Revitalizing Auto Communities Environmental Response (RACER) Trust

Lower 1,4-Dioxane Biosparge Progress Report

Lansing Industrial Land
Lansing, Michigan

April 2024

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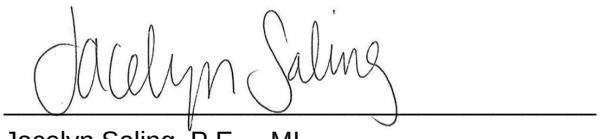

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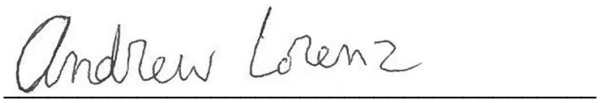

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Acronyms and Abbreviations

µg/L	micrograms per liter
%	percent
Arcadis	Arcadis of Michigan, LLC
EGLE	Michigan Department of Environment, Great Lakes, and Energy
IGMP	Interim Groundwater Monitoring Plan
O&M	operation and maintenance
RACER Trust	Revitalizing Auto Communities Environmental Response Trust
ROI	radius of influence
RRV	reference reduction value
Site	Revitalizing Auto Communities Environmental Response Trust Lansing Industrial Land Site, Lansing, Michigan

1 Introduction

On behalf of Revitalizing Auto Communities Environmental Response Trust (RACER Trust), Arcadis of Michigan, LLC (Arcadis) installed a propane biosparge remediation system at the RACER Trust Lansing Industrial Land Site in Lansing, Michigan (Site) to address 1,4-dioxane impacts in the weathered bedrock. Two treatment systems, encompassing 41 biosparge wells in four transects (Transects B, E, F, and G) on Plant 2 with an equipment enclosure (**Figure 1**) and seven wells in one transect (Transect A) on Plant 3 with an equipment enclosure (**Figure 2**), comprise the overall biosparge system. The biosparge system was designed to inject air and propane to facilitate co-metabolic biodegradation of 1,4-dioxane. This progress report provides an update of system operations and performance and presents recommendations for system optimization. This progress report also addresses operations of the biosparge system for 2023.

The long-term objectives of the biosparge system are to:

- Provide for continued protection of the municipal drinking water supply wells by preventing site-related 1,4-dioxane-impacted groundwater from migrating offsite laterally in the weathered bedrock zone at concentrations greater than 7.2 micrograms per liter (µg/L); and
- Reduce the potential for substantial migration of 1,4-dioxane downward into less-weathered bedrock.

The short-term objective of the biosparge system is to reduce site-related 1,4-dioxane concentrations along the core of the lower 1,4-dioxane weathered bedrock plume.

As presented in the Interim Measures Work Plan (Arcadis 2018), the biosparge system will be operated until:

- Concentrations of site-related 1,4-dioxane in weathered bedrock and bedrock monitoring wells along the core of the plume and in monitoring wells along the western Plant 2 property boundary exhibit stable to decreasing trends based on statistical evaluation (e.g., Mann-Kendall or other method acceptable to the Michigan Department of Environment, Great Lakes, and Energy [EGLE]);
- Further reduction in groundwater concentrations reaches the point of diminishing returns. Evaluation of the point of diminishing returns is detailed in Section 3.2 of this progress report. The diminishing return evaluation process has been updated, in collaboration with EGLE, over the course of operation of the biosparge system as the information gained during operation and monitoring activities has allowed for better operation and evaluation over time; or
- The short- and long-term objectives have been met.

2 Biosparge System Operation and Maintenance

The Plant 2 and Plant 3 biosparge systems operated throughout 2023 to continue treating 1,4-dioxane in the weathered bedrock. A summary of operations and maintenance (O&M) is outlined in the following sections.

2.1 Summary of Operations

The operational uptime of the Plant 3 system was 92 percent (%) during 2023. The Plant 3 system was down approximately 2% of the time for routine maintenance activities and approximately 6% of the time for non-routine maintenance activities. The Plant 2 system was operational 88% of the time during 2023. The Plant 2 system was down approximately 2% of the time for routine maintenance activities and approximately 10% of the time for non-routine maintenance activities. These activities are detailed further in Sections 2.2 and 2.3.

The biosparge system operated as follows in 2023:

- Air flow rates were maintained at 2 to 5 actual cubic feet per minute per biosparge well using the system variable frequency drive and the gate valves installed on the manifolds in the equipment enclosures.
- Wells from different transects are grouped into three sparge groups at Plant 2 and two sparge groups at Plant 3 that alternate through sparge cycles, with an hour on for each group, followed by a rest cycle. Any given biosparge well received 1 hour of air sparging followed by 3 hours of rest – a total of 6 hours of sparging and 18 hours of rest per day.
  - Air sparge cycle times were updated on November 1, resulting in a 25% reduction of air delivery (no change in propane sparge times). This change was made in response to indications that the weathered bedrock was becoming overpressurized with sparged air and propane gas.
- Air dosed with propane at 15% to 20% of its lower explosive limit was injected into the sparging wells at Plant 2 and Plant 3 in ½-hour increments during four of the six sparging cycles per day, for a total of 2 hours per day per well.
- The Plant 3 system continued to sparge into wells AS-19-A01 through AS-19-A05. Wells AS-19-A06 and AS-19-A07 remain idle.

Detailed O&M data are provided in the completed O&M forms included in **Appendix A**.

2.2 Routine Operation and Maintenance

O&M visits were conducted monthly in 2023 and included data collection, equipment maintenance, and system checks to verify normal system operation. Onsite data collection included flow rates and pressures for individual wells; the system flow and pressure data were logged remotely through the programmable logic controller. At the Plant 3 system, propane tank changeouts occurred once per month. At the Plant 2 system, propane was delivered on an as-needed basis, approximately three times per year.

Other routine O&M activities included compressor maintenance, equipment calibration, and nutrient injections. Both compressors were serviced quarterly in 2023 in accordance with the manufacturer's recommendations. Nutrient injections were performed twice in 2023 to maintain optimal conditions for biodegradation, in March and September. Nutrient injections accounted for most of the routine O&M downtime for both systems, while shutdowns for equipment calibration, equipment replacement, and compressor maintenance accounted for the remainder of the routine maintenance shutdowns. The 2023 O&M logs are included in **Appendix A**.

2.3 Non-Routine Operation and Maintenance

2.3.1 Plant 3

The following non-routine maintenance was completed at the Plant 3 biosparge system in 2023:

- The system was shut down for 3 weeks, from February 15, 2023 to March 8, 2023, due to a leak in the propane tank supply hose, which was repaired, and the system was restarted.
- Radius of influence (ROI) well TW-14-06 likely suffered damage from property tenant activities (related to car parking) in March. It was later identified that injected air/propane was short-circuiting to the ground surface, as observed by air leaking on the outside of the monitoring well casing, limiting distribution in the weathered bedrock and treatment. Arcadis obtained EGLE approval to abandon TW-14-06 to eliminate the short-circuiting.
- It was observed that monitoring well caps had become dislodged at Plant 3, apparently due to the buildup of pressure from sparging. When monitoring well caps dislodge, sparged gases can short-circuit through the monitoring well casings rather than distribute in the subsurface to facilitate treatment. Air sparge duration was reduced by 25% at both plants to mitigate overpressurization of the formation and to prevent sparged gases from short-circuiting through the monitoring well casings. The well caps are re-installed during O&M and monitoring events, and more secure caps are being assessed to prevent this issue from reoccurring.

2.3.2 Plant 2

The following non-routine maintenance was completed at the Plant 2 biosparge system in 2023:

- On June 26, 2023, a suspected power surge damaged overcurrent protection and fuses on the biosparge equipment. After diagnosis, parts were ordered and reinstalled. To safeguard the system from potential surges, operations were halted until the installation of the new equipment, which was performed on July 27, 2023. After the repair was completed, Transects B, E, and F were restarted. However, Transect G remained offline until September 14, 2023 to allow for additional sampling in August to monitor for potential concentration rebounds.
- In March 2023, damage to a section of the aboveground biosparge hose was detected; it was believed to be caused by vehicular traffic. The hose was repaired promptly.
- During O&M and monitoring events, it was observed that monitoring well caps had become dislodged, apparently due to the buildup of pressure from sparging. When monitoring wells caps dislodge, sparged gases can short-circuit through the monitoring well casings rather than distribute in the subsurface to facilitate treatment. Air sparge duration was reduced by 25% at both plants to mitigate overpressurization of the formation and to prevent sparged gases from short-circuiting through the monitoring well casings. The well caps are re-installed during O&M and monitoring events, and more secure caps are being assessed to prevent this issue from reoccurring.

3 Performance Monitoring Results

System performance is monitored using the established performance monitoring well network across the Site. The Plant 2 and Plant 3 performance monitoring networks are presented on **Figure 1** and **Figure 2**, respectively. Performance monitoring wells are set within the biosparge well ROI, upgradient, and downgradient and are positioned approximately every 300 feet along the transects. Groundwater samples and field parameters were collected from the performance monitoring wells quarterly for the first 2 years of biosparge operation and semi-annually thereafter. Some biosparge performance wells are sampled more frequently than semi-annually for specific purposes (e.g., in anticipation of shutdown testing, to support the diminishing returns evaluation). **Figures 3** through **6** show the 1,4-dioxane and dissolved oxygen concentrations for performance monitoring wells. Performance monitoring data, including 1,4-dioxane, dissolved oxygen, and nutrient concentrations, are summarized in **Table 1**.

Full results for groundwater sampling events, including laboratory reports and data tables for constituents other than 1,4-dioxane, dissolved oxygen, and nutrients, are provided in previous Annual Groundwater Monitoring Reports (Arcadis 2020, 2021, 2022) and will be provided in the upcoming 2023 Annual Groundwater Monitoring Report.

3.1 Performance Evaluation

The biosparge system has met the short-term objective of reducing 1,4-dioxane concentrations along the core of the weathered bedrock plume. Based on biosparge performance monitoring and Interim Groundwater Work Plan (Arcadis 2023c) bedrock monitoring well results, the long-term objectives of continued protection of the municipal drinking water supply wells by preventing lateral migration and reducing the potential for vertical migration of site-related 1,4-dioxane continue to be achieved.

IGMP and biosparge performance monitoring indicates that the extent of 1,4-dioxane exceedances has decreased since system startup in 2019. **Figure 7** is a comparison of the extent of the 1,4-dioxane plume from before system startup in 2019 until the end of 2023, after 4 years of operation. The biosparge treatment transects were installed to treat 1,4-dioxane above 72 µg/L in weathered bedrock. The extent of the 72 µg/L contour has decreased to a fraction of its previous size. In addition, annual Mann-Kendall analysis of plume stability demonstrates stable to decreasing concentrations in all key deep overburden and weathered bedrock wells surrounding the Plant 3 biosparge system (Arcadis 2022, 2023b).

Plant 3 results since system startup are summarized here and presented on **Figure 3,** in **Table 2,** and in **Appendix B**:

- Upgradient wells: The upgradient weathered bedrock well, MW-13-22, had an overall downward trend in 1,4-dioxane concentrations in 2022, but concentrations rose to near pre-startup baseline levels in 2023. Overall, results during the last 10 years suggest that natural flushing of groundwater entering the Plant 3 biosparge treatment transect has resulted in a decreasing trend of 1,4-dioxane (**Appendix B**). The upgradient deep overburden well, MW-12-21, has also exhibited a decreasing concentration trend since its installation in 2012 (**Appendix B**), indicating that mass stored in the deep overburden continues to reduce its contribution to the weathered bedrock.
- Radius of influence wells: Results for well TW-14-06 continue to demonstrate sustained treatment within the ROI of Transect A.

- Downgradient wells:
  - Weathered bedrock monitoring wells 50 to 60 feet beyond Transect A (PW-14-03 and TW-15-11) are exhibiting results indicative of treatment. Concentrations in TW-15-11 did increase in the second half of 2023, likely due to short-circuiting of air associated with the damaged TW-14-06 well and/or dislodged monitoring well caps, but concentrations remain below pre-startup baseline levels.
  - The next farthest downgradient weathered bedrock well, MW-13-34, located approximately 460 feet from Transect A, has not yet exhibited a sustained decreasing concentration trend, although concentrations did decrease in the last two quarters of 2023.
  - The two deep overburden wells, MW-13-29 and MW-13-48, located 140 and 350 feet downgradient of the treatment transect, have exhibited decreasing trends, indicating that mass flux in the deep overburden is decreasing and that its contribution to the weathered bedrock continues to decrease.

Plant 2 results since system startup are summarized here and presented on **Figures 4** through **6,** in **Table 3**, and in **Appendix B**:

- Upgradient wells: Concentrations at MW-21-142, located approximately 620 feet upgradient of Plant 2 Transect B and 600 feet downgradient of Plant 3 Transect A, may be showing early signs of a decreasing trend. Concentrations at MW-20-126, located approximately 65 feet upgradient of Transect B, continue to decrease. Wells located upgradient of Transects E, F, and G are all stable to decreasing and below pre-startup concentrations.
- Radius of influence wells: Results continue to demonstrate treatment within the ROI of all transects. Concentrations of 1,4-dioxane in Transect G ROI well TW-14-02 rose to 220 µg/L in August 2023 following the 5-week shutdown of the Plant 2 system, but concentrations decreased to non-detect once the system was restarted. A more-prolonged shutdown evaluation would be required to verify that the concentrations in TW-14-02 remain stable or continue to increase.
- Downgradient wells: Downgradient wells, including those that exhibited non-detect/low concentrations when installed before the system was started, continue to exhibit non-detect/low concentrations. Weathered bedrock wells 50 to 120 feet downgradient of the Plant 2 treatment transects exhibit decreased concentration trends, except for MW-20-127, located approximately 110 feet from Transect B, which continues to be stable. Concentrations in monitoring well MW-19-123 temporarily increased due to the 5-week shutdown of the Plant 2 system. However, once the system was back up and running in the fourth quarter, concentrations once again decreased.

3.2 Point of Diminishing Return Evaluation

Assessment of the point of diminishing returns is important to evaluating the effectiveness of ongoing biosparge treatment. The current framework for evaluating the point of diminishing returns involves four main lines of evidence:

1. Assessment of upgradient well trends to evaluate the stability and magnitude of concentrations of 1,4-dioxane entering the biosparge system and requiring treatment;
2. Assessment of average plume concentrations to evaluate the trend of overall reductions year over year (i.e., 12-month reductions) to determine if ongoing treatment is meaningful;
3. Comparison of the 12-month average reduction of 1,4-dioxane to 20% of a reference reduction value (RRV) and
4. Financial assessment of the cost per unit of treatment to understand the cost benefit of ongoing treatment.

To evaluate these lines of evidence in terms of localized system effectiveness, biosparge performance monitoring wells have been grouped based on transect and proximity: one group for Plant 3 and three groups for Plant 2. An average concentration for each group of wells is calculated after each comprehensive sampling event. A 12-month reduction in the 1,4-dioxane concentration is calculated by subtracting the current average plume concentration from the average plume concentration 12 months prior. **Tables 2** and **3** present the average 1,4-dioxane plume concentrations and 12-month reduction values for the one group for Plant 3 and the three groups for Plant 2, respectively. For the third line of evidence listed, the maximum 12-month reduction in 1,4-dioxane observed during the first 3 years of operation serves as the RRV.

Prior to 2023, the Plant 3 diminishing returns evaluation included upgradient wells but excluded deep overburden wells. Decreases observed in 1,4-dioxane concentrations since system startup in the deep overburden indicate that the deep overburden is influenced by the biosparge system and that contribution to the weathered bedrock from the deep overburden continues to decrease. Therefore, downgradient deep overburden wells MW-13-29 and MW-13-48 are included in the Plant 3 diminishing returns evaluation to account for this reduction in mass flux contribution from the deep overburden to weathered bedrock downgradient of Plant 3. While Plant 3 upgradient wells MW-13-22 and MW-12-21 have shown a decreasing concentration trend over the last 10 years, they do not appear to be under the direct influence of the biosparge system. Because the upgradient wells are considered in a separate portion of the diminishing returns evaluation (#1 in the list of lines of evidence), MW-13-22 was removed from the treatment portion of the diminishing returns evaluation to improve the accuracy of the reference reduction (#2 and #3 in the list of lines of evidence) and financial cost per unit of treatment (#4 in the list of lines of evidence) evaluations that is specifically evaluating the biosparge system performance.

Upgradient wells at Plant 2 will continue to be included in the reference reduction and treatment unit cost evaluations because they are either directly influenced by the system or are affected by flushing of treated water from upgradient.

3.2.1 Plant 3

3.2.1.1 Upgradient Well Trends

The upgradient weathered bedrock well, MW-13-22, was generally stable in 2023. The upgradient deep overburden well, MW-12-21, exhibits a decreasing concentration trend, indicating that the contribution to the weathered bedrock transport zone from mass stored in the deep overburden continues to decrease.

