	5/24/2023 14:07	0

* All wells listed are operating under the approved alternative monitoring plan. Therefore, the corrective action and root cause analysis is not applicable.

APPENDIX C

CONTROL DEVICE DOWNTIME LOG/TREATMENT SYSTEM DOWNTIME LOG

CONTROL DEVICE DOWNTIME LOG – FLARE #1

Coffin Butte Landfill
Control Device Downtime for Flare #1
Reporting Period: January 1, 2023 to June 30, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm:ss)	Description
2/9/2023 13:04	2/9/2023 13:34	0:30:00	Power outage to flare
2/21/2023 1:30	2/21/2023 1:42	0:12:00	LFG diverted to PNGC
2/21/2023 3:06	2/21/2023 3:38	0:32:00	LFG diverted to PNGC
2/21/2023 13:58	2/21/2023 15:00	1:02:00	LFG diverted to PNGC
2/21/2023 15:14	2/21/2023 15:22	0:08:00	LFG diverted to PNGC
2/27/2023 16:14	2/27/2023 16:34	0:20:00	LFG diverted to PNGC
2/28/2023 13:30	2/28/2023 13:38	0:08:00	LFG diverted to PNGC
3/2/2023 8:18	3/2/2023 8:36	0:18:00	LFG diverted to PNGC
3/2/2023 9:30	3/2/2023 9:44	0:14:00	LFG diverted to PNGC
3/8/2023 9:22	3/8/2023 9:28	0:06:00	Sump cleaning
3/8/2023 9:30	3/8/2023 9:32	0:02:00	Sump cleaning
3/8/2023 9:34	3/8/2023 9:40	0:06:00	Sump cleaning
3/8/2023 9:42	3/8/2023 10:50	1:08:00	Sump cleaning
3/8/2023 11:20	3/8/2023 11:28	0:08:00	LFG diverted to PNGC
3/8/2023 15:32	3/10/2023 8:28	40:56:00	LFG diverted to PNGC
3/19/2023 12:04	3/19/2023 12:14	0:10:00	LFG diverted to PNGC
3/24/2023 9:26	3/24/2023 9:48	0:22:00	LFG diverted to PNGC
4/19/2023 10:30	4/19/2023 13:00	2:30:00	LFG diverted to PNGC
4/19/2023 13:02	4/19/2023 13:06	0:04:00	LFG diverted to PNGC
5/4/2023 9:26	5/4/2023 9:34	0:08:00	LFG diverted to PNGC
5/19/2023 18:50	5/19/2023 19:00	0:10:00	LFG diverted to PNGC
5/20/2023 23:12	5/20/2023 23:20	0:08:00	LFG diverted to PNGC
5/21/2023 21:36	5/21/2023 21:48	0:12:00	LFG diverted to PNGC
5/23/2023 10:34	5/23/2023 10:40	0:06:00	LFG diverted to PNGC
5/23/2023 10:44	5/23/2023 10:58	0:14:00	LFG diverted to PNGC
5/25/2023 10:30	5/25/2023 10:40	0:10:00	LFG diverted to PNGC
5/31/2023 21:46	5/31/2023 21:54	0:08:00	LFG diverted to PNGC
6/1/2023 20:26	6/1/2023 20:38	0:12:00	LFG diverted to PNGC
6/7/2023 7:46	6/7/2023 7:54	0:08:00	LFG diverted to PNGC
6/7/2023 8:12	6/7/2023 10:10	1:58:00	LFG diverted to PNGC
6/7/2023 11:08	6/7/2023 11:16	0:08:00	Sump and plant outage
6/7/2023 13:14	6/7/2023 13:38	0:24:00	LFG diverted to PNGC
6/7/2023 18:40	6/7/2023 18:50	0:10:00	LFG diverted to PNGC
6/7/2023 20:16	6/7/2023 20:26	0:10:00	LFG diverted to PNGC
6/7/2023 21:38	6/7/2023 21:48	0:10:00	LFG diverted to PNGC
6/7/2023 21:50	6/7/2023 22:04	0:14:00	LFG diverted to PNGC
6/7/2023 22:10	6/7/2023 22:22	0:12:00	LFG diverted to PNGC
6/7/2023 22:48	6/7/2023 23:02	0:14:00	LFG diverted to PNGC
6/8/2023 8:30	6/8/2023 8:38	0:08:00	LFG diverted to PNGC
6/8/2023 8:42	6/8/2023 8:50	0:08:00	LFG diverted to PNGC
6/12/2023 12:06	6/12/2023 12:14	0:08:00	LFG diverted to PNGC
6/13/2023 7:46	6/13/2023 7:52	0:06:00	LFG diverted to PNGC
6/21/2023 8:34	6/21/2023 8:42	0:08:00	LFG diverted to PNGC

CONTROL DEVICE DOWNTIME LOG – FLARE #2

Coffin Butte Landfill
Control Device Downtime for Flare #2
Reporting Period: January 1, 2023 to June 30, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm:ss)	Description
2/9/2023 13:04	2/9/2023 13:34	0:30:00	Power outage to flare
2/21/2023 1:28	2/21/2023 1:38	0:10:00	LFG diverted to PNGC
2/21/2023 13:58	2/21/2023 14:26	0:28:00	LFG diverted to PNGC
2/21/2023 14:28	3/8/2023 15:36	361:08:00	LFG diverted to PNGC Sump cleaning
4/19/2023 10:32	4/19/2023 10:48	0:16:00	LFG diverted to PNGC
5/4/2023 9:26	5/4/2023 9:32	0:06:00	LFG diverted to PNGC
5/21/2023 21:36	5/21/2023 21:38	0:02:00	LFG diverted to PNGC
5/23/2023 10:34	5/23/2023 10:36	0:02:00	LFG diverted to PNGC
5/31/2023 21:46	5/31/2023 21:48	0:02:00	LFG diverted to PNGC
6/7/2023 7:46	6/7/2023 7:50	0:04:00	LFG diverted to PNGC
6/7/2023 8:12	6/7/2023 10:08	1:56:00	Power outage to flare
6/7/2023 20:16	6/7/2023 20:18	0:02:00	LFG diverted to PNGC
6/7/2023 21:38	6/7/2023 21:40	0:02:00	LFG diverted to PNGC
6/7/2023 21:50	6/7/2023 21:52	0:02:00	LFG diverted to PNGC
6/7/2023 21:54	6/7/2023 21:58	0:04:00	LFG diverted to PNGC
6/7/2023 22:10	6/7/2023 22:16	0:06:00	LFG diverted to PNGC
6/7/2023 22:48	6/13/2023 7:50	129:02:00	LFG diverted to PNGC

TREATMENT SYSTEM DOWNTIME LOG – PNGC

Coffin Butte Landfill
Treatment System Downtime Log
Reporting Period: January 1, 2023 to June 30, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm:ss)	Comments
2/21/2023 1:15	2/21/2023 2:45	1:30:00	Utility outage
3/8/2023 9:00	3/8/2023 11:00	2:00:00	Plant outage for sump cleaning
6/7/2023 8:00	6/7/2023 13:00	5:00:00	Plant outage and sump cleaning

APPENDIX D

COLLECTION SYSTEM DOWNTIME LOG

Coffin Butte Landfill
Collection System Downtime
Reporting Period: January 1, 2023 to June 30, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm)	Description
2/21/2023 1:30	2/21/2023 1:42	0:12:00	Utility outage
6/7/2023 8:12	6/7/2023 10:08	1:56:00	Sump and plant outage

APPENDIX E

GCCS EXPANSION/CURRENT SITE GCCS LAYOUT

Coffin Butte Landfill - GCCS Expansion

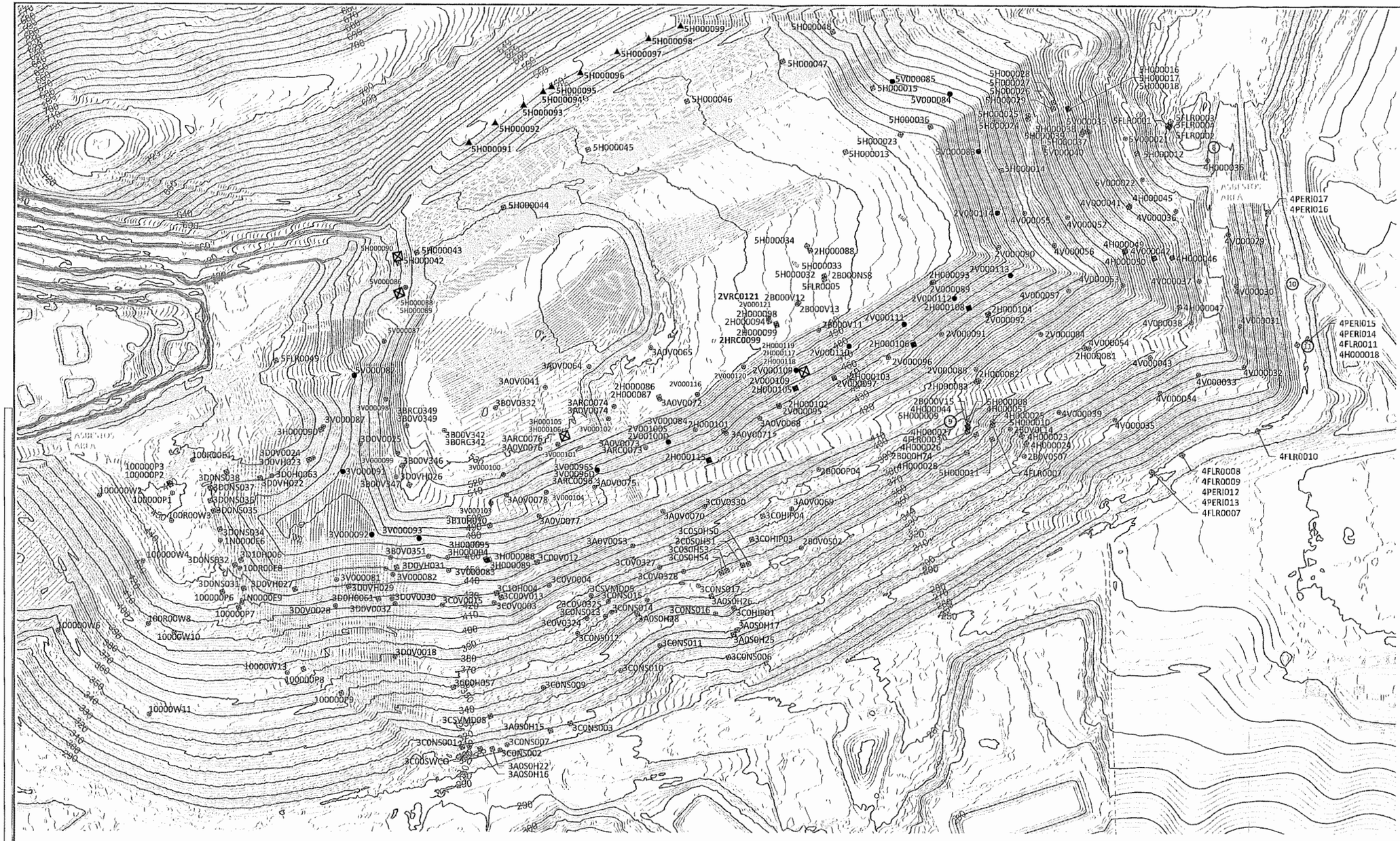
Reporting Period: January 1, 2023 to June 30, 2023

New Extraction Wells

New Well ID	Date Installed
5H000091	3/31/2023
5H000092	3/31/2023
5H000093	3/31/2023
5H000094	3/31/2023
5H000095	3/31/2023
5H000096	3/31/2023
5H000097	3/31/2023
5H000098	3/31/2023
5H000099	3/31/2023
2HRC0099	6/16/2023

Decommissioned Wells

Well ID	Date Decomissioned
3A0V0041	2/14/2023
3A0V0064	2/14/2023
2H000088	3/28/2023
2H000094	3/28/2023
2B000012	3/28/2023
5H000032	3/28/2023
5H000033	3/28/2023



NOTES:

1. "EGC" WELLS LEFT OFF FOR CLARITY.

REV	DATE	DESCRIPTION	DRN BY	DSN BY	CHK BY
0	07/18/23	AS-BUILT	PD	AH	AH

REPUBLIC SERVICES
28972 COFFIN BUTTE ROAD CORVALLIS OR 97330 PHONE: (541) 745-5792 FAX: (541) 745-3826

ENERGYNEERING SOLUTIONS
15820 BARCLAY DRIVE SISTERS, OR 97759 PHONE: (541) 549-8766 FAX: (541) 549-1901

WELLHEAD LAYOUT

2022 WELLFIELD GCCS AS-BUILT
COFFIN BUTTE LANDFILL
CORVALLIS, OR

DRAWING NO.
W1.01
PROJECT NO.
XXX.XXX

REPUBLIC SERVICES

28972 Coffin Butte Rd Corvallis, OR 97330
o 541.745.5792 f 541.230.5534 republicservices.com

February 7, 2024

Ms. Suzy Luttrell
Oregon Department of Environmental Quality
Air Quality Division
4026 Fairview Industrial Drive
Salem, OR 97302

Re: Semi-Annual Report and Annual Report
Coffin Butte Landfill
Operating Permit No. 02-9502-TV-01
Project No. 0120-174-76-09-14

Dear Ms. Luttrell:

Pursuant to the State of Oregon Department of Environmental Quality (ODEQ) Oregon Administrative Rule (OAR) 340-239-0700(3)(c) and 340-239-0700(3)(d), Valley Landfills, Inc. submits the original and two copies of the enclosed Semi-Annual Report and Annual Report for Coffin Butte Landfill. The semi-annual report is being submitted to cover the period of July 1, 2023 through December 31, 2023. The annual report is being submitted to cover the period of January 1, 2023 through December 31, 2023.

If you have any questions, please do not hesitate to contact Ian Macnab or myself at 541.745.5792.

Sincerely,
Valley Landfills, Inc.

Bret Davis
General Manager

Attachments

cc: U.S. Environmental Protection Agency, Air Operating Permits, Region X
ODEQ AQ Document Upload Website (electronic upload)
Melissa Green, Weaver Consultants Group *(via email)*

ANNUAL REPORT

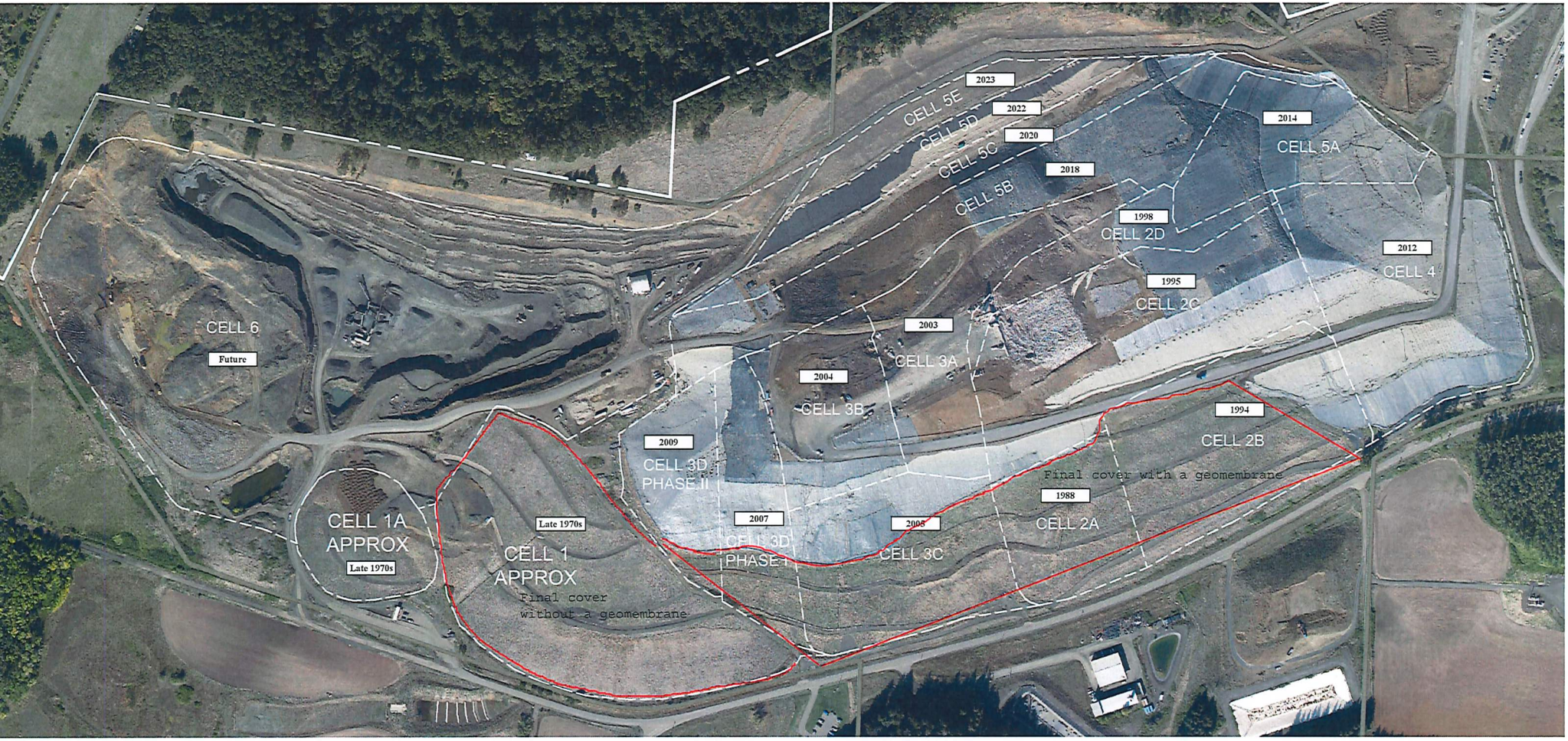
340-239-0700(3)(d)

Coffin Butte Landfill
Oregon Department of Environmental Quality
§340-239-0700(3)(d) Annual Report
Reporting Period: January 1, 2023 to December 31, 2023

Regulation	Citation	Description
Landfill name, owner and operator, address, and permit number	§340-239-0700(3)(d)(A)	Landfill Name: Coffin Butte Landfill Owner/Operator: Valley Landfills, Inc. Address: Highway 99 & Coffin Butte Road, Corvallis, OR 97330 Permit Number: 02-9502-TV-01
Total volume of landfill gas collected (standard cubic feet)	§340-239-0700(3)(d)(B)	Total volume of landfill gas collected: 1,497,523,240 scf (on-site and off-site devices)
Average composition of the landfill gas collected over the reporting period (% methane and % carbon dioxide by volume)	§340-239-0700(3)(d)(C)	Average Methane Composition = 52.7% Average Carbon Dioxide Composition = 37.9%
Gas control device type, year of installation, rating, fuel type, and total amount of landfill gas combusted in each control device	§340-239-0700(3)(d)(D)	Coffin Butte Landfill has 3 gas control devices. Control device 1 is a utility flare with a capacity of 2,000 scfm of landfill gas. Control device 1 was installed in 2002. In 2023, this control device combusted 266,118,599 scf. Control device 2 is a utility flare with a capacity of 1,000 scfm of landfill gas. Control device 2 was installed in 2015. In 2023, this control device combusted 311,507,784 scf. Control device 3 is a landfill gas to energy facility with a capacity of 2,000 scfm of landfill gas. Control device 3 was installed in 1995. In 2023, this control device combusted 919,896,857 scf.
The date that the gas collection and control system was installed and in full operation	§340-239-0700(3)(d)(E)	1994
The percent methane destruction efficiency of each gas control device(s)	§340-239-0700(3)(d)(F)	The utility flares have a 98% destructive efficiency. The landfill gas to energy facility has a 99% destruction efficiency.
Type and amount of supplemental fuels burned with the landfill gas in each device, if applicable	§340-239-0700(3)(d)(G)	No supplemental fuels are burned with the landfill gas. Minimal quantities of propane are utilized during flare startup event.
Total volume of landfill gas shipped off-site (MMscf), the composition of the landfill gas collected (reported in % methane and % carbon dioxide by volume), and the recipient of the gas	§340-239-0700(3)(d)(H)	PNGC Power owns and operates the landfill gas to energy facility at Coffin Butte Landfill. The is referred to as control device 3 above. The average methane composition is 52.6% and the average carbon dioxide composition is 38.0% In 2023, PNGC combusted 919.90 MMscf. The beneficial use and recipient of the gas is the power grid (electricity).
Most recent topographic map of the site showing the areas with final cover and a geomembrane and the areas with final cover without a geomembrane with corresponding percentages over the landfill surface	§340-239-0700(3)(d)(I)	CBLF has installed final cover on 45.3 acres out of the constructed 118.7 acres (45.3/118.7 = 38%), therefore, 38% of the landfill surface has final cover. Landfills are not required to install final certified closure until the landfill is no longer accepting waste. However, CBLF is installing final clover well before it is required regulatorily. The attachment includes the drawing showing the final cover areas.
The information required in paragraphs (2)(a)(A) through (2)(a)(E), (2)(a)(G), (2)(a)(J) through (2)(a)(L) of this rule	§340-239-0700(3)(d)(J)	This information is included in the OAR Semi-Annual Reports for reporting periods January 1 through June 31 (submitted in July 2023) and July 1 through December 31 (submitted as Attachment 2 of this Annual Report) and the Annual Waste-in-Place Report (submitted in January 2024).
Instrument specifications for all instruments used for monitoring compliance with this division	§340-239-0700(3)(d)(K)	The flares and landfill gas to energy facility each have individual flow meters. The two flares share a data recorder and the plant has a data recorder. All flowmeters are Rosemount and are field calibrated therefore no calibrated pressure and temperature. The flare data recorder is a Yokogawa.

FINAL COVER AREAS DRAWING

340-239-0700(3)(d)(I)


CELL 6
Future
CELL 1A
APPROX
Late 1970s
Late 1970s
CELL 1
APPROX
Final cover
without a geomembrane
2009
CELL 3D
PHASE II
2007
CELL 3D
PHASE I
2004
CELL 3B
2003
CELL 3A
2008
CELL 3C
1988
CELL 2A
Final cover with a geomembrane
1994
CELL 2B
1995
CELL 2C
1998
CELL 2D
2012
CELL 4
2014
CELL 5A
2018
2020
2022
2023
CELL 5B
CELL 5C
CELL 5D
CELL 5E

SEMI-ANNUAL REPORT

340-239-0700(3)(c)

COFFIN BUTTE LANDFILL

SEMI-ANNUAL REPORT

PREPARED FOR

VALLEY LANDFILLS, INC.

February 7, 2024

PREPARED BY

Weaver Consultants Group

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

The Coffin Butte Landfill is a municipal solid waste (MSW) landfill located in Benton County, Oregon and is owned by Valley Landfills, Inc (VLI). The facility is subject to the Semi-Annual Report requirements of Oregon Department of Environmental Quality (ODEQ) Oregon Administrative Rule (OAR) 340-239-0700(3)(c). This Semi-Annual Report covers the period of July 1, 2023 through December 31, 2023.

2 SEMI-ANNUAL REPORTING REQUIREMENTS

Records are prepared and maintained in accordance with OAR 340-239-0700(3)(c). The primary location for records storage is the Coffin Butte Landfill. Coffin Butte Landfill is submitting this Semi-Annual Report in accordance with OAR 340-239-0700(3)(c).

§340-239-0700(3)(c)(A) – Monitoring and Exceedances

> All instantaneous surface readings of 100 ppmv or greater. All exceedances of the limits in OAR 340-239-0100(6)(b), 340-239-0200 and 340-239-0600(2)(c) including the location of the leak (or affected grid), leak concentration in ppmv, date and time of measurement, the action taken to repair the leak, date of repair, any required remonitoring and the remonitored concentration in ppmv, wind speed during surface sampling, the concentration recorded at each location for which an exceedance was recorded in the previous month, and the installation date and location of each well installed as part of a gas collection system expansion.

§340-239-0100(6)(b) – Methane Generation Rate Exceedances

> Demonstrate that after four consecutive quarterly monitoring periods there is no measured concentration of methane of 200 parts per million by volume (ppmv) or greater using the instantaneous surface monitoring procedures specified in OAR 340-239-0800(3). The owner or operator of the landfill must begin quarterly monitoring within 90 days after the Methane Generation Rate Report is required to be submitted under section (1) or (2) of this rule or OAR 340-239-0100(6) and submit Instantaneous Surface Monitoring Reports according to OAR 340-239-0700(3)(l).

Quarterly instantaneous surface emissions monitoring (SEM) was performed at the landfill by SCS Field Services (SCS) personnel.

The second, third, and fourth quarter 2023 instantaneous SEM monitoring results are included in the SEM Reports provided in Appendix A.

§340-239-0200 – Compliance Standards

> When required as provided in OAR 340-239-0100 through 340-239-0800, the owner or operator of a landfill must comply with this rule.
>
> (1) Surface Emission Methane Concentration Limits. Except as provided in OAR 340-239-0110(4), 340-239-0110(5), 340-239-0300, and 340-239-0600(1), beginning August 1, 2022, or upon commencing operation of a newly installed gas collection and control system or modification of an existing gas collection and control system pursuant to OAR 340-239-0110(1), whichever is later, no location on the landfill surface may exceed either of the following methane concentration limits:
>
> (a) 500 ppmv, other than nonrepeatable, momentary readings, as determined by instantaneous surface emissions monitoring conducted in accordance with OAR 340-239-0800(3)(b);
> (b) An average methane concentration limit of 25 ppmv as determined by integrated surface emissions monitoring conducted in accordance with OAR 340-239-800(3)(c).

Quarterly integrated SEM was performed at the landfill by SCS personnel.

The second, third, and fourth quarter 2023 integrated SEM monitoring results are included in the SEM Report provided in Appendix A.

§340-239-0200(2) – Wellhead Gauge Pressure Requirement

Operate the collection system with negative pressure at each wellhead

On a monthly basis, operations and maintenance personnel measure the gauge pressure at each wellhead. The gauge pressure taken at the wellhead is used in determining the presence of vacuum at the collector. The wellfield pressure exceedance report is provided in Appendix B.

§340-239-0200(3) – Wellhead Temperature Requirement

Each landfill gas collection and control system interior wellhead in the collection system must be operated with a landfill gas temperature less than 62.8 degrees Celsius (145 degrees Fahrenheit).

Each LFG collector is equipped with an access port for measuring temperature at each wellhead. On a monthly basis, operations and maintenance personnel measure the temperature at each wellhead. All wells operated below 145 °F during the reporting period. Therefore, a temperature wellfield exceedance report is not applicable during this reporting report.

§340-239-0600(2)(c) – Gas Control System Equipment Monitoring

Components containing landfill gas and under positive pressure must be monitored quarterly for leaks. Any component leak over 500 ppmv methane must be tagged and repaired within 10 days. Any component leak over 250 ppmv must be recorded pursuant to OAR 340-239-0700(2)(a)(S). Quarterly component leak testing at landfills having landfill gas-to-energy facilities may be conducted prior to scheduled maintenance or planned outage periods.

SCS performed the second quarter gas control system equipment monitoring on May 22, 2023. No locations exceeding the 500 ppmv threshold were observed during the monitoring event. The gas control system equipment monitoring results are included in the second quarter SEM Report, included as Appendix A.

SCS performed the third quarter gas control system equipment monitoring on September 12, 2023. No locations exceeding the 500 ppmv threshold were observed during the monitoring event. The gas control system equipment monitoring results are included in the third quarter SEM Report, included as Appendix A.

SCS performed the fourth quarter gas control system equipment monitoring on November 21, 2023. No locations exceeding the 500 ppmv threshold were observed during the monitoring event. The gas control system equipment monitoring results are included in the fourth quarter SEM Report, included as Appendix A.

§340-239-0700(3)(c)(B) – Corrective Action Analysis

> For any corrective action analysis for which corrective actions are required in OAR 340-239-0600(3)(a) and 340-239-0600(3)(b) and that take more than 60 days to correct the exceedance, the root cause analysis conducted, including a description of the recommended corrective action(s), the date for corrective action(s) already completed following the positive pressure or elevated temperature reading, and, for action(s) not already completed, a schedule for implementation, including proposed commencement and completion dates.

During the reporting period, all exceedances were corrected within 60 days. The site conducted a pressure exceedance root cause analysis for exceedances that were remediated between 15 and 60 days and were not operating under the site's approved Alternative Monitoring Plan. The Root Cause Analyses are not required to be submitted; however, they are provided in Appendix F for informational purposes.

§340-239-0700(3)(c)(C) – Subsurface Landfill Fire(s)

> All known, prevented, or suspected subsurface landfill fire(s) along with potential causes and any efforts conducted to avoid or put out the fire(s). Any positive pressure readings that may have contributed to the known, prevented, or suspected fire.

During the reporting period, no subsurface landfill fire(s) occurred.

§340-239-0700(3)(c)(D) – Deviations

> The number of times that applicable parameters monitored under OAR 340-239-0110(2) or 340-239-0200, were exceeded and when the gas collection and control system was not operating in compliance with OAR 340-0110(2)(a) including periods of startup, shutdown, and malfunction. For each instance, report the date, time, and duration of each exceedance. Where an owner or operator subject to the requirements of this division is demonstrating compliance with the operational standard for temperature OAR 340-239-0600(3)(b), the owner or operator must provide a statement of the wellhead operational standard for temperature and oxygen the landfill is complying with for the period covered by the report.

During this reporting period, there were no times that applicable parameters monitored under OAR 340-239-0110(2) or 340-239-0200 were exceeded. There were also no times when the gas collection and control system (GCCS) was not operating in compliance with OAR 340-0110(2).

> (i) The number of times each of those parameters monitored under OAR 340-239-0600(3)(b), were exceeded. For each instance, report the date, time, and duration of each exceedance.

During the reporting period, no temperature exceedances occurred.

> (ii) The number of times the parameters for the site-specific treatment system in OAR 340-239-0110(2)(d)(C) were exceeded.

> **§340-239-0110(2)(d)(C) –** Route the collected gas to a treatment system that processes the collected gas for subsequent sale or use. Venting of treated landfill gas to the ambient air is not allowed. If the treated landfill gas cannot be routed for subsequent sale or beneficial use, then the treated landfill gas must be controlled according to either subsection (2)(b), (2)(c) or (2)(d) of this rule. All emissions vented to the atmosphere from the gas treatment system are subject to the requirements of subsection (2)(b) or (2)(c) of this rule.

In accordance with §340-239-0110(2)(d)(C), PNGC Power owns and operates a landfill treatment system at the landfill that processes the collected gas for subsequent sale or beneficial use. There are no vents within the treatment system that allow venting of gas to the atmosphere. The treatment system is not designed nor equipped to bypass the control devices. A calibrated flow meter was installed to measure flow to the treatment system. PNGC Power maintains and operates all monitoring systems associated with the treatment system in accordance with the PNGC Power site-specific treatment system monitoring plan required by §340-239-0700(2)(b)(H)(ii). During this reporting period there were no parameter exceedances of the Treatment Monitoring Plan.

§340-239-0700(3)(c)(E) – Bypass line

> Description and duration of all periods when the gas stream was diverted from the control device or treatment system through a bypass line or the indication of bypass flow as specified OAR 340-239-0110(2)(c).

The gas collection system is not designed nor equipped to bypass the control devices; therefore, §340-239-0700(2)(c)(E) is not applicable.

§340-239-0700(3)(c)(F) – Control Device or Treatment System Downtime

> Description and duration of all periods when the control device or treatment system was not operating and length of time the control device or treatment system was not operating.

The tables provided in Appendix C summarize all the periods when the control device was not operating.

§340-239-0700(3)(c)(G) – Collection System Downtime

> All periods when the collection system was not operating.

The table provided in Appendix D summarizes all the periods when the collection system was not operating.

§340-239-0700(3)(c)(H) – Collection System Expansion

> The date of installation and the location of each well or collection system expansion.

During this reporting period, the gas collection and control system (GCCS) was expanded by adding 15 new extraction wells. The new wells are adding to the performance of the GCCS. During this reporting period, no wells were decommissioned. Appendix E contains an updated site layout showing the approximate locations of the new wells and a table with their installation dates.

§340-239-0700(3)(c)(I) – Enhanced Monitoring

> Each owner or operator required to conduct enhanced monitoring in accordance with OAR 340-239-0800(8) for temperatures exceeding 62.8 degrees Celsius (145 degrees Fahrenheit) must include the results of all monitoring activities conducted during the period.

During the reporting period, no temperature exceedances occurred.

§340-239-0700(3)(c)(J) – Enclosed Combustors

> For enclosed combustors except for boilers and process heaters with design heat input capacity of 44 megawatts per hour (150 million British thermal units per hour) or greater, all three-hour periods of operation during which the average temperature was more than 28 degrees Celsius (82 degrees Fahrenheit) below the average combustion temperature during the most recent performance test.

Coffin Butte Landfill does not own and/or operate an enclosed combustor; therefore, §340-239-0700(3)(c)(J) is not applicable.

§340-239-0700(3)(c)(K) – Boilers or Process Heaters

> For boilers or process heaters, whenever there is a change in the location at which the vent stream is introduced into the flame zone.

Coffin Butte Landfill does not own and/or operate boilers or process heaters; therefore, §340-239-0700(3)(c)(K) is not applicable.

3 ADDITIONAL REPORTING/RECORDKEEPING

The information in this section includes additional recording/reporting within the semi-annual report.

§340-239-0600(3)(b)(E)(5) – Monitoring System Malfunctions

> The monitoring requirements of this division apply at all times, except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities. A monitoring system malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring system failures that are caused in part by poor maintenance or careless operation are not malfunctions. Monitoring system repairs completed in response to monitoring system malfunctions to return the monitoring system to operation must be completed as expeditiously as practicable.

There were no monitoring system malfunctions during this reporting period.

4 LIMITATIONS

This Semi-Annual Report for the Coffin Butte Landfill GCCS has been prepared by WCG, as authorized by VLI. The report was prepared based on WCG's review of information provided by Coffin Butte Landfill. The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. These services were performed consistent with our agreement with our client. Any reliance on this report by a third party is at such party's sole risk. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

APPENDIX A

SURFACE EMISSION MONITORING

SECOND QUARTER 2023

SURFACE EMISSIONS MONITORING

August 17, 2023
File No. 07222178.00

Mr. Ian MacNab
Republic Services – Coffin Butte Landfill
28972 Coffin Butte Road
Corvallis, Oregon 97330

Subject: Coffin Butte Landfill - Corvallis, Oregon

Surface Emissions Monitoring for Second Quarter 2023.

Dear Mr. MacNab:

SCS Field Services (SCS-FS) is pleased to provide Republic Services, with the enclosed report summarizing the surface emissions monitoring services provided at the Coffin Butte Landfill (Site) during the second quarter of 2023. This report includes the results of the surface scan, component emissions, and blower/flare station emissions monitoring for the Site for this monitoring period.

SCS-FS appreciates the opportunity to be of assistance to Republic Services on this project. As you review the enclosed information, please contact Stephan Harquail at (503) 867-2369 or Max Polkabla at (510) 277-5122 if you have any questions or comments.

Sincerely,

Max Polkabla

Max Polkabla
Senior Technician/Data Analyst
SCS Field Services

Stephen Harquail
PNW Region Manager
SCS Field Services

Coffin Butte Landfill

Oregon Landfill Gas Emissions Rule (OAR) and Surface Emissions Monitoring

Second Quarter 2023

Presented to:

Mr. Ian MacNab
28972 Coffin Butte Road
Corvallis, Oregon 97330

SCS FIELD SERVICES

File No. 0722178.00 | August 17, 2023

SCS FIELD SERVICES
15949 SW 72nd Ave
Portland, Or 97224

Coffin Butte Landfill

Oregon Landfill Gas Emissions Rule (OAR) and Surface Emissions Monitoring Second Quarter 2023

INTRODUCTION

This letter provides results of the May 16, 17, 22, 23, 26, 30, and June 5 and 16, 2023, OAR landfill surface emissions monitoring (SEM) performed by SCS Field Services (SCS) at the Coffin Butte Landfill. All work was performed in accordance with our approved Work Scope dated August 29, 2022, and the OAR requirements.