3.2.1.2 Average Plume Concentrations

The assessment of the average plume concentration at Plant 3 was completed to evaluate the trend of overall reductions year over year (i.e., 12-month reductions) to determine if ongoing treatment is meaningful. Data are provided in **Table 2** and on **Figure 8**, and key points are summarized below:

- The baseline average plume concentration before startup of the biosparge system was 232 µg/L.
- In 2023, the average plume concentration ranged from 39 µg/L to 44 µg/L, an 81% to 83% reduction over baseline.
- In the fourth quarter of 2023, the average plume concentration was 17 µg/L higher than the average plume concentration in the fourth quarter of 2022.

The reductions in plume concentrations at Plant 3 have diminished in magnitude over time. Portions of the Plant 3 treatment area have hit the point of diminishing returns from treatment, and slight fluctuations in 1,4-dioxane concentrations can be attributed to acceptable variations in low groundwater concentrations (i.e., TW-14-06, PW-14-03, MW-13-29). However, the observation of short-circuiting of air due to damage at TW-14-06 and instances of monitoring well caps becoming dislodged suggest that treatment may be suboptimal where the distribution of gases in the subsurface has been affected by these issues, most notably at TW-15-11.

Note that concentrations of 1,4-dioxane in idled biosparge wells AS-19-06 and AS-19-07 remained at 3 µg/L or less (**Table 1**). These low concentrations continue to confirm that treatment is not needed at the east end of Transect A at this time.

3.2.1.3 Reference Reduction Value Comparison

A 12-month reduction in the 1,4-dioxane concentration is calculated by subtracting the current average plume concentration from the average plume concentration 12 months prior. **Table 2** presents the average 1,4-dioxane plume concentrations and 12-month reduction values for Plant 3. The maximum 12-month reduction in 1,4-dioxane observed during the first 3 years of operation serves as the RRV. For Plant 3, the RRV is 142 µg/L, and the point of diminishing returns is 28.4 µg/L. As shown in **Table 2**, the 12-month reduction was less than 28.4 µg/L for all of 2022. In 2023, the 12-month reduction became negative, likely due to a combination of a plateau in average plume concentration and surface leakage of gas, leading to a localized area of reduced treatment (i.e., TW-15-11).

3.2.1.4 Financial Assessment

A financial assessment of the cost per unit of treatment was completed to evaluate the cost benefit of ongoing treatment. The cost of treatment was calculated using the annual O&M cost and the annual average reduction of 1,4-dioxane. **Exhibit 1** summarizes the approximate cost per 1 µg/L of 1,4-dioxane treated. Backup calculation details are included in **Appendix C.** The calculation of the cost per unit treated cannot be calculated for 2023 because the average plume concentration did not decrease.

Exhibit 1. Plant 3 Operations Cost per µg/L Treated (Excludes Upgradient Wells and Includes Deep Overburden Wells)

Year	Annual Average Reduction in Plume Concentration (µg/L)	Unit Treatment Cost ($ per µg/L)
2019*	108	$216
2020	51	$784
2021	29	$1,379
2022	19	$2,105
2023	-17	--

Note:

*The Plant 3 system began operation in June 2019, Concentrations and costs are based on 7 months of operation (June to December 2019).

As of the end of 2023, the Plant 3 system had been operating for 4.5 years, and, based on the well trends, average plume concentration reductions, reference reduction value comparison, and financial assessment, Plant 3 has reached the point of diminishing returns. Although gas distribution challenges led to a localized area of reduced treatment in 2023, a shutdown test is still recommended. The shutdown test would provide valuable information to help determine if the system (or portions of the system) could be idled and still meet the stated objectives for the biosparge system.

3.2.2 Plant 2

3.2.2.1 Mini-Shutdown Evaluation

As stated in Section 2.3.2, operation of the Plant 2 biosparge system ceased on June 26, 2023 due to an electrical issue. During this downtime, additional performance sampling was carried out to assess a potential rebound in 1,4-dioxane concentrations. On July 27, 2023, following repair of the electrical issue, Transects B, E, and F were restarted. Meanwhile, Transect G remained inactive for supplementary shutdown sampling on August 7, 2023, followed by quarterly sampling on August 29, 2023. Upon completion of this sampling, Transect G was restarted.

The supplementary sampling conducted during the temporary shutdown offered insights into the rebound of 1,4-dioxane. The concentration of 1,4-dioxane in Transect G's performance monitoring ROI well, TW-14-02, increased from 8 µg/L to 152 µg/L between May 18, 2023, when the system was operational, and August 7, 2023, after Transect G had been idle for 5 weeks. The quarterly sample collected on August 29, 2023 had a concentration of 220 µg/L. In addition, concentrations increased slightly in Transect G upgradient well MW-20-129 and downgradient well MW-19-123 during the quarterly sampling event. Following system restart and subsequent sampling on October 26, 2023, the 1,4-dioxane concentration sampled from TW-14-02 decreased to less than 1 µg/L, while concentrations in MW-20-129 and MW-19-123 decreased to their pre-shutdown levels.

Although the performance monitoring wells experienced rebound during the system shutdown, monitoring was not performed for a long enough time to evaluate stability of the post-shutdown condition. The insights gleaned from the data collected during this mini-shutdown evaluation will help refine planning and timing considerations for future potential shutdown evaluations. In addition, they showed the immediate effectiveness of system restart in reducing 1,4-dioxane concentrations.

3.2.2.2 Upgradient Well Trends

Trends in wells upgradient of the Plant 2 treatment transects are a consideration for evaluating the point of diminishing returns. Concentrations at MW-21-142, approximately 620 feet upgradient of the Plant 2 Transect B and 600 feet downgradient of Plant 3 Transect A, may be showing early signs of a decreasing trend. Concentrations at MW-20-126, approximately 65 feet upgradient of Transect B, continue to decrease (**Figure 4**). Dissolved oxygen concentrations measured in this well suggest that the well may be influenced by the biosparge system.

Monitoring wells upgradient of Transects E, F, and G have all experienced decreasing 1,4-dioxane trends since system startup. These decreasing trends could be the result of direct treatment from the biosparge transect, clean water flushing from upgradient transects, decreased mass flux from the shallower subsurface, or a combination of these factors.

3.2.2.3 Average Plume Concentrations

The assessment of the average plume concentration at Plant 2 was completed to evaluate the trend of overall reductions year over year (i.e., 12-month reductions) to determine if ongoing treatment is meaningful. Data are provided in **Tables 3a, 3b,** and **3c** and on **Figures 9, 10,** and **11**, and a summary of key points follows:

- The average plume concentration in northern Plant 2 (Transect B) prior to startup of the biosparge system in June 2020 was 206 µg/L. In 2023, the average plume concentration ranged from 51 µg/L to 69 µg/L, a 67% to 75% reduction over baseline (**Figure 9**). In the fourth quarter of 2023, the average plume concentration was 5 µg/L lower than the average plume concentration in the fourth quarter of 2022.
- The average plume concentration in southern Plant 2 (Transect G and a portion of Transect E) prior to startup of the biosparge system was 484 µg/L. In 2023, the average plume concentration ranged from 27 µg/L to 41 µg/L, a 92% to 94% reduction over baseline (**Figure 10**). In the fourth quarter of 2023, the average plume concentration was 7 µg/L greater than the average plume concentration in the fourth quarter of 2022.
- In eastern Plant 2 (Transect F and a portion of Transect E), the average plume concentration before startup of the biosparge system was 159 µg/L. The average plume concentration ranged from 37 µg/L to 45 µg/L in 2023, a 72% to 77% reduction over baseline (**Figure 11**). The average plume concentration in the fourth quarter of 2023 and the fourth quarter of 2022 was the same.

Note that monitoring well MW-16-79, a downgradient performance monitoring well for Transect E, was abandoned in April 2023. The well was abandoned due to vehicular damage, which caused it to potentially become a conduit connecting perched groundwater to the weathered bedrock zone. 1,4-dioxane concentrations in MW-16-79 were generally non-detect (pre- and post-biosparge system startup); therefore, that well was not measuring performance of the biosparge system. This results from MW-16-79 have been excluded from the average plume concentrations calculation and the RRV evaluation for the eastern/central transect.

3.2.2.4 Reference Reduction Value Comparison

The current RRV for the Plant 2 northern transect (Transect B) is 125 µg/L. The point of diminishing returns has been defined as the point at which the 12-month reduction is less than 20% of the RRV, or 25 µg/L. This target was achieved throughout 2023.

The current RRV for southern Plant 2 (Transects G and E) is 398 µg/L. The point of diminishing returns at 20% of the RRV for southern Plant 2 (Transects G and E) is 79.6 µg/L. As shown in **Table 3**, the 12-month reduction was less than 79.6 µg/L in second and fourth quarters of 2022. However, the 12-month reductions were slightly negative in 2023 due to a plateau of concentrations.

The current RRV for the Plant 2 eastern/central transect is 106 µg/L. The point of diminishing returns at 20% of the RRV for eastern/central Plant 2 (Transects E and F) is 21.2 µg/L. As shown in **Table 3**, this target was achieved at the Plant 2 eastern/central transects in second quarter of 2022, when the 12-month reduction was 21 µg/L. However, the 12-month reductions were slightly negative in 2023 due to a plateau of concentrations.

3.2.2.5 Financial Assessment

A financial assessment of the cost per unit of treatment was completed for Plant 2 to evaluate the cost benefit of ongoing treatment. The cost of treatment was calculated using the annual O&M cost and the annual average reduction of 1,4-dioxane. **Exhibit 2** summarizes the approximate cost per 1 µg/L of 1,4-dioxane treated. The cost per unit treated for southern and eastern Plant 2 cannot be calculated because the average plume concentration increased slightly year over year.

Exhibit 2. Plant 2 Operations Cost per µg/L Treated

Year	P2 North – Transect B		P2 South – Transects G & E		P2 East – Transects E & F	
	Annual Reduction in Average Plume Concentration (µg/L)	**Unit Treatment Cost ($ per µg/L)**	**Annual Average Reduction in Plume Concentration (µg/L)**	**Unit Treatment Cost ($ per µg/L)**	**Annual Average Reduction in Plume Concentration (µg/L)**	**Unit Treatment Cost ($ per µg/L)**
2020*	54*	$211	215*	$121	47*	$623
2021	38	$719	215	$290	44	$1,596
2022	59	$463	34	$1,836	31	$2,266
2023	5	$5,463	-7	--	0	--

Note:
*The Plant 2 system began operation in August 2020. Concentrations and costs are based on five months of operation (August to December 2020).

As of the end of 2023, the Plant 2 system had been operating for more than 3 years, and, based on the upgradient well trends, average plume concentration reductions, reference reduction value comparison, and financial assessment, it has reached the point of diminishing returns. A temporary shutdown evaluation of any or all portions of the Plant 2 system would help determine if the system could be idled or if continued operation is required to continue to meet the short- and long-term objectives.

4 Recommendations

Evaluation of biosparge performance monitoring, operations, and treatment cost data presented in Sections 2 and 3 leads to the following recommendations for optimization of the biosparge system.

4.1 Optimization Recommendations

As previously noted, the concentration of 1,4-dioxane at Plant 3 downgradient well TW-15-11 has shown an increase in 2023. This upward trend is likely attributed to surface leakage observed at ROI well TW-14-06 and potentially by the dislodged monitoring well caps nearby. To remedy the apparent short-circuiting, TW-14-06 was abandoned in 2024, and well caps are routinely inspected and replaced, as needed. To prevent overpressurization in the subsurface, sparge duration was reduced by 25%, and additional options are being evaluated.

4.1.1 TW-14-06 Abandonment

Arcadis recommended and EGLE approved the abandonment of damaged Plant 3 ROI performance monitoring well TW-14-06. TW-14-06 was abandoned on February 15, 2024. The direct influence from the sparged gases at ROI performance monitoring wells create a general challenge associated with pressure buildup, potential for short-circuiting, and safety. While these challenges can be and have been managed, the value of re-installation of this ROI well did not outweigh these challenges/risks. The initial purpose of the ROI well was to confirm the design ROI for the biosparge system, which has been confirmed over the first 3 to 4 years of operation at Plant 3. Elevated dissolved oxygen is observed, and performance monitoring samples are non-detect for 1,4-dioxane,

confirming that the design ROI is being consistently achieved. Metrics for diminishing returns that have been laid out by RACER Trust can be evaluated without further collection of data from TW-14-06. In the event that shutdown testing is approved by EGLE, samples can be obtained from an idle biosparge point to assess rebound within the ROI of the treatment transect. If a biosparge point fails to yield representative data during rebound testing, installation of a new ROI monitoring well can be reconsidered and explored at that time.

4.1.2 Management of Formation Overpressurization

In 2023, several monitoring well caps became dislodged, apparently due to air pressure from sparging. When monitoring wells caps dislodge, sparged gases can short-circuit through the monitoring well casings rather than distribute in the subsurface to facilitate treatment. Air sparge duration was reduced by 25% at both plants to mitigate overpressurization of the formation and to prevent sparged gases from short-circuiting through the monitoring well casings. No changes to the propane sparge time was made, but air sparging time was reduced, and rest-cycle time was increased. The well caps are re-installed during O&M and monitoring events, and more secure caps are being assessed to prevent this issue from reoccurring, if warranted.

4.2 Shutdown Evaluation

The biosparge transect performance metrics described in Section 3 were evaluated relative to the diminishing returns criteria and the short- and long-term objectives. Arcadis presented a comprehensive shutdown evaluation plan to EGLE in the 2022 Annual Groundwater Monitoring Report (Arcadis 2023b). Although surface leakage led to a localized area of reduced treatment in 2023, shutdown testing is still recommended. RACER Trust will revisit the proposed shutdown testing and update it, as needed, based on the data collected in 2023 to ensure it will provide the information needed to determine if the system (or portions of the system) could be idled and still meet the stated objectives for the biosparge system.

Information gathered during rebound testing will be used to optimize the system to lower the unit cost per treatment while still maintaining the short- and long-term objectives of the biosparge treatment system. At the end of the shutdown testing, recommendations will be made and discussed with EGLE based on the data collected during the test, which may include restarting portions of the system, continued shutdown of portions of the system, shutdown testing for other portions of the system, and/or additional monitoring.

RACER Trust understands that a Remediation Advisory Team (RAT) meeting is the next step to obtaining approval of the shutdown testing and will work with EGLE to facilitate the meeting.

4.3 Transect C

Continued monitoring of wells in the central portion of Plant 2 (MW-19-115, MW-19-116, MW-19-117, MW-16-82, MW-15-72), where an additional biosparge transect was originally planned, indicates that installation of this transect is not needed. Concentrations in the area are stable to decreasing, and the short- and long-term objectives of the remedy continue to be met through operation of the existing transects. The six blank casings that were installed at Transect C are currently sealed off with well caps. This area will continue to be monitored, and, if it is determined that the additional transect is not warranted, abandonment of the currently installed blank casings will be recommended.

4.4 Ongoing Evaluation

As performance monitoring data are collected and evaluated, additional actions will be recommended to EGLE as appropriate. Operational adjustments will be proposed in annual progress reports if future performance monitoring results justify such adjustments. It is proposed that a 5-year review be completed during the first quarter of 2026 for the biosparge system to document recommendations, proposals, and concurrences with EGLE over its 5 years of operation. Site redevelopment potential and opportunities, as they relate to the biosparge system, will be a factor to be considered in that review.

4.5 Summary

To remedy the identified short-circuiting, Plant 3 ROI monitoring well TW-14-06 was abandoned in 2024. Dislodged well caps of ROI and near downgradient monitoring wells are replaced during routine O&M visits and monitoring events, as needed. To prevent overpressurization in the subsurface, sparge duration in the systems has been reduced by 25%, and additional solutions are being evaluated.

The shutdown evaluation will proceed upon EGLE approval, pending the RAT meeting. RACER Trust will revisit the proposed shutdown testing and update it, as needed, based on the data collected in 2023 to ensure it will provide the information needed to determine if the system (or portions of the system) could be idled and still meet the stated objectives for the biosparge system. Biosparge system infrastructure will be maintained during the shutdown testing so that transects can be restarted, if required.

5 References

Arcadis. 2018. Interim Measures Work Plan: Lower 1,4-Dioxane Biosparge. RACER Trust Lansing Industrial Land, Lansing, Michigan. October 19.

Arcadis. 2020. 2019 Annual Groundwater Report. RACER Trust Lansing Industrial Land, Lansing, Michigan. May 4.

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Arcadis. 2023a. 2022 Lower 1,4-Dioxane Biosparge Progress Report and Shutdown Evaluation. March 15.