2022 State Regulatory Applicability

CBL is subject to the Oregon-specific landfill gas emission regulations in OAR Chapter 340 Division 239. These SEM regulations are detailed below. The following requirements are stricter than the NESHAP regulations in previous Sections and require additional compliance:

SURFACE EMISSION METHANE CONCENTRATION LIMITS

> *340-239-0200 (1) Surface Emission Methane Concentration Limits. Except as provided in OAR 340-239-0110(4), 340-239-0110(5), 340-239-0300, and 340-239-0600(1), beginning August 1, 2022, or upon commencing operation of a newly installed gas collection and control system or modification of an existing gas collection and control system pursuant to OAR 340-239-0110(1), whichever is later, no location on the landfill surface may exceed either of the following methane concentration limits:*
>
> *(a) 500 ppmv, other than nonrepeatable, momentary readings, as determined by instantaneous surface emissions monitoring conducted in accordance with OAR 340-239-0800(3)(b);*
>
> *(b) An average methane concentration limit of 25 ppmv as determined by integrated surface emissions monitoring conducted in accordance with OAR 340-239-800(3)(c).*

The 500 ppmv limit is already a requirement in the Federal regulations above, but an average methane concentration limit of 25 ppmv will be adhered to as required.

SURFACE EMISSION RECORDKEEPING

> *340-239-0700(2)(a)(C) All instantaneous surface readings of 100 ppmv methane or greater. All exceedances of the limits in OAR 340-239-0100(6)(b) and 340-239-0200, including the location of the leak (or affected grid), leak concentration in ppmv methane, date and time of measurement, the action taken to repair the leak, date of repair, any required remonitoring and the remonitored concentration in ppmv methane, wind speed during surface sampling, and the installation date and location of each well installed as part of a gas collection system expansion;*

The Federal regulations only require monitored surface emissions over 500 ppmv to be documented, so all of the above recordkeeping will be performed on emission points 100 ppmv or over. All repeatable instantaneous records of 100 ppm or higher (taken during SEM) must be kept for 5 years AND recorded in the semi-annual reports.

SUMMARY AND CONCLUSIONS

As stipulated in OAR, if uncorrectable exceedances within the 10-day limitation are detected or emissions are discovered during an inspection by Regulatory Agencies, the landfill must perform monitoring on a 25-foot pathway on a quarterly basis for active disposal sites. Upon completion of four consecutive SEM events without an uncorrectable exceedance of the 25 ppmv or 500 ppmv standards, other than non-repeatable momentary readings, the landfill may perform the monitoring on a 100-foot spacing on an annual basis for closed landfills or quarterly for active disposal sites. In accordance with the provisions of the OAR, the monitoring of the landfill was done on 25-foot pathway based on a prior inspection, in which exceedances were observed.

On May 16, 17, 22, 23, 26, 30, and June 5 and 16, 2023, SCS performed second quarter 2023 surface emissions monitoring testing as required by the Oregon Landfill Gas emission Rule. Instantaneous surface emissions monitoring results indicated that eighteen (18) locations exceeded the 500 ppmv maximum concentration on the above-mentioned dates (Table 1 in Attachment 3). The required first/second 10-day (OAR) and 1-month (OAR) follow-up monitoring indicated that fourteen (14) areas had returned to compliance following system adjustments and remediation by SCS and site personnel. However, the remaining 4 areas remained above compliance. Based on these monitoring results, and in accordance with the OAR, the site is required to perform a system expansion within 120 days of the third detected exceedance or October 3, 2023. These results are discussed in a subsequent section of this report.

Also, during the instantaneous monitoring event, SCS performed integrated monitoring of the landfill surface. As required by the OAR, the landfill was divided into 50,000 square foot areas. The Coffin Butte Landfill surface is divided into 105 grids, as shown in Figure 1 in Attachment 1. During this monitoring event, several grids were not monitored, in accordance with the regulations, due to ongoing active landfilling activities, unsafe conditions, or there was no waste in place prior to the monitoring event.

During the monitoring event, there were nineteen (19) areas observed to exceed the 25 ppmv OAR integrated average threshold (Table 2 in Attachment 4). The required first and second 10-day OAR follow-up monitoring indicated that two (2) areas had returned to compliance following system adjustments and remediation by SCS and site personnel. However, the remaining seventeen (17) areas remained above compliance. Based on these monitoring results, and in accordance with the OAR, the site is required to perform a system expansion within 120 days of the third detected exceedance or October 3, 2023. These results are discussed in a subsequent section of this report.

In addition, quarterly monitoring of the pressurized piping or components of the Gas Collection and Control System (GCCS) under positive pressure must be performed quarterly. Results of the testing of the landfill gas (LFG) Blower Flare Station (BFS) pressurized pipe and components indicated that all test locations were in compliance with the 500 ppmv requirements.

Further, as required under the OAR, any location on the landfill that has an observed instantaneous methane concentration above 100 ppmv, must be included within the surface emission monitoring report and if any instantaneous location records above 250 ppmv, it must be monitored in a 5-foot grid around the location to determine extents of the methane leak. During this reporting period, two (2)

locations were observed showing elevated concentrations between 100-499 ppmv, of the reporting threshold. When these readings are observed to be repeatable, they are reported to site personnel for tracking and/or remediation and will be reported in the next submittal of the annual OAR report. Finally, to help prevent potential future exceedances, SCS recommends that the landfill surface be routinely inspected and any observed surface erosion be routinely repaired.

BACKGROUND

The Coffin Butte Landfill is an active organic refuse disposal site. By way of background, organic materials buried in a landfill decompose anaerobically (in the absence of oxygen) producing a combustible gas that contains approximately 50 to 60 percent methane gas, 40 to 50 percent carbon dioxide, and a trace amount of various other gases, some of which are odorous. The Coffin-Butte/Corvallis property contains a system to control the combustible gases generated in the landfill.

SURFACE EMISSIONS MONITORING

On May 16, 17, 22, 23, 26, 30, and June 5 and 16, 2023, the instantaneous and integrated SEM was performed over the surface of the subject site. The intent of the monitoring was to identify any specific locations or areas of the landfill surface with organic compound concentrations exceeding the OAR threshold limit values of 500 ppmv measured as methane for instantaneous monitoring, or an average methane concentration of 25 ppmv for the integrated monitoring in the 50,000 square foot grids as required under the OAR. During this event, SCS performed the monitoring on a 25 and 100-foot pathway in accordance with the rules as required.

EMISSIONS TESTING INSTRUMENTATION/CALIBRATION

The instruments used to perform the landfill surface emission testing consisted of the following:

- Thermo Scientific TVA 2020 portable Flame Ionization Detector (FID). This instrument measures methane in the air over a range of 1 to 50,000 ppmv. The TVA 2020 meets the State of California Air Resources Board (CARB) requirements for combined instantaneous and integrated monitoring and was calibrated in accordance with the United States Environmental Protection Agency (US EPA) Method 21.

- Weather Anemometer with continuous recorder for meteorological conditions in accordance with the OAR.

Instrument calibration logs and weather information are shown in Attachments 5 and 6.

SURFACE EMISSIONS MONITORING PROCEDURES

Surface emissions monitoring was conducted in accordance with the OAR and SEM requirements. Monitoring was performed with the FID inlet held within 2 inches of the landfill surface while a technician walked a grid in parallel paths not more than 25 or 100 feet apart over the landfill's surface. Cracks, holes, and other cover penetrations in the surface were also tested. Surface emissions readings were monitored continuously and recorded every 5 seconds. Any areas exceeding the 100 or 500 ppmv standards (reporting and compliance levels, respectively) would be GPS tagged and stake-marked for on-site personnel to perform remediation or repairs.

The integrated average is based on the readings stored on the instrument, which are recorded every 5 seconds. The readings are then downloaded and the averages are calculated for each grid using SCS

eTools®. All readings are maintained in this secure SCS Database. The readings are not provided in the report due to the volume of readings but can be furnished upon request.

Recorded wind speed results are shown in Attachment 6. Wind speed averages were observed to remain below the alternative threshold of 10 miles per hour, and no instantaneous speeds exceeded 20 miles per hour. No rainfall occurred within 72 hours of the monitoring events. Therefore, site meteorological conditions were within the alternatives of the OAR requirements on the above-mentioned dates.

TESTING RESULTS

During this event, SCS performed the monitoring on a 25-foot pathway in accordance with the rule as required under the OAR. The intent of the monitoring was to identify any specific locations or areas of the landfill surface with organic compound concentrations exceeding the OAR or NSPS threshold limit values of 500 ppmv measured as methane for instantaneous monitoring, or an average methane concentration of 25 ppmv for the integrated monitoring (OAR).

On May 16, 17, 22, 23, 26, 30, and June 5 and 16, 2023, SCS performed second quarter 2023 instantaneous emissions monitoring testing as required by the Oregon DEQ/OAR. During this monitoring, surface emissions results indicated that eighteen (18) locations exceeded the 500 ppmv maximum concentration. The required first and second 10-day (OAR) follow-up monitoring performed on May 30 & June 5 and the 1-month (OAR) follow-up monitoring event performed on June 16, 2023, indicated that fourteen (14) areas had returned to compliance following system adjustments and remediation by SCS and site personnel. In accordance with requirements for expansion and remediation, the instantaneous locations needs to be remediated and returned to compliance in accordance with the rule (expansion of the collection system or an alternative compliance option if approved by the OAR) within 120 days after the third integrated exceedance, which will be due by October 3, 2023. Results of the monitoring are shown in Attachments 2 and 3 (Table 1).

Additionally, calculated integrated monitoring indicated nineteen (19) integrated exceedances of the 25-ppmv requirement on May 16, 17 and 22, 2023. The required first and second 10-day OAR follow-up monitoring performed on May 26 and June 5, 2023, indicated that two (2) of the nineteen (19) areas had returned to compliance. In accordance with requirements for expansion and remediation, the instantaneous locations need to be remediated and returned to compliance in accordance with the rule (expansion of the collection system or an alternative compliance option if approved by the OAR) within 120 days after the third integrated exceedance, which will be due by October 3, 2023. Calibration logs for monitoring equipment are provided in Attachment 5.

During this monitoring event, several girds were not monitored, in accordance with the OAR, due to active landfilling activities, unsafe conditions, overgrown vegetation, or no waste in place. SCS will continue to monitor all accessible locations during the third quarter of 2023.

PRESSURIZED PIPE AND COMPONENT LEAK MONITORING

On May 22, 2023, quarterly leak monitoring was performed in accordance with the OAR. SCS performed LFG pressurized pipe and component leak monitoring at the BFS. Monitoring was performed with the detector inlet held one-half of an inch from the pressurized pipe and associated components. No locations exceeding the 500 ppmv threshold were observed during our monitoring event. The maximum reading, which was 3.50 ppmv, was well below the maximum threshold (see Table 1 for component results). Therefore, all pressurized pipes and components located at the LFG BFS were in compliance at the time of our testing.

PROJECT SCHEDULE

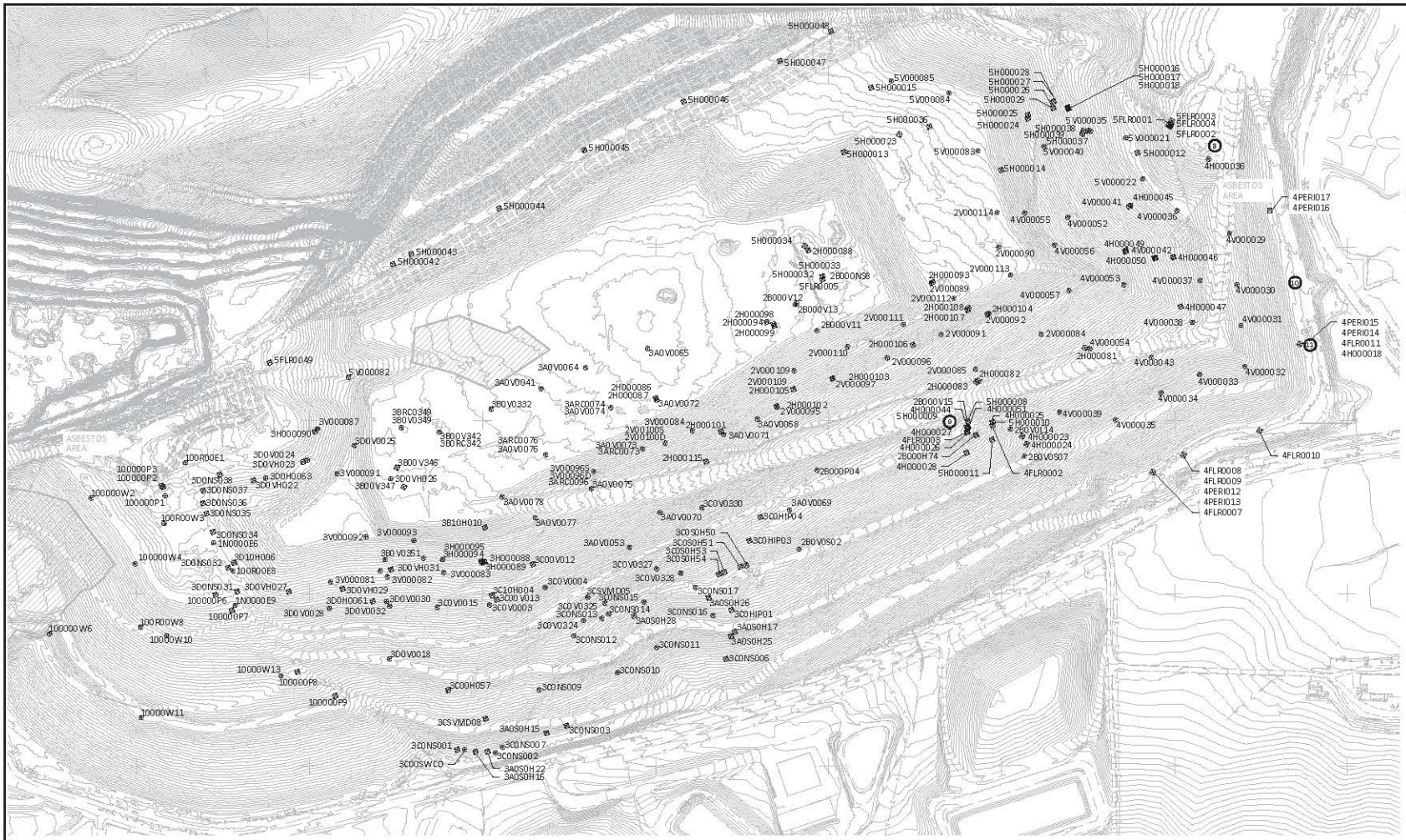
According to the OAR, surface emissions monitoring at active landfills is required to be performed on a quarterly basis. Therefore, in accordance with our approved Work Scope, the third quarter 2023 (July through September) surface emissions testing event is scheduled to be performed by the end of September 2023.

STANDARD PROVISIONS

This report addresses the conditions of the subject site during the testing dates only. Accordingly, we assume no responsibility for any changes that may occur subsequent to our testing which could affect the surface emissions at the subject site or adjacent properties.

Attachment 1

Landfill Grid



NOTES:

1. "EGC" WELLS LEFT OFF FOR CLARITY.

REV	DATE	DESCRIPTION	DRN BY	DSN BY	CHK BY
0	07/14/22	AS-BUILT	PD	AH	AH

REPUBLIC SERVICES
28972 COFFIN BUTTE ROAD CORVALLIS OR 97330 PHONE: (541) 745-5792 FAX: (541) 745-3825

ENERGYNEERING SOLUTIONS
15820 BARCLAY DRIVE SISTERS, OR 97759 PHONE: (541) 549-8766 FAX: (541) 549-1901

WELLHEAD LAYOUT

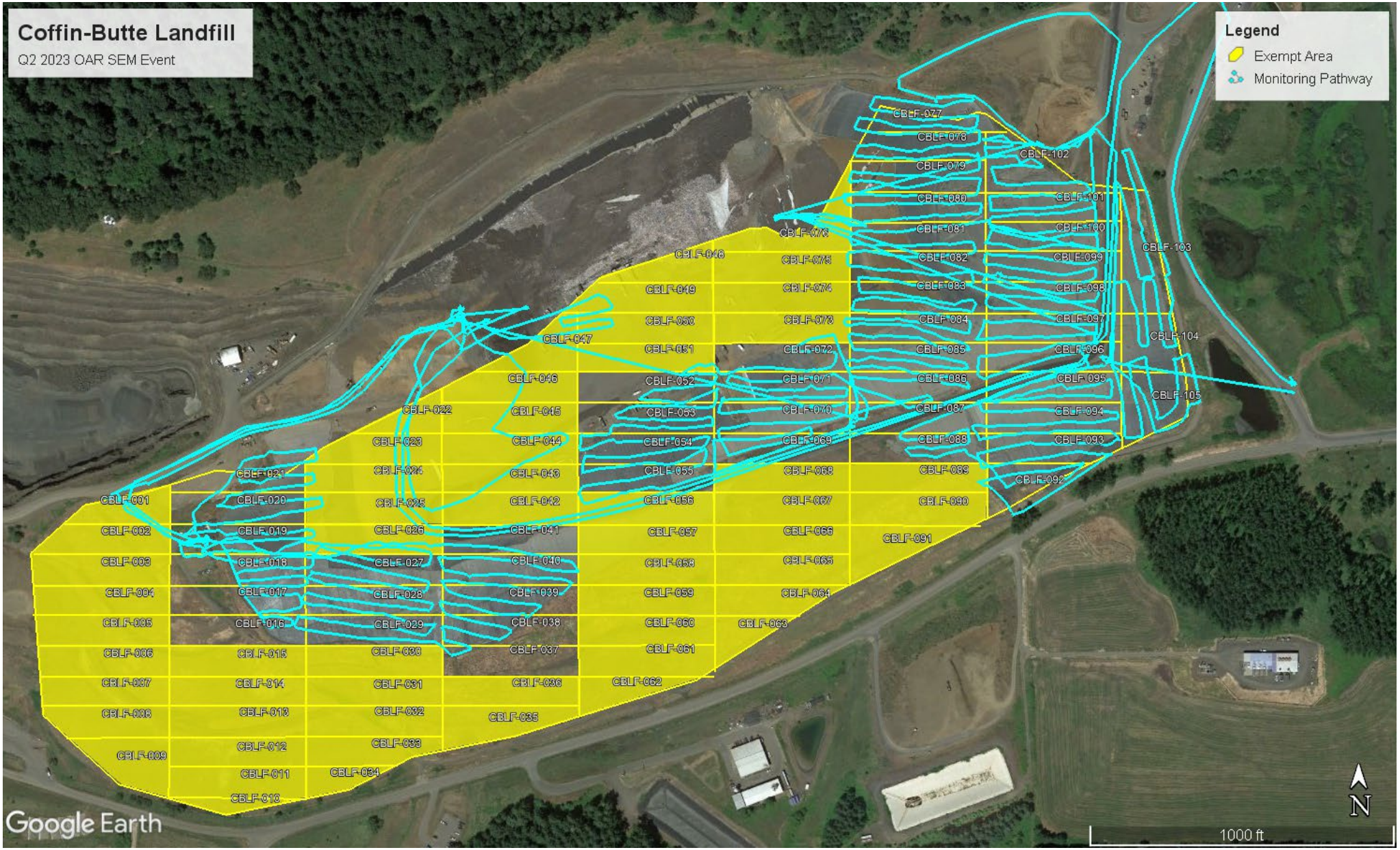
2022 WELLFIELD GCCS AS-BUILT
COFFIN BUTTE LANDFILL
CORVALLIS, OR

DRAWING NO.
W1.01

PROJECT NO.
XXX.XXX

Attachment 2

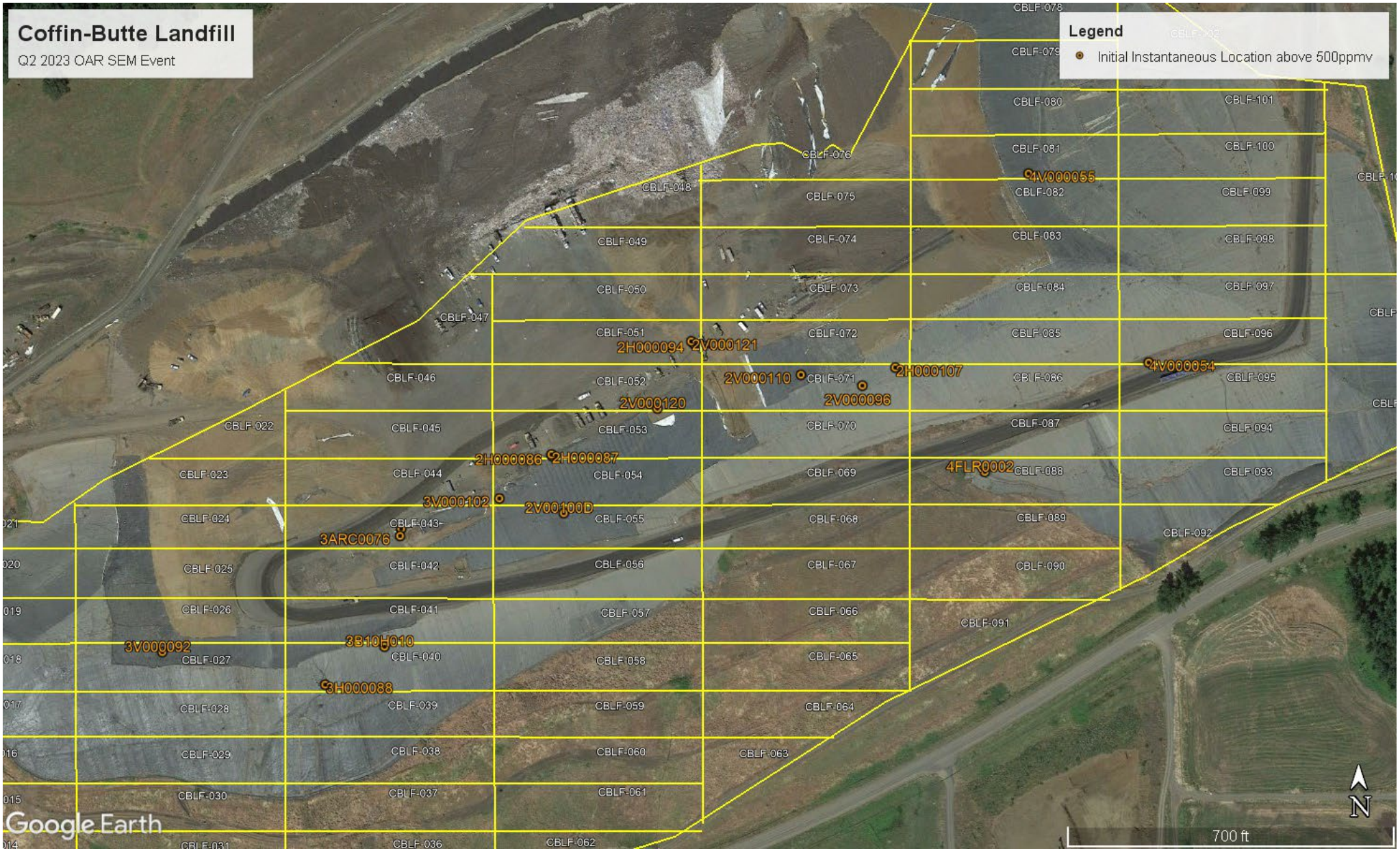
Surface Pathway



Second Quarter 2023
Initial Surface Emissions Monitoring Pathway
Coffin Butte Landfill, Corvallis, Oregon

Attachment 3

Instantaneous and Component Emissions Monitoring Results



Second Quarter 2023
Initial Emissions Monitoring Results Greater Than 500 ppmv
Coffin Butte Landfill, Corvallis, Oregon

Second Quarter 2023

Table 1. Instantaneous Surface and Component Emissions Monitoring Results Coffin-Butte Landfill, Corvallis, Oregon

Instantaneous Data Report for May 16, 17, 22, 23, 26, 30, and June 5 and 16, 2023

Location (Surface)	Initial Monitoring Results (ppmv) 5/23/2023	Follow Up Monitoring Results (ppmv) 5/30/2023	Follow Up Monitoring Results (ppmv) 6/5/2023	1-Month Follow Up Monitoring Results (ppmv) 6/16/2023	Latitude	Longitude
2V000121	10322	Active	Active	Active	44.70020221	-123.230366
2H000107	9960	9923	450	193	44.70004924	-123.2286903
4V000055	9907	8364	7000	3658	44.70118172	-123.2275967
2V000096	9800	8790	220	138	44.69994371	-123.228961
2H000094	9790	Active	Active	Active	44.7001867	-123.2303417
2V00100D	4100	3817	341	115	44.69919973	-123.2314128
2V000120	3397	3159	92	54.8	44.69981018	-123.2306442
2V000110	3368	3298	87	63.5	44.70000699	-123.2294653
3V000102	3349	3012	111	443	44.69928531	-123.2319418
2H000086	2471	2263	780	663	44.69953174	-123.2315083
4FLR0002	2296	2149	54	43	44.69944004	-123.227955
4V000054	2213	2426	23	4	44.70007832	-123.22661
2H000087	2158	2303	677	685	44.69954171	-123.231515
3ARC0076	1639	1654	2045	4850	44.69906671	-123.232757
3B10H010	1287	1155	50	63	44.69841996	-123.232885
3A0V0076	1215	940	35	482	44.69910828	-123.2327483
3H000088	788	473	--	250	44.69819801	-123.2333723

Second Quarter 2023

Table 1. Instantaneous Surface and Component Emissions Monitoring Results Coffin-Butte Landfill, Corvallis, Oregon

Location (Surface)	Initial Monitoring Results (ppmv) 5/23/2023	Follow Up Monitoring Results (ppmv) 5/30/2023	Follow Up Monitoring Results (ppmv) 6/5/2023	1-Month Follow Up Monitoring Results (ppmv) 6/16/2023	Latitude	Longitude
3V000092	572		--	321	44.69838803	-123.2347092

Instantaneous Data Report for May 16, 17, 22, 23, 26, 30, and June 5 and 16, 2023
Readings between 100-499 ppmv

Location (Surface)	Initial Monitoring Results (ppmv) 5/22/2023	Latitude	Longitude
FD5	456	44.702429	-123.228200
H15	315	44.701791	-123.227407

Pressurized Pipe and Component Results

Route	Date	Concentration (ppmv)
FLARE STATION	5/22/2023	3.50

No other exceedances of the 500 ppmv threshold were observed during the second quarter of 2023 monitoring.

Attachment 4

Integrated Monitoring Results

Second Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-001	--	--	Overgrown Vegetation
CBLF-002	--	--	Overgrown Vegetation
CBLF-003	--	--	Overgrown Vegetation
CBLF-004	--	--	Overgrown Vegetation
CBLF-005	--	--	Overgrown Vegetation
CBLF-006	--	--	Overgrown Vegetation
CBLF-007	--	--	Overgrown Vegetation
CBLF-008	--	--	Overgrown Vegetation
CBLF-009	--	--	Overgrown Vegetation
CBLF-010	--	--	Overgrown Vegetation
CBLF-011	--	--	Overgrown Vegetation
CBLF-012	--	--	Overgrown Vegetation
CBLF-013	--	--	Overgrown Vegetation
CBLF-014	--	--	Overgrown Vegetation
CBLF-015	--	--	Overgrown Vegetation
CBLF-016	5/22/2023	9.38	
CBLF-017	5/22/2023	5.83	
CBLF-018	5/22/2023	15.32	
CBLF-019	5/22/2023	5.11	
CBLF-020	5/22/2023	6.78	
CBLF-021	5/22/2023	5.01	
CBLF-022	--	--	Active Area
CBLF-023	--	--	Active Area
CBLF-024	--	--	Active Area
CBLF-025	--	--	Active Area
CBLF-026	--	--	Active Area
CBLF-027	5/17/2023	82.74	Initial Monitoring
CBLF-027	5/26/2023	33.29	First 10-Day Recheck
CBLF-027	6/5/2023	40.47	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-028	5/17/2023	24.66	
CBLF-029	5/17/2023	6.30	
CBLF-030	--	--	Overgrown Vegetation
CBLF-031	--	--	Overgrown Vegetation
CBLF-032	--	--	Overgrown Vegetation
CBLF-033	--	--	Overgrown Vegetation
CBLF-034	--	--	Overgrown Vegetation
CBLF-035	--	--	Overgrown Vegetation
CBLF-036	--	--	Overgrown Vegetation
CBLF-037	5/17/2023	0.00	
CBLF-038	5/17/2023	0.39	
CBLF-039	5/17/2023	7.39	
CBLF-040	5/17/2023	38.51	Initial Monitoring

Second Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-040	5/26/2023	42.60	First 10-Day Recheck
CBLF-040	6/5/2023	47.34	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-041	5/17/2023	6.68	
CBLF-042	--	--	Active Area
CBLF-043	--	--	Active Area
CBLF-044	--	--	Active Area
CBLF-045	--	--	Active Area
CBLF-046	--	--	Active Area
CBLF-047	--	--	Active Area
CBLF-048	--	--	Active Area
CBLF-049	--	--	Active Area
CBLF-050	--	--	Active Area
CBLF-051	--	--	Active Area
CBLF-052	5/17/2023	127.07	Initial Monitoring
CBLF-052	5/26/2023	88.23	First 10-Day Recheck
CBLF-052	6/5/2023	181.32	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-053	5/17/2023	119.33	Initial Monitoring
CBLF-053	5/26/2023	96.40	First 10-Day Recheck
CBLF-053	6/5/2023	84.67	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-054	5/17/2023	62.21	Initial Monitoring
CBLF-054	5/26/2023	40.56	First 10-Day Recheck
CBLF-054	6/5/2023	87.42	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-055	5/17/2023	40.26	Initial Monitoring
CBLF-055	5/26/2023	22.45	First 10-Day Recheck
CBLF-056	--	--	Overgrown Vegetation
CBLF-057	--	--	Overgrown Vegetation
CBLF-058	--	--	Overgrown Vegetation
CBLF-059	--	--	Overgrown Vegetation
CBLF-060	--	--	Overgrown Vegetation
CBLF-061	--	--	Overgrown Vegetation
CBLF-062	--	--	Overgrown Vegetation
CBLF-063	--	--	Overgrown Vegetation
CBLF-064	--	--	Overgrown Vegetation
CBLF-065	--	--	Overgrown Vegetation
CBLF-066	--	--	Overgrown Vegetation
CBLF-067	--	--	Overgrown Vegetation
CBLF-068	--	--	Overgrown Vegetation
CBLF-069	5/17/2023	31.46	Initial Monitoring
CBLF-069	5/26/2023	7.67	First 10-Day Recheck
CBLF-070	5/17/2023	89.36	Initial Monitoring
CBLF-070	5/26/2023	33.41	First 10-Day Recheck

Second Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-070	6/5/2023	58.79	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-071	5/17/2023	207.08	Initial Monitoring
CBLF-071	5/26/2023	90.20	First 10-Day Recheck
CBLF-071	6/5/2023	119.10	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-072	5/17/2023	196.26	Initial Monitoring
CBLF-072	5/26/2023	74.76	First 10-Day Recheck
CBLF-072	6/5/2023	217.64	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-073	--	--	Active Area
CBLF-074	--	--	Active Area
CBLF-075	--	--	Active Area
CBLF-076	--	--	Active Area
CBLF-077	5/16/2023	2.05	
CBLF-078	5/16/2023	3.55	
CBLF-079	5/16/2023	18.01	
CBLF-080	5/16/2023	80.16	Initial Monitoring
CBLF-080	5/26/2023	48.09	First 10-Day Recheck
CBLF-080	6/5/2023	27.42	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-081	5/17/2023	122.36	Initial Monitoring
CBLF-081	5/26/2023	107.23	First 10-Day Recheck
CBLF-081	6/5/2023	16.19	Second 10-Day Recheck
CBLF-082	5/17/2023	87.44	Initial Monitoring
CBLF-082	5/26/2023	24.16	First 10-Day Recheck
CBLF-083	5/17/2023	72.94	Initial Monitoring
CBLF-083	5/26/2023	107.73	First 10-Day Recheck
CBLF-083	6/5/2023	46.58	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-084	5/17/2023	191.69	Initial Monitoring
CBLF-084	5/26/2023	93.43	First 10-Day Recheck
CBLF-084	6/5/2023	59.25	Second 10-Day Recheck 120-Day Expansion due by Oct 3, 2023
CBLF-085	5/17/2023	60.79	Initial Monitoring
CBLF-085	5/26/2023	24.80	First 10-Day Recheck
CBLF-086	5/17/2023	23.19	
CBLF-087	5/17/2023	26.55	Initial Monitoring
CBLF-087	5/26/2023	14.11	First 10-Day Recheck
CBLF-088	5/16/2023	26.06	Initial Monitoring
CBLF-088	5/26/2023	63.08	First 10-Day Recheck
CBLF-088	6/5/2023	2.23	Second 10-Day Recheck
CBLF-089	--	--	Overgrown Vegetation
CBLF-090	--	--	Overgrown Vegetation
CBLF-091	--	--	Overgrown Vegetation
CBLF-092	5/16/2023	4.84	

Second Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-093	5/16/2023	4.55	
CBLF-094	5/16/2023	22.12	
CBLF-095	5/16/2023	42.65	Initial Monitoring
CBLF-095	5/26/2023	22.48	First 10-Day Recheck
CBLF-096	5/16/2023	6.54	
CBLF-097	5/16/2023	5.07	
CBLF-098	5/16/2023	4.72	
CBLF-099	5/16/2023	0.58	
CBLF-100	5/16/2023	0.00	
CBLF-101	5/16/2023	0.00	
CBLF-102	5/16/2023	0.00	
CBLF-103	5/16/2023	6.17	
CBLF-104	5/16/2023	7.27	
CBLF-105	5/16/2023	5.62	

Attachment 5

Calibration Logs

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 5/16/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 4 MPH Wind Direction: SW Barometric Pressure: 29.93

Air Temperature: 72 deg F General Weather Conditions: Sunny

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	502	2
2	0	501	1
3	0	499	1

Average Difference: 1.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 1.33 / 500 X 100%
= 0.3% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0.5 ppm

Downwind West side of site Reading: 1 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 5/17/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: SW Barometric Pressure: 30.04

Air Temperature: 76 deg F General Weather Conditions: Sunny

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *4 seconds*

Response Time trial #2 *6 seconds*

Response Time Trial #3 5 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	1
2	0	497	3
3	0	498	2

Average Difference: 2

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 2 / 500 X 100%
= 0.4% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0.5 ppm

Downwind West side of site Reading: 1 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 5/22/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 5 MPH Wind Direction: SW Barometric Pressure: 29, 29.97

Air Temperature: 72 deg F General Weather Conditions: overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *6 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 5 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	1
2	0	498	2
3	0	502	2

Average Difference: 1.666

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 1.666 / 500 X 100%
= 0.3% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0.2 ppm

Downwind West side of site Reading: 1.1 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 5/23/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: SW Barometric Pressure: 29.92

Air Temperature: 71 deg F General Weather Conditions: overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *6 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 5 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	498	2
2	0	499	1
3	0	501	1

Average Difference: 1.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 1.33 / 500 X 100%
= 0.3% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0 ppm

Downwind West side of site Reading: 1.1 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 5/30/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: W Barometric Pressure: 29.73

Air Temperature: 69 deg F General Weather Conditions: overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	1
2	0	498	2
3	0	499	1

Average Difference: 1.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 1.33 / 500 X 100%
= 0.3% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area near entrance Reading: 0 ppm

Downwind South West side of site Reading: 1.1 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 6/5/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 7 MPH Wind Direction: W Barometric Pressure: 29.89

Air Temperature: 68 deg F General Weather Conditions: overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *4 seconds*

Response Time Trial #3 5 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	502	2
2	0	501	1
3	0	499	1

Average Difference: 1.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 1.33 / 500 X 100%
= 0.3% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0 ppm

Downwind West side of site Reading: 0 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 6/16/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 6 MPH Wind Direction: SW Barometric Pressure: 29.97

Air Temperature: 74 deg F General Weather Conditions: overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *4 seconds*

Response Time trial #2 *6 seconds*

Response Time Trial #3 4 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	499	1
2	0	498	2
3	0	501	1

Average Difference: 1.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 1.33 / 500 X 100%
= 0.3% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

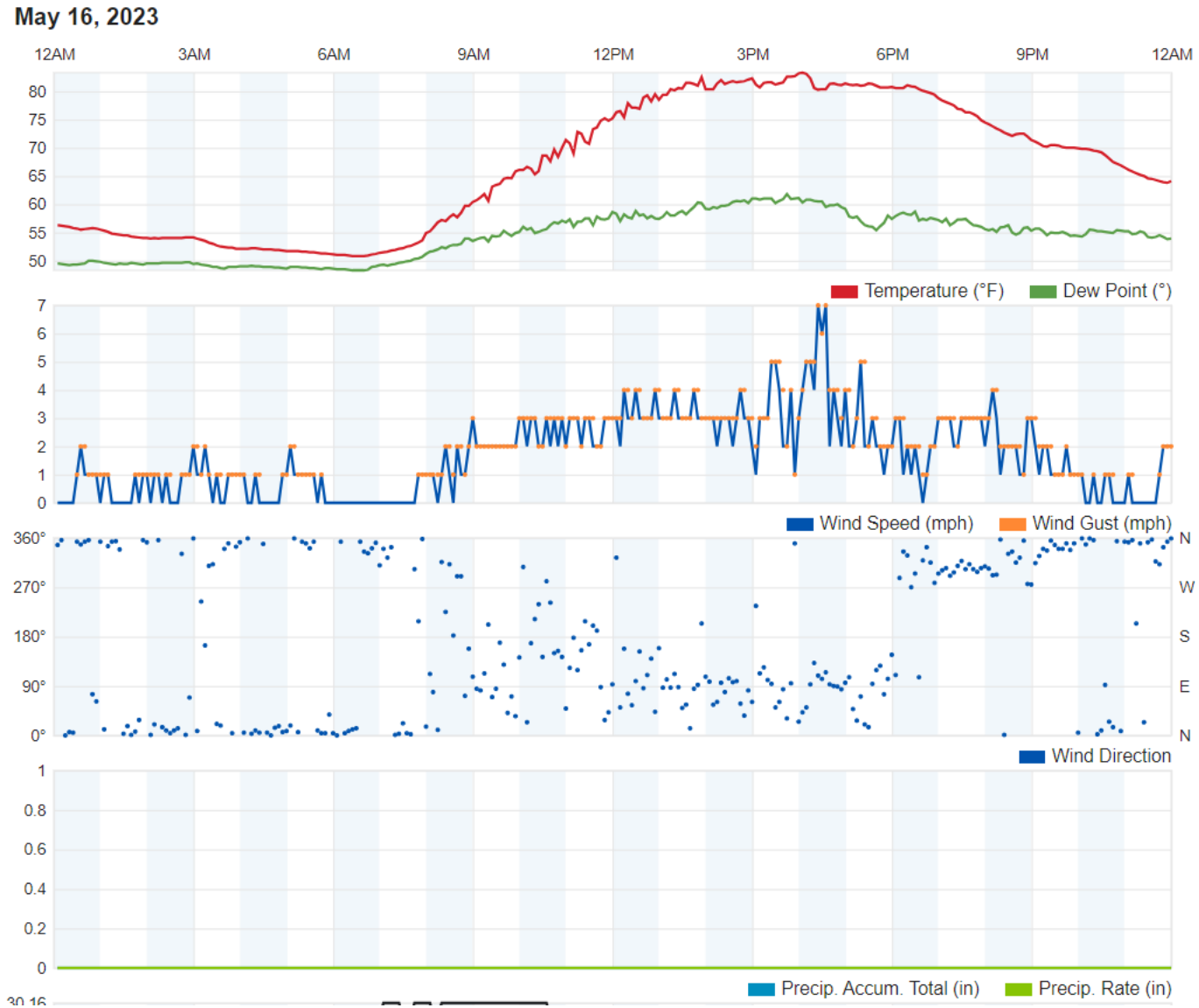
Up Wind of landfill area on SE side. Reading: 0 ppm

Downwind West side of site Reading: 1 ppm

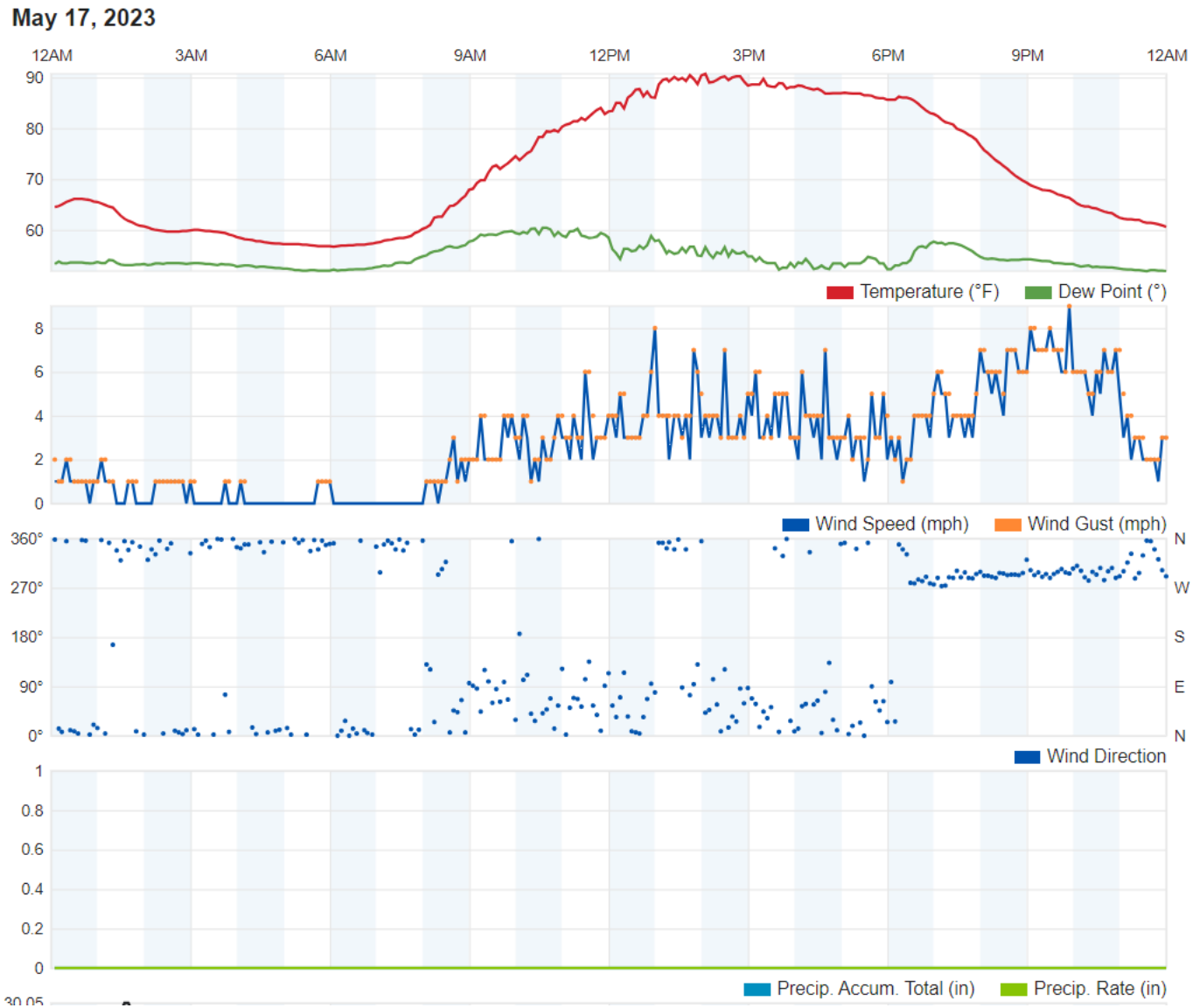
NOTES:

Attachment 6

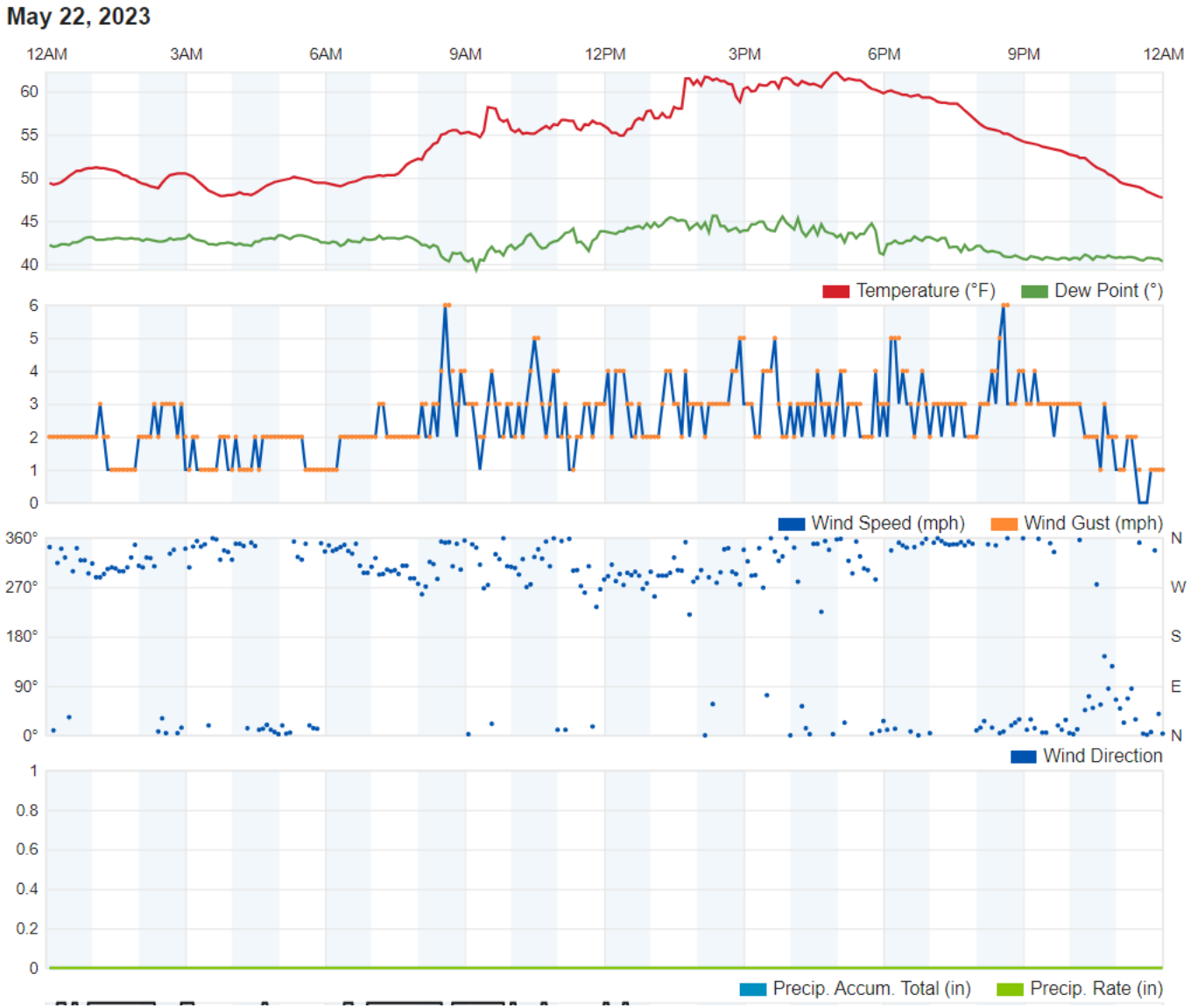
Weather Data



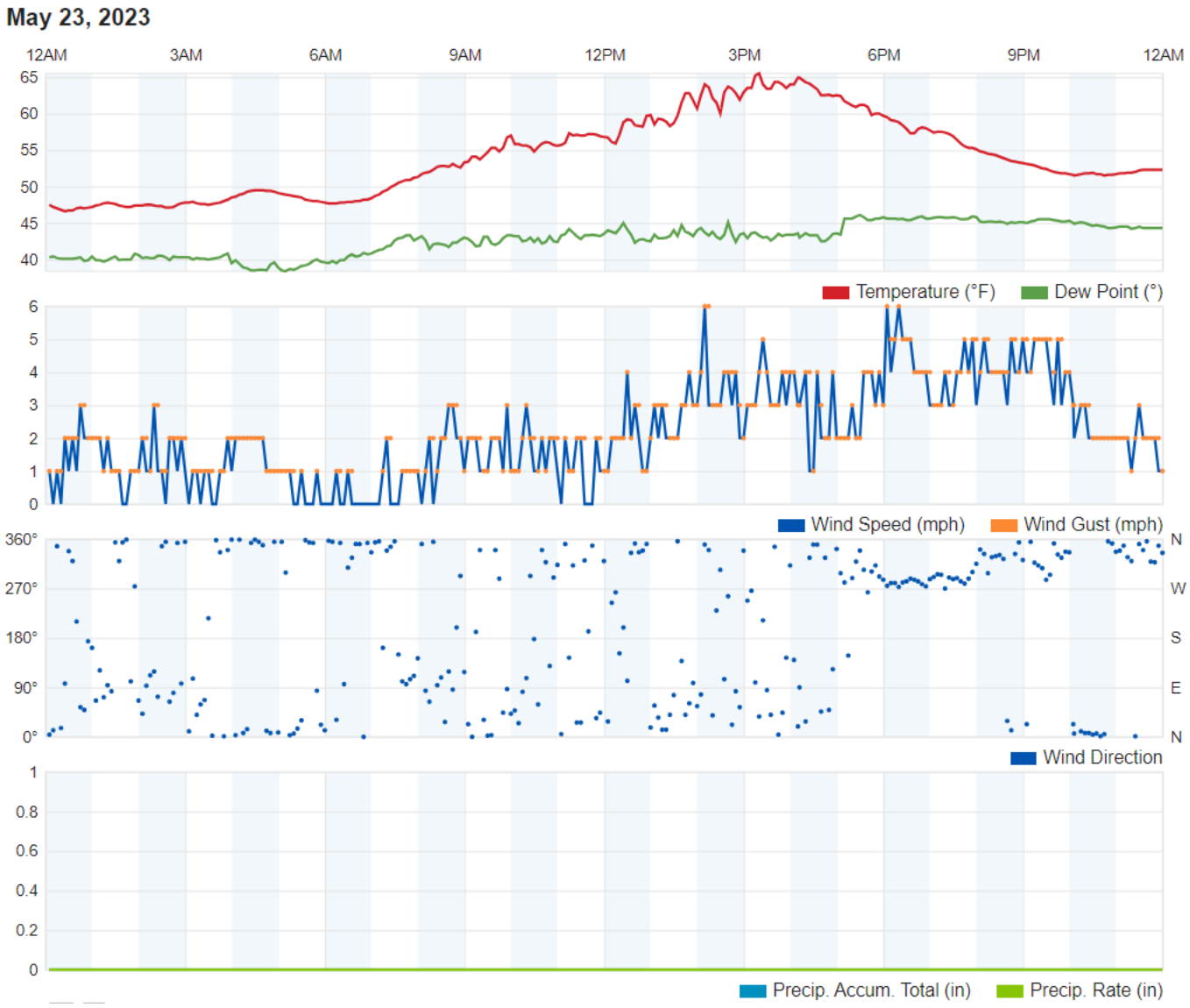
May 16, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



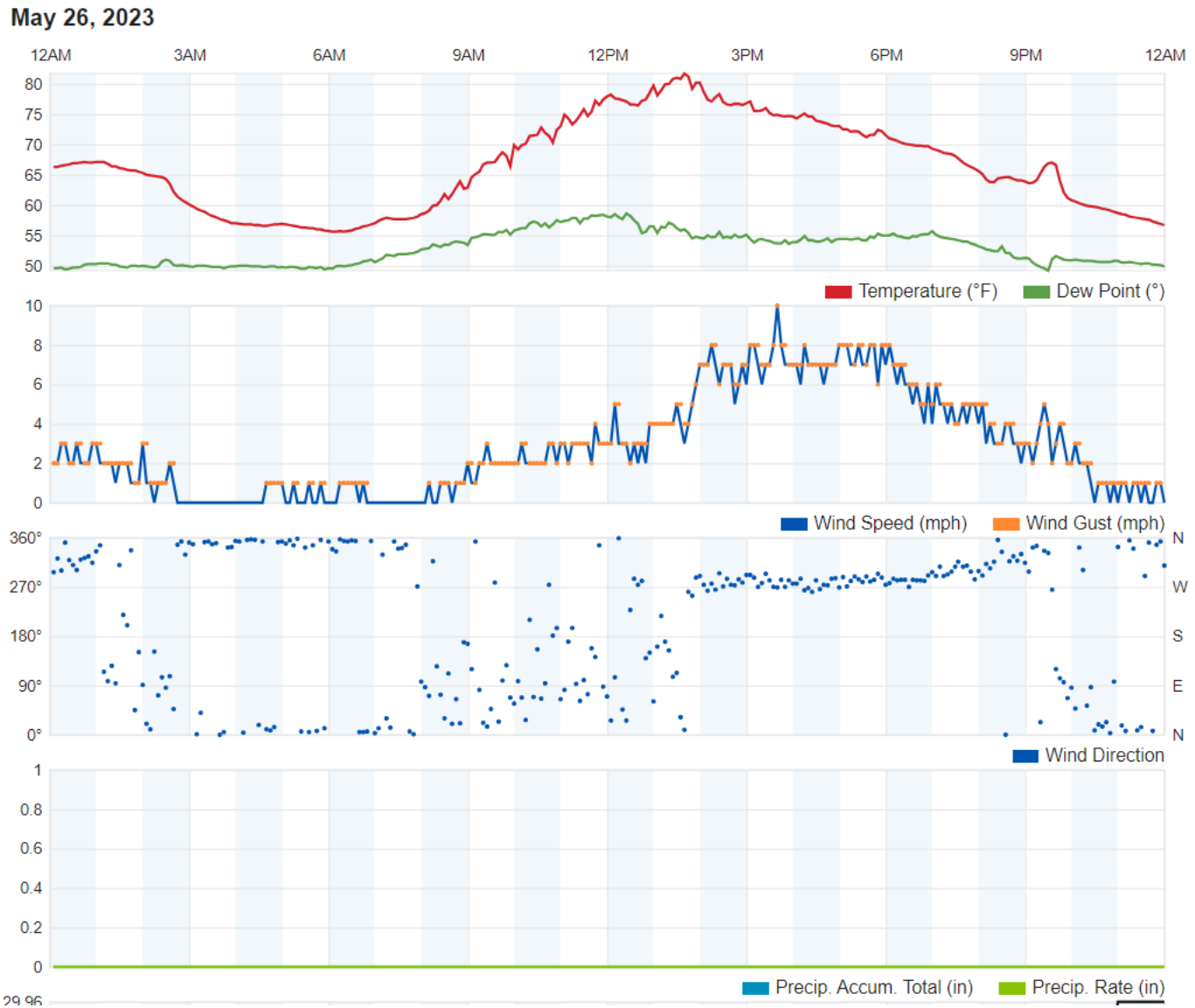
May 17, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



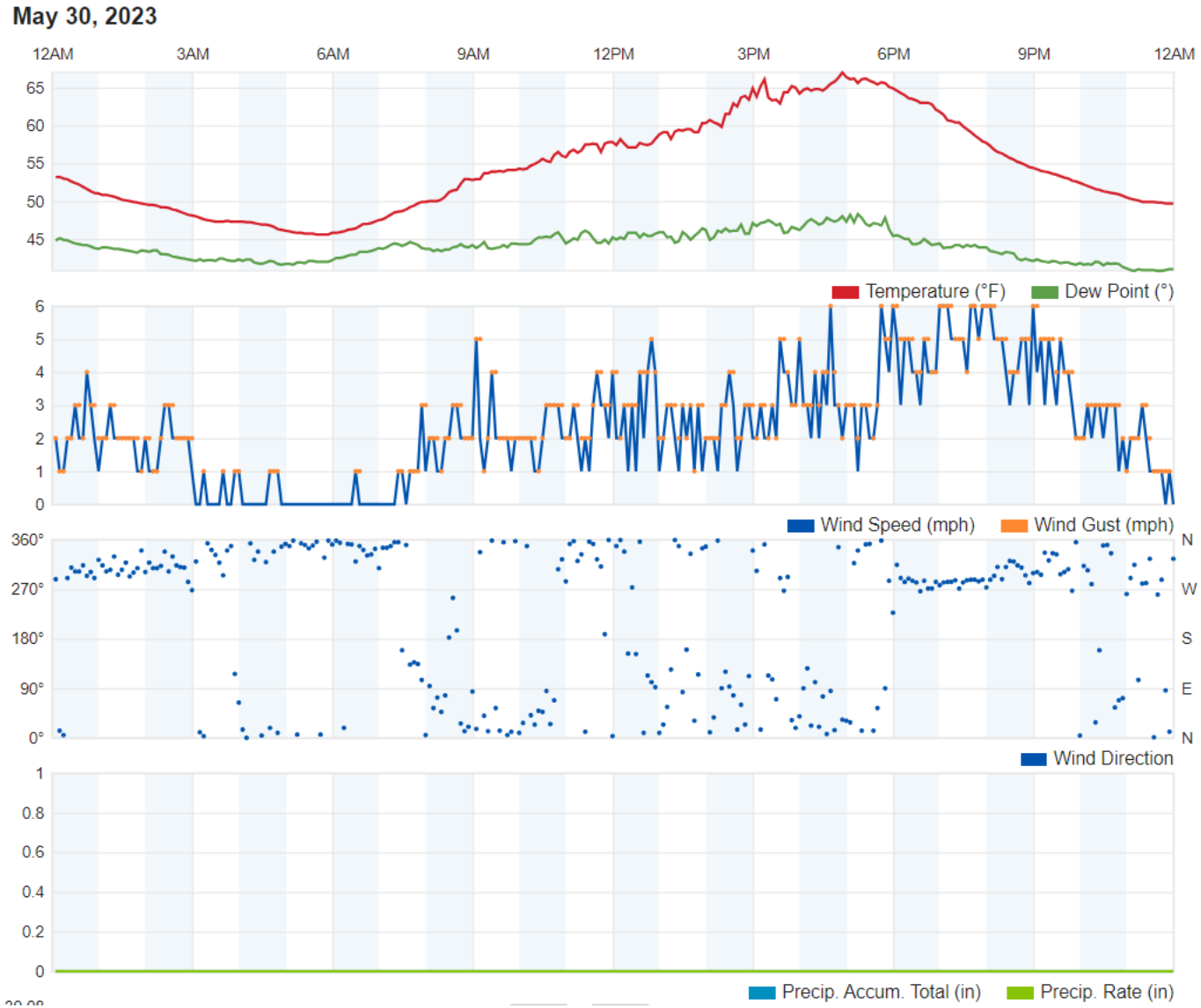
May 22, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



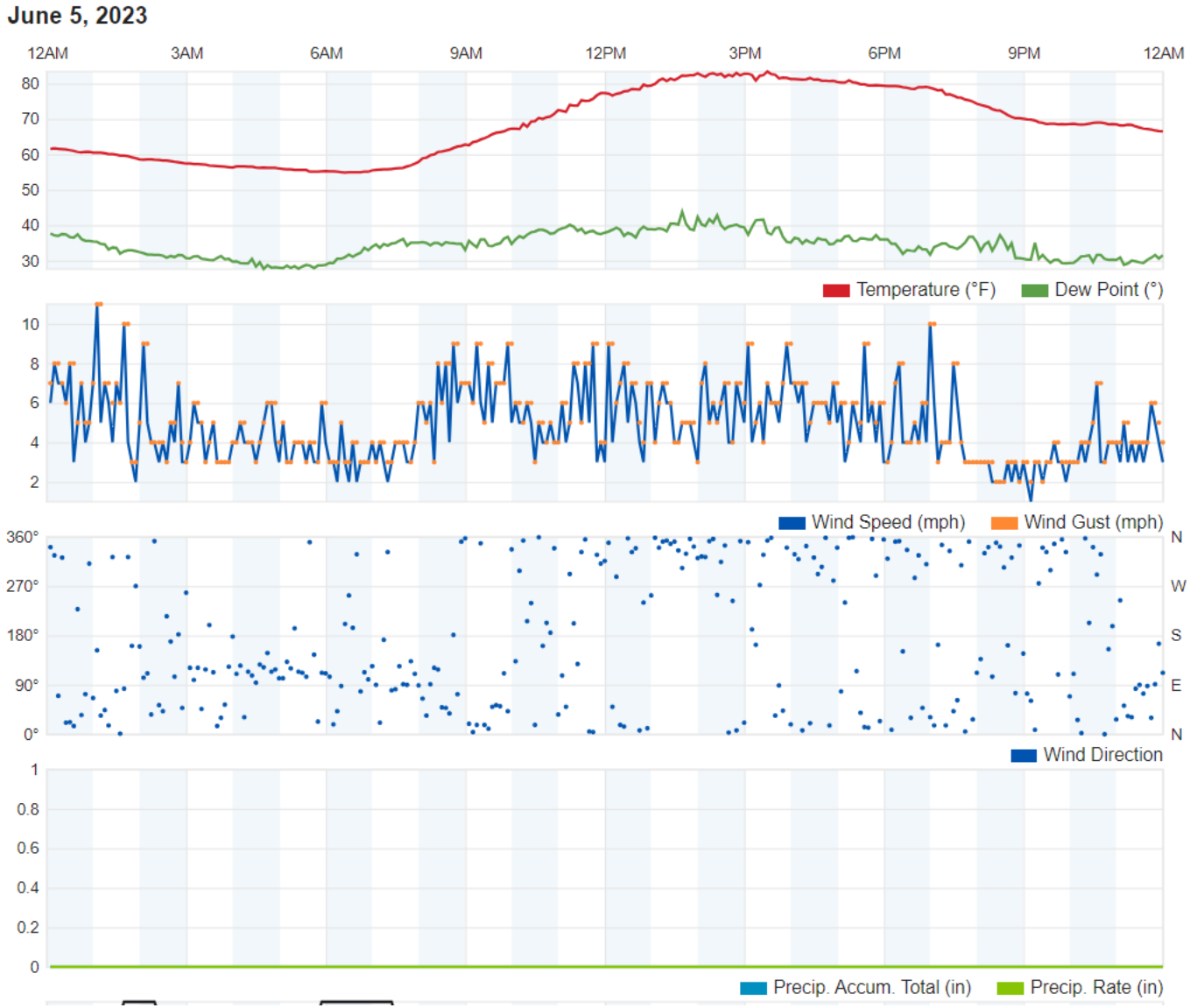
May 23, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



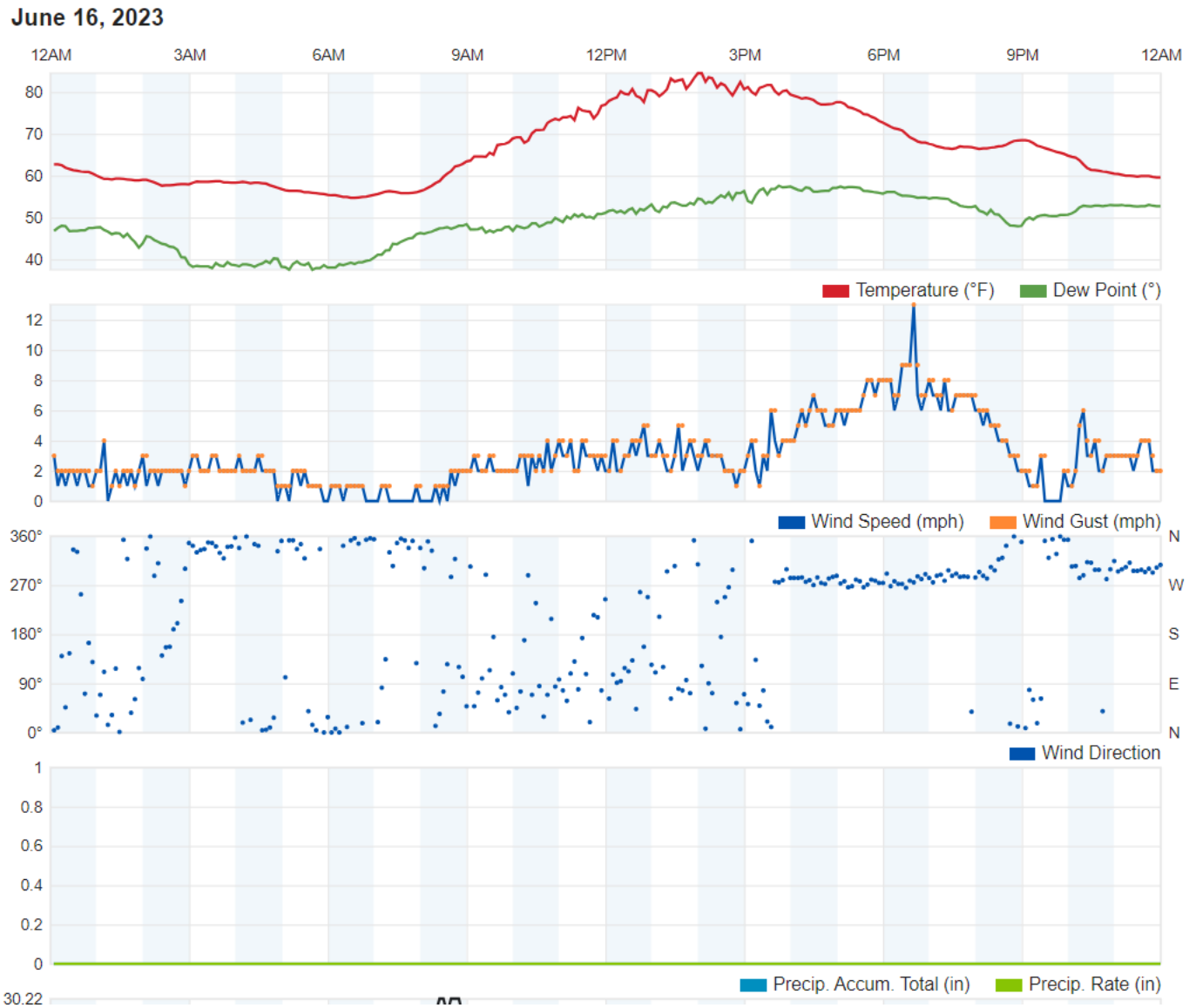
May 26, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



May 30, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



June 5, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



June 16, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon

THIRD QUARTER 2023

SURFACE EMISSIONS MONITORING

November 15, 2023
File No. 07222178.00

Mr. Ian MacNab
Republic Services – Coffin Butte Landfill
28972 Coffin Butte Road
Corvallis, Oregon 97330

Subject: Coffin Butte Landfill - Corvallis, Oregon

Surface Emissions Monitoring for Third Quarter 2023.

Dear Mr. MacNab:

SCS Field Services (SCS-FS) is pleased to provide Republic Services, with the enclosed report summarizing the surface emissions monitoring services provided at the Coffin Butte Landfill (Site) during the third quarter of 2023. This report includes the results of the surface scan, component emissions, and blower/flare station emissions monitoring for the Site for this monitoring period.

SCS-FS appreciates the opportunity to be of assistance to Republic Services on this project. As you review the enclosed information, please contact Stephan Harquail at (503) 867-2369 or Max Polkabla at (510) 277-5122 if you have any questions or comments.

Sincerely,

Max Polkabla

Max Polkabla
Senior Technician/Data Analyst
SCS Field Services

Stephen Harquail
PNW Region Manager
SCS Field Services

Coffin Butte Landfill

Oregon Landfill Gas Emissions Rule (OAR) and Surface Emissions Monitoring

Third Quarter 2023

Presented to:

Mr. Ian MacNab
28972 Coffin Butte Road
Corvallis, Oregon 97330

SCS FIELD SERVICES

File No. 0722178.00 | November 15, 2023

SCS FIELD SERVICES
15949 SW 72nd Ave
Portland, Or 97224

Coffin Butte Landfill

Oregon Landfill Gas Emissions Rule (OAR) and Surface Emissions Monitoring Third Quarter 2023

INTRODUCTION

This letter provides results of the August 29, September 1, 6, 7, 8, 11, 12, 20, and 29, 2023, OAR landfill surface emissions monitoring (SEM) performed by SCS Field Services (SCS) at the Coffin Butte Landfill. All work was performed in accordance with our approved Work Scope dated August 29, 2022, and the OAR requirements.

2022 State Regulatory Applicability

CBL is subject to the Oregon-specific landfill gas emission regulations in OAR Chapter 340 Division 239. These SEM regulations are detailed below. The following requirements are stricter than the NESHAP regulations in previous Sections and require additional compliance:

SURFACE EMISSION METHANE CONCENTRATION LIMITS

> *340-239-0200 (1) Surface Emission Methane Concentration Limits. Except as provided in OAR 340-239-0110(4), 340-239-0110(5), 340-239-0300, and 340-239-0600(1), beginning August 1, 2022, or upon commencing operation of a newly installed gas collection and control system or modification of an existing gas collection and control system pursuant to OAR 340-239-0110(1), whichever is later, no location on the landfill surface may exceed either of the following methane concentration limits:*
>
> *(a) 500 ppmv, other than nonrepeatable, momentary readings, as determined by instantaneous surface emissions monitoring conducted in accordance with OAR 340-239-0800(3)(b);*
>
> *(b) An average methane concentration limit of 25 ppmv as determined by integrated surface emissions monitoring conducted in accordance with OAR 340-239-800(3)(c).*

The 500 ppmv limit is already a requirement in the Federal regulations above, but an average methane concentration limit of 25 ppmv will be adhered to as required.

SURFACE EMISSION RECORDKEEPING

> *340-239-0700(2)(a)(C) All instantaneous surface readings of 100 ppmv methane or greater. All exceedances of the limits in OAR 340-239-0100(6)(b) and 340-239-0200, including the location of the leak (or affected grid), leak concentration in ppmv methane, date and time of measurement, the action taken to repair the leak, date of repair, any required remonitoring and the remonitored concentration in ppmv methane, wind speed during surface sampling, and the installation date and location of each well installed as part of a gas collection system expansion;*

The Federal regulations only require monitored surface emissions over 500 ppmv to be documented, so all of the above recordkeeping will be performed on emission points 100 ppmv or over. All repeatable

instantaneous records of 100 ppm or higher (taken during SEM) must be kept for 5 years AND recorded in the semi-annual reports.

SUMMARY AND CONCLUSIONS

As stipulated in OAR, if uncorrectable exceedances within the 10-day limitation are detected or emissions are discovered during an inspection by Regulatory Agencies, the landfill must perform monitoring on a 25-foot pathway on a quarterly basis for active disposal sites. Upon completion of four consecutive SEM events without an uncorrectable exceedance of the 25 ppmv or 500 ppmv standards, other than non-repeatable momentary readings, the landfill may perform the monitoring on a 100-foot spacing on an annual basis for closed landfills or quarterly for active disposal sites. In accordance with the provisions of the OAR, the monitoring of the landfill was done on a 25-foot pathway based on a prior inspection, in which exceedances were observed.

On August 29, September 1, 6, 7, 8, 11, 12, 20, and 29, 2023, SCS performed third quarter 2023 surface emissions monitoring testing as required by the Oregon Landfill Gas emission Rule. Instantaneous surface emissions monitoring results indicated that one (1) location exceeded the 500 ppmv maximum concentration on the above-mentioned dates (Table 1 in Attachment 3). The required first 10-day (OAR) and 1-month (OAR) follow-up monitoring indicated that the area had returned to compliance following system adjustments and remediation by SCS and site personnel. Based on these monitoring results no additional follow-up testing was required.

Also, during the instantaneous monitoring event, SCS performed integrated monitoring of the landfill surface. As required by the OAR, the landfill was divided into 50,000 square foot areas. The Coffin Butte Landfill surface is divided into 105 grids, as shown in Figure 1 in Attachment 1. During this monitoring event, several grids were not monitored, in accordance with the regulations, due to ongoing active landfilling activities, unsafe conditions, or there was no waste in place prior to the monitoring event.

During the monitoring event, there were five (5) areas observed to exceed the 25 ppmv OAR integrated average threshold (Table 2 in Attachment 4). The required first and second 10-day OAR follow-up monitoring indicated that two (2) areas had returned to compliance following system adjustments and remediation by SCS and site personnel. However, the remaining three (3) areas remained above compliance. Based on these monitoring results, and in accordance with the OAR, the site is required to perform a system expansion within 120 days of the third detected exceedance or January 27, 2024. These results are discussed in a subsequent section of this report.

In addition, quarterly monitoring of the pressurized piping or components of the Gas Collection and Control System (GCCS) under positive pressure must be performed quarterly. Results of the testing of the landfill gas (LFG) Blower Flare Station (BFS) pressurized pipe and components indicated that all test locations were in compliance with the 500 ppmv requirements.

Further, as required under the OAR, any location on the landfill that has an observed instantaneous methane concentration above 100 ppmv, must be included within the surface emission monitoring report and if any instantaneous location records above 250 ppmv, it must be monitored in a 5-foot grid around the location to determine extents of the methane leak. During this reporting period, nine (9) locations were observed showing elevated concentrations between 100-499 ppmv, of the reporting threshold. When these readings are observed to be repeatable, they are reported to site personnel for tracking and/or remediation and will be reported in the next submittal of the annual OAR report. Finally, to help prevent potential future exceedances, SCS recommends that the landfill surface be routinely inspected and any observed surface erosion be routinely repaired.