Arcadis. 2023b. 2022 Annual Groundwater Monitoring Report. RACER Trust Lansing Industrial Land, Lansing, Michigan. March 15.

Arcadis. 2023c. Revised Interim Groundwater Monitoring Plan. May 23.

Tables

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
MW-13-43	**2**	06/06/19	0.23	--	--	--	266
		12/04/19	0.36	--	--	--	320
		06/09/20	0.28	--	--	--	230
		12/04/20	4.26	--	--	--	15
		06/03/21	7.36	--	--	--	<1
		12/06/21	9.20	--	--	--	31
		06/07/22	14.84	--	--	--	3
		11/01/22	10.24	--	--	--	2
		05/16/23	10.51	--	--	--	2
		10/28/23	10.20	--	--	--	<1
MW-13-45	**2**	06/05/19	0.14	--	--	--	40
		12/03/19	-	--	--	--	41
		06/09/20	0.18	--	--	--	38
		12/04/20	0.09	--	--	--	58
		06/03/21	0.32	--	--	--	42
		12/06/21	0.29	--	--	--	37
		06/07/22	0.39	--	--	--	32
		11/01/22	0.85	--	--	--	26
		05/16/23	5.61	--	--	--	28
		10/28/23	0.19	--	--	--	25
MW-14-61	**2**	06/13/19	0.75	--	--	--	151
		12/06/19	0.25	--	--	--	140
		03/03/20	1.60	<0.50	0.60	0.07	148
		06/02/20	0.36	<0.50	0.80	0.05	152
		08/31/20	2.55	<0.50	0.50	0.03	98
		12/02/20	1.27	<0.50	0.30	0.15	18
		03/02/21	1.85	<0.50	1.00	0.76	21
		06/02/21	1.40	<0.50	0.20	0.23	9
		09/02/21	1.31 [1.31]	<0.50 [<0.50]	0.10 [0.10]	0.09 [0.08]	9 [8]
		11/30/21	1.10 [1.10]	--	0.20 [0.20]	0.14 [0.12]	5 [7]
		06/01/22	2.10	<0.50	0.30	0.11	16
		11/02/22	0.48	<0.50	0.30	0.13	21
		05/17/23	2.11	<0.50	0.17	0.07	13
		10/26/23	8.66	0.02	0.10	0.11	13
MW-15-72	**2**	05/16/16	0.11	--	--	--	190
		09/09/16	--	--	--	--	--
		11/11/16	4.31	--	--	--	--
		12/07/16	3.30	--	--	--	--
		12/29/16	4.85	--	--	--	--
		01/31/17	1.95	--	--	--	--
		04/26/17	0.23	--	--	--	320
		12/07/17	1.67	--	--	--	290
		01/10/18	0.27	--	--	--	--
		02/14/18	0.21	--	--	--	230
		03/08/18	0.40	--	--	--	324
		04/09/18	0.19	--	--	--	220
		05/08/18	0.25	--	--	--	260
		09/05/18	0.06	--	--	--	240
		12/05/18	0.30	--	--	--	290
		02/27/19	0.68	--	--	--	28
		06/13/19	0.54	--	--	--	128
		09/26/19	--	--	--	--	17
		10/04/19	--	--	--	--	16
		12/05/19	0.24	--	--	--	310
		03/02/20	0.63	--	--	--	150
		06/02/20	0.18	--	--	--	270
		09/01/20	0.29	--	--	--	90
		12/03/20	0.09	--	--	--	270

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
MW-15-72 (Cont.)	**2**	03/02/21	0.19	--	--	--	240
		06/02/21	4.94	--	--	--	15
		08/31/21	0.12	--	--	--	112
		12/01/21	0.34	--	--	--	133
		06/01/22	0.11	--	--	--	144
		11/03/22	0.46	--	--	--	11
		05/17/23	3.31	--	--	--	199
		10/27/23	0.28	--	--	--	67
MW-16-74	**2**	03/02/20	0.44	--	--	--	2
		06/05/20	0.49	--	--	--	2
		09/01/20	0.15	--	--	--	3
		12/01/20	0.62	--	--	--	<1
		03/03/21	0.43	--	--	--	<1
		06/02/21	0.37	--	--	--	<1
		08/31/21	0.12	--	--	--	2
		12/02/21	0.26	--	--	--	3
		06/01/22	0.17	--	--	--	2
		11/01/22	0.71	--	--	--	2
		05/17/23	0.27	--	--	--	2
		10/27/23	0.61	--	--	--	3
MW-16-75	**2**	06/05/19	0.11	--	--	--	<1
		12/05/19	0.57	--	--	--	2
		06/08/20	0.32	--	--	--	2
		12/04/20	0.06	--	--	--	<1
		06/03/21	0.34	--	--	--	<1
		12/06/21	0.70	--	--	--	3
		06/08/22	0.11	--	--	--	2
		11/01/22	0.47	--	--	--	2
		05/16/23	0.26	--	--	--	1
		10/28/23	0.35	--	--	--	2
MW-16-77	**2**	06/06/19	0.33	--	--	--	<1
		12/05/19	6.54	--	--	--	<1
		06/08/20	0.74	--	--	--	<1
		12/04/20	0.26	--	--	--	<1
		06/04/21	0.46	--	--	--	<1
		12/06/21	0.78	--	--	--	<1
		06/08/22	0.61	--	--	--	1
		11/02/22	0.50	--	--	--	<1
		05/17/23	1.47	--	--	--	2
		10/28/23	1.09	--	--	--	1
MW-16-78	**2**	06/05/19	0.16	--	--	--	<1
		12/04/19	0.20	--	--	--	<1
		06/09/20	0.26	--	--	--	<1
		12/07/20	0.14 [0.14]	--	--	--	<1 [<1]
		03/03/21	0.23	--	--	--	<1
		06/02/21	0.67	--	--	--	<1
		08/31/21	0.36	--	--	--	<1
		12/02/21	0.30	--	--	--	<1
		06/02/22	0.12	--	--	--	<1
		11/02/22	0.51	--	--	--	<1
		02/16/23	1.22 [1.22]	--	--	--	1 [1]
		05/17/23	0.15	--	--	--	1
		08/29/23	0.42	--	--	--	<1
		10/28/23	0.68	--	--	--	1
MW-16-79	**2**	06/04/19	0.86	--	--	--	<1
		12/04/19	1.10	--	--	--	2
		06/09/20	0.79	--	--	--	<1
		12/07/20	0.34	--	--	--	<1

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
MW-16-79 (Cont.)	**2**	03/03/21	0.20	--	--	--	<1
		06/03/21	0.75	--	--	--	<1
		08/31/21	0.64	--	--	--	<1
		12/02/21	0.42	--	--	--	<1
		06/02/22	0.71	--	--	--	<1
		11/02/22	--	--	--	--	<1
MW-16-81	**2**	06/13/19	0.27	--	--	--	3200
		12/06/19	0.16	--	--	--	2500
		03/02/20	0.40 [0.40]	--	--	--	2600 [2700]
		06/05/20	0.26 [0.26]	--	--	--	3100 [2700]
		09/02/20	0.16 [0.16]	--	--	--	500 [590]
		12/03/20	0.23 [0.23]	--	--	--	1930 [1070]
		03/03/21	0.20 [0.20]	--	--	--	560 [570]
		06/03/21	0.52 [0.52]	--	--	--	490 [500]
		08/31/21	0.29	--	--	--	230
		12/01/21	0.80	--	--	--	310
		06/02/22	6.55	--	--	--	143
		11/03/22	1.00	--	--	--	70
		05/17/23	0.79	--	--	--	168
		10/27/23	1.83	--	--	--	99
MW-16-82	**2**	06/07/19	0.27	--	--	--	<1
		12/04/19	0.32	--	--	--	<1
		06/10/20	0.36	--	--	--	<1
		12/04/20	0.27	--	--	--	<1
		03/03/21	0.29	--	--	--	<1
		06/04/21	0.34	--	--	--	<1
		09/01/21	0.30	--	--	--	<2
		12/02/21	0.31	--	--	--	<1
		06/02/22	0.09	--	--	--	1
		11/03/22	0.30	--	--	--	1
		05/17/23	0.21	--	--	--	1
		10/27/23	3.65	--	--	--	3
MW-16-84	**2**	06/04/19	7.89	--	--	--	47
		12/03/19	--	--	--	--	67
		03/04/20	0.21	--	--	--	66
		06/04/20	0.63 [0.63]	--	--	--	58 [58]
		09/01/20	0.39	--	--	--	57
		12/01/20	0.10	--	--	--	81
		03/02/21	1.69	<0.50	0.50	0.06	66
		06/03/21	0.51	<0.50	0.40	0.09	15
		09/01/21	0.21	--	--	--	43
		12/02/21	0.27	--	--	--	60
		06/02/22	0.14 [0.14]	--	--	--	44 [44]
		11/03/22	0.59 [0.59]	--	--	--	29 [30]
		05/17/23	0.23	--	--	--	44
		10/28/23	4.44	--	--	--	39
MW-16-85	**2**	06/04/19	4.49	--	--	--	16
		12/03/19	--	--	--	--	17
		06/08/20	0.48	--	--	--	8
		12/04/20	0.40	--	--	--	8
		06/04/21	0.27	--	--	--	4
		12/03/21	1.99	--	--	--	10
		06/06/22	0.03	--	--	--	8
		11/04/22	1.47	--	--	--	6
		05/18/23	0.58	--	--	--	6
		10/28/23	4.99	--	--	--	28
MW-17-86	**2**	06/04/19	0.23	--	--	--	75
		12/03/19	0.18	--	--	--	90

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
MW-17-86 (Cont.)	**2**	03/04/20	0.15	--	--	--	99
		06/03/20	2.12	--	--	--	94
		09/01/20	0.53	--	--	--	88
		12/01/20	0.11	--	--	--	106
		03/03/21	0.20	--	--	--	79
		06/03/21	0.28 [0.28]	--	--	--	69 [70]
		09/01/21	0.28	--	--	--	48
		12/03/21	0.32	--	--	--	43
		06/02/22	0.42	--	--	--	27
		11/03/22	0.34	--	--	--	19
		05/17/23	0.86	--	--	--	20
		10/27/23	0.00	--	--	--	16
MW-19-115	**2**	12/20/19	0.68	--	--	--	11
		03/04/20	0.22	--	--	--	9
		06/03/20	0.24	--	--	--	13
		09/01/20	1.99	--	--	--	8
		12/01/20	0.17	--	--	--	12
		03/03/21	0.60	--	--	--	2
		06/04/21	1.08	--	--	--	2
		09/01/21	0.23	--	--	--	7
		12/03/21	0.24	--	--	--	8
		06/03/22	1.63	--	--	--	7
		11/02/22	0.39	--	--	--	7
		05/17/23	5.57	--	--	--	8
		10/27/23	5.08	--	--	--	6
MW-19-116	**2**	12/20/19	0.19	--	--	--	51
		03/04/20	0.17	--	--	--	60
		06/03/20	0.18	--	--	--	61
		09/02/20	0.24 [0.24]	--	--	--	54 [55]
		12/02/20	0.30 [0.30]	--	--	--	82 [83]
		03/03/21	0.22 [0.22]	--	--	--	72 [71]
		06/04/21	0.30	--	--	--	69
		09/01/21	0.20 [0.20]	--	--	--	54 [58]
		12/03/21	0.34 [0.34]	--	--	--	68 [73]
		06/03/22	7.01	--	--	--	69
		11/02/22	0.20	--	--	--	65
		05/17/23	1.91	--	--	--	81
		10/27/23	5.64	--	--	--	61
MW-19-117	**2**	06/03/20	0.30	--	--	--	2
		09/02/20	0.23	--	--	--	2
		12/02/20	0.23	--	--	--	<1
		03/03/21	1.22	--	--	--	<1
		06/04/21	0.16	--	--	--	<1
		09/02/21	0.13	--	--	--	<2
		12/03/21	0.29	--	--	--	1
		06/02/22	0.48	--	--	--	1
		11/03/22	0.16	--	--	--	<1
		05/18/23	0.36	--	--	--	<1
		10/27/23	0.94	--	--	--	<1
MW-19-120	**2**	12/04/19	0.63	--	--	--	165
		03/04/20	0.23	--	--	--	198
		06/04/20	0.35	--	--	--	184
		09/02/20	0.11	--	--	--	137
		12/02/20	2.68	--	--	--	28
		03/02/21	0.16	<0.50	0.50	0.02	73
		06/04/21	0.29	<0.50	0.40	0.02	49
		09/02/21	4.14	--	--	--	7
		12/03/21	2.75	--	--	--	15

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
MW-19-120 (Cont.)	**2**	06/02/22	1.08	--	--	--	12
		11/03/22	1.14	--	--	--	13
		05/18/23	0.50	--	--	--	15
		10/28/23	2.96	--	--	--	11
MW-19-121	**2**	12/04/19	0.75	--	--	--	99
		03/03/20	0.14	<0.50	0.70	0.10	119
		06/04/20	1.16	<0.50	0.80	0.14	115
		08/31/20	6.06	<0.50	0.90	0.06	17
		12/02/20	2.53	8.20	0.50	1.74	4
		03/02/21	2.13	2.20	0.40	0.87	<1
		06/04/21	4.36	8.80	0.30	1.66	<1
		09/02/21	1.20	7.60	0.20	0.89	<2
		11/30/21	0.33	--	0.10	11.30	<1
		03/01/22	1.89	--	--	--	<1
		06/01/22	5.79	18.60	0.40	4.10	<1
		11/02/22	4.55	15.00	0.80	15.30	<1
		02/16/23	10.50	--	--	--	<1
		05/17/23	4.29 [4.29]	5.60 [5.40]	0.32 [0.45]	5.10 [4.80]	<1 [<1]
		08/29/23	7.76	--	--	--	<1
		10/26/23	10.44 [10.44]	0.02 [0.02]	1.30 [1.30]	10.30 [10.30]	<1 [<1]
MW-19-122	**2**	12/03/19	0.97	--	--	--	43
		03/04/20	0.31 [0.31]	--	--	--	41 [41]
		06/05/20	0.21	--	--	--	42
		09/02/20	1.87	--	--	--	33
		12/03/20	0.11	--	--	--	34
		03/02/21	0.38	--	--	--	25
		06/03/21	1.20	--	--	--	37
		09/03/21	1.63	--	--	--	9
		12/03/21	6.25	--	--	--	4
		06/02/22	6.05	--	--	--	3
		11/01/22	5.12	--	--	--	6
		02/16/23	9.46	--	--	--	3
		05/18/23	6.57	--	--	--	2
		08/07/23	--	--	--	--	5
		08/29/23	1.02	--	--	--	8
		10/30/23	3.05	--	--	--	4
MW-19-123	**2**	12/03/19	3.14	--	--	--	52
		03/04/20	0.21	--	--	--	76
		06/04/20	0.22	--	--	--	75
		09/01/20	1.46	--	--	--	51
		12/03/20	5.35	--	--	--	39
		03/02/21	5.49	<0.50	0.30	0.03	58
		06/07/21	6.03	<0.50	0.30	0.03	50
		09/02/21	5.35	<0.50	0.20	0.01	43
		11/30/21	6.43	--	0.10	0.02	20
		06/01/22	4.25	<0.50	0.30	0.01	25
		11/02/22	5.10	<0.50	0.30	0.01	21
		02/16/23	6.54	--	--	--	26
		05/17/23	10.19	<0.50	0.23	0.07	44
		08/07/23	--	--	--	--	53
		08/29/23	0.53	--	--	--	72
		10/26/23	4.10	0.02	0.10	0.02	39
MW-19-124	**2**	12/04/19	0.67	--	--	--	220
		06/05/20	0.18	--	--	--	197
		09/02/20	0.12	--	--	--	230
		12/03/20	0.11	--	--	--	420
		03/02/21	0.17	--	--	--	182
		06/03/21	0.12	--	--	--	173

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
MW-19-124 (Cont.)	**2**	09/03/21	0.72	--	--	--	222
		12/02/21	0.33	--	--	--	280
		06/02/22	0.48	--	--	--	90
		11/01/22	0.26	--	--	--	137
		05/18/23	0.24	--	--	--	172
		10/30/23	0.62	--	--	--	143
MW-20-126	**2**	07/23/20	0.26	--	--	--	370
		09/02/20	4.26	--	--	--	360
		12/03/20	0.94	--	--	--	320
		03/03/21	1.04	--	--	--	220
		06/03/21	6.70	--	--	--	156
		09/03/21	1.11	--	--	--	143
		12/02/21	5.39	--	--	--	170
		03/01/22	10.04	--	--	--	130
		06/03/22	4.65	--	--	--	120
		11/01/22	2.87	--	--	--	85
		02/16/23	10.89	--	--	--	82
		05/18/23	4.06	--	--	--	81
		08/30/23	9.61 [9.61]	--	--	--	91 [88]
		10/30/23	2.36	--	--	--	63
MW-20-127	**2**	07/23/20	0.71	--	--	--	85
		08/31/20	7.15	<0.50	0.80	0.04	115
		12/02/20	0.06	<0.50	0.70	0.16	157
		03/02/21	4.00	<0.50	0.70	0.08	138
		06/03/21	0.23	<0.50	0.80	0.06	140
		09/02/21	2.01	<0.50	0.50	0.09	126
		11/30/21	0.56	--	0.50	0.09	158
		03/01/22	0.78	--	--	--	130
		06/01/22	0.60 [0.60]	<0.50 [<0.50]	0.70 [0.80]	0.06 [0.07]	142 [143]
		11/02/22	0.43 [0.43]	<0.50 [<0.50]	0.80 [0.70]	0.04 [0.04]	126 [122]
		02/16/23	0.40	--	--	--	146
		05/17/23	0.72	<0.50	0.75	0.06	155
		08/30/23	0.32	--	--	--	180
		10/26/23	0.00	0.54	0.70	0.05	132
MW-20-128	**2**	07/23/20	0.15	<0.50	0.60	0.09	270
		09/01/20	9.82	--	--	--	112
		12/03/20	7.13	--	--	--	20
		03/02/21	9.69	<0.50	1.40	0.43	9
		06/02/21	7.95	0.70	6.10	1.00	4
		09/02/21	3.92	<0.50	0.20	0.04	11
		11/30/21	9.39	--	2.10	0.70	5
		06/01/22	7.13	<0.50	2.20	0.39	6
		11/02/22	7.59	<0.50	1.60	0.60	<1
		05/17/23	7.58	<0.50	0.81	0.33	4
		10/26/23	11.62	0.03	6.70	3.30	1
MW-20-129	**2**	07/23/20	0.41	--	--	--	126
		09/01/20	0.35	--	--	--	126
		12/03/20	0.09	--	--	--	140
		03/02/21	0.48	--	--	--	108
		06/02/21	0.20	--	--	--	108
		09/02/21	0.18	--	--	--	82
		12/02/21	0.43	--	--	--	83
		06/03/22	0.17	--	--	--	80
		11/01/22	0.31	--	--	--	60
		02/16/23	0.79	--	--	--	71
		05/18/23	0.21	--	--	--	103
		08/07/23	--	--	--	--	75
		08/29/23	0.71	--	--	--	74

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
MW-20-129 (Cont.)	**2**	10/30/23	0.38	--	--	--	71
MW-21-142	**2**	12/03/21	0.30	--	--	--	91
		06/07/22	0.04	--	--	--	81
		11/02/22	0.51	--	--	--	64
		05/18/23	0.48	--	--	--	82
		10/30/23	0.21	--	--	--	70
PW-14-02	**2**	06/06/19	0.12	--	--	--	260
		12/04/19	0.24	--	--	--	260
		06/03/20	0.39 [0.39]	--	--	--	160 [160]
		09/02/20	7.57	--	--	--	43
		12/03/20	1.15	--	--	--	97
		03/03/21	9.04	--	--	--	37
		06/02/21	8.56	--	--	--	23
		09/03/21	1.39	--	--	--	50
		12/02/21	0.70	--	--	--	95
		03/01/22	10.81 [10.81]	--	--	--	11 [12]
		06/01/22	5.46	<0.50	0.40	0.03	26
		11/03/22	8.20	--	--	--	9
		02/16/23	9.42	--	--	--	18
		05/18/23	7.50	--	--	--	14
		08/30/23	9.11	--	--	--	5
		10/26/23	8.97	--	--	--	7
TW-14-02	**2**	03/04/20	0.34	--	--	--	470
		06/04/20	0.37	--	--	--	410
		09/01/20	10.72	--	--	--	3
		12/02/20	9.81	--	--	--	<1
		03/03/21	12.61	--	--	--	<1
		06/02/21	8.39	--	--	--	<1
		09/03/21	5.08	--	--	--	29
		12/02/21	9.61	--	--	--	8
		03/02/22	9.44	--	--	--	<1
		06/01/22	8.07	<0.50	0.50	0.11	<1
		11/03/22	13.03	--	--	--	<1
		02/16/23	12.10	--	--	--	3
		05/18/23	8.16 [8.16]	--	--	--	9 [8]
		08/07/23	--	--	--	--	152
		08/29/23	0.32	--	--	--	220
		10/26/23	10.48	--	--	--	1
TW-15-12	**2**	03/03/20	0.33	<0.50	0.40	0.03	220
		06/02/20	1.33	<0.50	0.90	0.31	210
		08/31/20	7.42	<0.50	1.00	0.45	100
		12/02/20	9.19	<0.50	2.00	0.76	34
		03/02/21	10.91	<0.50	0.40	0.15	5
		06/02/21	8.58	<0.50	0.40	0.14	7
		09/02/21	6.15	<0.50	0.20	0.03	10
		11/30/21	8.86	--	0.10	0.02	34
		03/02/22	11.92	--	--	--	4
		06/01/22	7.33	0.50	5.10	2.50	9
		11/02/22	10.14	0.50	4.60	3.00	2
		02/16/23	10.73	--	--	--	1
		05/17/23	7.35	<0.50	0.30	0.12	3
		08/30/23	8.86	--	--	--	<1
		10/26/23	10.49	0.02	0.30	0.12	<1
AS-19-A06	**3**	07/06/22		--	--	--	<1
		08/30/22	3.24	--	--	--	<1
		11/07/22	0.50	--	--	--	<1
		02/17/23	1.27	--	--	--	<1
		05/19/23	0.49	--	--	--	<1

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
AS-19-A06 (Cont.)	**3**	08/30/23	1.16	--	--	--	<1
		11/02/23	0.79	--	--	--	<1
AS-19-A07	**3**	2/17/2023	4.50	--	--	--	1
		5/19/2023	5.72	--	--	--	<1
		8/30/2023	1.98	--	--	--	3
		11/2/2023	4.09	--	--	--	3
MW-12-21	**3**	05/08/18	1.21	--	--	--	200
		12/11/18	4.54	--	--	--	251
		06/05/19	6.79	--	--	--	255
		12/06/19	0.57	--	--	--	250
		06/11/20	0.62	--	--	--	230
		12/08/20	0.20	--	--	--	310
		06/07/21	1.02 [1.02]	--	--	--	167 [171]
		12/09/21	0.46	--	--	--	177
		06/10/22	4.55	--	--	--	179
		11/04/22	1.10	--	--	--	150
		02/17/23	1.60	--	--	--	141
		05/19/23	0.77 [0.77]	--	--	--	162 [167]
		08/30/23	7.22	--	--	--	199
		11/01/23	0.45	--	--	--	118
MW-13-22	**3**	12/12/18	1.11	--	--	--	160
		06/06/19	0.62	--	--	--	159
		08/27/19	6.58	<0.5	1.00	0.39	173
		12/05/19	1.91	--	--	--	162
		03/03/20	0.23	--	--	--	203
		06/11/20	0.47	--	--	--	157
		08/27/20	1.52	--	--	--	141
		12/01/20	3.55	--	--	--	162
		03/03/21	0.16	--	--	--	86
		06/07/21	0.34	--	--	--	45
		09/01/21	0.52	--	--	--	132
		12/07/21	0.45	--	--	--	152
		03/02/22	0.35	--	--	--	100
		06/06/22	0.37	--	--	--	109
		08/30/22	6.69	--	--	--	137
		11/05/22	0.22	--	--	--	84
		02/17/23	0.98	--	--	--	171
		05/19/23	1.39	--	--	--	179
		08/30/23	2.61	--	--	--	138
		11/01/23	0.23	--	--	--	135
MW-13-29	**3**	12/10/18	1.00	--	--	--	16
		06/05/19	0.19	--	--	--	21
		06/10/20	0.26	--	--	--	35
		06/08/21	--	<0.50	0.70	0.06	26
		09/02/21	0.64	<0.50	0.40	0.01	18
		11/30/21	1.59	--	0.40	0.06	12
		06/06/22	3.46	--	--	--	8
		11/07/22	1.05	<0.50	0.80	0.02	12
		05/23/23	3.51	<0.50	0.47	0.08	9
		10/26/23	2.34 [2.34]	0.13 [0.12]	0.40 [0.20]	0.02 [0.02]	7 [7]
MW-13-34	**3**	05/14/18	3.53	--	--	--	75
		12/11/18	1.79	--	--	--	70
		06/07/19	0.15	--	--	--	74
		08/29/19	0.39	--	--	--	94
		12/05/19	1.42	--	--	--	105
		06/10/20	0.01	--	--	--	81
		08/27/20	0.35	--	--	--	75
		12/01/20	0.12	--	--	--	106

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
MW-13-34 (Cont.)	**3**	03/03/21	6.61	--	--	--	127
		06/07/21	0.12	--	--	--	86
		09/02/21	0.31	--	--	--	77
		12/07/21	0.49	--	--	--	83
		03/02/22	0.86	--	--	--	75
		06/06/22	0.33	--	--	--	80
		11/08/22	0.47	--	--	--	81
		02/17/23	0.16 [0.16]	--	--	--	87 [85]
		05/19/23	0.99	--	--	--	109
		08/30/23	0.26	--	--	--	106
		11/02/23	0.21	--	--	--	82
MW-13-48	**3**	05/14/18	0.24	--	--	--	141
		12/11/18	1.83	--	--	--	117
		06/07/19	0.10	--	--	--	128
		12/06/19	2.02	--	--	--	162
		06/10/20	0.01	--	--	--	128
		12/07/20	0.04 [0.04]	--	--	--	137 [137]
		06/07/21	1.03	--	--	--	114
		12/09/21	0.27	--	--	--	84
		06/10/22	0.65	--	--	--	37
		11/08/22	0.37	--	--	--	24
		05/19/23	0.63	--	--	--	62
		11/02/23	0.39	--	--	--	61
MW-19-109	**3**	06/20/19	3.99	--	--	--	34
		08/27/19	8.08	<0.50	0.40	0.40	29
		12/05/19	6.95	--	--	--	4
PW-14-03	**3**	05/09/18	0.29	--	--	--	500
		12/11/18	1.22	--	--	--	378
		06/04/19	0.33	<0.09	1.30	0.08	223
		08/27/19	0.64 [0.64]	<0.50 [<0.50]	1.20 [1.10]	0.14 [0.11]	250 [245]
		12/05/19	1.04	--	--	--	43
		03/03/20	5.90	--	--	--	75
		06/10/20	0.02	--	--	--	65
		08/27/20	4.51	--	--	--	69
		12/01/20	8.30	--	--	--	71
		03/03/21	9.12	--	--	--	27
		06/08/21	8.63	--	--	--	22
		09/01/21	7.59	--	--	--	19
		12/07/21	1.07	--	--	--	25
		03/02/22	10.37 [10.37]	--	--	--	3 [2]
		06/06/22	12.18 [12.18]	--	--	--	3 [3]
		11/05/22	5.53 [5.53]	--	--	--	8 [8]
		02/17/23	6.22	--	--	--	6
		05/20/23	7.69	--	--	--	5
		08/30/23	7.30	--	--	--	3
		11/02/23	7.59	--	--	--	2
TW-14-06	**3**	06/04/19	2.12	<0.09	2.40	1.00	700
		08/27/19	9.16	<0.50	9.10	14.00	430
		12/06/19	8.92 [8.92]	<0.50 [--]	1.50 [--]	1.00 [--]	59 [61]
		03/03/20	12.46	<0.50	22.40	29.00	23
		06/23/20	0.91	<0.50	2.70	1.60	13
		08/31/20	6.69 [6.69]	<0.50 [<0.50]	2.40 [2.20]	1.60 [1.14]	4 [4]
		12/02/20	12.49 [12.49]	<0.50 [<0.50]	18.00 [19.10]	22.00 [24.00]	<1 [<1]
		03/02/21	10.44 [10.44]	<0.50 [<0.50]	8.60 [8.40]	10.80 [8.30]	<1 [<1]
		06/07/21	12.87 [12.87]	<0.50 [<0.50]	8.20 [7.00]	14.00 [9.30]	<1 [<1]
		09/02/21	11.29 [11.29]	<0.50 [<0.50]	4.70 [4.70]	2.90 [1.90]	9 [8]
		11/30/21	11.24 [11.24]	--	7.50 [7.70]	4.00 [6.00]	34 [36]
		03/02/22	12.34	--	--	--	7

Table 1
Biosparge Performance Results
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Location ID	Plant	Date Collected	Field Parameters	Results			
			Dissolved Oxygen	Nitrate-N	Total Kjeldahl Nitrogen	Total Phosphorus	1,4-Dioxane
		Units	mg/L	mg/L	mg/L	mg/L	µg/L
TW-14-06 (Cont.)	**3**	06/06/22	15.09	<0.50	4.30	1.50	2
		11/07/22	9.53	2.50	2.60	0.60	10
		05/23/23	11.94	<0.50	9.70	10.00	4
		08/30/23	10.31 [10.31]	--	--	--	4 [5]
		10/26/23	11.92	0.02	0.80	0.46	<1
TW-15-11	**3**	06/04/19	0.20	<0.09	0.90	0.07	246
		08/28/19	4.22	<0.50	0.40	0.07	218
		12/05/19	2.78	--	--	--	250
		03/03/20	5.91	--	--	--	130
		06/23/20	0.63	--	--	--	220
		08/27/20	4.11	--	--	--	120
		12/01/20	10.66	--	--	--	51
		03/03/21	9.45	--	--	--	48
		06/07/21	11.85	--	--	--	41
		09/01/21	7.77	--	--	--	7
		12/08/21	0.32	--	--	--	30
		03/02/22	0.02	--	--	--	5
		06/06/22	13.66	--	--	--	5
		11/05/22	9.82	--	--	--	22
		02/17/23	0.29	--	--	--	17
		05/20/23	8.66 [8.66]	--	--	--	46 [47]
		08/30/23	10.15	--	--	--	120
		11/02/23	12.88	--	--	--	108

Notes:
mg/L = milligrams per liter
µg/L = micrograms per liter
< = less than lab reporting limit
-- = Not Analyzed
[ ] = Duplicate Sample

Table 2
Biosparge Performance Tracking Plant 3
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

Plant 3 (Transect A) - Includes Deep Overburden Wells but Excludes Upgradient Wells

Descriptor:		Well 1,4-Dioxane (µg/L)						Average (µg/L)	Average 12-month Reduction (µg/L)*
		TW-14-06 ROI 14	TW-15-11 DG 48	PW-14-03 DG 56	MW-13-34 DG 460	MW-13-29 DG 250	MW-13-48 DG 460		
Distance (ft):									
Year	Quarter								
1	6/1/2019	700	246	223	74	21	128	232	--
	9/1/2019	430	218	250	94	--	--	--	--
	12/1/2019	59	250	43	105	--	162	124	--
	3/1/2020	23	130	75	--	--	--	--	--
2	6/1/2020	13	220	65	81	34	128	90	142
	9/1/2020	4	120	69	75	--	--	--	--
	12/1/2020	< 1	51	71	106	--	137	73	51
	3/1/2021	< 1	48	27	127	--	--	--	***--***
3	6/1/2021	< 1	41	22	86	26	114	48	42
	9/1/2021	9	7	19	77	18	--	--	--
	12/1/2021	34	30	25	83	12	84	45	29
	3/1/2022	7	5	3	75	--	--	--	--
4	6/1/2022	2	5	3	80	8	37	23	***26***
	9/1/2022	--	--	--	--	--	--	--	--
	12/1/2022	10	22	8	81	12	24	26	***19***
	3/1/2023	--	17	6	85	--	--	--	--
5	6/1/2023	4	47	5	109	9	62	39	-17
	9/1/2023	5	120	3	106	--	--	--	--
	12/1/2023	< 1	108	2	82	7	61	44	-17

Notes:
All concentrations are in micrograms per liter.
Actual sample date varies, sample date displayed represents first day of the third month of the quarter
ROI = radius of influence
DG = downgradient
UG = upgradient
µg/L = micrograms per liter
< = less than lab reporting limit
-- = Not Analyzed
*Reference Reduction Value (RRV) is 142 µg/L, the point of diminishing returns is achieved after 3 years of operation when the 12-month reduction is less than 20% of the RRV, or 28.4 µg/L
Bold and Italic = below 20% of the RRV

Table 3a
Biosparge Performance Tracking Plant 2
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

ARCADIS

Plant 2 North (Transect B)