BACKGROUND

The Coffin Butte Landfill is an active organic refuse disposal site. By way of background, organic materials buried in a landfill decompose anaerobically (in the absence of oxygen) producing a combustible gas that contains approximately 50 to 60 percent methane gas, 40 to 50 percent carbon dioxide, and a trace amount of various other gases, some of which are odorous. The Coffin-Butte/Corvallis property contains a system to control the combustible gases generated in the landfill.

SURFACE EMISSIONS MONITORING

On August 29, September 1, 6, 7, 8, 11, 12, 20, and 29, 2023, the instantaneous and integrated SEM was performed over the surface of the subject site. The intent of the monitoring was to identify any specific locations or areas of the landfill surface with organic compound concentrations exceeding the OAR threshold limit values of 500 ppmv measured as methane for instantaneous monitoring, or an average methane concentration of 25 ppmv for the integrated monitoring in the 50,000 square foot grids as required under the OAR. During this event, SCS performed the monitoring on a 25 and 100-foot pathway in accordance with the rules as required.

EMISSIONS TESTING INSTRUMENTATION/CALIBRATION

The instruments used to perform the landfill surface emission testing consisted of the following:

- Thermo Scientific TVA 2020 portable Flame Ionization Detector (FID). This instrument measures methane in the air over a range of 1 to 50,000 ppmv. The TVA 2020 meets the State of California Air Resources Board (CARB) requirements for combined instantaneous and integrated monitoring and was calibrated in accordance with the United States Environmental Protection Agency (US EPA) Method 21.

- Weather Anemometer with continuous recorder for meteorological conditions in accordance with the OAR.

Instrument calibration logs and weather information are shown in Attachments 5 and 6.

SURFACE EMISSIONS MONITORING PROCEDURES

Surface emissions monitoring was conducted in accordance with the OAR and SEM requirements. Monitoring was performed with the FID inlet held within 2 inches of the landfill surface while a technician walked a grid in parallel paths not more than 25 or 100 feet apart over the landfill's surface. Cracks, holes, and other cover penetrations in the surface were also tested. Surface emissions readings were monitored continuously and recorded every 5 seconds. Any areas exceeding the 100 or 500 ppmv standards (reporting and compliance levels, respectively) would be GPS tagged and stake-marked for on-site personnel to perform remediation or repairs.

The integrated average is based on the readings stored on the instrument, which are recorded every 5 seconds. The readings are then downloaded and the averages are calculated for each grid using SCS eTools®. All readings are maintained in this secure SCS Database. The readings are not provided in the report due to the volume of readings but can be furnished upon request.

Recorded wind speed results are shown in Attachment 6. Wind speed averages were observed to remain below the alternative threshold of 10 miles per hour, and no instantaneous speeds exceeded 20 miles

per hour. No rainfall occurred within 72 hours of the monitoring events. Therefore, site meteorological conditions were within the alternatives of the OAR requirements on the above-mentioned dates.

TESTING RESULTS

During this event, SCS performed the monitoring on a 25-foot pathway in accordance with the rule as required under the OAR. The intent of the monitoring was to identify any specific locations or areas of the landfill surface with organic compound concentrations exceeding the OAR or NSPS threshold limit values of 500 ppmv measured as methane for instantaneous monitoring, or an average methane concentration of 25 ppmv for the integrated monitoring (OAR).

On August 29, September 1, 6, 7, 8, 11, and 12, 2023, SCS performed third quarter 2023 instantaneous emissions monitoring testing as required by the Oregon DEQ/OAR. During this monitoring, surface emissions results indicated that one (1) location exceeded the 500 ppmv maximum concentration. The required first 10-day (OAR) follow-up monitoring performed on September 20, 2023, and the 1-month (OAR) follow-up monitoring event performed on September 29, 2023, indicated that the area had returned to compliance following system adjustments and remediation by SCS and site personnel. Based on these monitoring results no additional follow-up testing was required. Results of the monitoring are shown in Attachments 2 and 3 (Table 1).

Additionally, calculated integrated monitoring indicated five (5) integrated exceedances of the 25-ppmv requirement on August 29, September 1, 6, 7, 8, 11, and 12, 2023. The required first and second 10-day OAR follow-up monitoring performed on September 20 and September 29, 2023, indicated that two (2) of the five (5) areas had returned to compliance. In accordance with requirements for expansion and remediation, the exceedance locations need to be remediated and returned to compliance in accordance with the rule (expansion of the collection system or an alternative compliance option if approved by the OAR) within 120 days after the third integrated exceedance, which will be due by January 27, 2024. Calibration logs for monitoring equipment are provided in Attachment 5.

During this monitoring event, several girds were not monitored, in accordance with the OAR, due to active landfilling activities, unsafe conditions, overgrown vegetation, or no waste in place. SCS will continue to monitor all accessible locations during the fourth quarter of 2023.

PRESSURIZED PIPE AND COMPONENT LEAK MONITORING

On September 12, 2023, quarterly leak monitoring was performed in accordance with the OAR. SCS performed LFG pressurized pipe and component leak monitoring at the BFS. Monitoring was performed with the detector inlet held one-half of an inch from the pressurized pipe and associated components. No locations exceeding the 500 ppmv threshold were observed during our monitoring event. The maximum reading, which was 3.00 ppmv, was well below the maximum threshold (see Table 1 for component results). Therefore, all pressurized pipes and components located at the LFG BFS were in compliance at the time of our testing.

PROJECT SCHEDULE

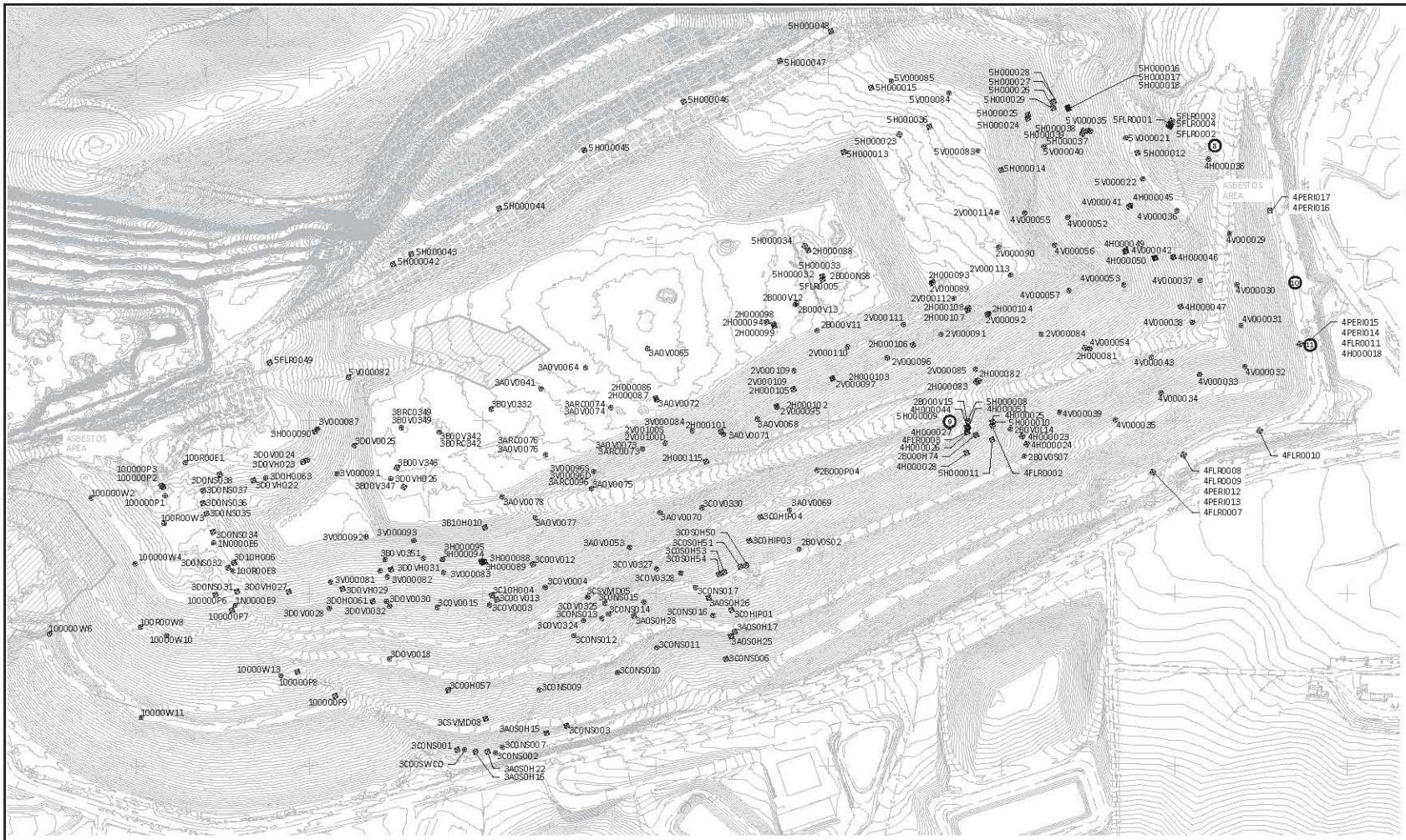
According to the OAR, surface emissions monitoring at active landfills is required to be performed on a quarterly basis. Therefore, in accordance with our approved Work Scope, the fourth quarter 2023 (October through December) surface emissions testing event is scheduled to be performed by the end of December 2023.

STANDARD PROVISIONS

This report addresses the conditions of the subject site during the testing dates only. Accordingly, we assume no responsibility for any changes that may occur subsequent to our testing which could affect the surface emissions at the subject site or adjacent properties.

Attachment 1

Landfill Grid



NOTES:

1. "EGC" WELLS LEFT OFF FOR CLARITY.

REV	DATE	DESCRIPTION	DRN BY	DSN BY	CHK BY
0	07/14/22	AS-BUILT	PD	AH	AH

REPUBLIC SERVICES
28972 COFFIN BUTTE ROAD CORVALLIS OR 97330 PHONE: (541) 745-5792 FAX: (541) 745-3825

ENERGYNEERING SOLUTIONS
15820 BARCLAY DRIVE SISTERS, OR 97759 PHONE: (541) 549-8766 FAX: (541) 549-1901

WELLHEAD LAYOUT

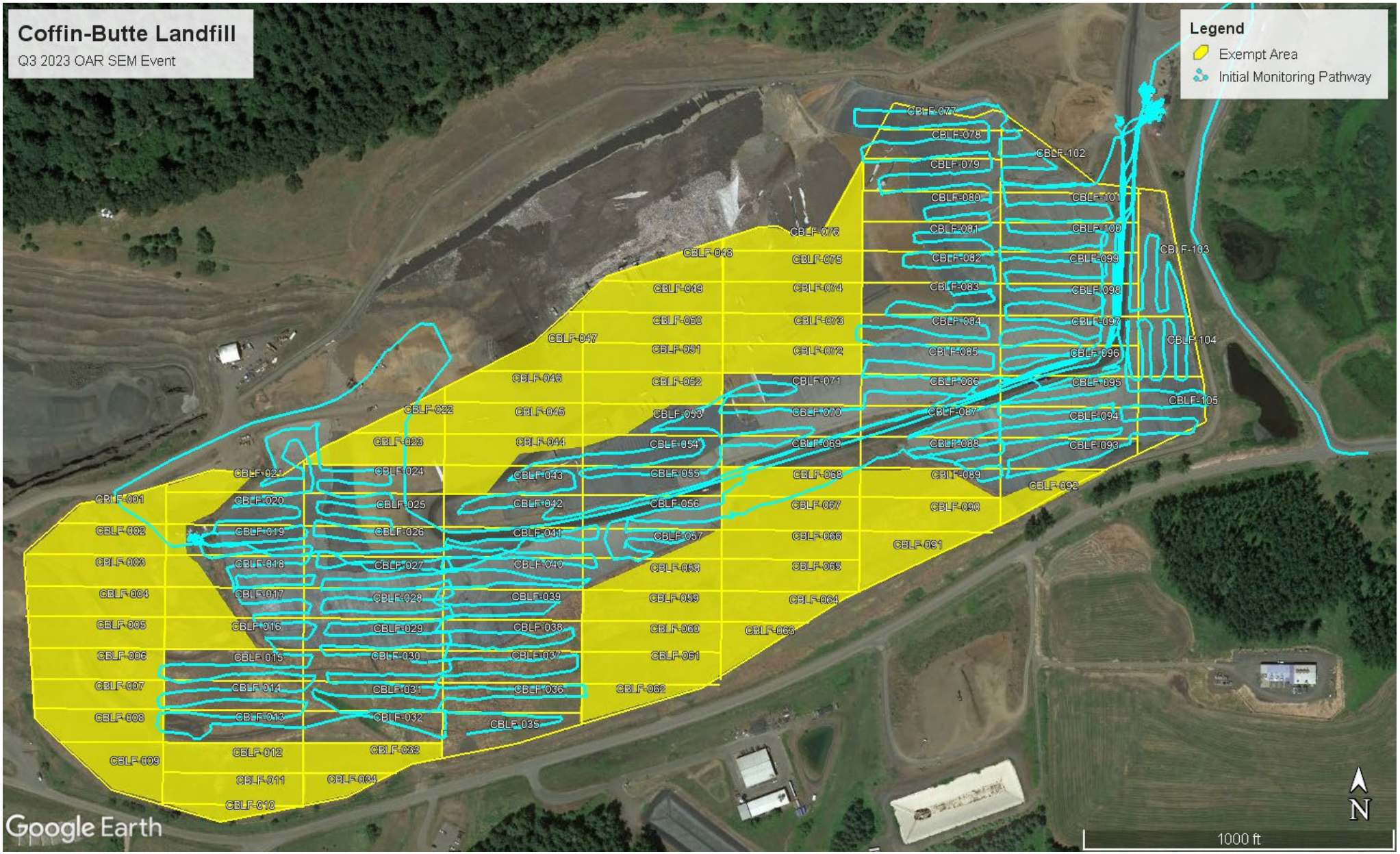
2022 WELLFIELD GCCS AS-BUILT
COFFIN BUTTE LANDFILL
CORVALLIS, OR

DRAWING NO.
W1.01

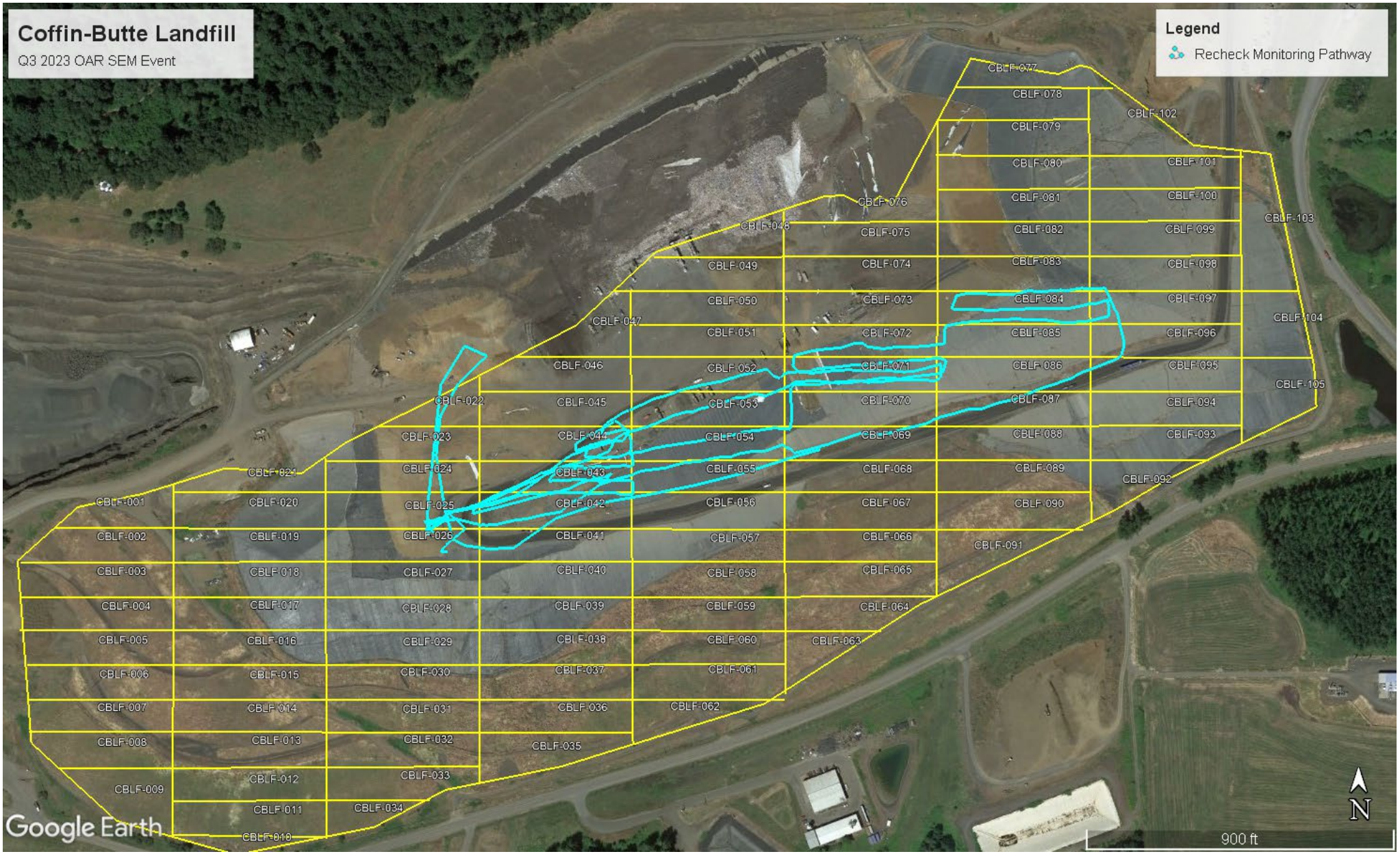
PROJECT NO.
XXX.XXX

Attachment 2

Surface Pathway



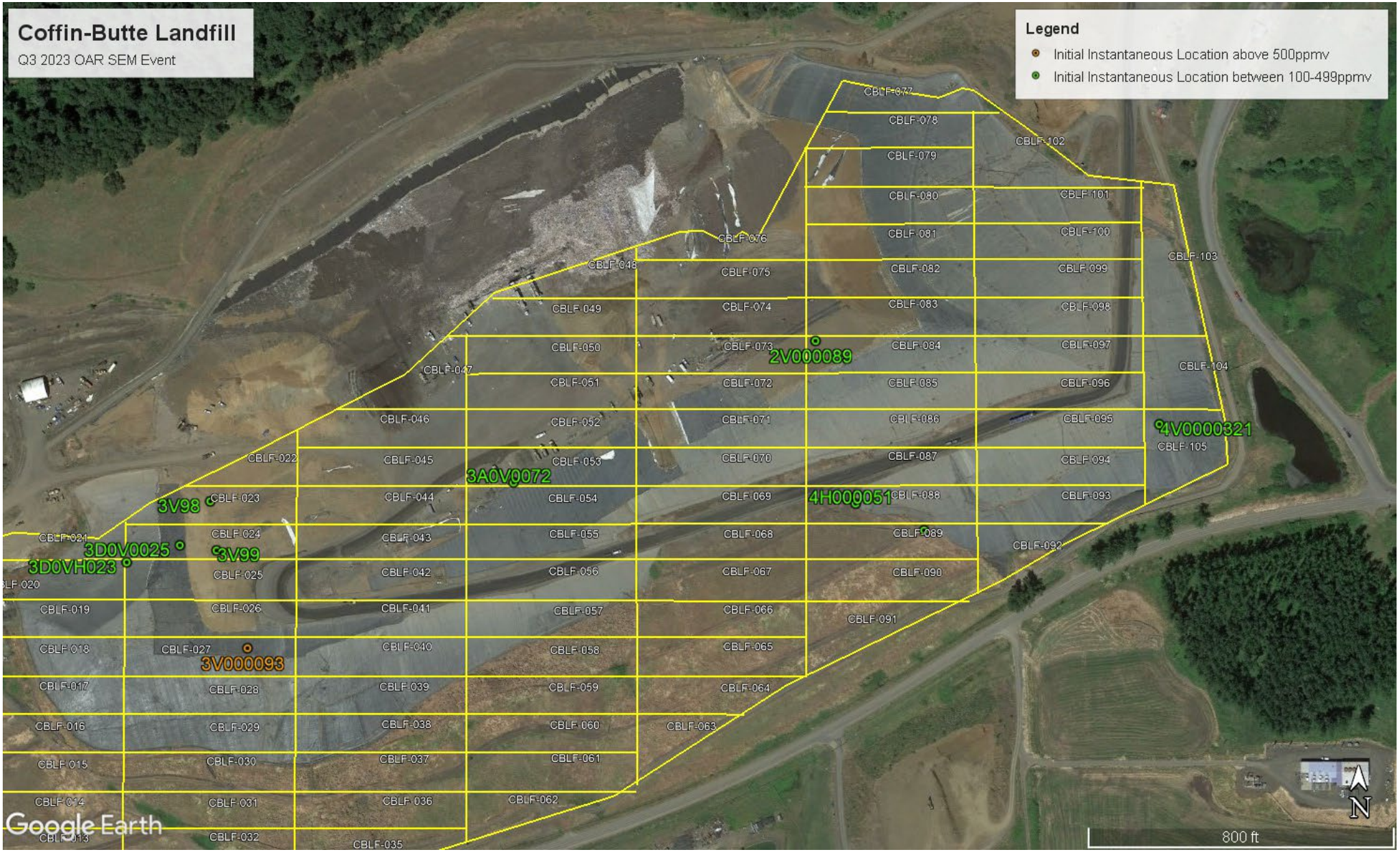
Third Quarter 2023
Initial Surface Emissions Monitoring Pathway
Coffin Butte Landfill, Corvallis, Oregon



Third Quarter 2023
Initial Surface Emissions Recheck Monitoring Pathway
Coffin Butte Landfill, Corvallis, Oregon

Attachment 3

Instantaneous and Component Emissions Monitoring Results



Third Quarter 2023
Initial Emissions Monitoring Results Greater Than 100 ppmv
Coffin Butte Landfill, Corvallis, Oregon

Third Quarter 2023

Table 1. Instantaneous Surface and Component Emissions Monitoring Results Coffin-Butte Landfill, Corvallis, Oregon

Instantaneous Data Report for August 29, September 1, 6, 7, 8, 11, 12, 20, and 29, 2023

Location (Surface)	Initial Monitoring Results (ppmv) 9/12/2023	Follow Up Monitoring Results (ppmv) 9/20/2023	1-Month Follow-Up Monitoring Results (ppmv) 9/29/2023	Latitude	Longitude
3V000093	543	455	400	44.69835953	-123.23418296

Instantaneous Data Report for August 29, September 1, 6, 7, 8, 11, 12, 20, and 29, 2023 Readings between 100-499 ppmv

Location (Surface)	Initial Monitoring Results (ppmv) 9/11/2023	Initial Monitoring Results (ppmv) 9/12/2023	Latitude	Longitude
4H000051	N/A	497	44.69939168	-123.22806828
4V000032	N/A	442	44.69995997	-123.22500000
2B0V0S07	N/A	239	44.69919998	-123.22738004
2V000089	N/A	212	44.70056003	-123.22846826
3D0VH023	N/A	195	44.69897166	-123.23540672
3D0V0025	N/A	182	44.69909328	-123.23487329
3V99	139	N/A	44.69905699	-123.23450399
3A0V0072	N/A	122	44.69954330	-123.23151668
3V98	107	N/A	44.69940802	-123.23457196

Third Quarter 2023

Table 1. Instantaneous Surface and Component Emissions Monitoring Results Coffin-Butte Landfill, Corvallis, Oregon

Pressurized Pipe and Component Results

Route	Date	Concentration (ppmv)
FLARE STATION	9/12/2023	3.00

No other exceedances of the 500 ppmv threshold were observed during the third quarter of 2023 monitoring.

Attachment 4

Integrated Monitoring Results

Third Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-001	--	--	Exempt Area
CBLF-002	--	--	Exempt Area
CBLF-003	--	--	Exempt Area
CBLF-004	--	--	Exempt Area
CBLF-005	--	--	Exempt Area
CBLF-006	--	--	Exempt Area
CBLF-007	--	--	Exempt Area
CBLF-008	--	--	Exempt Area
CBLF-009	--	--	Exempt Area
CBLF-010	--	--	Exempt Area
CBLF-011	--	--	Exempt Area
CBLF-012	--	--	Exempt Area
CBLF-013	8/29/2023	0.00	
CBLF-014	8/29/2023	0.00	
CBLF-015	8/29/2023	0.00	
CBLF-016	8/29/2023	0.05	
CBLF-017	8/29/2023	1.42	
CBLF-018	8/29/2023	9.36	
CBLF-019	8/29/2023	4.84	
CBLF-020	8/29/2023	2.70	
CBLF-021	8/29/2023	3.88	
CBLF-022	--	--	Exempt Area
CBLF-023	--	--	Exempt Area
CBLF-024	8/29/2023	21.04	
CBLF-025	8/29/2023	13.75	
CBLF-026	8/29/2023	4.94	
CBLF-027	8/29/2023	4.41	
CBLF-028	8/29/2023	1.21	
CBLF-029	8/29/2023	0.37	
CBLF-030	8/29/2023	0.00	
CBLF-031	8/29/2023	0.00	
CBLF-032	8/29/2023	0.11	
CBLF-033	--	--	Exempt Area
CBLF-034	--	--	Exempt Area
CBLF-035	9/1/2023	0.50	
CBLF-036	9/1/2023	0.34	
CBLF-037	9/1/2023	0.36	
CBLF-038	9/1/2023	0.20	
CBLF-039	9/1/2023	0.76	
CBLF-040	9/1/2023	1.19	
CBLF-041	9/1/2023	1.31	
CBLF-042	9/8/2023	11.54	
CBLF-043	9/8/2023	51.87	Initial Monitoring

Third Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-043	9/20/2023	46.89	First 10-Day Recheck (Delayed due to weather)
CBLF-043	9/29/2023	92.78	Second 10-Day 120-Day Expansion due 1/27/2024
CBLF-044	9/8/2023	30.31	Initial Monitoring
CBLF-044	9/20/2023	46.09	First 10-Day Recheck (Delayed due to weather)
CBLF-044	9/29/2023	86.14	Second 10-Day 120-Day Expansion due 1/27/2024
CBLF-045	--	--	Exempt Area
CBLF-046	--	--	Exempt Area
CBLF-047	--	--	Exempt Area
CBLF-048	--	--	Exempt Area
CBLF-049	--	--	Exempt Area
CBLF-050	--	--	Exempt Area
CBLF-051	--	--	Exempt Area
CBLF-052	--	--	Exempt Area
CBLF-053	9/8/2023	24.14	
CBLF-054	9/8/2023	57.74	Initial Monitoring
CBLF-054	9/20/2023	19.85	First 10-Day Recheck (Delayed due to weather)
CBLF-055	9/8/2023	18.70	
CBLF-056	9/7/2023	5.60	
CBLF-057	9/7/2023	3.58	
CBLF-058	9/7/2023	1.20	
CBLF-059	--	--	Exempt Area
CBLF-060	--	--	Exempt Area
CBLF-061	--	--	Exempt Area
CBLF-062	--	--	Exempt Area
CBLF-063	--	--	Exempt Area
CBLF-064	--	--	Exempt Area
CBLF-065	--	--	Exempt Area
CBLF-066	--	--	Exempt Area
CBLF-067	--	--	Exempt Area
CBLF-068	--	--	Exempt Area
CBLF-069	9/8/2023	5.95	
CBLF-070	9/8/2023	12.73	
CBLF-071	9/8/2023	72.77	Initial Monitoring
CBLF-071	9/20/2023	31.26	First 10-Day Recheck (Delayed due to weather)
CBLF-071	9/29/2023	38.84	Second 10-Day 120-Day Expansion due 1/27/2024
CBLF-072	--	--	Exempt Area
CBLF-073	--	--	Exempt Area
CBLF-074	--	--	Exempt Area
CBLF-075	--	--	Exempt Area

Third Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-076	--	--	Exempt Area
CBLF-077	9/8/2023	3.75	
CBLF-078	9/8/2023	3.12	
CBLF-079	9/8/2023	4.05	
CBLF-080	9/8/2023	3.10	
CBLF-081	9/8/2023	5.87	
CBLF-082	9/8/2023	8.38	
CBLF-083	9/8/2023	21.79	
CBLF-084	9/8/2023	35.70	Initial Monitoring
CBLF-084	9/20/2023	10.77	First 10-Day Recheck (Delayed due to weather)
CBLF-085	9/8/2023	7.18	
CBLF-086	9/8/2023	11.95	
CBLF-087	9/8/2023	10.95	
CBLF-088	9/7/2023	3.30	
CBLF-089	9/7/2023	2.36	
CBLF-090	--	--	Exempt Area
CBLF-091	--	--	Exempt Area
CBLF-092	9/7/2023	22.63	
CBLF-093	9/6/2023	2.01	
CBLF-094	9/6/2023	1.76	
CBLF-095	9/6/2023	4.82	
CBLF-096	9/7/2023	0.35	
CBLF-097	9/7/2023	5.38	
CBLF-098	9/7/2023	4.73	
CBLF-099	9/7/2023	-0.05	
CBLF-100	9/7/2023	0.15	
CBLF-101	9/7/2023	0.28	
CBLF-102	9/8/2023	2.36	
CBLF-103	9/6/2023	5.53	
CBLF-104	9/6/2023	3.48	
CBLF-105	9/6/2023	2.42	

Attachment 5

Calibration Logs

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 8/29/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 7 MPH Wind Direction: SE Barometric Pressure: 29.91

Air Temperature: 69 deg F General Weather Conditions: Partly Sunny

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	500	2
2	0	501	1
3	0	500	1

Average Difference: 0.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0.333333333 / 500 X 100%
= 0.1% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0.9 ppm

Downwind NW side of site Reading: 3.5 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/1/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: SE Barometric Pressure: 29.96

Air Temperature: 67 deg F General Weather Conditions: Overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	2
2	0	499	1
3	0	500	1

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 1.2 ppm

Downwind NW side of site Reading: 3.7 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/6/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 3 MPH Wind Direction: SE Barometric Pressure: 29.91

Air Temperature: 65 deg F General Weather Conditions: Sunny

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	500	2
2	0	501	1
3	0	499	1

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0.7 ppm

Downwind NW side of site Reading: 3.2 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/7/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 9 MPH Wind Direction: S Barometric Pressure: 29.96

Air Temperature: 58 deg F General Weather Conditions: Partly Cloudy

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	2
2	0	499	1
3	0	499	1

Average Difference: -0.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= -0.333333333 / 500 X 100%
= -0.1% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on S side. Reading: 0.3 ppm

Downwind N side of site Reading: 3.1 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/8/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 10 MPH Wind Direction: SE Barometric Pressure: 30.02

Air Temperature: 66 deg F General Weather Conditions: Sunny

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	499	2
2	0	500	1
3	0	501	1

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 1.4 ppm

Downwind NW side of site Reading: 3.4 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/11/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 6 MPH Wind Direction: SE Barometric Pressure: 29.94

Air Temperature: 58 deg F General Weather Conditions: Overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	499	2
2	0	499	1
3	0	501	1

Average Difference: -0.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= -0.333333333 / 500 X 100%
= -0.1% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 1.1 ppm

Downwind NW side of site Reading: 3.3 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/12/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: SE Barometric Pressure: 30.01

Air Temperature: 53 deg F General Weather Conditions: Overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	500	2
2	0	499	1
3	0	500	1

Average Difference: -0.33

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= -0.333333333 / 500 X 100%
= -0.1% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 1.7 ppm

Downwind NW side of site Reading: 4.1 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/20/2023

Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS

SCS Employee: Riley Baksic

Wind Speed: 9 MPH

Wind Direction: SE

Barometric Pressure: 29.95

Air Temperature: 61 deg F

General Weather Conditions: Sunny

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210

Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	2
2	0	499	1
3	0	500	1

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm

Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 1.4 ppm

Downwind NW side of site Reading: 3.5 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/29/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: SE Barometric Pressure: 29.91

Air Temperature: 68 deg F General Weather Conditions: Overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	2
2	0	499	1
3	0	500	1

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

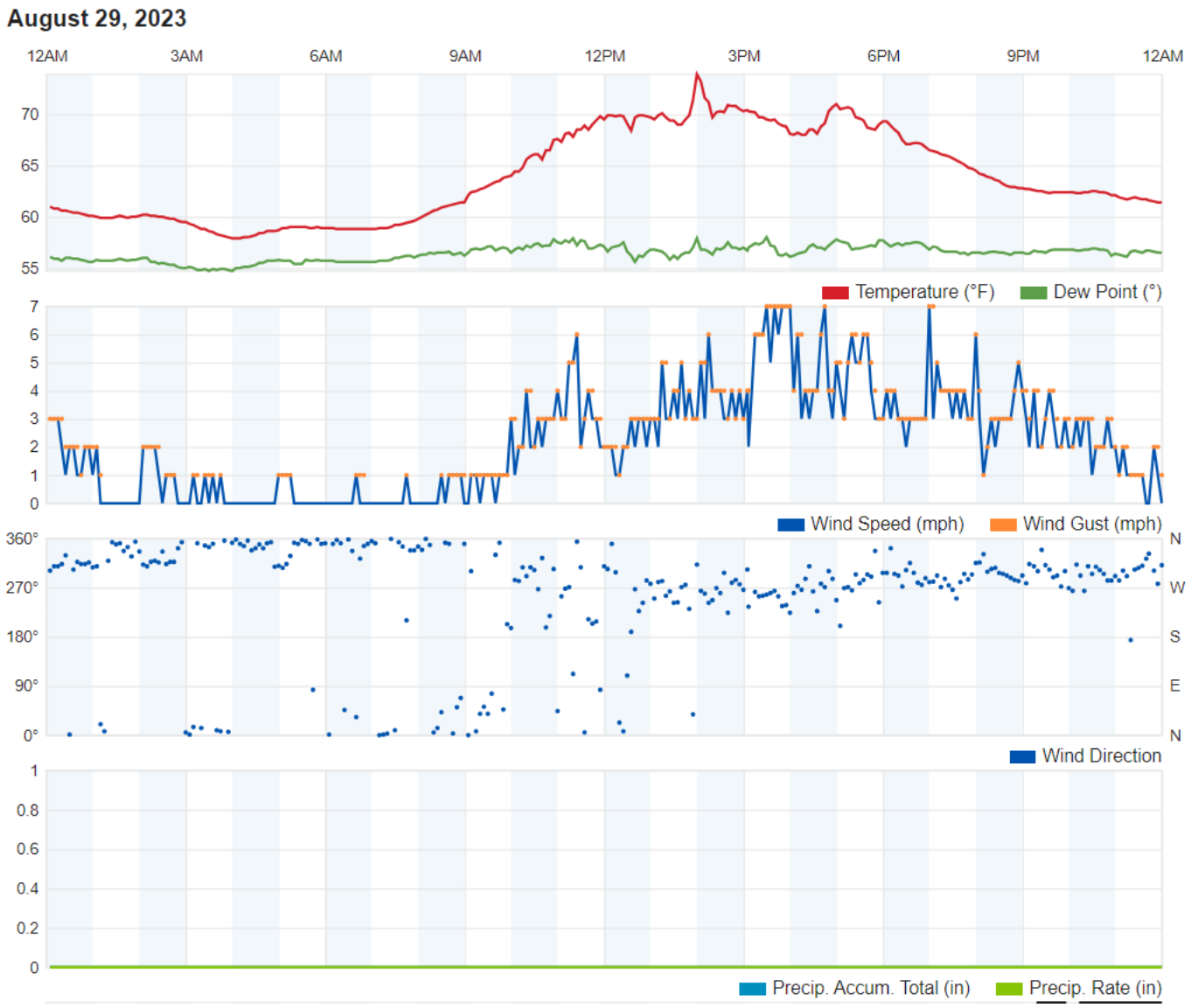
Up Wind of landfill area on SE side. Reading: 1.2 ppm