Descriptor:		Well 1,4-Dioxane (µg/L)				Average (µg/L)	Average 12-month Reduction (µg/L)*
		TW-15-12 ROI	PW-14-02 DG	MW-20-127 DG	MW-20-126 UG		
Distance (ft):		8	54	102	66		
Year	Date						
	6/1/2020	210	160	85	370	206	--
	9/1/2020	100	43	115	360	155	--
	12/1/2020	34	97	157	320	152	--
2	3/1/2021	5	37	138	220	100	--
	6/1/2021	7	23	140	156	82	125
	9/1/2021	10	50	126	143	82	72
	12/1/2021	34	95	158	170	114	38
3	3/1/2022	4	11	130	130	69	31
	6/1/2022	9	26	142	120	74	***7***
	9/1/2022	--	--	--	--	--	--
	12/1/2022	2	9	126	85	56	59
4	3/1/2023	1	18	146	82	62	***7***
	6/1/2023	3	14	155	81	63	***11***
	9/1/2023	< 1	5	180	88	69	--
	12/1/2023	< 1	7	132	63	51	***5***

Notes:
All concentrations are in micrograms per liter.
Actual sample date varies, sample date displayed represents first day of the third month of the quarter
ROI = radius of influence
DG = downgradient
UG = upgradient
µg/L = micrograms per liter
< = less than lab reporting limit
-- = Not Analyzed
*Reference Reduction Value (RRV) is 125 µg/L, RACER proposes the point of diminishing returns is achieved after 3 years of operation when the 12-month reduction is less than 20% of the RRV, or 25 µg/L
Bold and Italic = below 20% of the RRV

Table 3b
Biosparge Performance Tracking Plant 2
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

ARCADIS

Plant 2 South (Transect G & E)

		Well 1,4-Dioxane (µg/L)									
Descriptor:		TW-14-02	MW-19-123	MW-16-74	MW-19-121	MW-20-129	MW-19-122	MW-16-78	MW-16-81	Average (µg/L)	Average 12-month Reduction (µg/L)*
Distance (ft):		ROI 2	DG 70	DG 75	ROI 2	UG 121	UG 92	DG 174	UG 120		
Year	Date										
1	3/1/2020	470	76	2	119	--	41	--	2600	--	--
	6/1/2020	410	75	2	115	126	42	< 1	3100	484	--
	9/1/2020	3	51	3	17	126	33	--	500	--	--
	12/1/2020	< 1	39	< 1	4	140	34	< 1	1930	269	--
2	3/1/2021	< 1	58	< 1	< 1	108	25	< 1	560	94	--
	6/1/2021	< 1	50	< 1	< 1	108	37	< 1	490	86	398
	9/1/2021	29	43	2	< 2	82	9	< 1	230	50	**--**
	12/1/2021	8	20	3	< 1	83	4	< 1	310	54	215
3	3/1/2022	< 1	--	--	< 1	--	--	--	--	--	--
	6/1/2022	< 1	25	2	< 1	80	3	< 1	143	32	***54***
	9/1/2022	--	--	--	--	--	--	--	--	--	--
	12/1/2022	< 1	21	2	< 1	60	6	< 1	70	20	***34***
4	3/1/2023	3	26	--	< 1	71	3	1	--	--	--
	6/1/2023	9	44	2	< 1	103	2	1	168	41	-9
	9/1/2023	220	72	--	< 1	74	8	< 1	--	--	--
	12/1/2023	1	39	3	< 1	71	4	1	99	27	-7

Notes:
All concentrations are in micrograms per liter.
Actual sample date varies, sample date displayed represents first day of the third month of the quarter.
ROI = radius of influence
DG = downgradient
UG = upgradient
µg/L = micrograms per liter
< = less than lab reporting limit
-- = Not Analyzed
*Reference Reduction Value (RRV) is 398 µg/L, RACER proposes the point of diminishing returns is achieved after 3 years of operation when the 12-month reduction is less than 20% of the RRV, or 79.6 µg/L
Bold and Italic = below 20% of the RRV

Table 3c
Biosparge Performance Tracking Plant 2
Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

ARCADIS

Plant 2 East (Transect E & F)

Descriptor:		Well 1,4-Dioxane (µg/L)							
Distance (ft):		MW-14-61 ROI 13	MW-19-120 ROI 44	MW-20-128 ROI 17	MW-16-84 DG 69	MW-17-86 DG 115	MW-19-124 UG 99	Average (µg/L)	Average 12-month Reduction (µg/L)*
Year	Date								
1	3/1/2020	148	198	--	66	99	--		--
	6/1/2020	152	184	270	58	94	197	159	--
	9/1/2020	98	137	112	57	88	230	120	--
	12/1/2020	18	28	20	81	106	420	112	--
2	3/1/2021	21	73	9	66	79	182	72	--
	6/1/2021	9	49	4	15	69	173	53	106
	9/1/2021	9	7	11	43	48	222	57	64
	12/1/2021	5	15	5	60	43	280	68	44
3	3/1/2022	--	--	--	--	--	--	--	--
	6/1/2022	16	12	6	44	27	90	33	**21**
	9/1/2022	--	--	--	--	--	--	--	--
	12/1/2022	21	13	< 1	29	19	137	37	31
4	3/1/2023	--	--	--	--	--	--	--	--
	6/1/2023	13	15	4	44	20	172	45	-12
	9/1/2023	--	--	--	--	--	--	--	--
	12/1/2023	13	11	1	39	16	143	37	**0**

Notes:
All concentrations are in micrograms per liter.
Actual sample date varies, sample date displayed represents first day of quarter for graphing purposes.
ROI = radius of influence
DG = downgradient
UG = upgradient
µg/L = micrograms per liter
< = less than lab reporting limit
-- = Not Analyzed
MW-16-79 was removed from calculation due to well damage.
*Reference Reduction Value (RRV) is 106 µg/L, RACER proposes the point of diminishing returns is achieved after 3 years of operation when the 12-month reduction is less than 20% of the RRV, or 21.2 µg/L
Bold and Italic = below 20% of the RRV

Figures

WELLS

- BIOSPARGE
- PERCHED MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- BIOSPARGE/IGMP SEMI-ANNUAL PERFORMANCE MONITORING WELL

- FENCE
- SYSTEM BUILDING
- FENCED AREA
- 1-INCH CONVEYANCE HOSE
- TRANSECT B
- TRANSECT E
- TRANSECT F
- TRANSECT G

PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

0 150 300
SCALE IN FEET

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 2 BIOSPARGE SYSTEM AND PERFORMANCE MONITORING WELLS

DRAFT

ARCADIS

FIGURE 1

CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: B0064479.2019 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
T:_ENVRACER\Lansing_BuffaloData\MXDs\2020_Biosparge\Completion Report\Completion_Report\Completion_Report.aprx PLOTTED: 4/1/2024 1:32 PM BY: KPullen

CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: B0064479.2019 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
T:_ENVRACER\Lansing_BuffaloData\MXDs\2023 Biosparge\Biosparge2023\Biosparge2023.aprx PLOTTED: 4/1/2024 11:38 AM BY: KPullen

LEGEND:

- BIOSPARGE
- DEEP OVERBURDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- BIOSPARGE/IGMP SEMI-ANNUAL PERFORMANCE MONITORING WELL
- 1-INCH CONVEYANCE HOSE
- SYSTEM BUILDING
- FENCE
- FENCED AREA
- PLANT 2
- PLANT 3

0 60 120

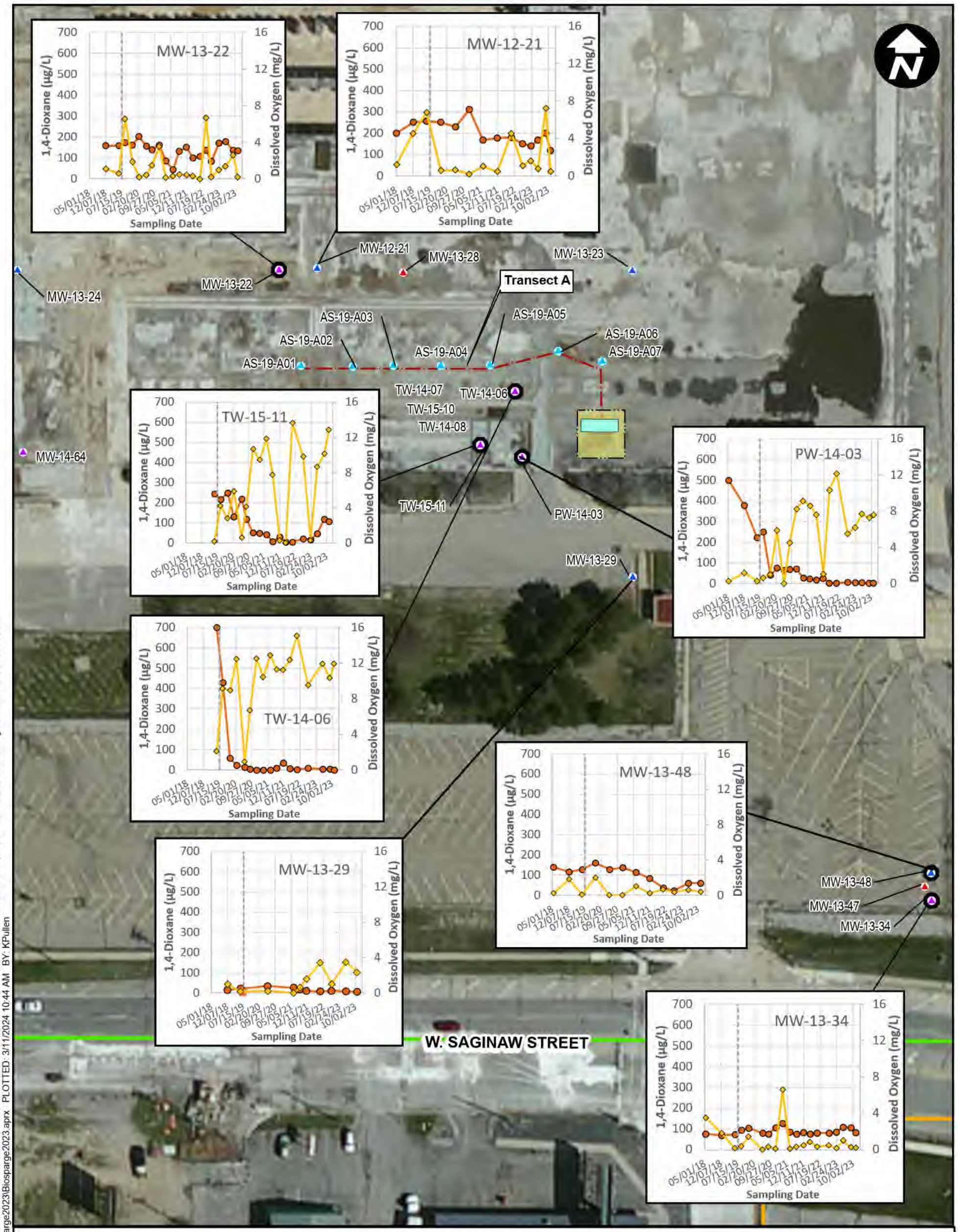
SCALE IN FEET

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 3 BIOSPARGE SYSTEM AND PERFORMANCE MONITORING WELLS

ARCADIS

FIGURE
2



CITY: Novi DIV: ENV PIC: J. BARRETT PM: T. LINDER TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: 30112892.0470B COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
T:_ENVRACER\Lansing_BuffaloData\MXDs\2023 Biosparge\Biosparge2023\Biosparge2023.aprx PLOTTED: 3/11/2024 10:44 AM BY: KPullen

LEGEND

WELLS
- BIOSPARGE
- DEEP OVERBUDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- PERFORMANCE MONITORING WELL
- SYSTEM BUILDING
- FENCE
- FENCED AREA
- 1-INCH CONVEYANCE HOSE

PLANT BOUNDARIES
- PLANT 2
- PLANT 3

GRAPH LEGEND
- 1,4-DIOXANE
- DISSOLVED OXYGEN
- SYSTEM AIR + PROPANE START DATE

ug/L MICROGRAMS PER LITER
mg/L MILLIGRAMS PER LITER

0 60 120
SCALE IN FEET

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 3 BIOSPARGE PERFORMANCE MONITORING RESULTS

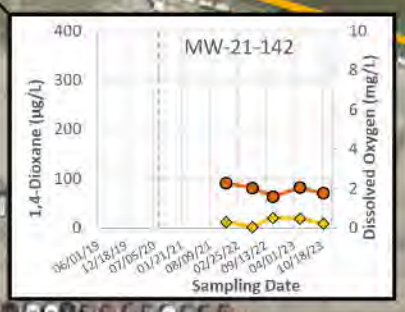
ARCADIS

FIGURE 3

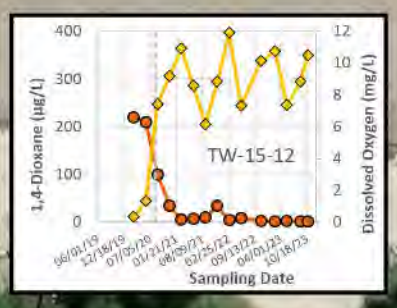
W. MICHIGAN AVENUE

N. ROSEMARY STREET

MW-21-142

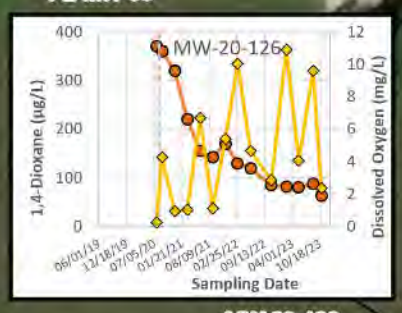


MW-14-63
MW-12-02

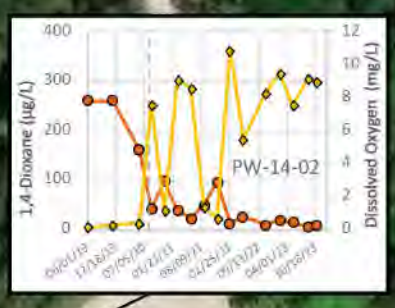


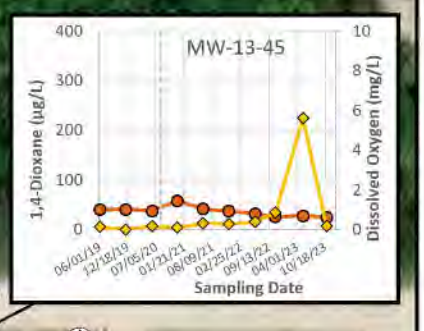
P2-MW-03

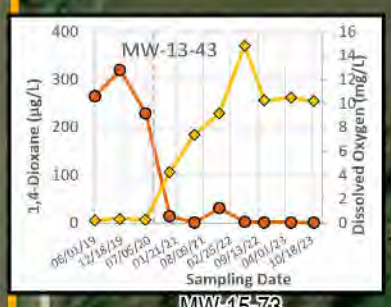
MW-16-80



MW-20-126







Transect B

AS-19-B01
AS-19-B02
AS-19-B03
AS-19-B04
AS-19-B05
AS-19-B06
AS-19-B07

TW-15-12

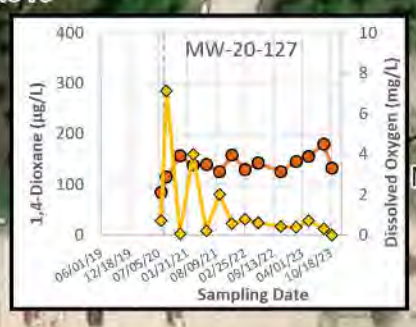
MW-13-45

MW-13-43

PW-14-02

MW-13-44

MW-15-73

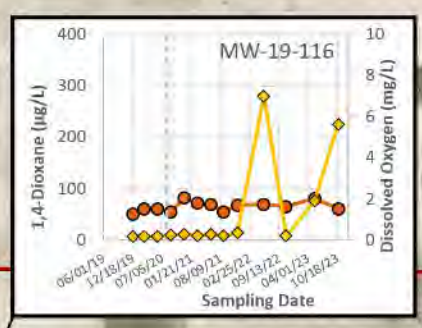


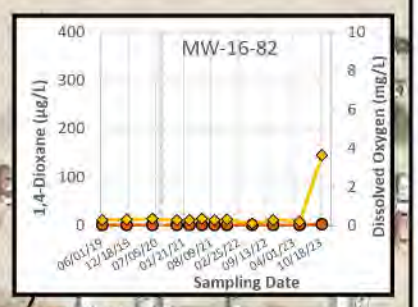
MW-22-155

MW-20-127

MW-19-125

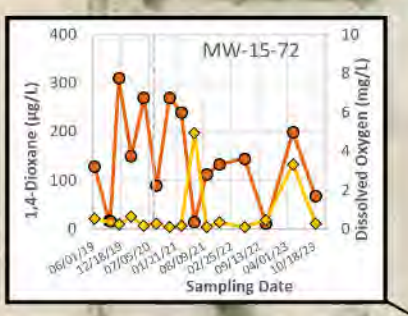
MW-19-118S/D





PSP-F12
CSP-F01
ASP-F03
ASP-F02
ASP-F01

MW-22-153
MW-14-58
MW-17-87
MW-16-83
MW-22-156



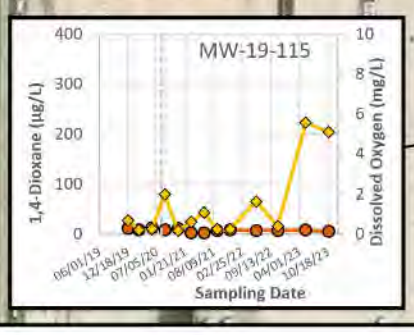
MW-19-116

MW-16-82

MW-20-128

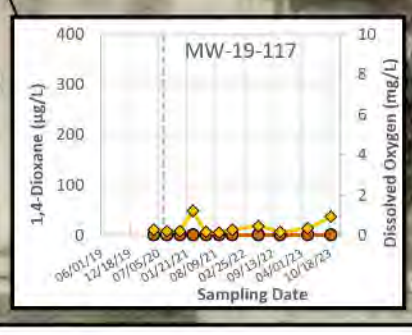
MW-19-117

MW-12-05R



MW-19-115

MW-15-72



MW-14-57

LEGEND

WELLS

- BIOSPARGE
- PERCHED MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- BIOSPARGE PERFORMANCE MONITORING WELL
- 1-INCH CONVEYANCE HOSE

PLANT BOUNDARIES

- PLANT 2
- PLANT 3

GRAPH LEGEND

- 1,4-DIOXANE
- DISSOLVED OXYGEN
- SYSTEM AIR + PROPANE START DATE

ug/L MICROGRAMS PER LITER
mg/L MILLIGRAMS PER LITER

0 90 180
SCALE IN FEET

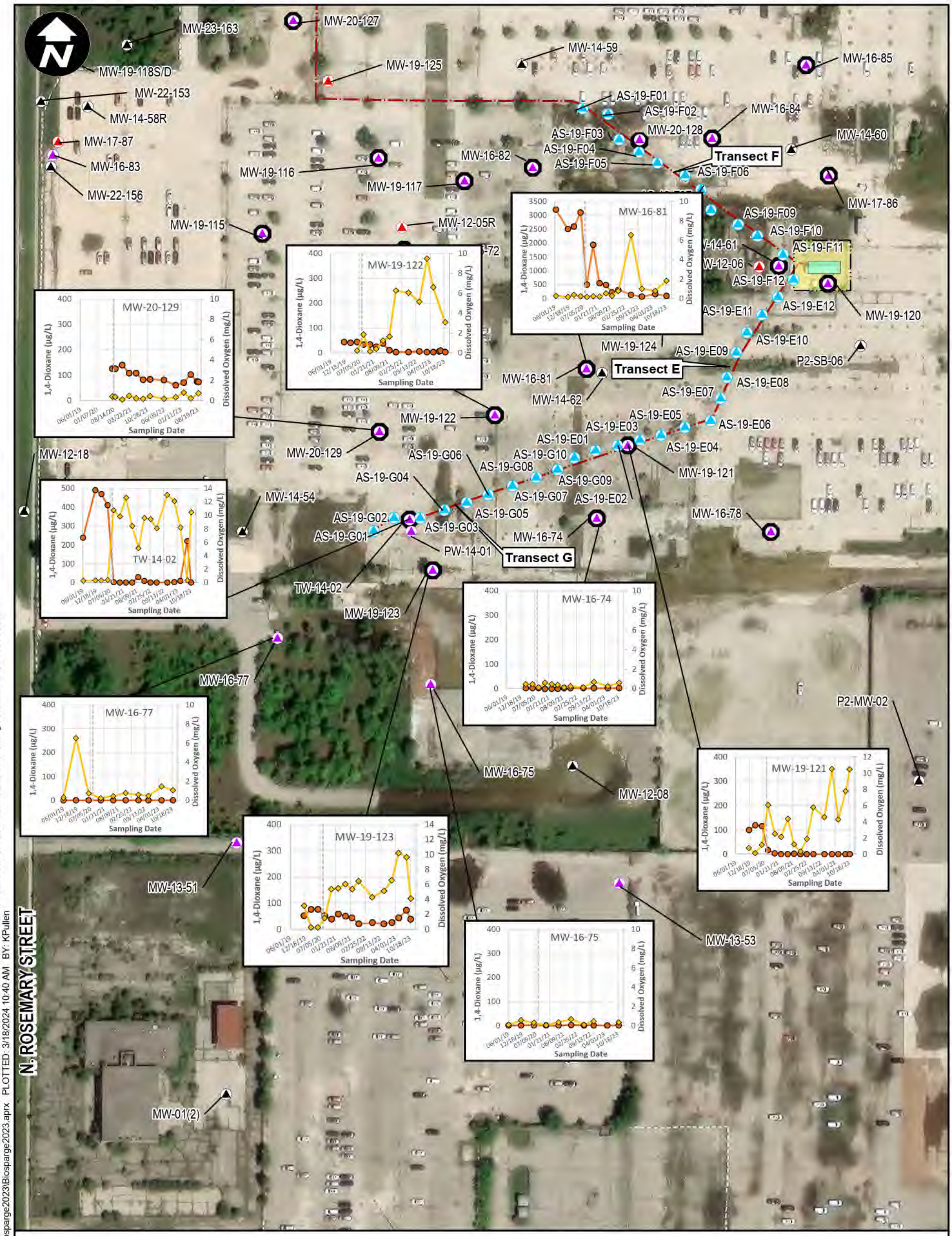
RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 2 NORTH BIOSPARGE PERFORMANCE MONITORING RESULTS

ARCADIS

FIGURE 4

CITY: Novi DIV: ENV PIC: J. BARRETT PM: T.LINDER TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: 30112892.0470B COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
T:_ENVRACER\Lansing_BuffaloData\MXDs\2023 Biosparge\Biosparge2023\Biosparge2023\Biosparge2023.aprx PLOTTED: 3/18/2024 10:35 AM BY: KPullen



CITY: Novi DIV: ENV PIC: J. BARRETT PM: T. LINDER TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: 30112892.0470B COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
T:_ENV\RACER\Lansing_BuffaloData\MXDs\2023 Biosparge\Biosparge2023\Biosparge2023.aprx PLOTTED: 3/18/2024 10:40 AM BY: KPullen

N. ROSEMARY STREET

LEGEND

WELLS

- BIOSPARGE
- PERCHED MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- BIOSPARGE PERFORMANCE MONITORING WELL
- FENCE
- SYSTEM BUILDING
- FENCED AREA
- 1-INCH CONVEYANCE HOSE

GRAPH LEGEND

- 1,4-DIOXANE
- DISSOLVED OXYGEN
- SYSTEM AIR + PROPANE START DATE

ug/L MICROGRAMS PER LITER
mg/L MILLIGRAMS PER LITER

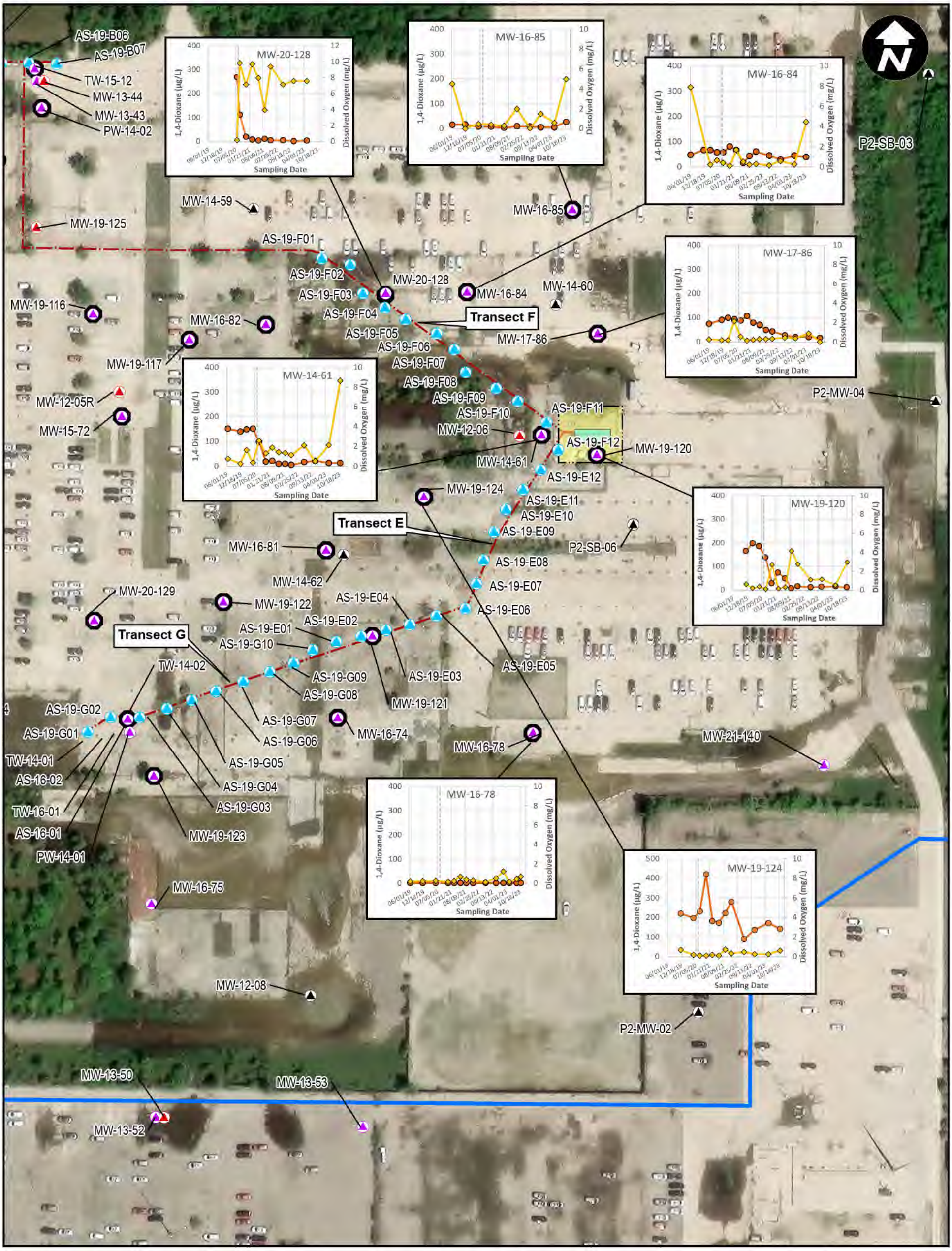
0 120 240
SCALE IN FEET

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 2 SOUTH BIOSPARGE PERFORMANCE MONITORING RESULTS

ARCADIS

FIGURE 5



LEGEND

WELLS
- BIOSPARGE
- PERCHED MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- BIOSPARGE PERFORMANCE MONITORING WELL
- FENCE
- SYSTEM BUILDING
- FENCED AREA
- 1-INCH CONVEYANCE HOSE

PLANT BOUNDARIES
- PLANT 2
- PLANT 6

GRAPH LEGEND
- 1,4-DIOXANE
- DISSOLVED OXYGEN
- SYSTEM AIR + PROPANE START DATE

ug/L MICROGRAMS PER LITER
mg/L MILLIGRAMS PER LITER

0 110 220
SCALE IN FEET

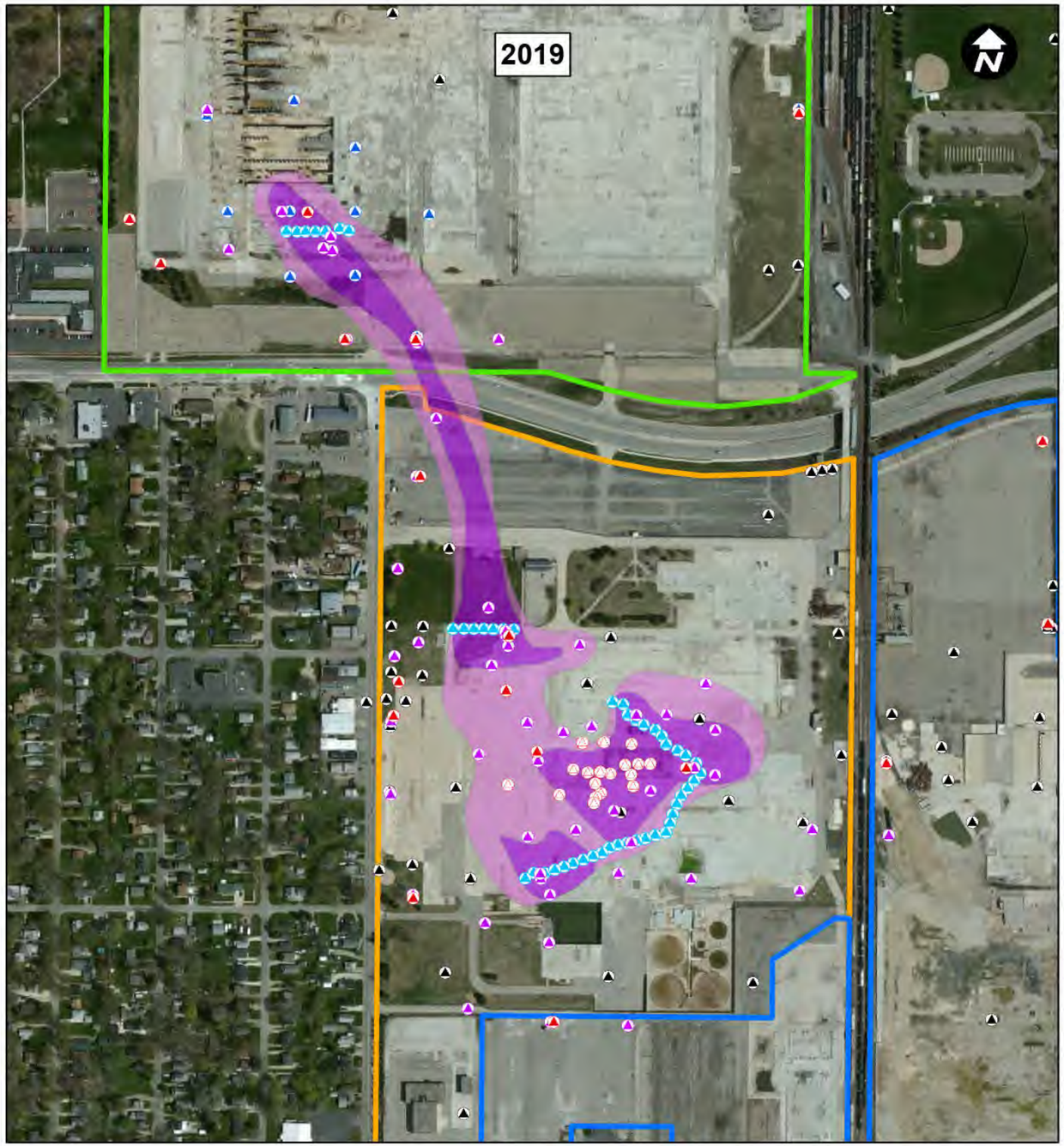
RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