Downwind NW side of site Reading: 3.4 ppm

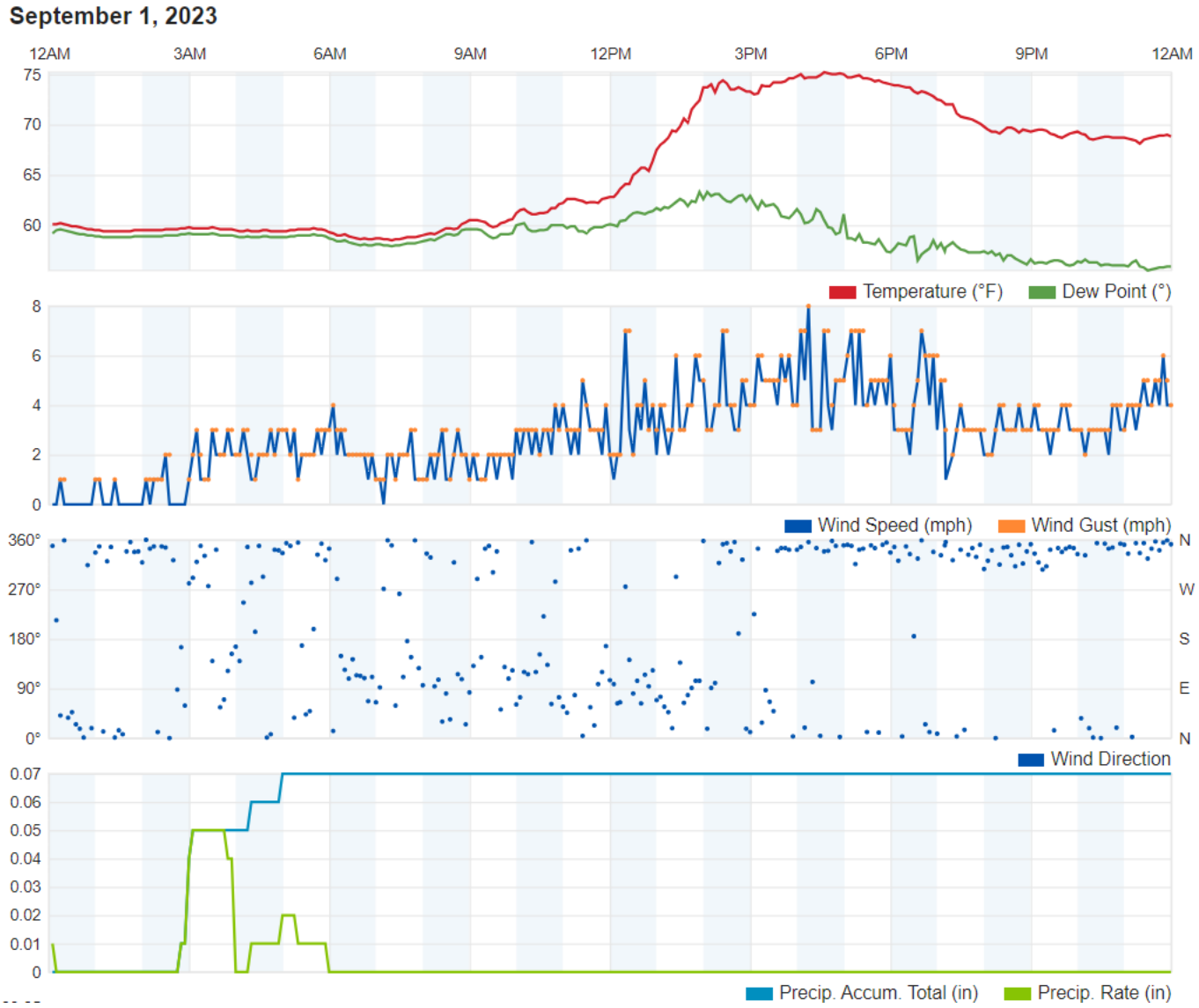
NOTES:

Attachment 6

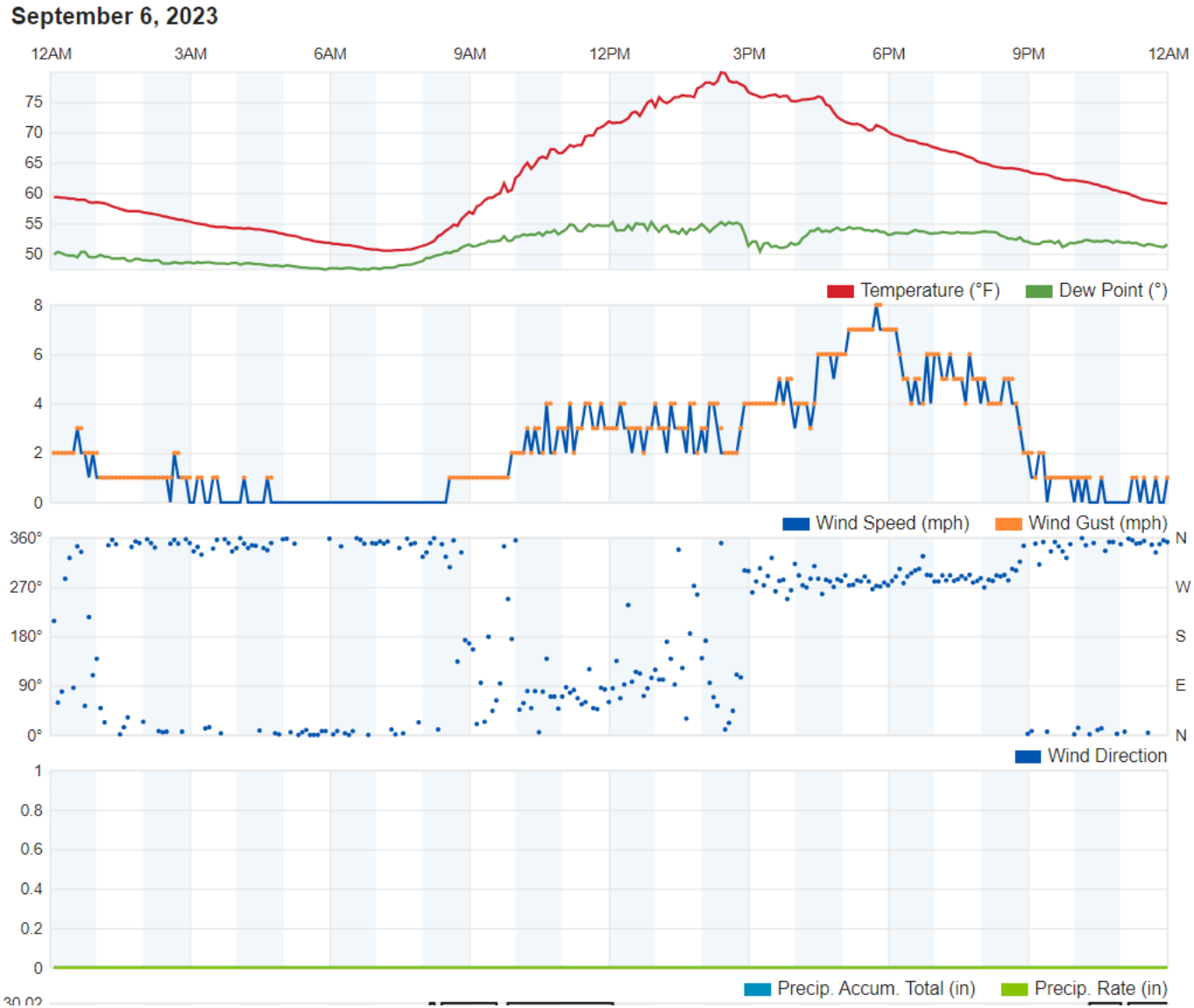
Weather Data



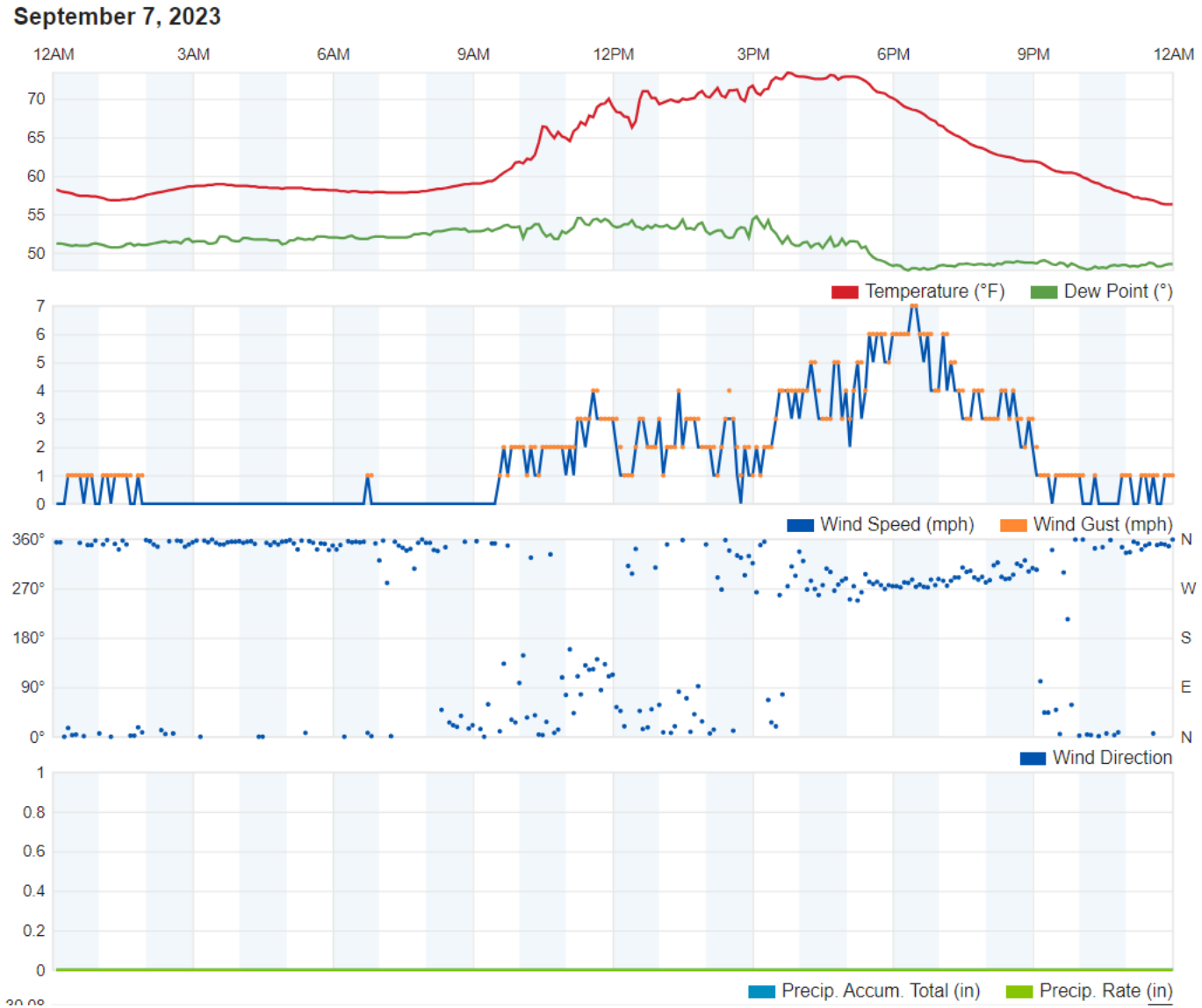
August 29, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



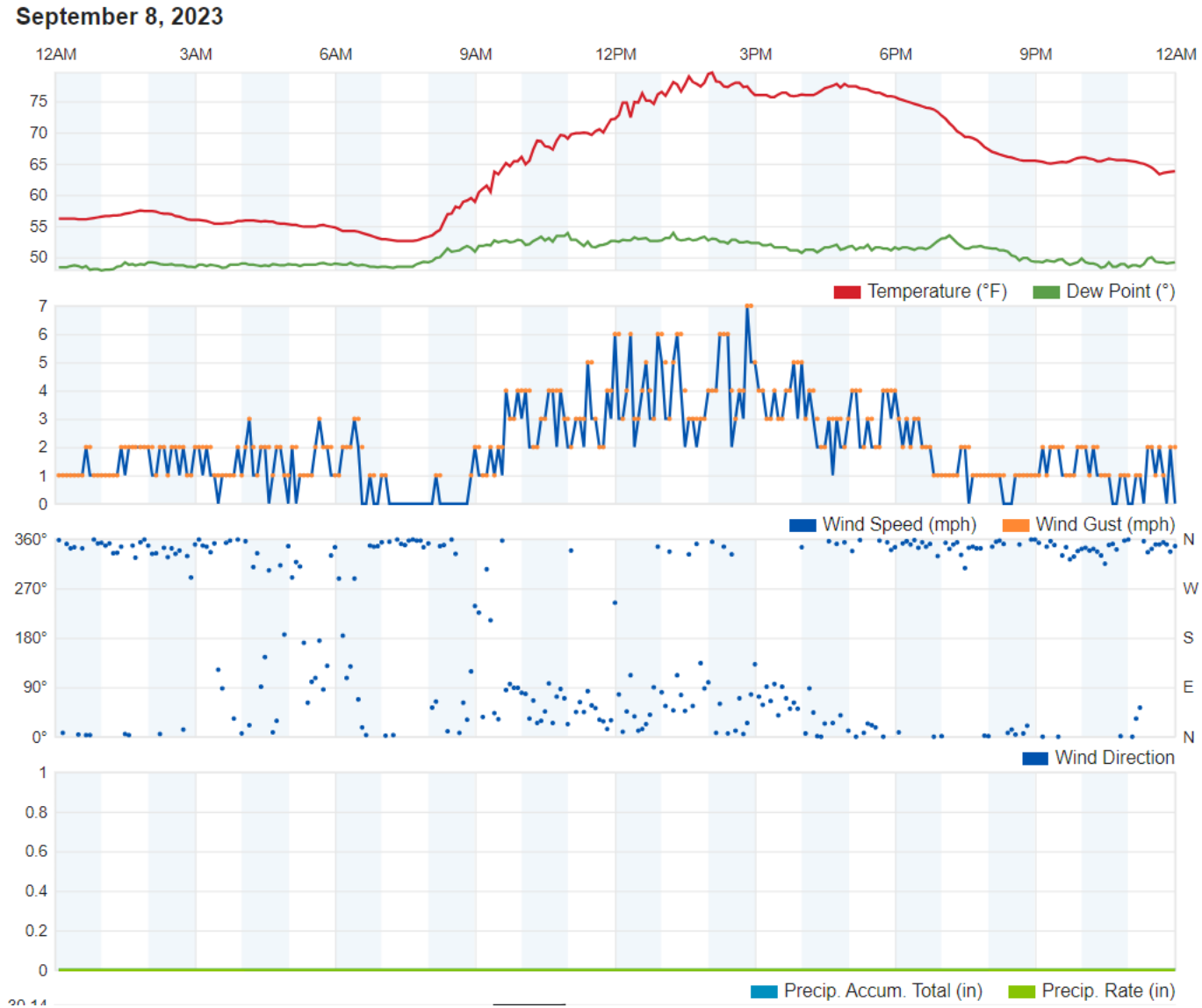
September 1, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



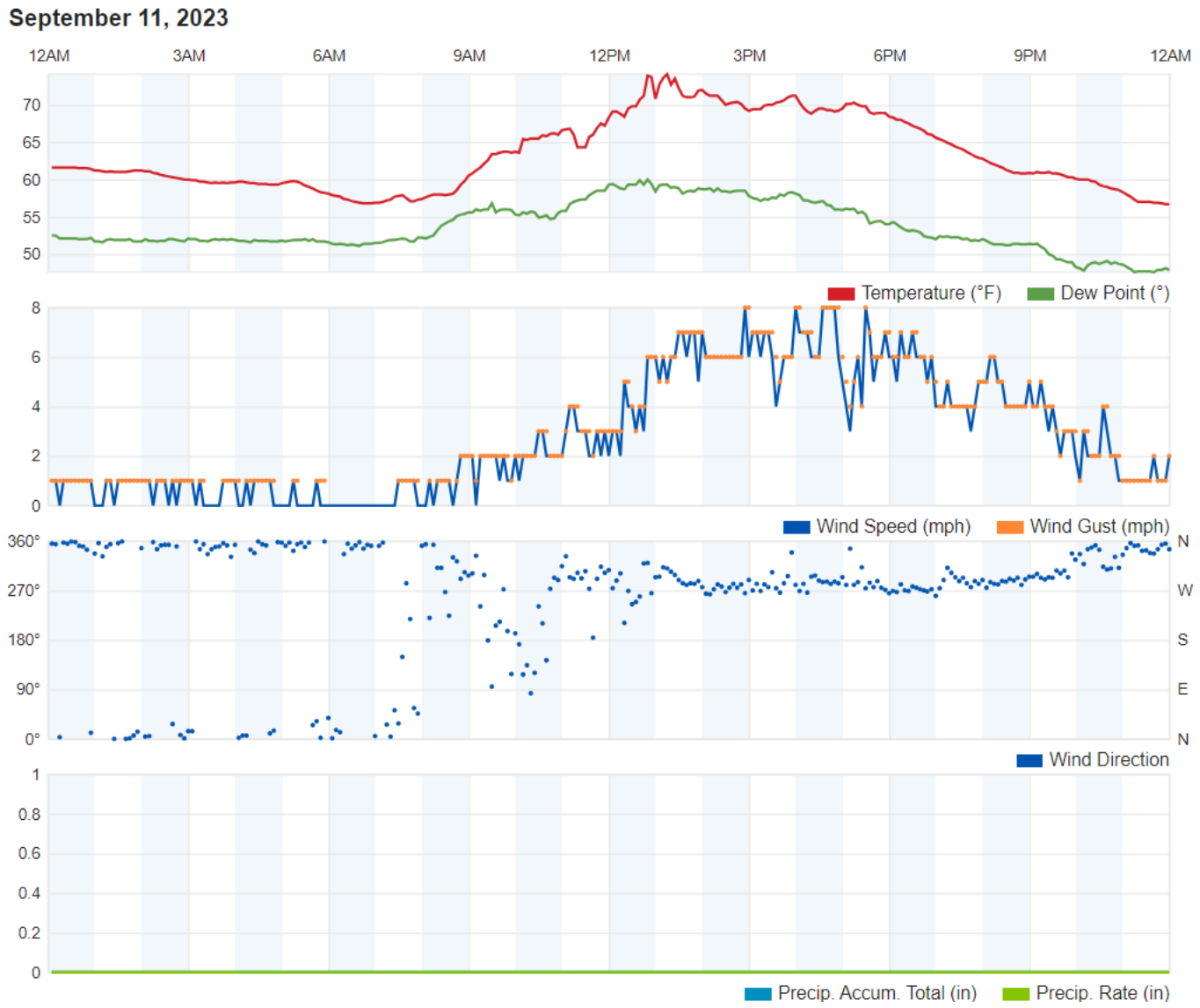
September 6, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



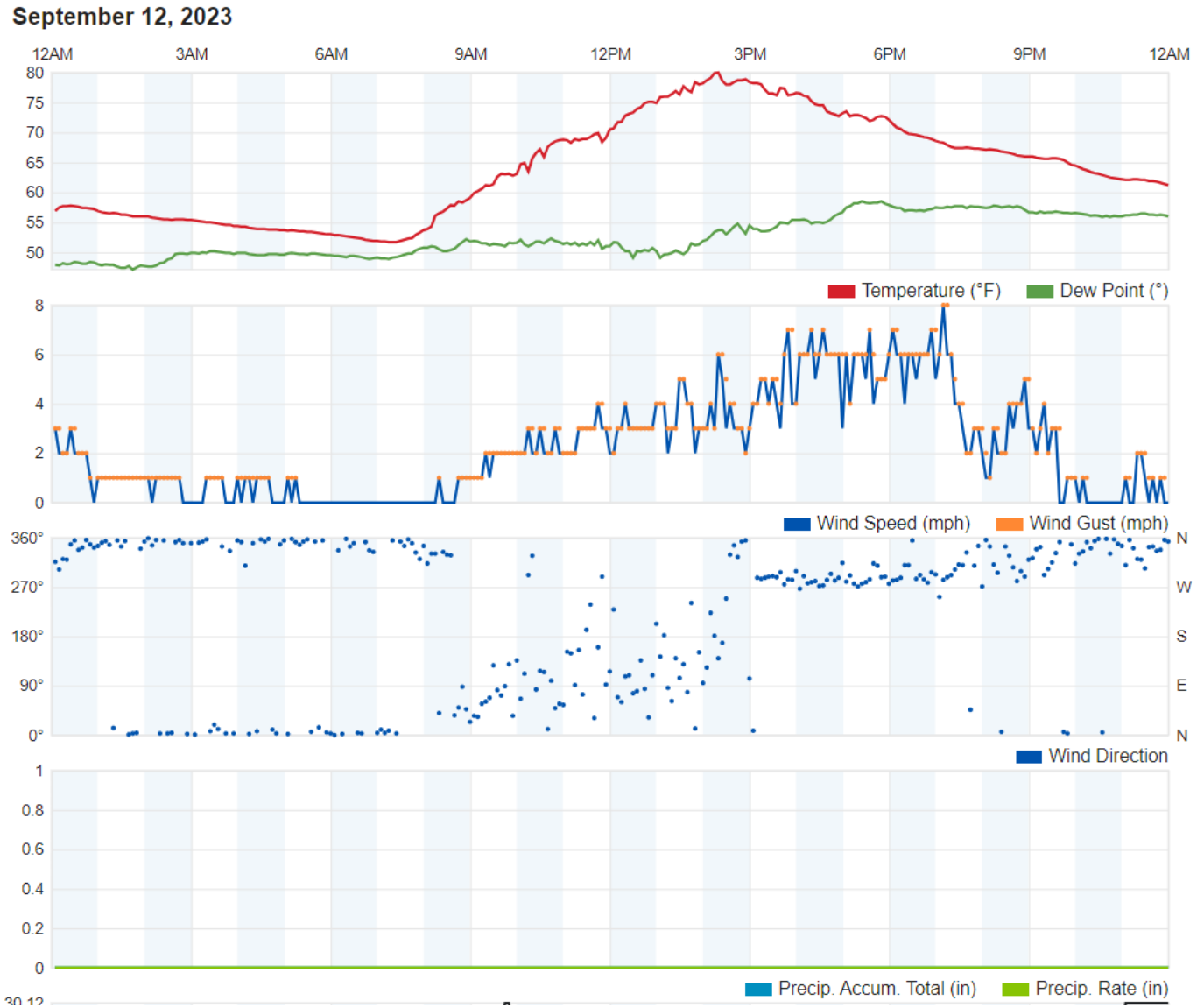
September 7, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



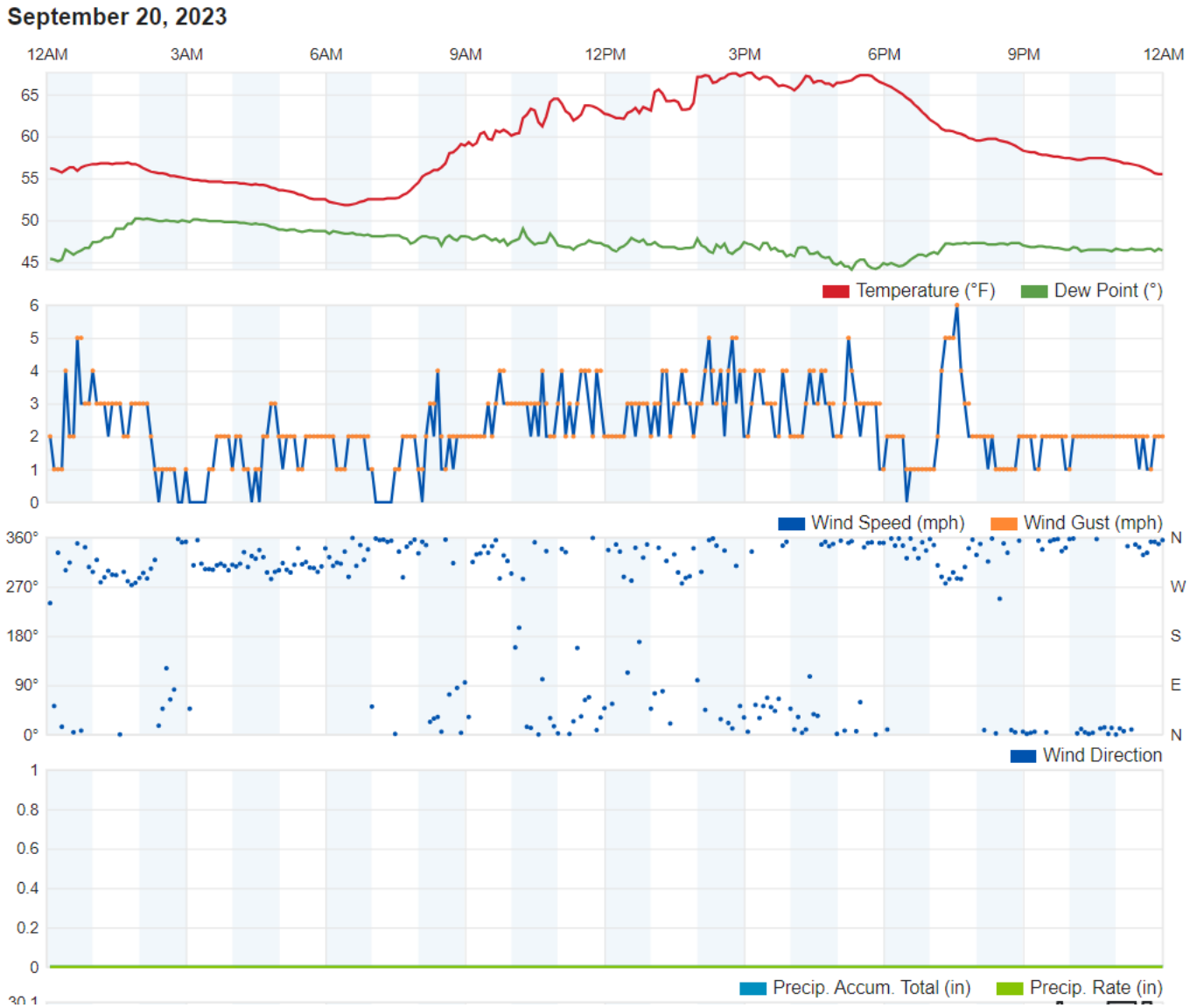
September 8, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



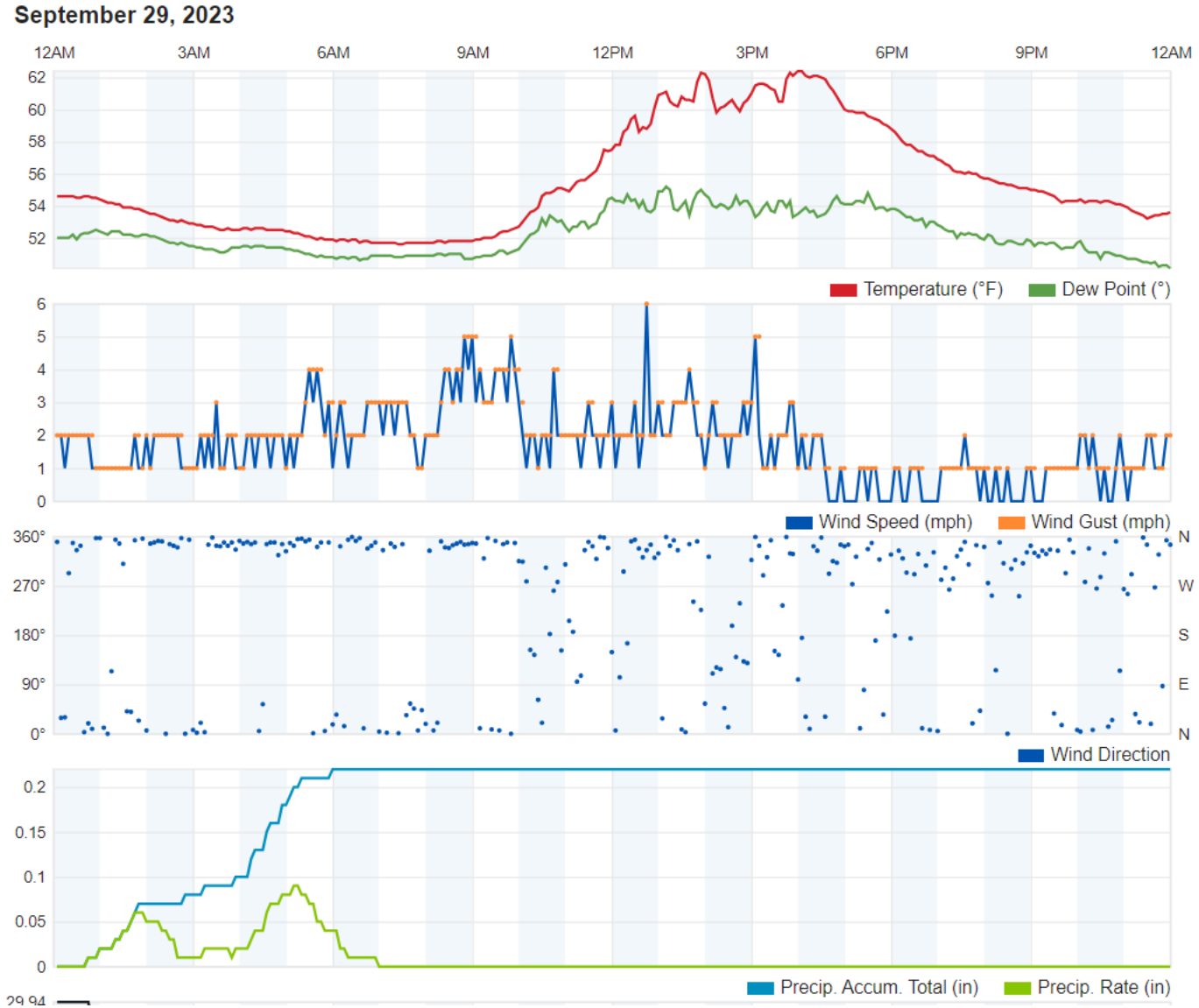
September 11, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



September 12, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



September 20, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



September 29, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon

FOURTH QUARTER 2023

SURFACE EMISSIONS MONITORING

January 16, 2024
File No. 07222178.00

Mr. Ian MacNab
Republic Services – Coffin Butte Landfill
28972 Coffin Butte Road
Corvallis, Oregon 97330

Subject: Coffin Butte Landfill - Corvallis, Oregon

Surface Emissions Monitoring for Fourth Quarter 2023.

Dear Mr. MacNab:

SCS Field Services (SCS-FS) is pleased to provide Republic Services, with the enclosed report summarizing the surface emissions monitoring services provided at the Coffin Butte Landfill (Site) during the fourth quarter of 2023. This report includes the results of the surface scan, component emissions, and blower/flare station emissions monitoring for the Site for this monitoring period.

SCS-FS appreciates the opportunity to be of assistance to Republic Services on this project. As you review the enclosed information, please contact Stephan Harquail at (503) 867-2369 or Max Polkabla at (510) 277-5122 if you have any questions or comments.

Sincerely,

Max Polkabla

Max Polkabla
Senior Technician/Data Analyst
SCS Field Services

Stephen Harquail
PNW Region Manager
SCS Field Services

Coffin Butte Landfill

Oregon Landfill Gas Emissions Rule (OAR) and Surface Emissions Monitoring

Fourth Quarter 2023

Presented to:

Mr. Ian MacNab
28972 Coffin Butte Road
Corvallis, Oregon 97330

SCS FIELD SERVICES

File No. 0722178.00 | January 16, 2024

SCS FIELD SERVICES
15949 SW 72nd Ave
Portland, Or 97224

Coffin Butte Landfill

Oregon Landfill Gas Emissions Rule (OAR) and Surface Emissions Monitoring Fourth Quarter 2023

INTRODUCTION

This letter provides results of the November 14, 16, 20, 21, and December 8, 15, and 18, 2023, OAR landfill surface emissions monitoring (SEM) performed by SCS Field Services (SCS) at the Coffin Butte Landfill. All work was performed in accordance with our approved Work Scope dated August 29, 2022, and the OAR requirements.

2022 State Regulatory Applicability

CBL is subject to the Oregon-specific landfill gas emission regulations in OAR Chapter 340 Division 239. These SEM regulations are detailed below. The following requirements are stricter than the NESHAP regulations in previous Sections and require additional compliance:

SURFACE EMISSION METHANE CONCENTRATION LIMITS

> *340-239-0200 (1) Surface Emission Methane Concentration Limits. Except as provided in OAR 340-239-0110(4), 340-239-0110(5), 340-239-0300, and 340-239-0600(1), beginning August 1, 2022, or upon commencing operation of a newly installed gas collection and control system or modification of an existing gas collection and control system pursuant to OAR 340-239-0110(1), whichever is later, no location on the landfill surface may exceed either of the following methane concentration limits:*
>
> *(a) 500 ppmv, other than nonrepeatable, momentary readings, as determined by instantaneous surface emissions monitoring conducted in accordance with OAR 340-239-0800(3)(b);*
>
> *(b) An average methane concentration limit of 25 ppmv as determined by integrated surface emissions monitoring conducted in accordance with OAR 340-239-800(3)(c).*

The 500 ppmv limit is already a requirement in the Federal regulations above, but an average methane concentration limit of 25 ppmv will be adhered to as required.

SURFACE EMISSION RECORDKEEPING

> *340-239-0700(2)(a)(C) All instantaneous surface readings of 100 ppmv methane or greater. All exceedances of the limits in OAR 340-239-0100(6)(b) and 340-239-0200, including the location of the leak (or affected grid), leak concentration in ppmv methane, date and time of measurement, the action taken to repair the leak, date of repair, any required remonitoring and the remonitored concentration in ppmv methane, wind speed during surface sampling, and the installation date and location of each well installed as part of a gas collection system expansion;*

The Federal regulations only require monitored surface emissions over 500 ppmv to be documented, so all of the above recordkeeping will be performed on emission points 100 ppmv or over. All repeatable

instantaneous records of 100 ppm or higher (taken during SEM) must be kept for 5 years AND recorded in the semi-annual reports.

SUMMARY AND CONCLUSIONS

As stipulated in OAR, if uncorrectable exceedances within the 10-day limitation are detected or emissions are discovered during an inspection by Regulatory Agencies, the landfill must perform monitoring on a 25-foot pathway on a quarterly basis for active disposal sites. Upon completion of four consecutive SEM events without an uncorrectable exceedance of the 25 ppmv or 500 ppmv standards, other than non-repeatable momentary readings, the landfill may perform the monitoring on a 100-foot spacing on an annual basis for closed landfills or quarterly for active disposal sites. In accordance with the provisions of the OAR, the monitoring of the landfill was done on a 25-foot pathway based on a prior inspection, in which exceedances were observed.

On November 14, 16, 20, 21, and December 8, 15, and 18, 2023, SCS performed fourth quarter 2023 surface emissions monitoring testing as required by the Oregon Landfill Gas emission Rule. Instantaneous surface emissions monitoring results indicated that five (5) locations exceeded the 500 ppmv maximum concentration on the above-mentioned dates (Table 1 in Attachment 3). The required first and second 10-day (OAR) and 30-day (OAR) follow-up monitoring indicated that not all areas returned to below regulatory compliance limits following system adjustments and remediation by site personnel. Based on these monitoring results, and in accordance with OAR, the site is required to perform a system expansion within 120 days of the initial detected exceedance or March 20, 2024. These results are discussed in a subsequent section of this report.

Also, during the instantaneous monitoring event, SCS performed integrated monitoring of the landfill surface. As required by the OAR, the landfill was divided into 50,000 square foot areas. The Coffin Butte Landfill surface is divided into 105 grids, as shown in Figure 1 in Attachment 1. During this monitoring event, several grids were not monitored, in accordance with the regulations, due to ongoing active landfilling activities, unsafe conditions, or there was no waste in place prior to the monitoring event.

During the monitoring event, there were eight (8) areas observed to exceed the 25 ppmv OAR integrated average threshold (Table 2 in Attachment 4). The required first and second 10-day OAR follow-up monitoring indicated that seven (7) areas had returned to compliance following system adjustments and remediation by SCS and site personnel. However, the remaining one (1) area remained above compliance. Based on these monitoring results, and in accordance with the OAR, the site is required to perform a system expansion within 120 days of the third detected exceedance or April 6, 2024. These results are discussed in a subsequent section of this report. However since the instantaneous exceedance regulation is from the initial exceedance, we will be using the March 20, 2024, due date for expansion. These results are discussed in a subsequent section of this report.