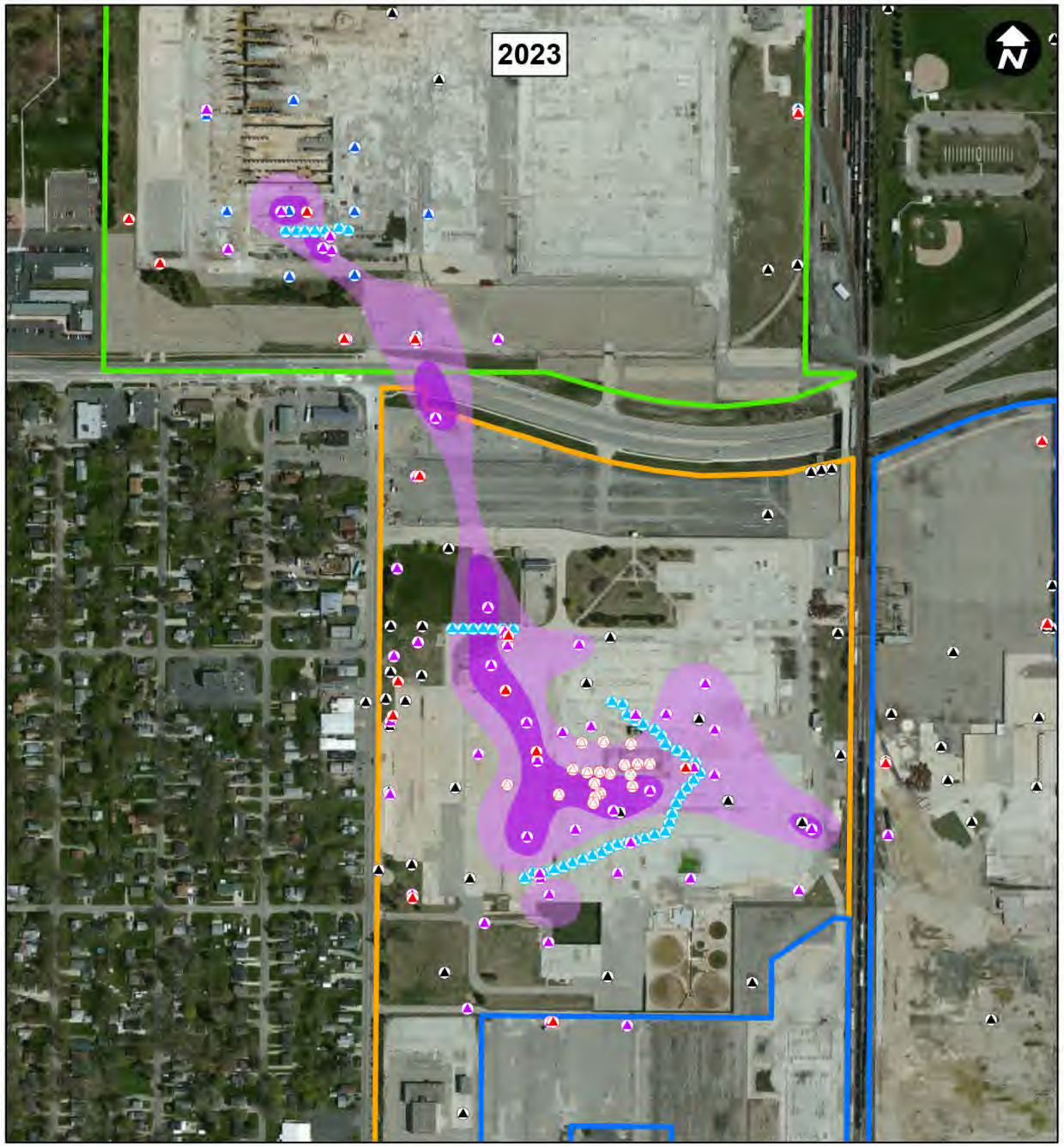
PLANT 2 CENTRAL/EAST BIOSPARGE PERFORMANCE MONITORING RESULTS

ARCADIS

FIGURE 6

CITY: Novi DIV: ENV PIC: J. BARRETT PM: T.LINDER TM: A. LORENZ TR: P. CURRY PROJECT NUMBER: 30112892.0470B COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
T:_ENV\RACER\Lansing_BuffaloData\MXDs\2023 Biosparge\Biosparge2023\Biosparge2023.aprx PLOTTED: 3/18/2024 10:57 AM BY: KPullen





LEGEND:

- BIOSPARGE
- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- DEEP OVERBURDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- LOWER 1,4-DIOXANE PLUME > 72 µg/L
- LOWER 1,4-DIOXANE IMPACTS > DW CRITERIA (7.2 µg/L)
- PLANT 2
- PLANT 3
- PLANT 6

0 200 400 800 Feet

NOTE:

1. IMAGERY OBTAINED FROM ESRI IMAGERY SERVICE.

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

LOWER 1,4-DIOXANE PLUME COMPARISON 2019 VS 2023

ARCADIS

FIGURE 7

CITY: Novi DIV: ENV PIC: J. BARRETT PM: T. LINDER TM: A. VILLHAUER TR: PROJECT NUMBER: 30171056 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
T:_ENVRACER\Lansing_BuffaloData\MXDs\2023 Biosparge\Biosparge2023\Biosparge2023.aprx PLOTTED: 4/1/2024 1:49 PM BY: KPullen

Figure 8
Plant 3 Transect A Average Plume Concentration of 1,4-Dioxane

Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

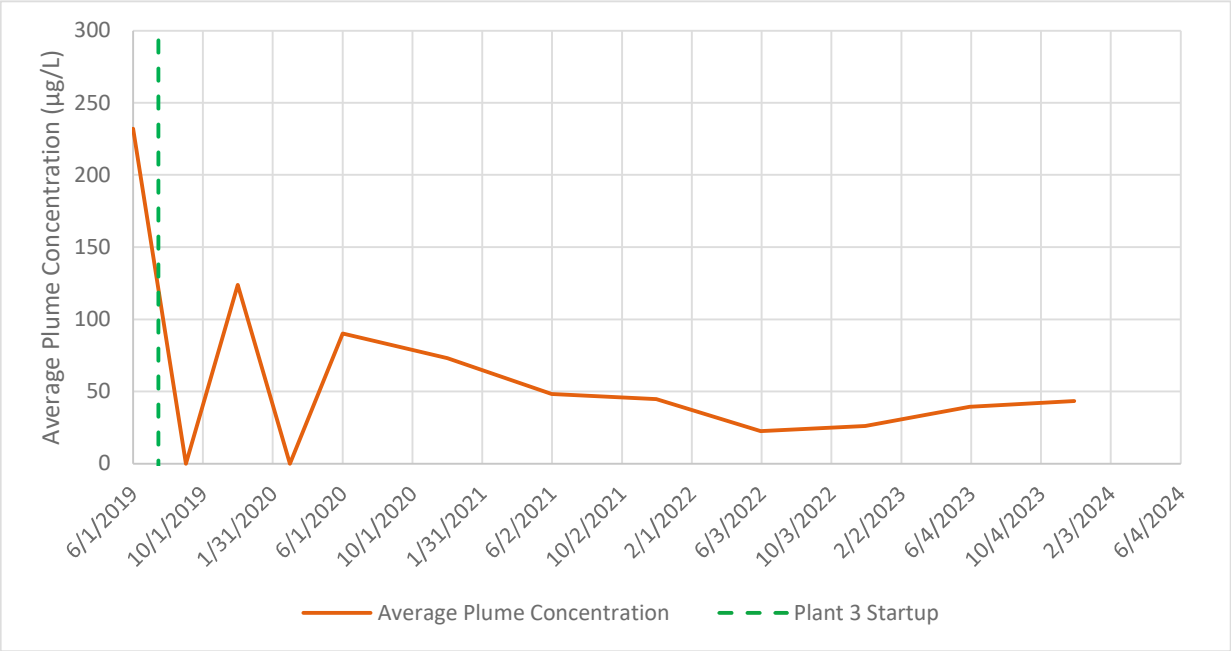


Figure 9
Plant 2 Transect B Average Plume Concentration of 1,4-Dioxane

Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

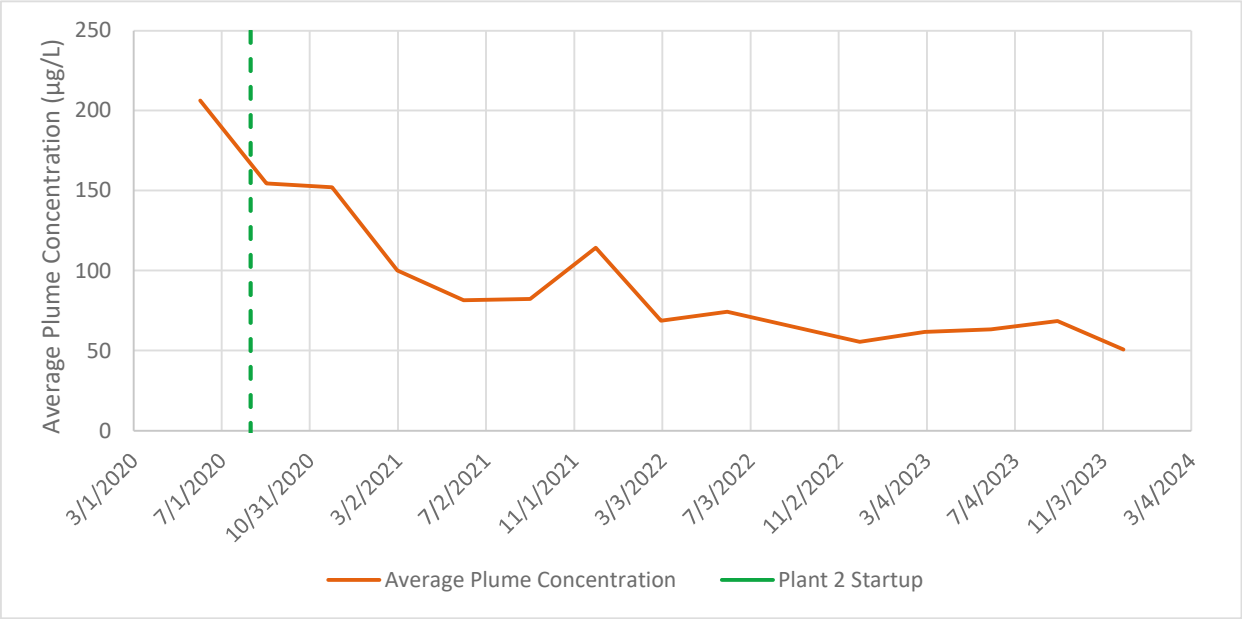


Figure 10
Plant 2 Transect G E Average Plume Concentration of 1,4-Dioxane

Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan

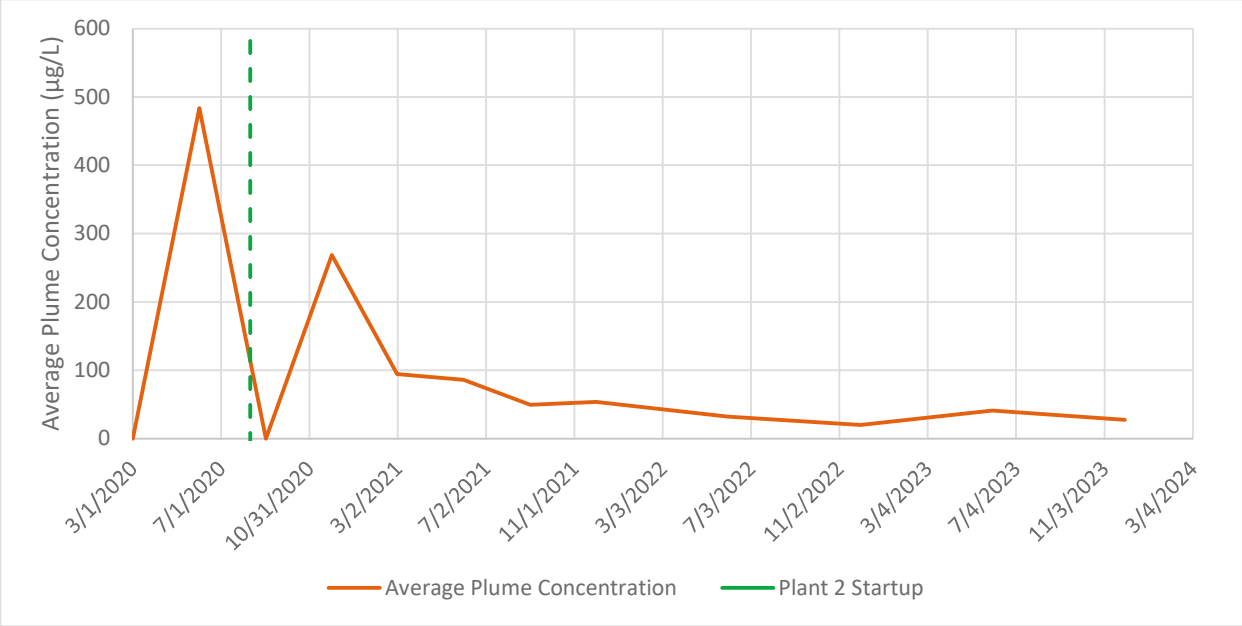
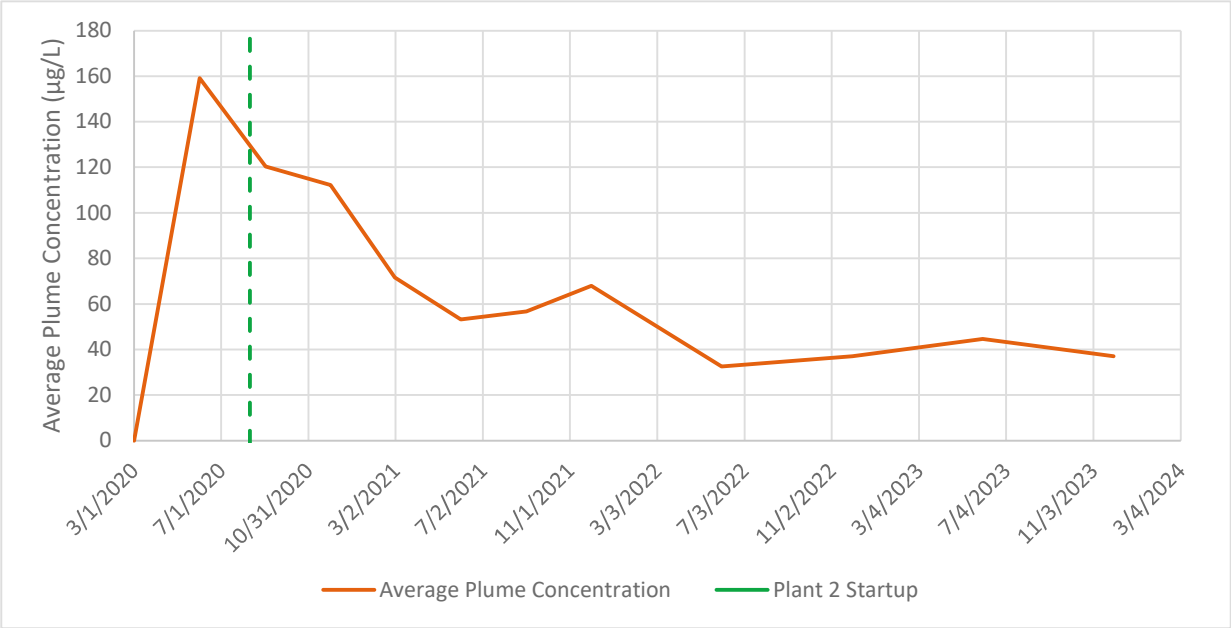


Figure 11
Plant 2 Transect E F Average Plume Concentration of 1,4-Dioxane

Lower 1,4-Dioxane Biosparge Update Report
Lansing Industrial Land, Lansing, Michigan



Appendix A

Operation and Maintenance Logs

Inspection Date	January 5, 2023
Last Quarterly Event Date	
Arrival Time	09:00
Personnel	Eric Feenstra, Robert Prigge
Weather	Cloudy 35 deg F
FWL Electrical Meter Reading (kWh)	

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 1 and 4
Compressed air setpoint (LPM)	1860
Propane setpoint (LPM)	6
PIT-101 (PSIG)	51.4
PIT-102 (PSIA)	65.4
FQI-101 (SLPM)	1858
PIT-201 (PSIA)	79.6
PIT-300 (PSIG)	27
FQI-201 (LPM)	6
AE-350 (%LEL)	0.2
AE-351 (%LEL)	0
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
UPS enabled?	No
Comments	

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Check the cooling oil level, Cooler: Check the Filter Mat, Control cabinet: Check Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	
Semiannual Compressor Maintenance	Display: Sigma Control 2: Change the air filter
Is the annual compressor inspection happening during this event?	No

Compressor Audio	1 Audio File
Number of air filters remaining	2
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	19179
Oil Pressure (PSIG)	125
Wet receiver tank loading pressure (PI-101)	132
Wet receiver tank unloading pressure (PI-101)	110
How full is the condensate drum? (Percentage)	80
The condensate drum needs to be transferred to an outdoor drum (use RED TAPED submersible pump)	Complete
PI-101 (PSIG)	120
PI-102 (PSIG)	102
PI-103 (PSIG)	49
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	TCA-101 Verify draining, S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	TCA-101 Inspect for debris sludge clean, Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Verify the silencers are not clogged, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older)
MFC-101 compressed air temperature	16.18
MFC-101 standardized flow rate on display (SLPM)	2000
MFC-101 uncorrected flow rate on display (LPM)	437
Comments	