In addition, quarterly monitoring of the pressurized piping or components of the Gas Collection and Control System (GCCS) under positive pressure must be performed quarterly. Results of the testing of the landfill gas (LFG) Blower Flare Station (BFS) pressurized pipe and components indicated that all test locations were in compliance with the 500 ppmv requirements.

Further, as required under the OAR, any location on the landfill that has an observed instantaneous methane concentration above 100 ppmv, must be included within the surface emission monitoring report and if any instantaneous location records above 250 ppmv, it must be monitored in a 5-foot grid around the location to determine extents of the methane leak. During this reporting period, no locations were observed showing elevated concentrations between 100-499 ppmv, of the reporting threshold.

When these readings are observed to be repeatable, they are reported to site personnel for tracking and/or remediation and will be reported in the next submittal of the annual OAR report. Finally, to help prevent potential future exceedances, SCS recommends that the landfill surface be routinely inspected and any observed surface erosion be routinely repaired.

BACKGROUND

The Coffin Butte Landfill is an active organic refuse disposal site. By way of background, organic materials buried in a landfill decompose anaerobically (in the absence of oxygen) producing a combustible gas that contains approximately 50 to 60 percent methane gas, 40 to 50 percent carbon dioxide, and a trace amount of various other gases, some of which are odorous. The Coffin-Butte/Corvallis property contains a system to control the combustible gases generated in the landfill.

SURFACE EMISSIONS MONITORING

On November 14, 16, 20, 21, and December 8, 15, and 18, 2023, the instantaneous and integrated SEM was performed over the surface of the subject site. The intent of the monitoring was to identify any specific locations or areas of the landfill surface with organic compound concentrations exceeding the OAR threshold limit values of 500 ppmv measured as methane for instantaneous monitoring, or an average methane concentration of 25 ppmv for the integrated monitoring in the 50,000 square foot grids as required under the OAR. During this event, SCS performed the monitoring on a 25 and 100-foot pathway in accordance with the rules as required.

EMISSIONS TESTING INSTRUMENTATION/CALIBRATION

The instruments used to perform the landfill surface emission testing consisted of the following:

- Thermo Scientific TVA 2020 portable Flame Ionization Detector (FID). This instrument measures methane in the air over a range of 1 to 50,000 ppmv. The TVA 2020 meets the State of California Air Resources Board (CARB) requirements for combined instantaneous and integrated monitoring and was calibrated in accordance with the United States Environmental Protection Agency (US EPA) Method 21.

- Weather Anemometer with continuous recorder for meteorological conditions in accordance with the OAR.

Instrument calibration logs and weather information are shown in Attachments 5 and 6.

SURFACE EMISSIONS MONITORING PROCEDURES

Surface emissions monitoring was conducted in accordance with the OAR and SEM requirements. Monitoring was performed with the FID inlet held within 2 inches of the landfill surface while a technician walked a grid in parallel paths not more than 25 or 100 feet apart over the landfill's surface. Cracks, holes, and other cover penetrations in the surface were also tested. Surface emissions readings were monitored continuously and recorded every 5 seconds. Any areas exceeding the 100 or 500 ppmv standards (reporting and compliance levels, respectively) would be GPS-tagged and stake-marked for on-site personnel to perform remediation or repairs.

The integrated average is based on the readings stored on the instrument, which are recorded every 5 seconds. The readings are then downloaded and the averages are calculated for each grid using SCS

eTools®. All readings are maintained in this secure SCS Database. The readings are not provided in the report due to the volume of readings but can be furnished upon request.

Recorded wind speed results are shown in Attachment 6. Wind speed averages were observed to remain below the alternative threshold of 10 miles per hour, and no instantaneous speeds exceeded 20 miles per hour. No rainfall occurred within 72 hours of the monitoring events. Therefore, site meteorological conditions were within the alternatives of the OAR requirements on the above-mentioned dates.

TESTING RESULTS

During this event, SCS performed the monitoring on a 25-foot pathway in accordance with the rule as required under the OAR. The intent of the monitoring was to identify any specific locations or areas of the landfill surface with organic compound concentrations exceeding the OAR or NSPS threshold limit values of 500 ppmv measured as methane for instantaneous monitoring, or an average methane concentration of 25 ppmv for the integrated monitoring (OAR).

On November 14, 16, 20, and 21, 2023, SCS performed fourth quarter 2023 instantaneous emissions monitoring testing as required by the Oregon DEQ/OAR. During this monitoring, surface emissions results indicated that five (5) location exceeded the 500 ppmv maximum concentration. The required first and second 10-day (OAR) follow-up monitoring performed on December 8, and 15, 2023, and the 1-month (OAR) follow-up monitoring event performed on December 18, 2023, indicated that not all locations returned below compliance limits as required, following system adjustments and remediation by site personnel. Based on these monitoring results, and in accordance with NSPS, the site is required to perform a system expansion within 120 days of the initial detected exceedance or March 20, 2024. Results of the initial and follow-up monitoring are shown in Attachment 3 (Table 1). Calibration logs for the monitoring equipment are provided in Attachment 5. Results of the monitoring are shown in Attachments 2 and 3 (Table 1).

Additionally, calculated integrated monitoring indicated eight (8) integrated exceedances of the 25-ppmv requirement on November 14, 16, 20, and 21, 2023. The required first and second 10-day OAR follow-up monitoring performed on December 8, and 15, 2023, indicated that seven (7) of the eight (8) areas had returned to compliance. In accordance with requirements for expansion and remediation, the exceedance locations need to be remediated and returned to compliance in accordance with the rule (expansion of the collection system or an alternative compliance option if approved by the OAR) within 120 days after the third integrated exceedance, which will be due by April 6, 2024. However since the instantaneous exceedance regulation is from the initial exceedance, we will be using the March 20, 2024, due date for expansion. Calibration logs for monitoring equipment are provided in Attachment 5.

During this monitoring event, several girds were not monitored, in accordance with the OAR, due to active landfilling activities, unsafe conditions, overgrown vegetation, or no waste in place. SCS will continue to monitor all accessible locations during the first quarter of 2024.

PRESSURIZED PIPE AND COMPONENT LEAK MONITORING

On November 21, 2023, quarterly leak monitoring was performed in accordance with the OAR. SCS performed LFG pressurized pipe and component leak monitoring at the BFS. Monitoring was performed with the detector inlet held one-half of an inch from the pressurized pipe and associated components. No locations exceeding the 500 ppmv threshold were observed during our monitoring event. The maximum reading, which was 5.00 ppmv, was well below the maximum threshold (see Table 1 for component results). Therefore, all pressurized pipes and components located at the LFG BFS were in compliance at the time of our testing.

PROJECT SCHEDULE

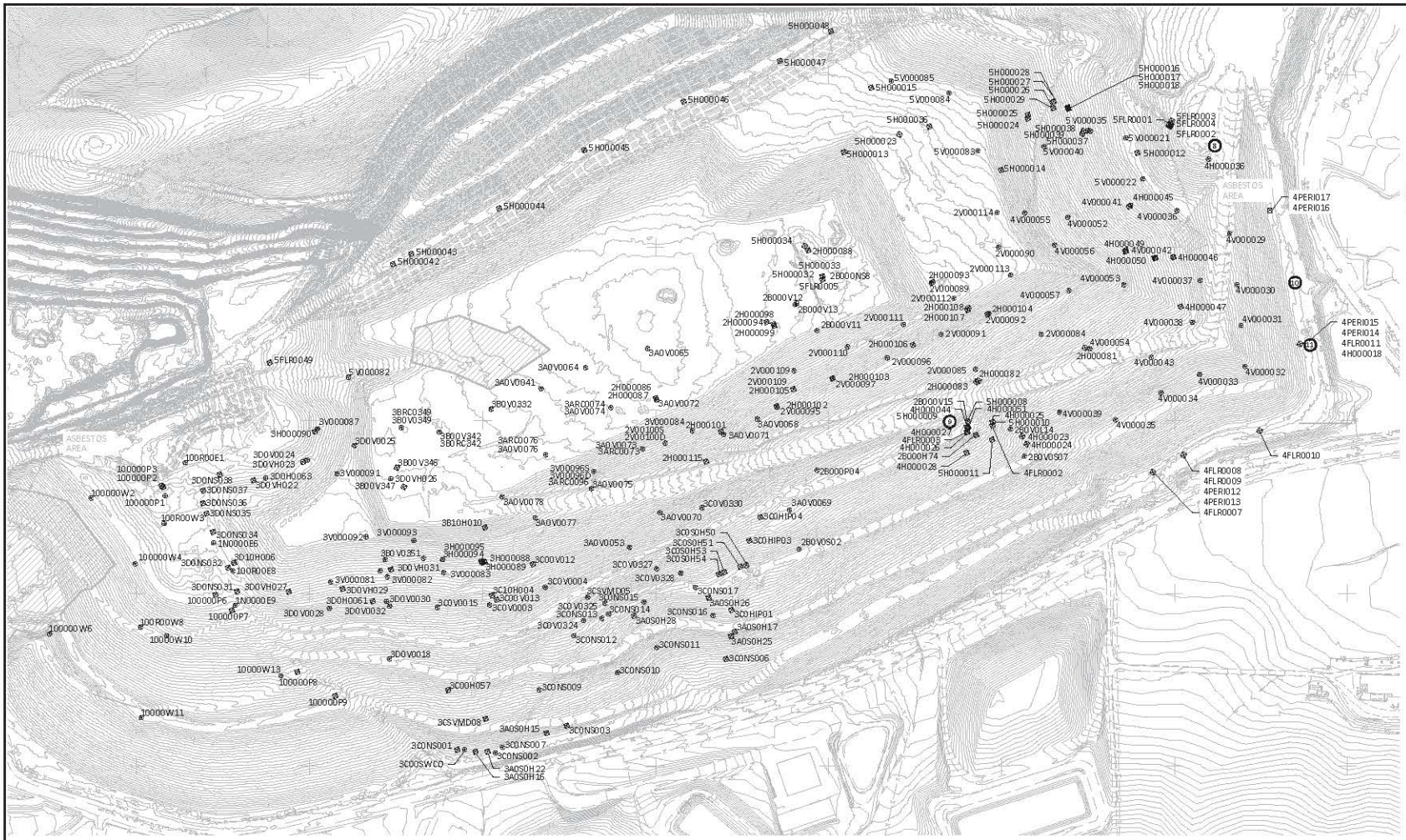
According to the OAR, surface emissions monitoring at active landfills is required to be performed on a quarterly basis. Therefore, in accordance with our approved Work Scope, the first quarter 2024 (January through March) surface emissions testing event is scheduled to be performed by the end of March 2024.

STANDARD PROVISIONS

This report addresses the conditions of the subject site during the testing dates only. Accordingly, we assume no responsibility for any changes that may occur subsequent to our testing which could affect the surface emissions at the subject site or adjacent properties.

Attachment 1

Landfill Grid



NOTES:

1. "EGC" WELLS LEFT OFF FOR CLARITY.

REV	DATE	DESCRIPTION	DRN BY	DSN BY	CHK BY
0	07/14/22	AS-BUILT	PD	AH	AH

REPUBLIC SERVICES
28972 COFFIN BUTTE ROAD CORVALLIS OR 97330 PHONE: (541) 745-5792 FAX: (541) 745-3825

ENERGYNEERING SOLUTIONS
15820 BARCLAY DRIVE SISTERS, OR 97759 PHONE: (541) 549-8766 FAX: (541) 549-1901

WELLHEAD LAYOUT

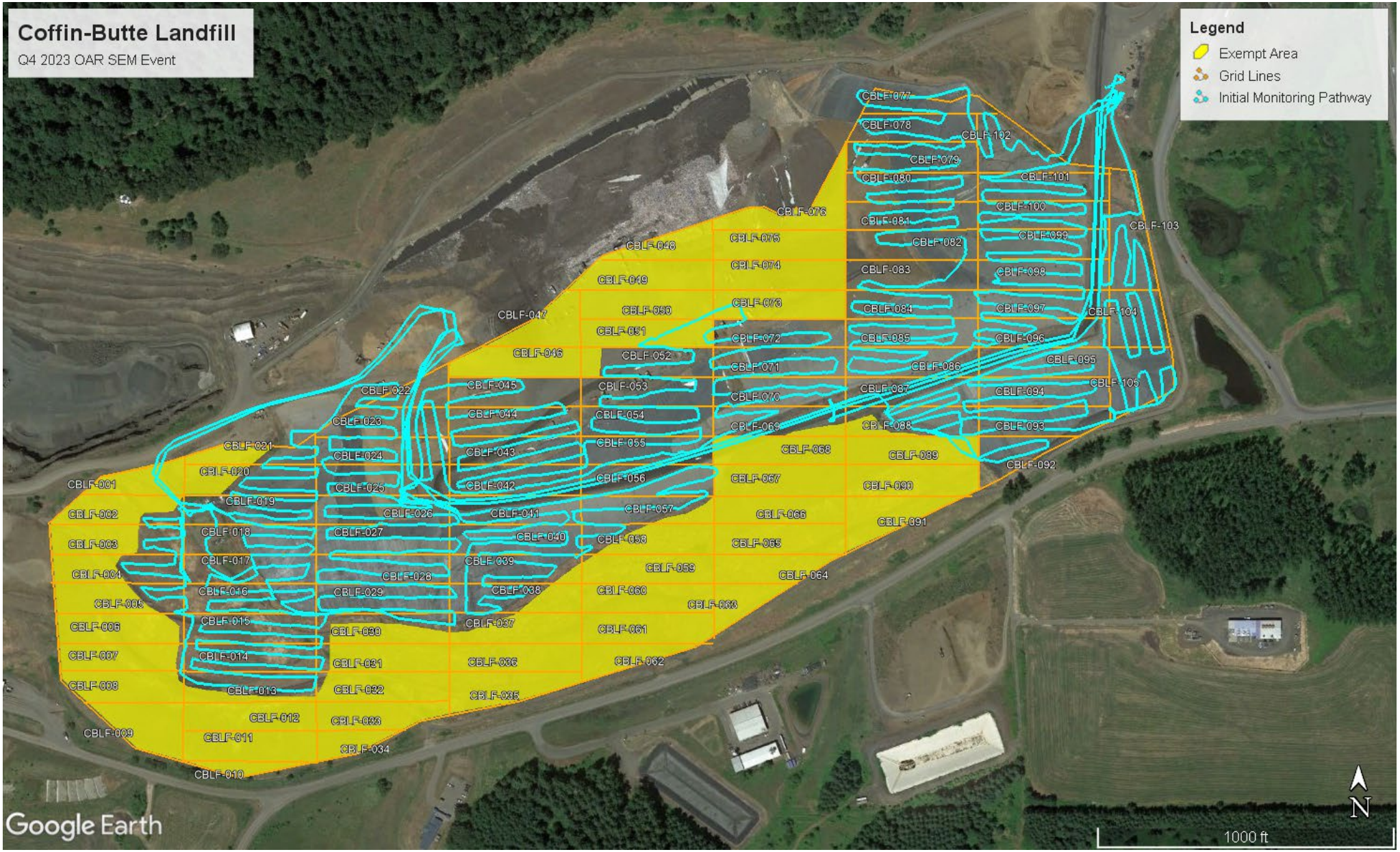
2022 WELLFIELD GCCS AS-BUILT
COFFIN BUTTE LANDFILL
CORVALLIS, OR

DRAWING NO.
W1.01

PROJECT NO.
XXX.XXX

Attachment 2

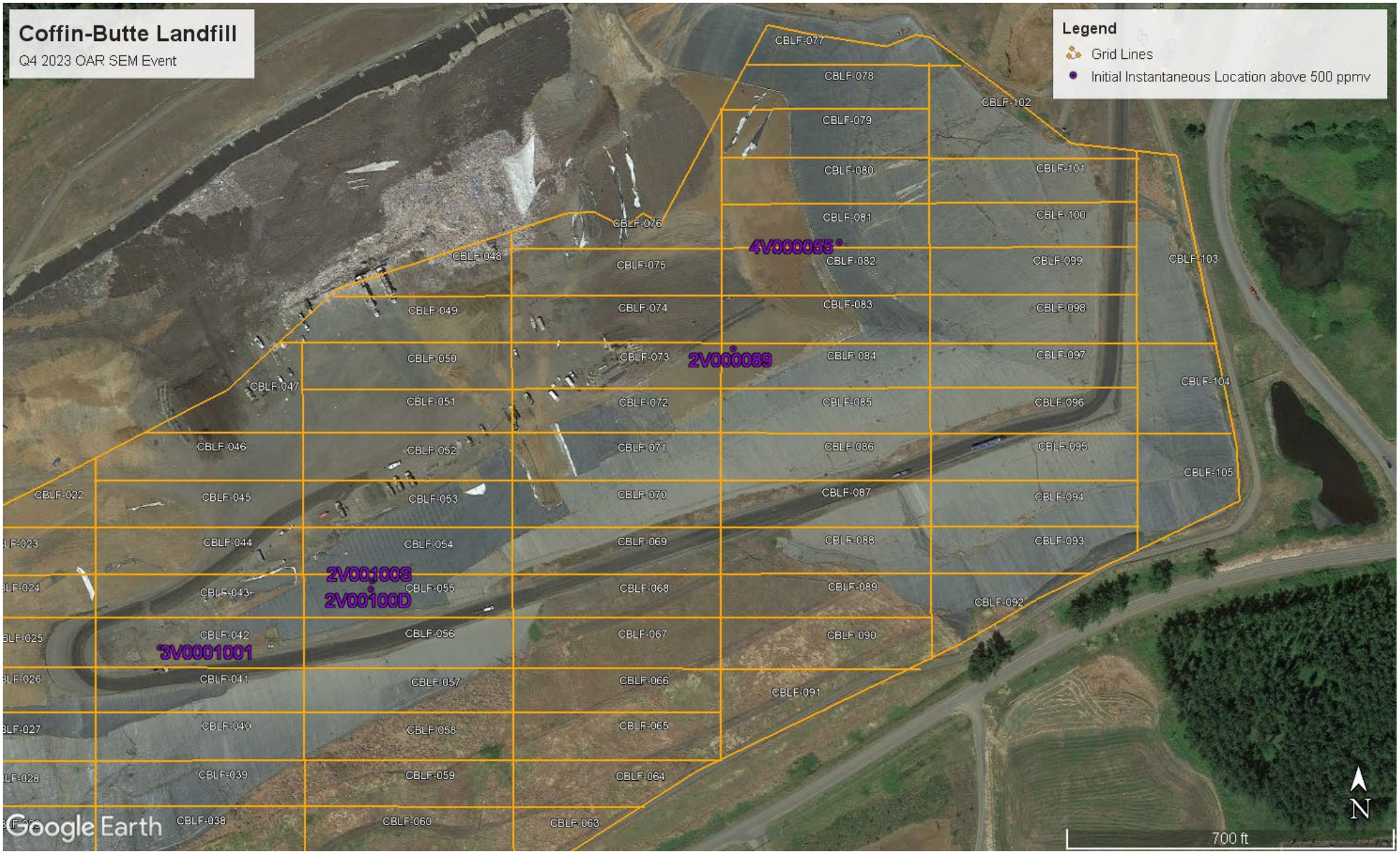
Surface Pathway



Fourth Quarter 2023
Initial Surface Emissions Monitoring Pathway
Coffin Butte Landfill, Corvallis, Oregon

Attachment 3

Instantaneous and Component Emissions Monitoring Results



Fourth Quarter 2023
Initial Emissions Monitoring Results Greater Than 500 ppmv
Coffin Butte Landfill, Corvallis, Oregon

Fourth Quarter 2023

Table 1. Instantaneous Surface and Component Emissions Monitoring Results
Coffin-Butte Landfill, Corvallis, Oregon

Instantaneous Data Report for November 14, 16, 20, 21, and December 8, 15 and 18, 2023

Location (Surface)	Initial Monitoring Results (ppmv) 11/21/2023	First 10-Day Monitoring Results (ppmv) 12/8/2023	Second 10-Day Monitoring Results (ppmv) 12/15/2023	1-Month Follow-Up Monitoring Results (ppmv) 12/18/2023	120-Day Expansion Due Date:	Latitude	Longitude
2V000089	3300	800	752	1360	**March 20,2024**	44.70056003	-123.22847002
2V00100D	1600	189	N/A	269	N/A	44.69920702	-123.23142330
2V00100S	2191	1000	336	449	N/A	44.69920753	-123.23143126
3V0001001	5194	250	N/A	105	N/A	44.69881701	-123.23317202
4V000055	3700	3000	1853	5807	**March 20,2024**	44.70118004	-123.22759998

Instantaneous Data Report for November 14, 16, 20, 21, and December 8, 15 and 18, 2023
Readings between 100-499 ppmv

N/A

Fourth Quarter 2023

Table 1. Instantaneous Surface and Component Emissions Monitoring Results Coffin-Butte Landfill, Corvallis, Oregon

Pressurized Pipe and Component Results

Route	Date	Concentration (ppmv)
FLARE STATION	11/21/2023	5.00

No other exceedances of the 500 ppmv threshold were observed during the fourth quarter of 2023 monitoring.

Attachment 4

Integrated Monitoring Results

Fourth Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-001	--	--	Exempt Area
CBLF-002	--	--	Exempt Area
CBLF-003	11/16/2023	2.58	
CBLF-004	11/16/2023	2.21	
CBLF-005	11/16/2023	2.07	
CBLF-006	--	--	Exempt Area
CBLF-007	--	--	Exempt Area
CBLF-008	--	--	Exempt Area
CBLF-009	--	--	Exempt Area
CBLF-010	--	--	Exempt Area
CBLF-011	--	--	Exempt Area
CBLF-012	--	--	Exempt Area
CBLF-013	11/16/2023	1.95	
CBLF-014	11/16/2023	1.89	
CBLF-015	11/16/2023	1.91	
CBLF-016	11/20/2023	4.59	
CBLF-017	11/16/2023	1.78	
CBLF-018	11/20/2023	5.70	
CBLF-019	11/20/2023	2.95	
CBLF-020	11/20/2023	2.66	
CBLF-021	11/20/2023	9.18	
CBLF-022	11/14/2023	62.94	Initial Monitoring
CBLF-022	11/21/2023	94.31	First 10-Day Recheck
CBLF-022	12/8/2023	34.78	Second 10-Day Recheck Expansion due by March 20, 2024
CBLF-023	11/20/2023	35.35	Initial Monitoring
CBLF-023	11/21/2023	68.53	First 10-Day Recheck
CBLF-023	12/8/2023	17.61	Second 10-Day Recheck
CBLF-024	11/20/2023	14.26	
CBLF-025	11/20/2023	10.02	
CBLF-026	11/20/2023	25.53	Initial Monitoring
CBLF-026	11/21/2023	29.47	First 10-Day Recheck
CBLF-026	12/8/2023	9.45	Second 10-Day Recheck
CBLF-027	11/20/2023	20.35	
CBLF-028	11/20/2023	11.49	
CBLF-029	11/20/2023	2.35	
CBLF-030	11/20/2023	5.22	
CBLF-031	--	--	Exempt Area
CBLF-032	--	--	Exempt Area
CBLF-033	--	--	Exempt Area
CBLF-034	--	--	Exempt Area
CBLF-035	--	--	Exempt Area
CBLF-036	--	--	Exempt Area

Fourth Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-037	--	--	Exempt Area
CBLF-038	11/20/2023	6.86	
CBLF-039	11/20/2023	10.19	
CBLF-040	11/20/2023	25.91	Initial Monitoring
CBLF-040	11/21/2023	7.64	First 10-Day Recheck
CBLF-041	--	--	Exempt Area
CBLF-042	11/14/2023	24.68	
CBLF-043	11/14/2023	22.67	
CBLF-044	11/14/2023	35.15	Initial Monitoring
CBLF-044	11/21/2023	11.21	First 10-Day Recheck
CBLF-045	11/14/2023	35.63	Initial Monitoring
CBLF-045	11/21/2023	28.55	First 10-Day Recheck
CBLF-045	12/8/2023	10.84	Second 10-Day Recheck
CBLF-046	--	--	Exempt Area
CBLF-047	--	--	Exempt Area
CBLF-048	--	--	Exempt Area
CBLF-049	--	--	Exempt Area
CBLF-050	--	--	Exempt Area
CBLF-051	--	--	Exempt Area
CBLF-052	11/14/2023	141.79	Initial Monitoring
CBLF-052	11/21/2023	14.85	First 10-Day Recheck
CBLF-053	11/14/2023	60.42	Initial Monitoring
CBLF-053	11/21/2023	9.83	First 10-Day Recheck
CBLF-054	11/14/2023	19.13	
CBLF-055	11/14/2023	7.70	
CBLF-056	11/20/2023	18.60	
CBLF-057	11/20/2023	14.07	
CBLF-058	11/20/2023	11.60	
CBLF-059	--	--	Exempt Area
CBLF-060	--	--	Exempt Area
CBLF-061	--	--	Exempt Area
CBLF-062	--	--	Exempt Area
CBLF-063	--	--	Exempt Area
CBLF-064	--	--	Exempt Area
CBLF-065	--	--	Exempt Area
CBLF-066	--	--	Exempt Area
CBLF-067	--	--	Exempt Area
CBLF-068	--	--	Exempt Area
CBLF-069	11/14/2023	10.35	
CBLF-070	11/14/2023	2.43	
CBLF-071	11/14/2023	15.24	
CBLF-072	11/14/2023	21.91	
CBLF-073	--	--	Exempt Area

Fourth Quarter 2023
Table 2. Integrated Surface Emissions Monitoring Results
Coffin-Butte Landfill Corvallis, Oregon

Point Name	Record Date	FID Concentration (ppm)	Comments
CBLF-074	--	--	Exempt Area
CBLF-075	--	--	Exempt Area
CBLF-076	--	--	Exempt Area
CBLF-077	--	--	Exempt Area
CBLF-078	11/14/2023	1.00	
CBLF-079	11/14/2023	7.07	
CBLF-080	11/14/2023	11.64	
CBLF-081	11/14/2023	11.30	
CBLF-082	11/14/2023	21.34	
CBLF-083	--	--	Exempt Area
CBLF-084	11/14/2023	24.57	
CBLF-085	11/14/2023	9.35	
CBLF-086	11/14/2023	6.22	
CBLF-087	11/14/2023	13.13	
CBLF-088	11/14/2023	1.64	
CBLF-089	--	--	Exempt Area
CBLF-090	--	--	Exempt Area
CBLF-091	--	--	Exempt Area
CBLF-092	11/14/2023	3.36	
CBLF-093	11/14/2023	2.34	
CBLF-094	11/14/2023	18.46	
CBLF-095	11/14/2023	3.90	
CBLF-096	11/14/2023	3.26	
CBLF-097	11/14/2023	5.56	
CBLF-098	11/14/2023	6.21	
CBLF-099	11/14/2023	2.99	
CBLF-100	11/14/2023	3.43	
CBLF-101	11/14/2023	5.76	
CBLF-102	11/14/2023	1.16	
CBLF-103	11/14/2023	0.63	
CBLF-104	11/14/2023	2.78	
CBLF-105	11/14/2023	8.12	

Attachment 5

Calibration Logs

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 11/14/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 3 MPH Wind Direction: SE Barometric Pressure: 29.89

Air Temperature: 39 deg F General Weather Conditions: Sunny

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	1
2	0	499	1
3	0	500	0

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0.7 ppm

Downwind NW side of site Reading: 4.1 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 11/16/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: SE Barometric Pressure: 29.84

Air Temperature: 39 deg F General Weather Conditions: Overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	2
2	0	499	1
3	0	500	1

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0.9 ppm

Downwind NW side of site Reading: 3.8 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 9/20/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: SE Barometric Pressure: 29.95

Air Temperature: 39 deg F General Weather Conditions: Overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	501	1
2	0	499	1
3	0	500	0

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 1.4 ppm

Downwind NW side of site Reading: 3.2 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 11/21/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 9 MPH Wind Direction: SE Barometric Pressure: 29.78

Air Temperature: 36 deg F General Weather Conditions: Overcast

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	500	0
2	0	501	1
3	0	499	1

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

Up Wind of landfill area on SE side. Reading: 0.7 ppm

Downwind NW side of site Reading: 3.3 ppm

NOTES:

CARBON EMISSION MONITORING
CALIBRATION AND PERTINENT DATA

Date: 12/8/2023 Site Name: Coffin Butte Landfill

WEATHER OBSERVATIONS SCS Employee Riley Baksic

Wind Speed: 8 MPH Wind Direction: SE Barometric Pressure: 29.82

Air Temperature: 42 deg F General Weather Conditions: Sunny

CALIBRATION INFORMATION

Pre-monitoring Calibration Precision Check

Response Time trial #1 *5 seconds*

Response Time trial #2 *5 seconds*

Response Time Trial #3 6 seconds

Instrument ID: TVA-202016031210 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	|(Cal Gas Conc. - Cal Gas Reading)|
1	0	500	0
2	0	499	1
3	0	501	1

Average Difference: 0.00

Calibration Precision = Average Difference / Cal Gas Concentration X 100%
= 0 / 500 X 100%
= 0.0% %

Post-monitoring Calibration Check

Zero Air Reading: 0 ppm Cal Gas Reading: 500 ppm

BACKGROUND CONCENTRATION CHECKS

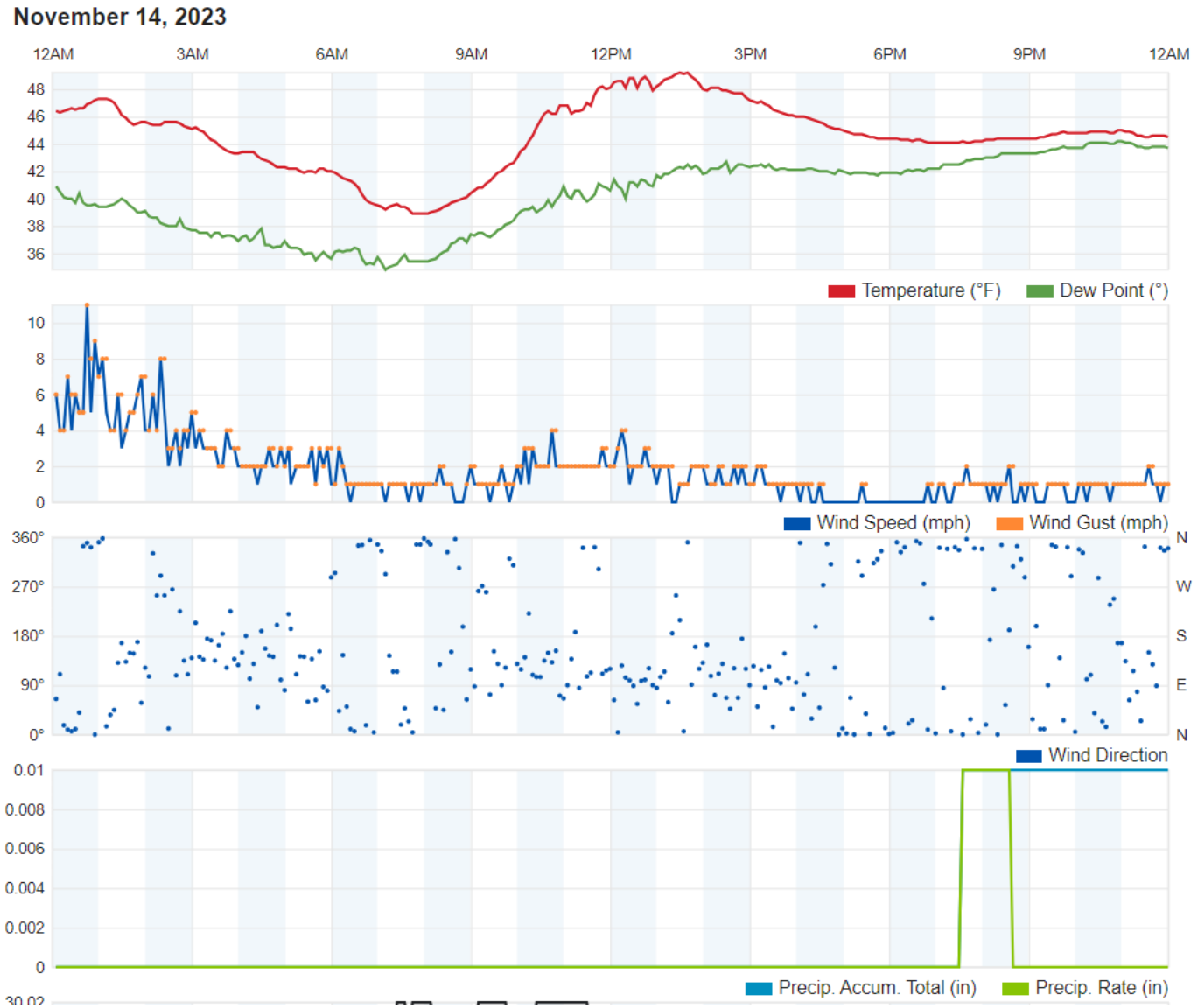
Up Wind of landfill area on SE side. Reading: 1.9 ppm

Downwind NW side of site Reading: 4.4 ppm

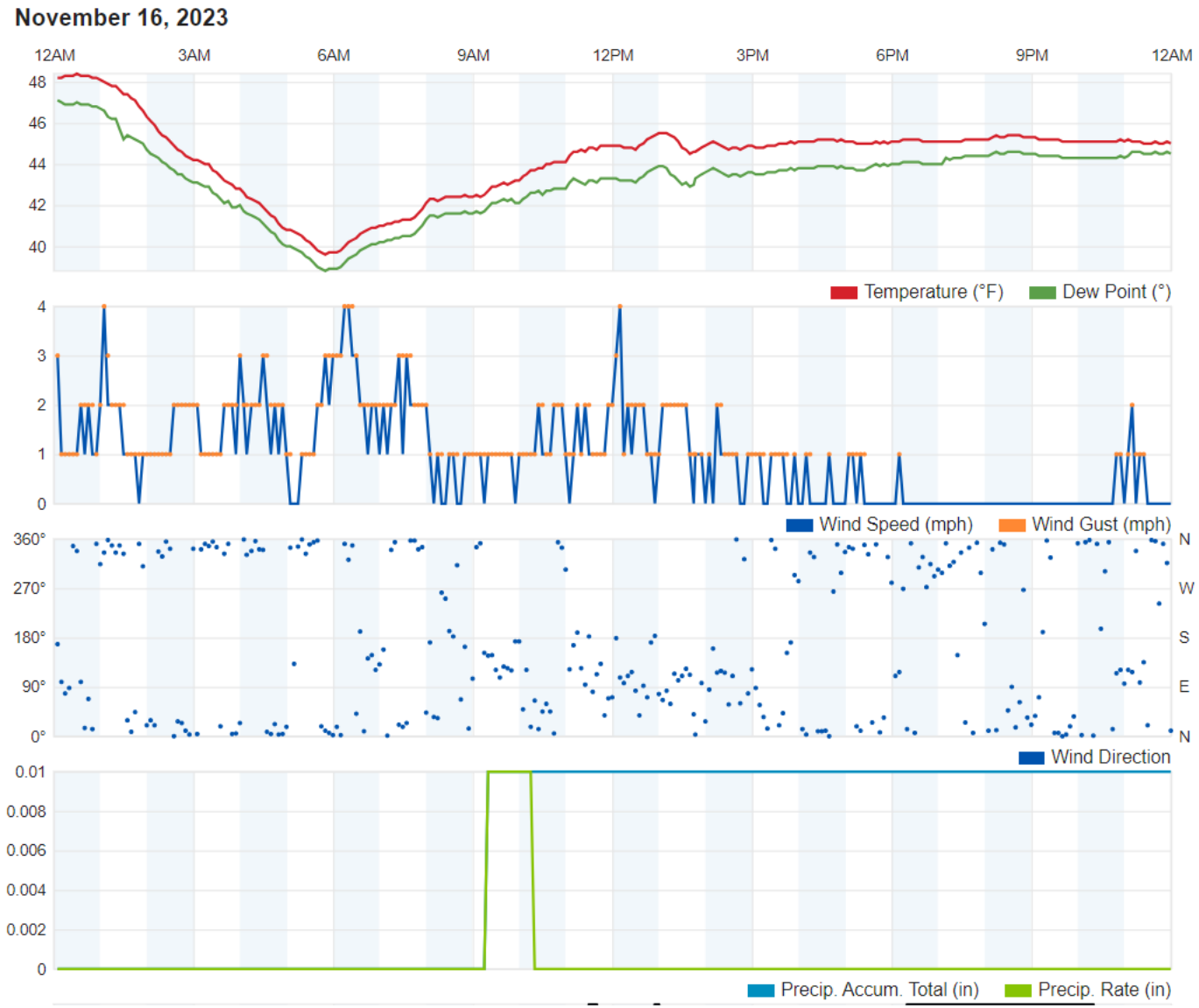
NOTES:

Attachment 6

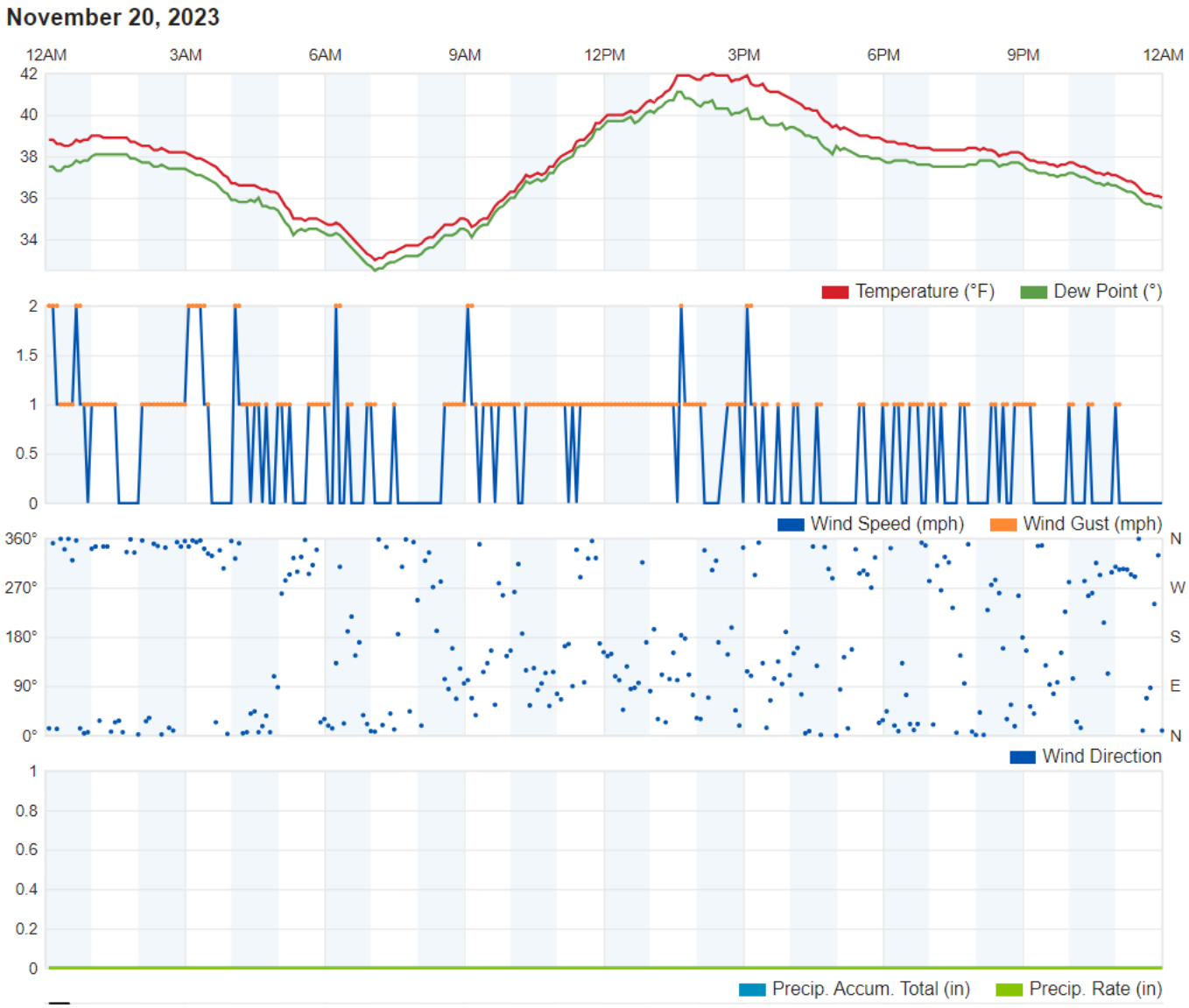
Weather Data



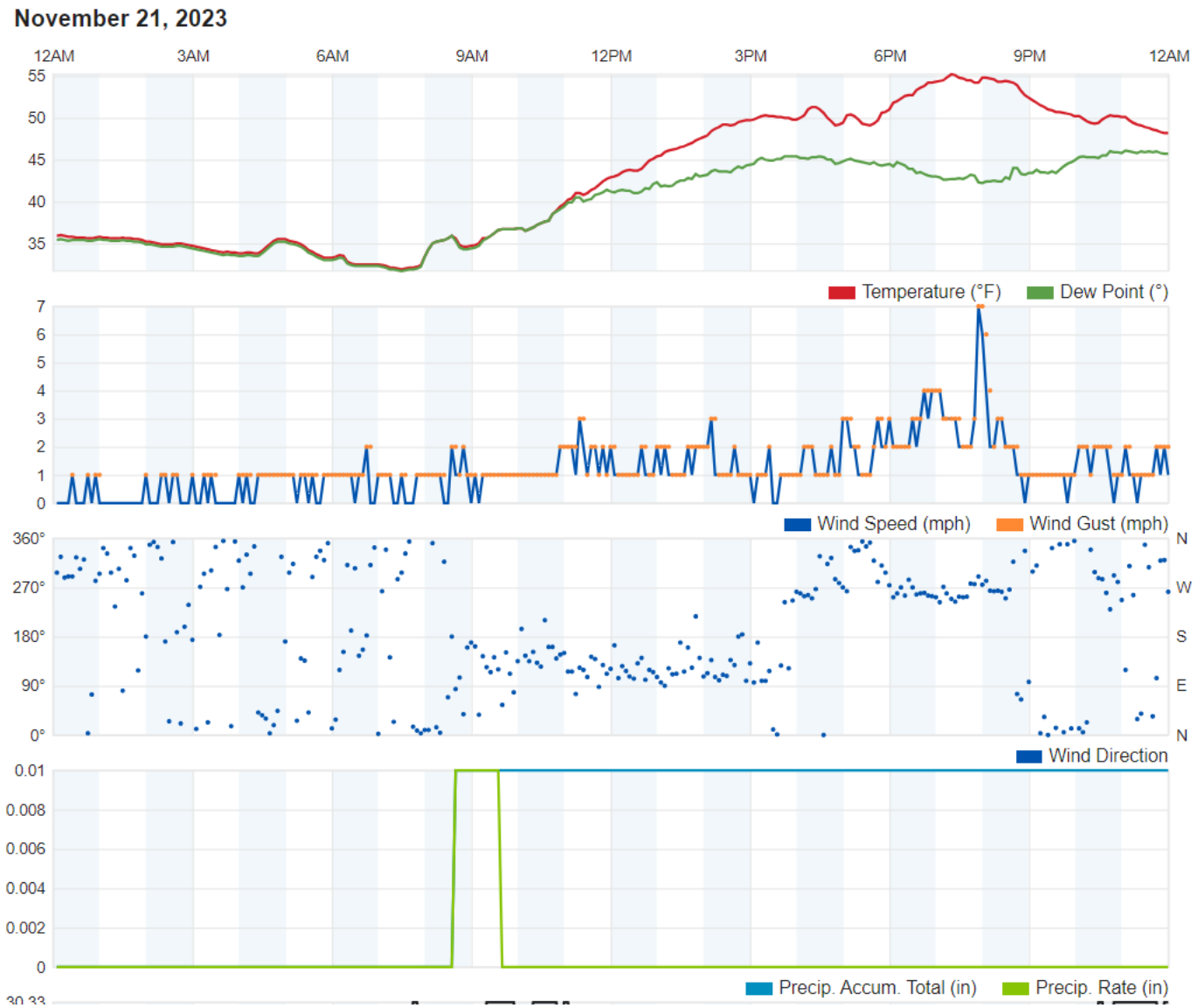
November 14, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



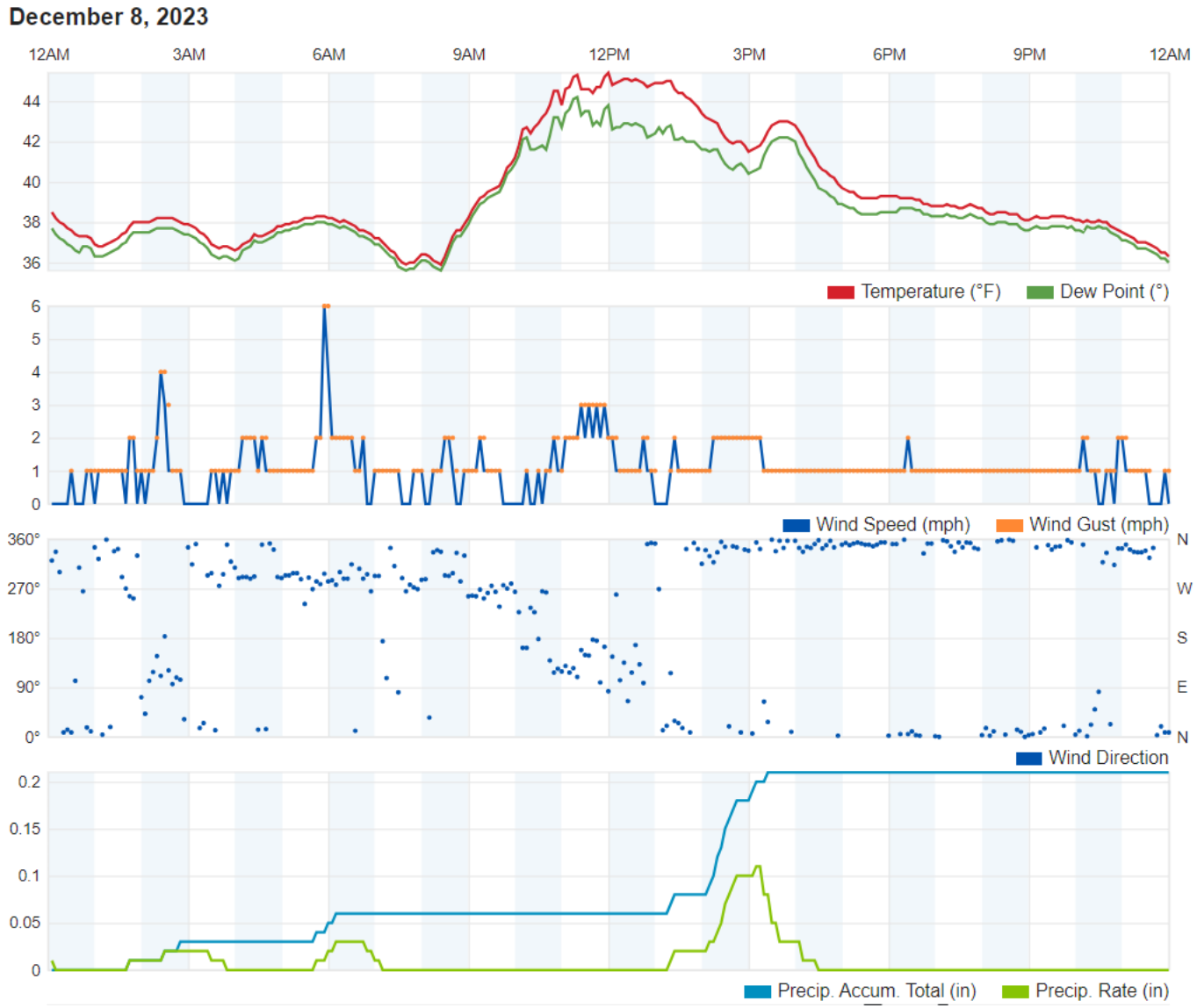
November 16, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



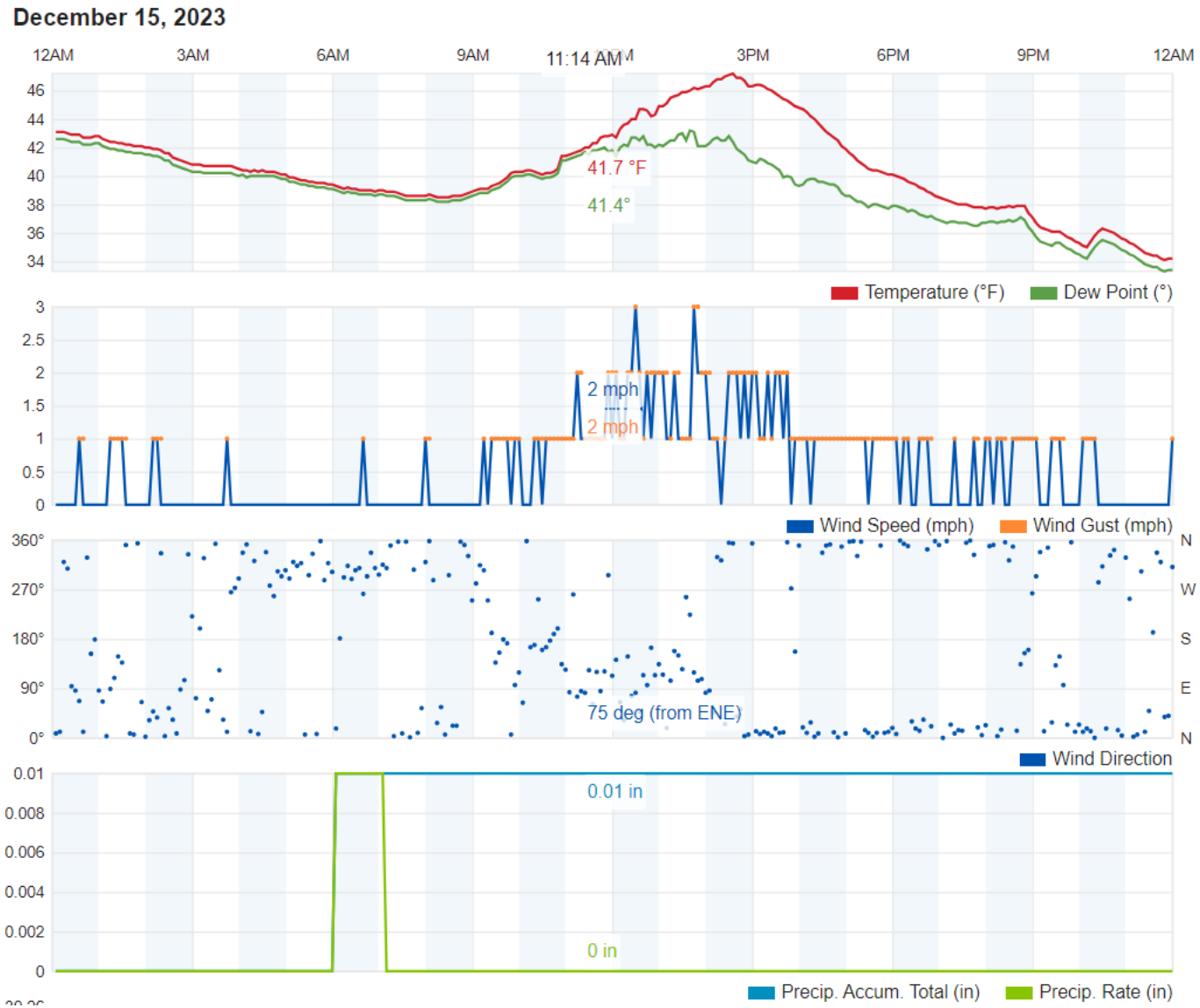
November 20, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



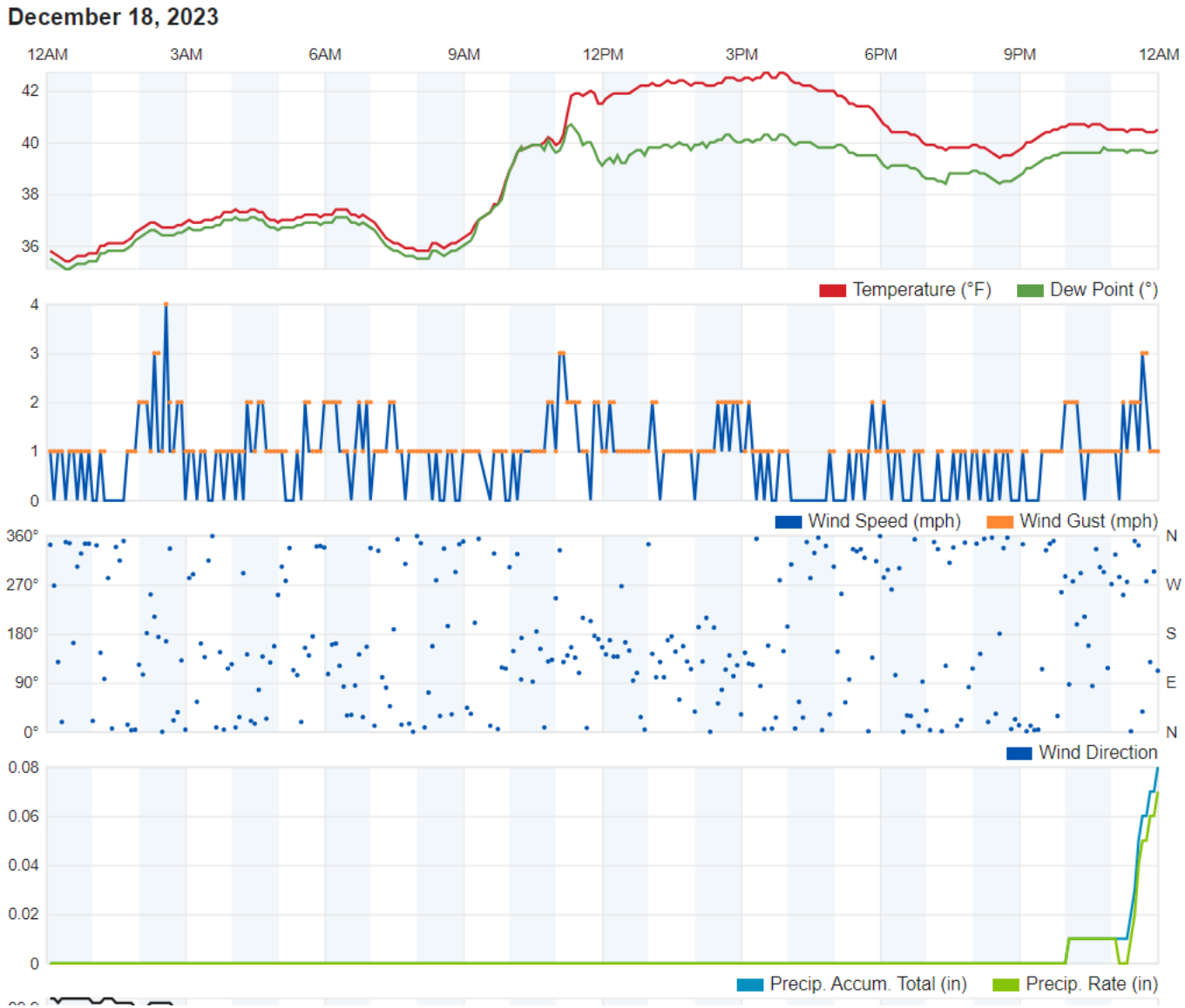
November 21, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



December 8, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



December 15, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon



December 18, 2023
Emissions Monitoring Weather Data
Coffin-Butte Landfill, Corvallis, Oregon

APPENDIX B

WELLFIELD PRESSURE EXCEEDANCE REPORT

Coffin Butte Landfill
Wellfield Pressure Exceedance Report
Reporting Period: July 1, 2023 to December 31, 2023

WellName	Date/Time Monitored	Pressure (in. H20)	Temperature (°F)	Date/Time Remediated	Duration Days
2H000082	9/26/2023 14:05	1.60	73.0	9/28/2023 14:26	2
2V000085	10/21/2023 15:38	2.22	73.0	11/10/2023 14:35	20
3D0NS034	8/11/2023 15:30	0.02	86.0	8/30/2023 8:52	19
3D0VH031	9/13/2023 14:19	27.20	78.0	9/27/2023 16:32	14
5V000084	8/25/2023 10:50	0.10	85.0	9/22/2023 13:58	28
5V000085	8/25/2023 10:41	6.51	100.0	9/22/2023 13:53	28

* Well 3D0NS034 is operating under the approved alternative monitoring plan. Therefore, the root cause analysis is not applicable.

APPENDIX C

CONTROL DEVICE DOWNTIME LOG/TREATMENT SYSTEM DOWNTIME LOG

CONTROL DEVICE DOWNTIME LOG – FLARE #1

Coffin Butte Landfill
Control Device Downtime for Flare #1
Reporting Period: July 1, 2023 to December 31, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm:ss)	Description
7/3/2023 21:56	7/3/2023 22:18	0:22:00	LFG diverted to PNGC
7/6/2023 14:12	7/6/2023 14:22	0:10:00	LFG diverted to PNGC
7/13/2023 10:16	7/13/2023 10:28	0:12:00	LFG diverted to PNGC
7/25/2023 15:08	7/25/2023 15:18	0:10:00	LFG diverted to PNGC
7/27/2023 14:48	7/27/2023 14:56	0:08:00	LFG diverted to PNGC
7/28/2023 12:22	7/28/2023 12:34	0:12:00	LFG diverted to PNGC
8/11/2023 2:04	8/11/2023 2:14	0:10:00	LFG diverted to PNGC
8/11/2023 19:22	8/11/2023 21:40	2:18:00	LFG diverted to PNGC
8/16/2023 1:20	8/16/2023 1:34	0:14:00	LFG diverted to PNGC
8/16/2023 7:44	8/16/2023 8:10	0:26:00	LFG diverted to PNGC
8/17/2023 7:40	8/17/2023 8:24	0:44:00	LFG diverted to PNGC
8/17/2023 11:58	8/17/2023 15:22	3:24:00	LFG diverted to PNGC
8/17/2023 16:12	8/17/2023 17:20	1:08:00	LFG diverted to PNGC
8/18/2023 9:16	8/18/2023 13:40	4:24:00	LFG diverted to PNGC
8/25/2023 4:42	8/25/2023 4:48	0:06:00	LFG diverted to PNGC
8/25/2023 5:00	8/25/2023 5:04	0:04:00	LFG diverted to PNGC
8/28/2023 12:56	8/29/2023 11:22	22:26:00	LFG diverted to PNGC
8/30/2023 9:46	8/30/2023 16:08	6:22:00	LFG diverted to PNGC
8/30/2023 19:16	8/31/2023 8:38	13:22:00	LFG diverted to PNGC
8/31/2023 11:50	8/31/2023 11:54	0:04:00	LFG diverted to PNGC
9/1/2023 6:00	9/1/2023 12:54	6:54:00	LFG diverted to PNGC
9/2/2023 21:54	9/2/2023 22:02	0:08:00	LFG diverted to PNGC
9/12/2023 13:16	9/13/2023 8:08	18:52:00	LFG diverted to PNGC
9/16/2023 0:56	9/16/2023 1:00	0:04:00	LFG diverted to PNGC
9/16/2023 1:12	9/16/2023 1:14	0:02:00	LFG diverted to PNGC
9/16/2023 4:30	9/16/2023 19:20	14:50:00	LFG diverted to PNGC
9/23/2023 11:22	9/23/2023 11:30	0:08:00	LFG diverted to PNGC
9/23/2023 13:42	9/23/2023 13:50	0:08:00	LFG diverted to PNGC
9/25/2023 17:36	9/25/2023 17:44	0:08:00	LFG diverted to PNGC
9/26/2023 12:34	9/26/2023 12:42	0:08:00	LFG diverted to PNGC
9/27/2023 2:02	9/27/2023 2:44	0:42:00	LFG diverted to PNGC
9/27/2023 3:10	9/27/2023 3:20	0:10:00	LFG diverted to PNGC
9/27/2023 3:36	9/27/2023 3:46	0:10:00	LFG diverted to PNGC
9/27/2023 5:04	9/27/2023 5:26	0:22:00	LFG diverted to PNGC
9/27/2023 9:36	9/27/2023 11:32	1:56:00	Power loss due to sump cleaning
9/27/2023 11:52	9/27/2023 12:30	0:38:00	LFG diverted to PNGC
9/27/2023 12:36	9/27/2023 12:42	0:06:00	LFG diverted to PNGC
9/27/2023 13:06	9/27/2023 13:30	0:24:00	LFG diverted to PNGC
9/27/2023 14:10	9/27/2023 14:30	0:20:00	LFG diverted to PNGC
9/27/2023 15:04	9/27/2023 15:14	0:10:00	LFG diverted to PNGC
9/27/2023 15:56	9/27/2023 16:10	0:14:00	LFG diverted to PNGC
9/27/2023 18:30	9/27/2023 18:40	0:10:00	LFG diverted to PNGC

Coffin Butte Landfill
Control Device Downtime for Flare #1
Reporting Period: July 1, 2023 to December 31, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm:ss)	Description
10/11/2023 8:12	10/11/2023 8:26	0:14:00	LFG diverted to PNGC
10/20/2023 2:10	10/20/2023 2:22	0:12:00	LFG diverted to PNGC
10/24/2023 4:22	10/24/2023 4:30	0:08:00	LFG diverted to PNGC
10/24/2023 23:04	10/25/2023 7:30	8:26:00	LFG diverted to PNGC
10/25/2023 7:36	10/25/2023 8:52	1:16:00	LFG diverted to PNGC
11/2/2023 5:16	11/2/2023 5:58	0:42:00	LFG diverted to PNGC
11/2/2023 10:14	11/2/2023 10:28	0:14:00	LFG diverted to PNGC
11/30/2023 10:26	11/30/2023 13:58	3:32:00	LFG diverted to PNGC
12/6/2023 9:24	12/6/2023 11:52	2:28:00	LFG diverted to PNGC
12/7/2023 13:24	12/7/2023 13:26	0:02:00	LFG diverted to PNGC
12/11/2023 11:06	12/11/2023 11:14	0:08:00	LFG diverted to PNGC
12/11/2023 12:38	12/11/2023 13:02	0:24:00	LFG diverted to PNGC
12/21/2023 15:44	12/21/2023 15:54	0:10:00	LFG diverted to PNGC
12/21/2023 16:28	12/21/2023 16:40	0:12:00	LFG diverted to PNGC
12/22/2023 11:04	12/22/2023 11:22	0:18:00	LFG diverted to PNGC
12/22/2023 11:42	12/22/2023 11:58	0:16:00	LFG diverted to PNGC

CONTROL DEVICE DOWNTIME LOG – FLARE #2

Coffin Butte Landfill
Control Device Downtime for Flare #2
Reporting Period: July 1, 2023 to December 31, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm:ss)	Description
8/16/2023 7:44	8/16/2023 7:56	0:12:00	LFG diverted to PNGC
9/27/2023 9:36	9/27/2023 14:18	4:42:00	Power loss due to sump cleaning
10/25/2023 7:28	10/25/2023 7:38	0:10:00	LFG diverted to PNGC
11/2/2023 5:16	11/2/2023 5:58	0:42:00	LFG diverted to PNGC
11/2/2023 10:14	11/2/2023 10:28	0:14:00	LFG diverted to PNGC
11/30/2023 10:26	11/30/2023 13:58	3:32:00	LFG diverted to PNGC
12/6/2023 9:34	12/6/2023 11:02	1:28:00	LFG diverted to PNGC
12/11/2023 11:06	12/11/2023 12:58	1:52:00	LFG diverted to PNGC
12/20/2023 13:32	12/22/2023 11:18	45:46:00	LFG diverted to PNGC
12/22/2023 11:46	12/22/2023 11:54	0:08:00	LFG diverted to PNGC
12/22/2023 11:58	12/31/2023 23:59	228:01:00	LFG diverted to PNGC

TREATMENT SYSTEM DOWNTIME LOG – PNGC

Coffin Butte Landfill
Treatment System Downtime Log
Reporting Period: July 1, 2023 to December 31, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm:ss)	Comments
7/3/2023 19:30	7/3/2023 20:45	1:15:00	Gas skid failure
7/6/2023 13:30	7/6/2023 13:45	0:15:00	Gas skid failure
7/25/2023 13:45	7/25/2023 14:30	0:45:00	Electrician working on gas skid
7/27/2023 13:15	7/27/2023 13:45	0:30:00	Electrician working on gas skid
9/27/2023 9:30	9/27/2023 10:45	1:15:00	Power loss due to sump cleaning

APPENDIX D

COLLECTION SYSTEM DOWNTIME LOG

Coffin Butte Landfill
Collection System Downtime
Reporting Period: July 1, 2023 to December 31, 2023

Shutdown Date/Time	Startup Date/Time	Duration (h:mm)	Description
9/27/2023 9:36	9/27/2023 10:45	1:09:00	Power loss due to sump cleaning

APPENDIX E

GCCS EXPANSION/CURRENT SITE GCCS LAYOUT

Coffin Butte Landfill - GCCS Expansion

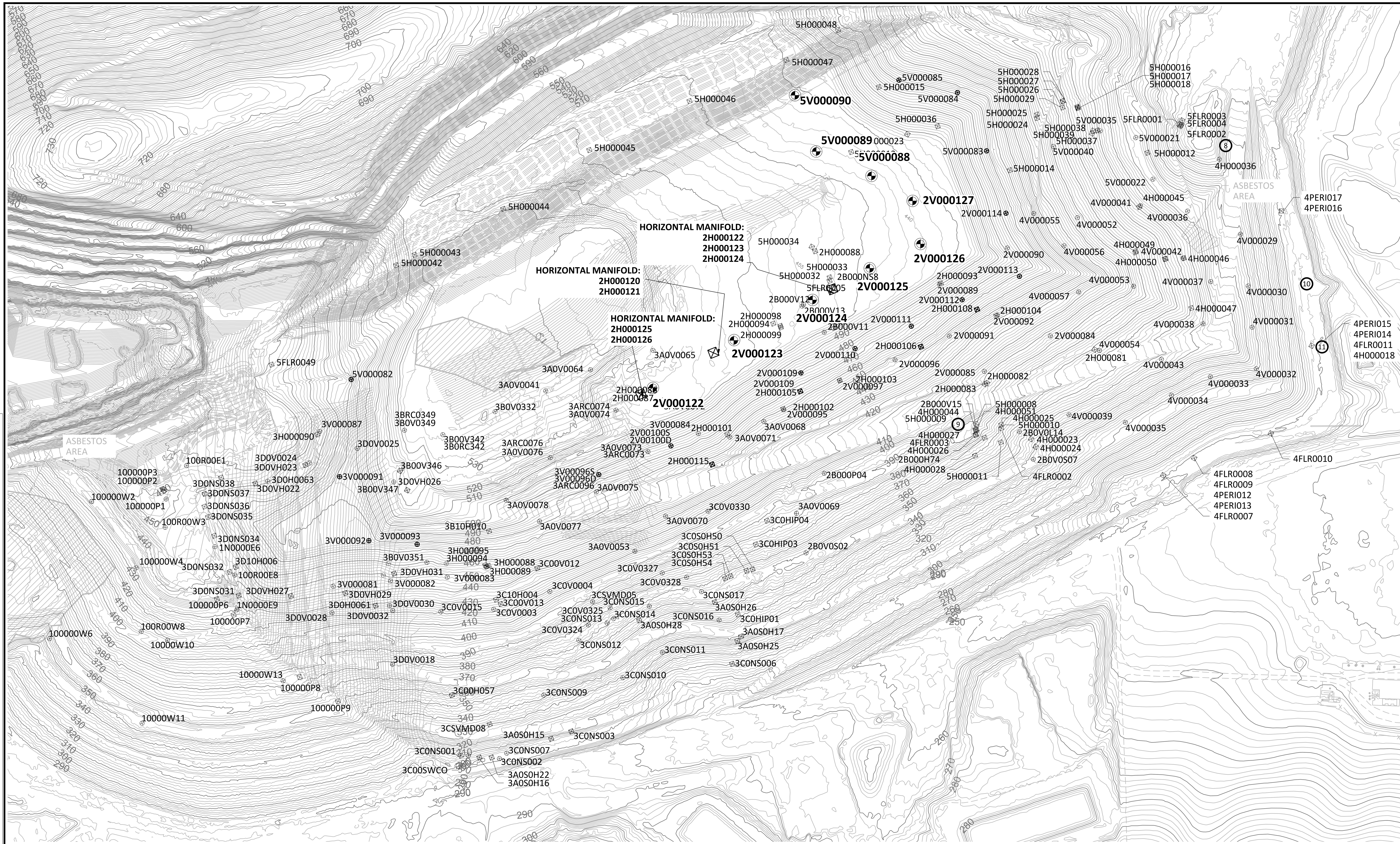
Reporting Period: July 1, 2023 to December 31, 2023

New Extraction Wells

New Well ID	Date Installed
2H000120	9/19/2023
2H000121	9/19/2023
2H000122	9/19/2023
2H000123	9/19/2023
2H000124	9/19/2023
2H000125	9/19/2023
2V000122	9/19/2023
2V000123	9/19/2023
2V000124	9/19/2023
2V000125	9/20/2023
2V000126	9/20/2023
2V000127	9/20/2023
5V000088	9/20/2023
5V000089	9/20/2023
5V000090	9/20/2023

Decommissioned Wells

Well ID	Date Decomissioned
No wells decommissioned	



N W E S

0	75	150	300

GRAPHIC SCALE IN FEET

LEGEND

- CURRENT GRADE TOPOGRAPHY
- ⊠ HORIZONTAL LFG EXTRACTION WELL
- ⊕ VERTICAL LFG EXTRACTION WELL
- COORDINATE GRID: 500FT SPACING

MANIFOLD 8
- ⊠ 4FLR0004
- ⊠ 4FLR0005
- ⊠ 4FLR0006

MANIFOLD 9
- ⊠ 4FLR0001
- ⊠ 4FLR0002
- ⊠ 4FLR0003
- ⊠ 4H000028
- ⊠ 5H000009
- ⊠ 5H000010
- ⊠ 5H000011

MANIFOLD 10
- ⊠ 4H000020

MANIFOLD 11
- ⊠ 4H000021
- ⊠ 4H000019

NOTES:
1. "EGC" WELLS LEFT OFF FOR CLARITY.

REV	DATE	DESCRIPTION	DRN BY	DSN BY	CHK BY
0	02/09/24	AS-BUILT	PD	AH	AH

REPUBLIC SERVICES
28972 COFFIN BUTTE ROAD CORVALLIS OR 97330 PHONE: (541) 745-5792
FAX: (541) 745-3826

ENERGYNEERING SOLUTIONS
15820 BARCLAY DRIVE SISTERS, OR 97759
PHONE: (541) 549-8766
FAX: (541) 549-1901

WELLHEAD LAYOUT

2024 WELLFIELD GCCS AS-BUILT
COFFIN BUTTE LANDFILL
CORVALLIS, OR

DRAWING NO.
W1.01

PROJECT NO.
XXX.XXX

APPENDIX F

ROOT CAUSE ANALYSES

PRESSURE EXCEEDANCE

Root Cause Analysis

Date of Initial Exceedance:	8/25/2023
Collection Device ID:	5V000084
Pressure Reading:	0.08

Root Cause Analysis		
Was the reason for the positive pressure due to one of the following:		
A fire or increased well temperature.	☐ Yes	☒ No
Use of a geomembrane or synthetic cover.	☐ Yes	☒ No
A decommissioned well.	☐ Yes	☒ No
• If YES to **ANY** of the above, exempt as per 40 CFR 62.16720(a)(3)(iii)/ 40 CFR §63.1958(b). • If NO to **ALL** of the above, continue the form.		
Describe what was inspected.		
Lateral inspected		
Describe what was determined to be the root cause of the exceedance.		
Lateral had settled		
Determine the required next steps.		
Was the positive pressure remediated within 60 days since the initial exceedance?	☒ Yes	☐ No
• If YES, keep records of Root Cause Analysis. No reporting required. • If NO, continue with Corrective Action Analysis and Implementation Plan and submit Notification to state agency within 75 days of initial exceedance.		

PRESSURE EXCEEDANCE

Root Cause Analysis

Date of Initial Exceedance:	8/25/2023
Collection Device ID:	5V000085
Pressure Reading:	6.51

Root Cause Analysis		
Was the reason for the positive pressure due to one of the following:		
A fire or increased well temperature.	☐ Yes	☒ No
Use of a geomembrane or synthetic cover.	☐ Yes	☒ No
A decommissioned well.	☐ Yes	☒ No
• If YES to **ANY** of the above, exempt as per 40 CFR 62.16720(a)(3)(iii)/ 40 CFR §63.1958(b). • If NO to **ALL** of the above, continue the form.		
Describe what was inspected.		
Lateral inspected		
Describe what was determined to be the root cause of the exceedance.		
Lateral had settled		
Determine the required next steps.		
Was the positive pressure remediated within 60 days since the initial exceedance?	☒ Yes	☐ No
• If YES, keep records of Root Cause Analysis. No reporting required. • If NO, continue with Corrective Action Analysis and Implementation Plan and submit Notification to state agency within 75 days of initial exceedance.		

PRESSURE EXCEEDANCE

Root Cause Analysis

Date of Initial Exceedance:	10/21/2023
Collection Device ID:	2V000085
Pressure Reading:	2.22

Root Cause Analysis		
Was the reason for the positive pressure due to one of the following:		
A fire or increased well temperature.	☐ Yes	☒ No
Use of a geomembrane or synthetic cover.	☐ Yes	☒ No
A decommissioned well.	☐ Yes	☒ No
• If YES to **ANY** of the above, exempt as per 40 CFR 62.16720(a)(3)(iii)/ 40 CFR §63.1958(b). • If NO to **ALL** of the above, continue the form.		
Describe what was inspected.		
Lateral inspected		
Describe what was determined to be the root cause of the exceedance.		
Lateral had settled		
Determine the required next steps.		
Was the positive pressure remediated within 60 days since the initial exceedance?	☒ Yes	☐ No
• If YES, keep records of Root Cause Analysis. No reporting required. • If NO, continue with Corrective Action Analysis and Implementation Plan and submit Notification to state agency within 75 days of initial exceedance.		

LU-24-027
Mason Leavitt GIS Analyst
120 Shelton McMurphy Blvd
Suite 280, Eugene OR, 97401

Becky Merja, speaker 67 and Todd Rowland, Speaker 69 have ceded their time to me. I am speaking for 9 minutes today.

My name is Mason Leavitt, and I am testifying on behalf of Beyond Toxics, a decades old Oregon Based environmental organization that fights for all Oregonians to have access to clean, safe air, water, and land. Our organization has worked with Soap Creek Valley and Adair Village Residents for three years to find solutions to many of the challenges posed by this facility, and I have been there through that journey.

My background is based in Geographic Information Systems or GIS, and I have been trained to map and analyze spatial data.

Today I want to draw attention to the odor study, which the county has determined as grounds for denial. This is due to the fact the applicant used an outdated software version and did not adequately take elevational differences into account. I wish to elaborate on why this odor study is neither **comprehensive nor objective**. But, first, I want to add some related details to the record.

One, the applicant highlighted the newly installed enclosed flare as an important piece of infrastructure to manage landfill gas. I want to note for the record that DEQ announced the requirement of enclosing all landfill gas flares in 2022. The applicant received multiple notices and extensions to comply with this requirement, and failed to do so resulting in an enforcement notice from DEQ. It's installed now, but this process is illustrative of how laborious it is to get the applicant to respond to required operating conditions.

Two, the applicant has waited until last week's hearing to announce their intentions to install fenceline monitoring for odorous pollutants. Beyond Toxics and residents have been pressing for this for years now, and that technology has been available the entire time. I want to note that the applicant's odor study chase not to incorporate any real time air monitoring despite the availability of that technology

Third, I want to problematize the applicants claim they found 99% of odor complaints to be "impossible" despite acknowledging they were working with an incomplete data set that does not have the time or location of odor detection. It's worth elaborating on this. How can we know someone didn't smell the landfill because the wind was blowing the opposite direction of their location, if we do now know their location or the wind direction at the time of their complaint? Additionally, when we find a model invalidates 99% of human experiences, we typically conclude the model is wrong. I teach GIS part time at the UO, and I would fail any student who would make a similar claim to the applicant without additional explanation.

Next, I want to turn to some additional assumptions of the applicant's odor study that need more explanation**.** The applicant has chosen to go with an atmospheric modeling system

using weather data from Coffin Butte, Salem Airport, and Corvallis airport. Using this data, they have made an educated guess on how air has moved around in the nearby area of the landfill.

As the famous saying goes: “All models are wrong, but some are useful.” Models have fundamental limitations and they cannot and do not reflect all the complexities of the real world. Modeling is a great tool but it is not the entire picture and there are many other tools in the toolbox the applicant has chosen not to deploy including the air monitoring I mentioned above.

Models are a series of mathematical equations- if you change the numerical inputs or the parameters, you get different results. Choosing those inputs is not an objective decision- it is subjective to the applicants preferences.

One of the most important assumptions made by the applicant is that the facility has a 25% fugitive emissions rate - mind you, I want to note that they used to claim it was 10%- the best in Oregon before quietly revising those numbers last year. Recall, fugitive emissions are landfill gas emissions that are not captured by gas extraction wells and other gas controls. I want to complicate that 25% assumption made by the applicant. Planning Commissioners brought up two important questions last session I would like to answer:

1. What about all the photos of holes in Coffin Butte’s covers and tarps meticulously documented by residents? Recall, the applicant stated they do regular surface emissions monitoring to repair these holes. This prompted the second question.

2. Do we have results of the surface emissions monitoring done by the applicant?

First, let's look at the EPA: Coffin Butte has been inspected twice by the US EPA inspections which uncovered over 100 violations, some of them 200 times the regulatory limit. The first time EPA inspected the landfill in 2022, Coffin Butte had done their own SEM monitoring 10 days prior where they found 6 leaks between 500ppm and 1,500 Ppm. The EPA found 71 leaks between 500 ppm and over 70,000 ppm and they only monitored a small portion of the landfill. They also found that the applicant had been not complying with several standard testing procedures required by Oregon Law. A similar story occurred in 2024 with 41 leaks between 500 and 118,000 ppm. the applicant is currently under investigation for failing to meet Clean Air Act standards.

Second, I have analyzed surface emissions monitoring reports submitted to DEQ by all Oregon Landfills legally required to do so. I found records that show that Coffin Butte is choosing not to monitor 56% percent of their landfill surface area in SEM using a legal loophole (**Exhibit A**). This is above average for privately operated landfills in Oregon which omit 50% on average. Publicly operated landfills omit about 10%. Coffin Butte claims that some of their slopes are too steep or too covered in vegetation meaning they can’t monitor them. These are slopes operators designed and vegetation they chose not to maintain, and the legality of these exemptions are ambiguous at best or illegal at worst.

Additionally, Third party satellite flyovers have found massive plumes of landfill gas that can be observed from space. They have flown over Coffin Butte 6 times over the last two years, and found leaks 100% of the time.

The working face, where garbage is currently being deposited, is a site of significant fugitive emissions. Coffin Butte claims they limit their working face to a half acre at any time. I have submitted nearly a dozen random satellite images showing otherwise (**Exhibit B**). They also claim they cover it with daily cover at the end of each working day. Photographs show otherwise.

Additionally, I have used air monitoring equipment to document hydrogen sulfide levels at residential households. This is the classic rotten-eggy smell we have all smelled in our garbage. Through monitoring, we have found Hydrogen sulfide levels between 250 and 500 ppb. This is well over the human detection threshold of 30 ppb (**Exhibit C**)

I also worked with Linfield University students to conduct a door to door survey of all 500 homes in Adair Village. Of 126 households that spoke to us, we found 60% of residents reported regularly smelling the landfill, and many were specific that the smell is distinct from the compost facility. 20% of residents reported having modified their daily activities to avoid going outside due to the smell being unbearable or concerns over exposure to toxics.

Remember, all models are wrong, but some are useful. The applicant's model is serving a purpose to cast doubt on hundreds of people’s lived experiences. The applicant has offered no explanation for the discrepancy between their odor study results and the experience of residents. They have offered no explanation of why their gas collection system is failing and how they plan to fix it. I urge the planning committee to believe the residents' experiences, and to acknowledge the applicants reliable record of bad behaviour.

Exhibit A

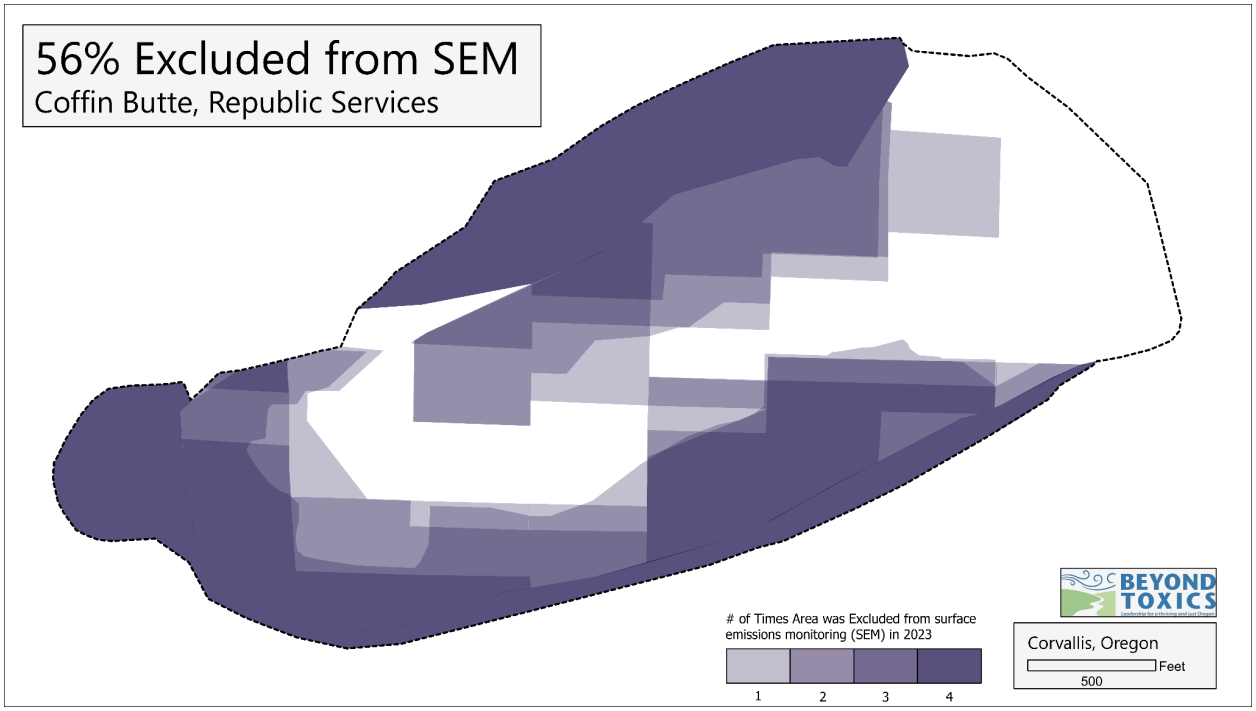


Exhibit B


June 22, 2022
1.23 acre exposed
Google Earth
Image © 2025 Maxar Technologies
N
700 ft


July 14, 2022
2.1 acre exposed
Google Earth
N
700 ft

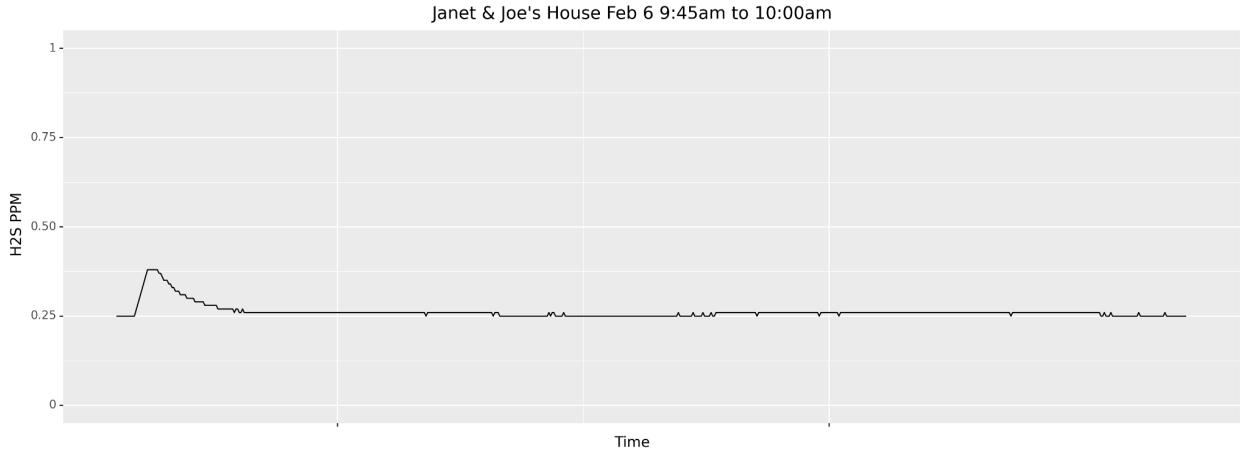

April 29, 2023
1.00 acre exposed
Google Earth
Image © 2025 Airbus
700 ft
N

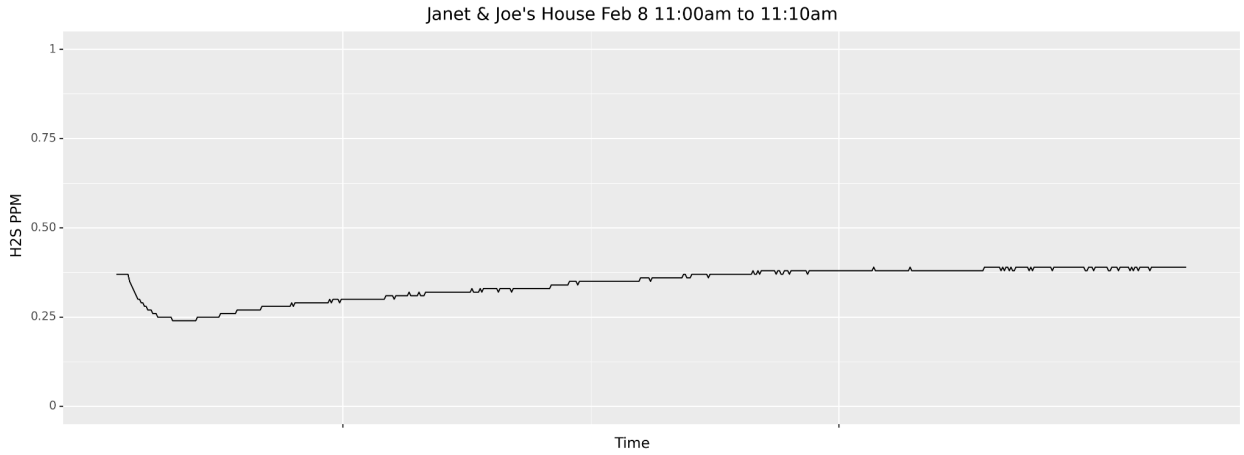

April 19, 2024
2.59 acres exposed
Google Earth
Image © 2025 Airbus
700 ft
N

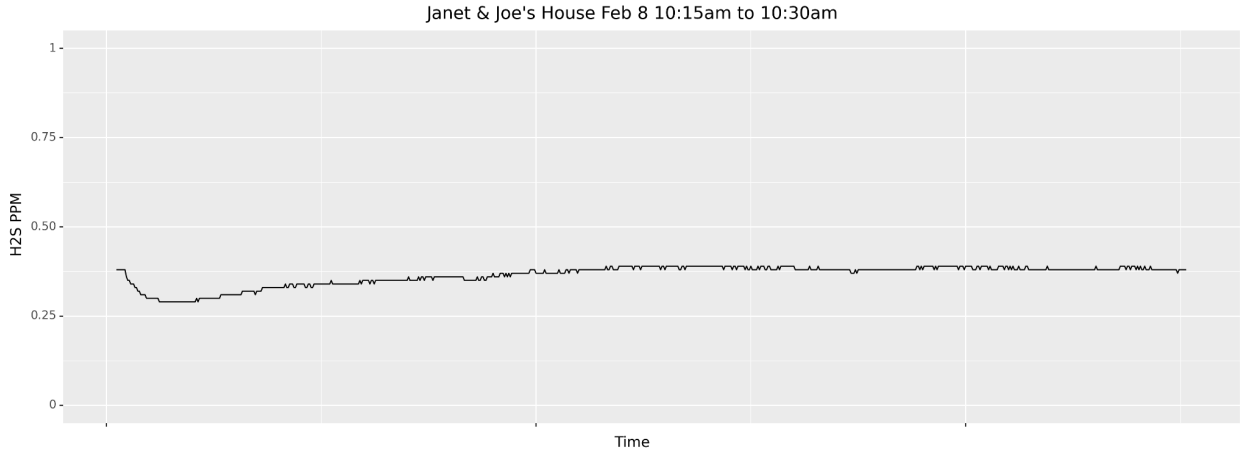

July 2, 2024
1.04 acres exposed
Google Earth
700 ft
N

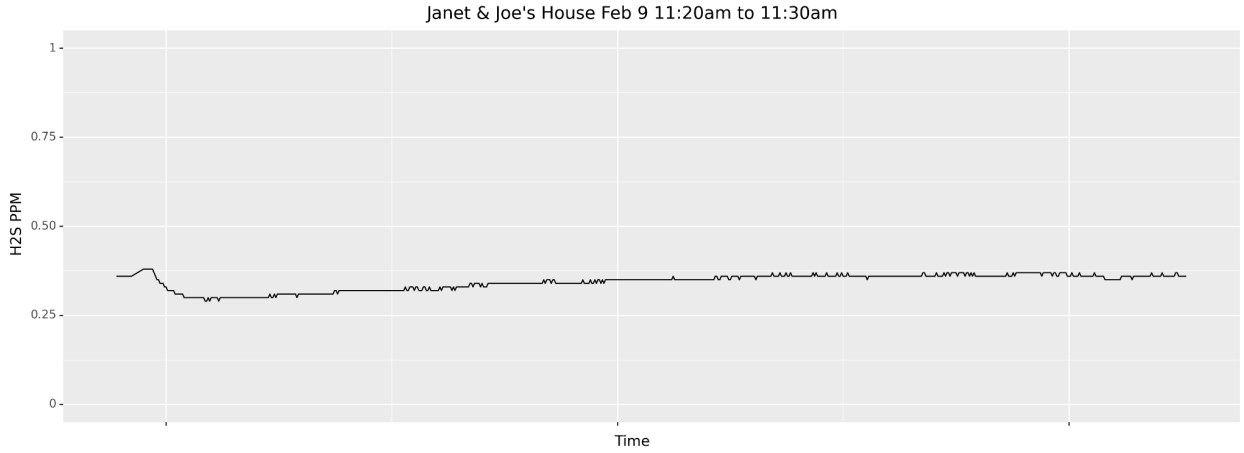

March 26, 2025
2.26 acres exposed
Google Earth
Image © 2025 Airbus
700 ft
N

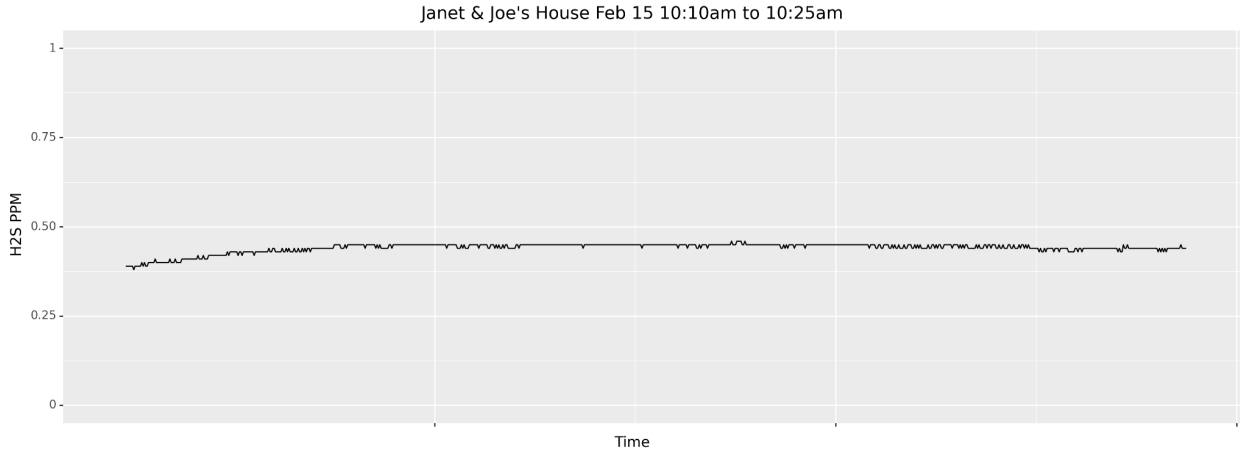
Exhibit C (Note graphics are in PPM. Convert to PPB= PPM x 1,000)








Janet & Joe's House Feb 9 11:20am to 11:30am
H2S PPM
1
0.75
0.50
0.25
0
Time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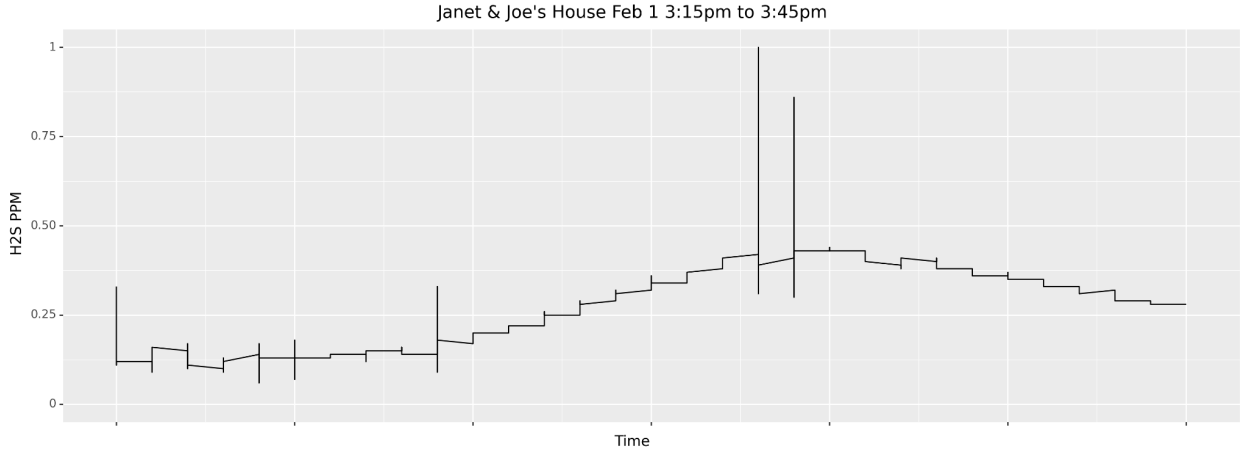
H2S PPM
1
0.75
0.50
0.25
0
Time


Janet & Joe's House Feb 1 3:15pm to 3:45pm
H2S PPM
1
0.75
0.50
0.25
0
Time

BEYOND TOXICS

DATE RECEIVED: 05-06-25
FROM: Mason Leavitt
PHONE OR EMAIL: MLeavitt@BeyondToxics.org

LU-24-027
Mason Leavitt GIS Analyst
120 Shelton McMurphy Blvd
Suite 280, Eugene OR, 97401

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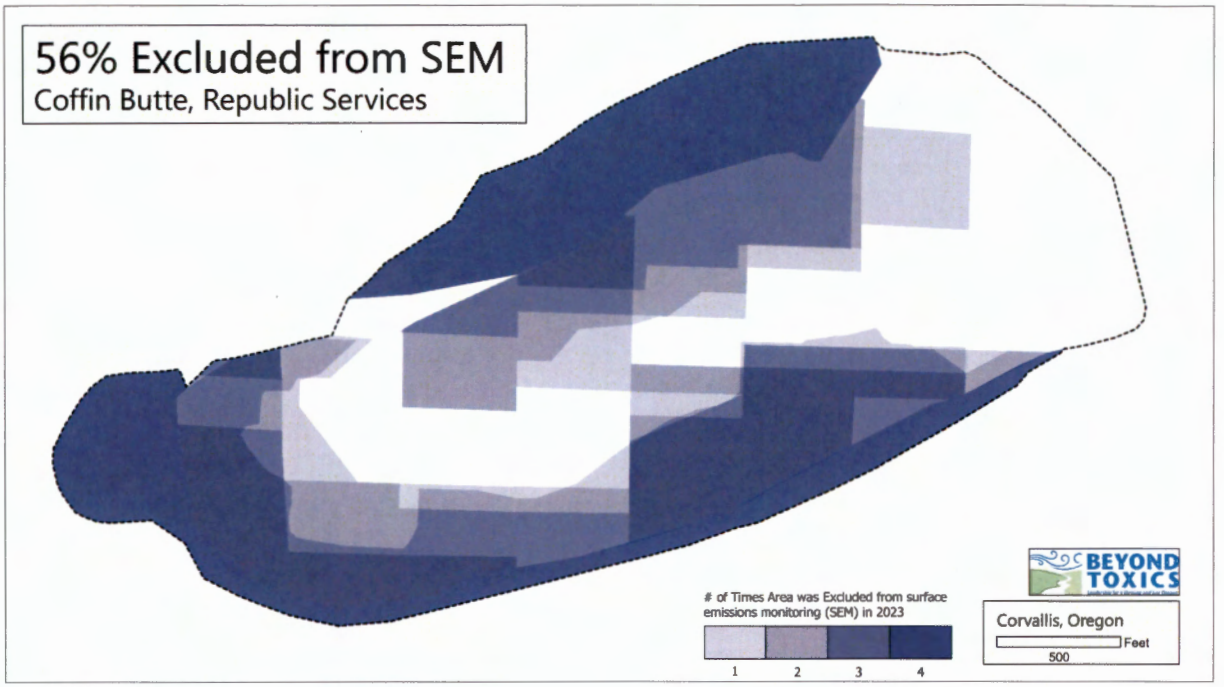


Exhibit B


June 22, 2022
1.23 acre exposed
Google Earth
700 ft
N


July 14, 2022
2.1 acre exposed
Google Earth
700 ft
N


April 29, 2023
1.00 acre exposed
Google Earth
700 ft
N

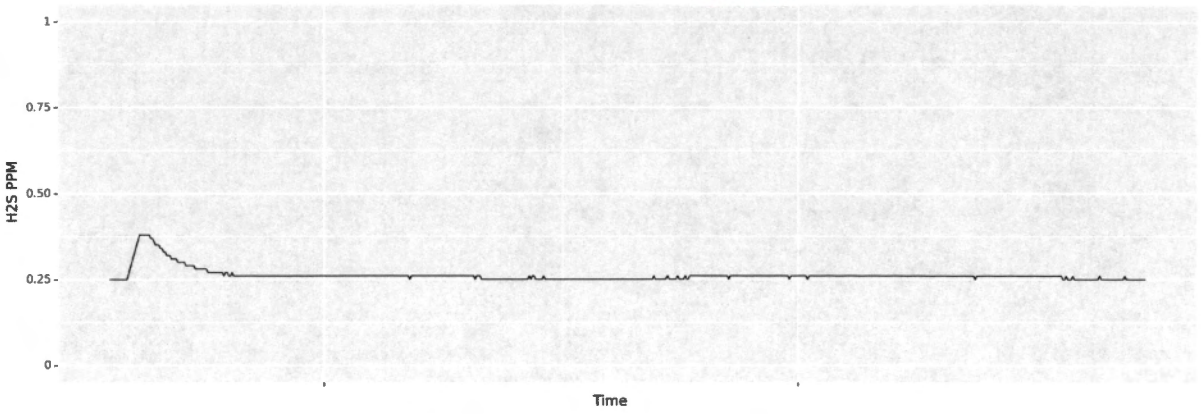

April 19, 2024
2.59 acres exposed
Google Earth
700 ft
N


July 2, 2024
1.04 acres exposed
Google Earth
700 ft
N

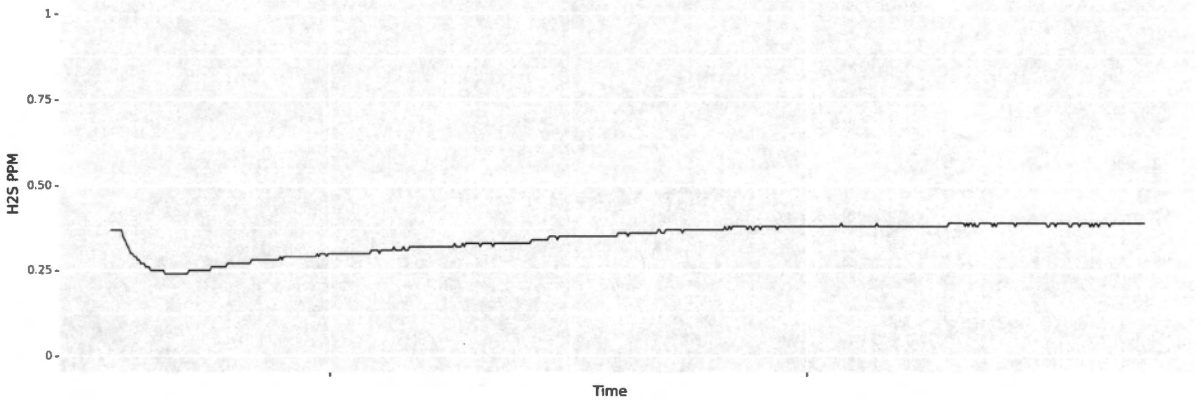

March 26, 2025
2.26 acres exposed
Google Earth
700 ft
N

Exhibit C (Note graphics are in PPM. Convert to PPB= PPM x 1,000)

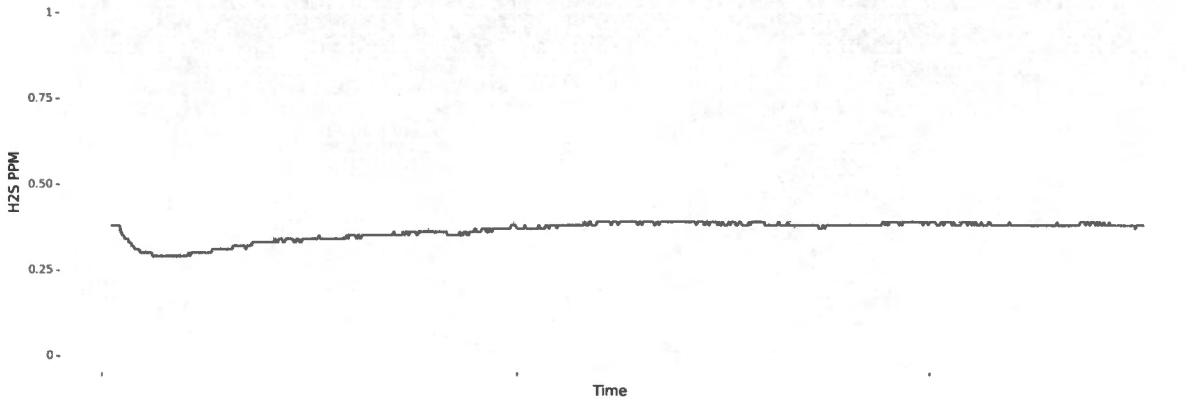
Janet & Joe's House Feb 6 9:45am to 10:00am

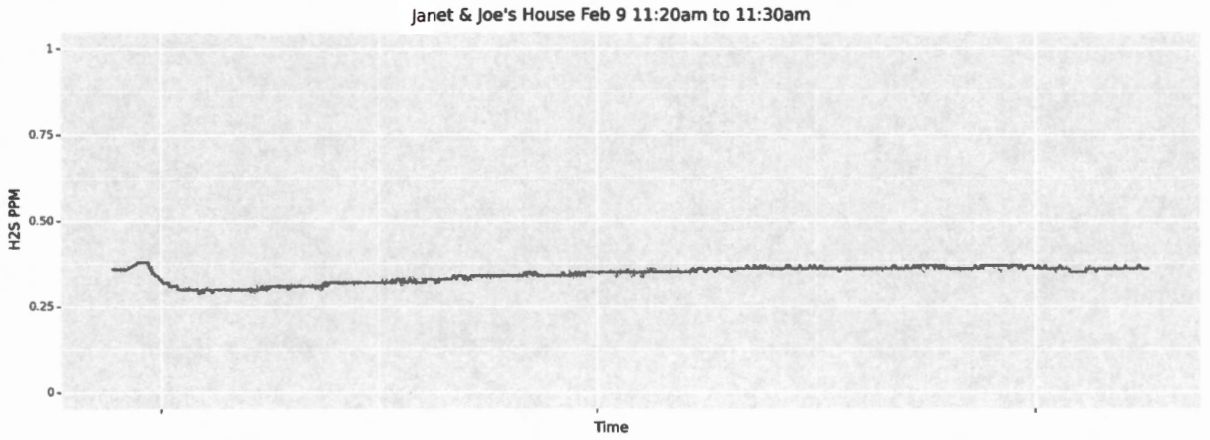


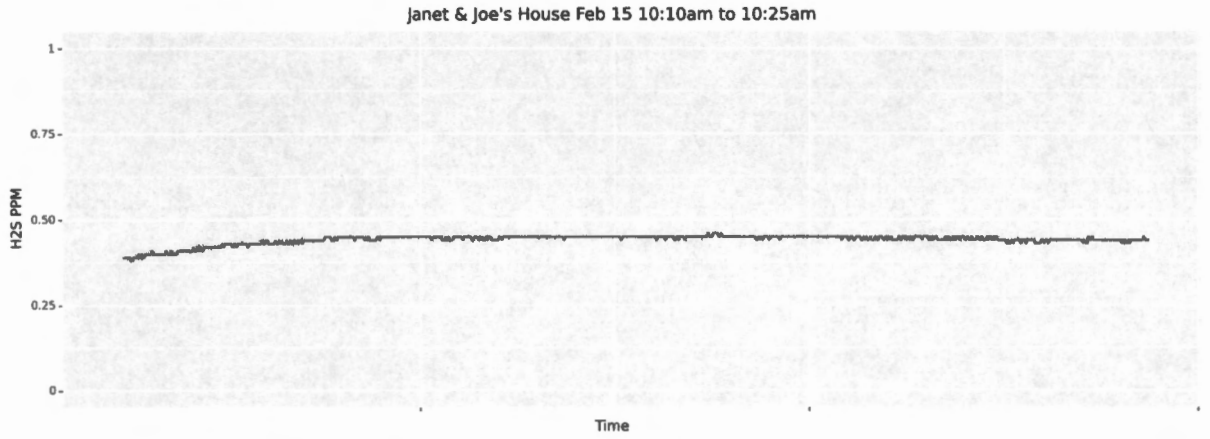
Janet & Joe's House Feb 8 11:00am to 11:10am

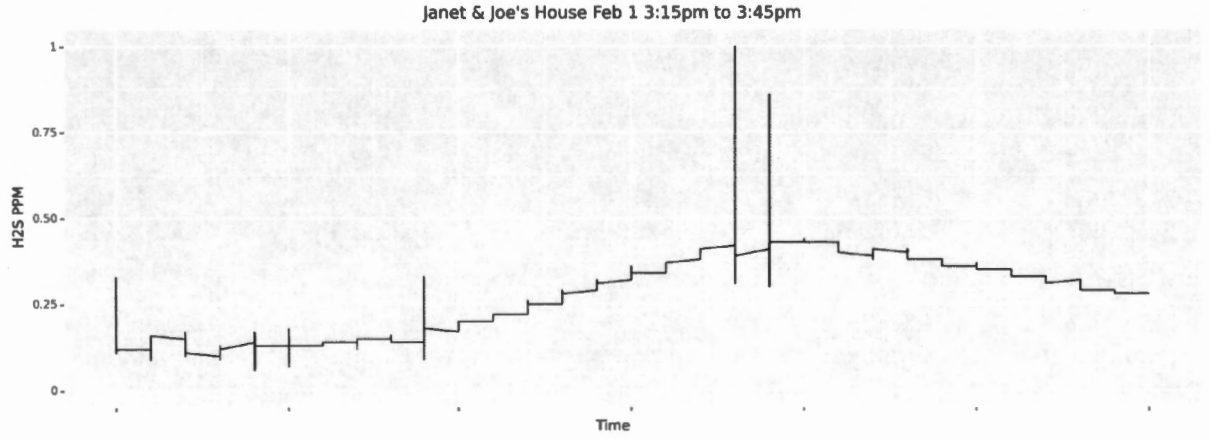


Janet & Joe's House Feb 8 10:15am to 10:30am




Janet & Joe's House Feb 9 11:20am to 11:30am
H2S PPM
1
0.75
0.50
0.25
0
Time


Janet & Joe's House Feb 15 10:10am to 10:25am
H2S PPM
1
0.75
0.50
0.25
0
Time


Janet & Joe's House Feb 1 3:15pm to 3:45pm
H2S PPM
1
0.75
0.50
0.25
0
Time