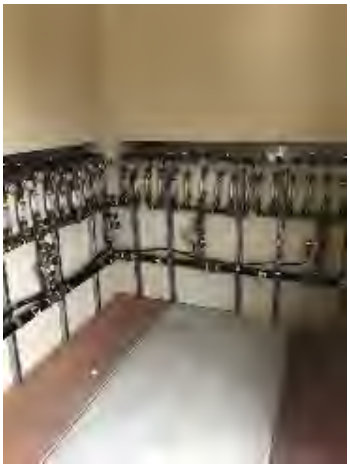
Non-XP room photo

XP-Room

First Aid Kit Expiration Date	July 1, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	72
PI-202 (PSIG)	65
MFC-201 temperature	34.78
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	1.02
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.2
PI-300 (PSIG)	25
Bi-Weekly XP Instrumentation Checks	FQI-351/352 verify rate, AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere).
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0.2
AE-350 reading during propane sparge cycle	0

AE-351 reading during propane sparge cycle	0
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older)
Comments	

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	24
AS-19-G01 Manifold Flowrate (CFM)	1
AS-19-G03 Manifold Pressure (PSIG)	25
AS-19-G03 Manifold Flowrate (CFM)	1
AS-19-G06 Manifold Pressure (PSIG)	8
AS-19-G06 Manifold Flowrate (CFM)	4.5
AS-19-G09 Manifold Pressure (PSIG)	2
AS-19-G09 Manifold Flowrate (CFM)	2.5
AS-19-E02 Manifold Pressure (PSIG)	5
AS-19-E02 Manifold Flowrate (CFM)	4
AS-19-E05 Manifold Pressure (PSIG)	2
AS-19-E05 Manifold Flowrate (CFM)	2
AS-19-E08 Manifold Pressure (PSIG)	5
AS-19-E08 Manifold Flowrate (CFM)	2

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	22
AS-19-G02 Manifold Flowrate (CFM)	0.5
AS-19-G05 Manifold Pressure (PSIG)	11

AS-19-G05 Manifold Flowrate (CFM)	3.5
AS-19-G08 Manifold Pressure (PSIG)	5
AS-19-G08 Manifold Flowrate (CFM)	4
AS-19-E01 Manifold Pressure (PSIG)	4
AS-19-E01 Manifold Flowrate (CFM)	4.5
AS-19-E04 Manifold Pressure (PSIG)	5
AS-19-E04 Manifold Flowrate (CFM)	4
AS-19-E07 Manifold Pressure (PSIG)	9
AS-19-E07 Manifold Flowrate (CFM)	3.5
AS-19-E10 Manifold Pressure (PSIG)	8
AS-19-E10 Manifold Flowrate (CFM)	3

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	17
AS-19-G04 Manifold Flowrate (CFM)	1
AS-19-G07 Manifold Pressure (PSIG)	7
AS-19-G07 Manifold Flowrate (CFM)	4
AS-19-G10 Manifold Pressure (PSIG)	8
AS-19-G10 Manifold Flowrate (CFM)	4
AS-19-E03 Manifold Pressure (PSIG)	4
AS-19-E03 Manifold Flowrate (CFM)	4.5
AS-19-E06 Manifold Pressure (PSIG)	8
AS-19-E06 Manifold Flowrate (CFM)	4
AS-19-E09 Manifold Pressure (PSIG)	10
AS-19-E09 Manifold Flowrate (CFM)	3.5
AS-19-E12 Manifold Pressure (PSIG)	13
AS-19-E12 Manifold Flowrate (CFM)	3.5

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	9
AS-19-F12 Manifold Flowrate (CFM)	3
AS-19-F09 Manifold Pressure (PSIG)	5
AS-19-F09 Manifold Flowrate (CFM)	5
AS-19-F06 Manifold Pressure (PSIG)	7
AS-19-F06 Manifold Flowrate (CFM)	3.5
AS-19-F03 Manifold Pressure (PSIG)	7
AS-19-F03 Manifold Flowrate (CFM)	4.5

AS-19-B06 Manifold Pressure (PSIG)	28
AS-19-B06 Manifold Flowrate (CFM)	1.5
AS-19-B03 Manifold Pressure (PSIG)	9
AS-19-B03 Manifold Flowrate (CFM)	4

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	4
AS-19-E11 Manifold Flowrate (CFM)	3
AS-19-F11 Manifold Pressure (PSIG)	6
AS-19-F11 Manifold Flowrate (CFM)	3
AS-19-F08 Manifold Pressure (PSIG)	8
AS-19-F08 Manifold Flowrate (CFM)	3
AS-19-F05 Manifold Pressure (PSIG)	8
AS-19-F05 Manifold Flowrate (CFM)	4
AS-19-F02 Manifold Pressure (PSIG)	12
AS-19-F02 Manifold Flowrate (CFM)	4
AS-19-B05 Manifold Pressure (PSIG)	9
AS-19-B05 Manifold Flowrate (CFM)	3
AS-19-B02 Manifold Pressure (PSIG)	8
AS-19-B02 Manifold Flowrate (CFM)	4

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	10
AS-19-F10 Manifold Flowrate (CFM)	4
AS-19-F07 Manifold Pressure (PSIG)	16
AS-19-F07 Manifold Flowrate (CFM)	4
AS-19-F04 Manifold Pressure (PSIG)	15
AS-19-F04 Manifold Flowrate (CFM)	3
AS-19-F01 Manifold Pressure (PSIG)	5
AS-19-F01 Manifold Flowrate (CFM)	2.5
AS-19-B07 Manifold Pressure (PSIG)	9
AS-19-B07 Manifold Flowrate (CFM)	3
AS-19-B04 Manifold Pressure (PSIG)	8
AS-19-B04 Manifold Flowrate (CFM)	3
AS-19-B01 Manifold Pressure (PSIG)	8
AS-19-B01 Manifold Flowrate (CFM)	3

Outdoors and General

Propane tank level (%)	74
Number of condensate drums outside	11

Drum Photo

Electric Meter Reading (kWh)	397328
Last fire extinguisher certification date	
Walked hose corridors and fixed fallen barrels?	
Checked wellheads for leaks/hissing?	
Comments on car parkers and site accessibility:	

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 1/5/2023, 11:11:09 AM EST
Departure Time	11:11

Inspection Date	February 3, 2023
Last Quarterly Event Date	
Arrival Time	10:02
Personnel	Robert Prigge
Weather	Overcast 11
FWL Electrical Meter Reading (kWh)	

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 2 and 5
Compressed air setpoint (LPM)	1000
Propane setpoint (LPM)	6
PIT-101 (PSIG)	51.4
PIT-102 (PSIA)	65.6
FQI-101 (SLPM)	1999
PIT-201 (PSIA)	92.7
PIT-300 (PSIG)	23.4
FQI-201 (LPM)	1.646
AE-350 (%LEL)	0.2
AE-351 (%LEL)	0.1
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
UPS enabled?	Yes
Comments	

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Check the cooling oil level, Cooler: Check the Filter Mat, Control cabinet: Check Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	
Semiannual Compressor Maintenance	
Is the annual compressor inspection happening during this event?	No

Compressor Audio	2 Audio Files
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	19824
Oil Pressure (PSIG)	122
Wet receiver tank loading pressure (PI-101)	125
Wet receiver tank unloading pressure (PI-101)	109
How full is the condensate drum? (Percentage)	50
PI-101 (PSIG)	127
PI-102 (PSIG)	108
PI-103 (PSIG)	20
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	TCA-101 Verify draining, S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer)
MFC-101 compressed air temperature	11.23
MFC-101 standardized flow rate on display (SLPM)	2000
MFC-101 uncorrected flow rate on display (LPM)	427
Comments	

Non-XP room photo

XP-Room

First Aid Kit Expiration Date	July 1, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	70
PI-202 (PSIG)	54
MFC-201 temperature	-13.94
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	6.08
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	2.48
PI-300 (PSIG)	15
Bi-Weekly XP Instrumentation Checks	AE-351 fail AE-500 fail
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0.1
AE-350 reading during propane sparge cycle	19
AE-351 reading during propane sparge cycle	0.1
Quarterly LEL Meter Calibration	

Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer)
Comments	

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	25
AS-19-G01 Manifold Flowrate (CFM)	1
AS-19-G03 Manifold Pressure (PSIG)	25
AS-19-G03 Manifold Flowrate (CFM)	1
AS-19-G06 Manifold Pressure (PSIG)	9
AS-19-G06 Manifold Flowrate (CFM)	4
AS-19-G09 Manifold Pressure (PSIG)	4
AS-19-G09 Manifold Flowrate (CFM)	3
AS-19-E02 Manifold Pressure (PSIG)	9
AS-19-E02 Manifold Flowrate (CFM)	6
AS-19-E05 Manifold Pressure (PSIG)	5
AS-19-E05 Manifold Flowrate (CFM)	2
AS-19-E08 Manifold Pressure (PSIG)	7
AS-19-E08 Manifold Flowrate (CFM)	2

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	20
AS-19-G02 Manifold Flowrate (CFM)	1
AS-19-G05 Manifold Pressure (PSIG)	8
AS-19-G05 Manifold Flowrate (CFM)	4.5
AS-19-G08 Manifold Pressure (PSIG)	5
AS-19-G08 Manifold Flowrate (CFM)	3.5

AS-19-E01 Manifold Pressure (PSIG)	4
AS-19-E01 Manifold Flowrate (CFM)	4.5
AS-19-E04 Manifold Pressure (PSIG)	5
AS-19-E04 Manifold Flowrate (CFM)	4
AS-19-E07 Manifold Pressure (PSIG)	9
AS-19-E07 Manifold Flowrate (CFM)	3.5
AS-19-E10 Manifold Pressure (PSIG)	9
AS-19-E10 Manifold Flowrate (CFM)	2

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	15
AS-19-G04 Manifold Flowrate (CFM)	1
AS-19-G07 Manifold Pressure (PSIG)	4
AS-19-G07 Manifold Flowrate (CFM)	2.5
AS-19-G10 Manifold Pressure (PSIG)	8
AS-19-G10 Manifold Flowrate (CFM)	3.5
AS-19-E03 Manifold Pressure (PSIG)	4
AS-19-E03 Manifold Flowrate (CFM)	3.5
AS-19-E06 Manifold Pressure (PSIG)	9
AS-19-E06 Manifold Flowrate (CFM)	4
AS-19-E09 Manifold Pressure (PSIG)	8
AS-19-E09 Manifold Flowrate (CFM)	3.5
AS-19-E12 Manifold Pressure (PSIG)	10
AS-19-E12 Manifold Flowrate (CFM)	4.5

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	16
AS-19-F12 Manifold Flowrate (CFM)	2
AS-19-F09 Manifold Pressure (PSIG)	9
AS-19-F09 Manifold Flowrate (CFM)	4
AS-19-F06 Manifold Pressure (PSIG)	10
AS-19-F06 Manifold Flowrate (CFM)	4
AS-19-F03 Manifold Pressure (PSIG)	10
AS-19-F03 Manifold Flowrate (CFM)	4
AS-19-B06 Manifold Pressure (PSIG)	20
AS-19-B06 Manifold Flowrate (CFM)	1
AS-19-B03 Manifold Pressure (PSIG)	10

AS-19-B03 Manifold Flowrate (CFM)	4

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	4
AS-19-E11 Manifold Flowrate (CFM)	2.5
AS-19-F11 Manifold Pressure (PSIG)	5
AS-19-F11 Manifold Flowrate (CFM)	2.5
AS-19-F08 Manifold Pressure (PSIG)	7
AS-19-F08 Manifold Flowrate (CFM)	2.5
AS-19-F05 Manifold Pressure (PSIG)	5
AS-19-F05 Manifold Flowrate (CFM)	3.5
AS-19-F02 Manifold Pressure (PSIG)	10
AS-19-F02 Manifold Flowrate (CFM)	3.5
AS-19-B05 Manifold Pressure (PSIG)	7
AS-19-B05 Manifold Flowrate (CFM)	2.5
AS-19-B02 Manifold Pressure (PSIG)	6
AS-19-B02 Manifold Flowrate (CFM)	3

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	8
AS-19-F10 Manifold Flowrate (CFM)	5
AS-19-F07 Manifold Pressure (PSIG)	13
AS-19-F07 Manifold Flowrate (CFM)	6
AS-19-F04 Manifold Pressure (PSIG)	14
AS-19-F04 Manifold Flowrate (CFM)	3.5
AS-19-F01 Manifold Pressure (PSIG)	10
AS-19-F01 Manifold Flowrate (CFM)	2
AS-19-B07 Manifold Pressure (PSIG)	10
AS-19-B07 Manifold Flowrate (CFM)	2
AS-19-B04 Manifold Pressure (PSIG)	7
AS-19-B04 Manifold Flowrate (CFM)	2.5
AS-19-B01 Manifold Pressure (PSIG)	9
AS-19-B01 Manifold Flowrate (CFM)	1

Outdoors and General

Propane tank level (%)	60

Number of condensate drums outside	2

Drum Photo

Electric Meter Reading (kWh)	412251
Last fire extinguisher certification date	July 3, 2022
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	
Comments on car parkers and site accessibility:	Ok

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	Security trailer meter reading: 225.05 kWh
Signature	Signed 2/7/2023, 1:44:33 PM EST
Departure Time	12:30

Inspection Date	March 3, 2023
Last Quarterly Event Date	
Arrival Time	09:30
Personnel	Billy J Cobern
Weather	Cloudy, 30's
FWL Electrical Meter Reading (kWh)	818.25

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 2 and 5
Compressed air setpoint (LPM)	2000
Propane setpoint (LPM)	5.587
PIT-101 (PSIG)	51
PIT-102 (PSIA)	64.7
FQI-101 (SLPM)	2003
PIT-201 (PSIA)	86.4
PIT-300 (PSIG)	23.8
FQI-201 (LPM)	0.059
AE-350 (%LEL)	0
AE-351 (%LEL)	0
AE-500 (%LEL)	0
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
UPS enabled?	Yes
Comments	AE-351 and AE-500 disabled upon arrival

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Cooler: Check the Filter Mat, Check the cooling oil level, Control cabinet: Check Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	Cooler: Change filter mat, Control Cabinet: Change filter mat, Take oil sample
Semiannual Compressor Maintenance	
Is the annual compressor inspection happening during this event?	No

Compressor Audio	1 Audio File
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	20457
Oil Pressure (PSIG)	122
Wet receiver tank loading pressure (PI-101)	130
Wet receiver tank unloading pressure (PI-101)	110
How full is the condensate drum? (Percentage)	65
The condensate drum needs to be transferred to an outdoor drum (use RED TAPED submersible pump)	Complete
PI-101 (PSIG)	120
PI-102 (PSIG)	110
PI-103 (PSIG)	49
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Verify the silencers are not clogged, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer)
MFC-101 compressed air temperature	24.39
MFC-101 standardized flow rate on display (SLPM)	2001
MFC-101 uncorrected flow rate on display (LPM)	453
Comments	Cleaned auto drain screen. Replaced sensor in AE 500 and AE 351. Calibrated AE 500 and AE 350. AE 350 and AE 351 are not in use. Generated 3 drums of condensate.

Non-XP room photo


XP-Room

First Aid Kit Expiration Date	July 6, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	73
PI-202 (PSIG)	73
MFC-201 temperature	32.51
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	6.02
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	2.35
PI-300 (PSIG)	26
Bi-Weekly XP Instrumentation Checks	AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere).
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0
AE-350 reading during propane sparge cycle	0

AE-351 reading during propane sparge cycle	16
Quarterly LEL Meter Calibration	AE-350 calibrated, AE-351 calibrated, AE-500 calibrated
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer)
Comments	Replaced sensor for AE 500 and AE 351. Calibrated all 3

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	30
AS-19-G01 Manifold Flowrate (CFM)	0.5
AS-19-G03 Manifold Pressure (PSIG)	30
AS-19-G03 Manifold Flowrate (CFM)	0.5
AS-19-G06 Manifold Pressure (PSIG)	10
AS-19-G06 Manifold Flowrate (CFM)	5
AS-19-G09 Manifold Pressure (PSIG)	1
AS-19-G09 Manifold Flowrate (CFM)	2
AS-19-E02 Manifold Pressure (PSIG)	3
AS-19-E02 Manifold Flowrate (CFM)	4
AS-19-E05 Manifold Pressure (PSIG)	2
AS-19-E05 Manifold Flowrate (CFM)	3
AS-19-E08 Manifold Pressure (PSIG)	5
AS-19-E08 Manifold Flowrate (CFM)	3

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	22
AS-19-G02 Manifold Flowrate (CFM)	1
AS-19-G05 Manifold Pressure (PSIG)	11

AS-19-G05 Manifold Flowrate (CFM)	4
AS-19-G08 Manifold Pressure (PSIG)	4
AS-19-G08 Manifold Flowrate (CFM)	4
AS-19-E01 Manifold Pressure (PSIG)	1
AS-19-E01 Manifold Flowrate (CFM)	4.5
AS-19-E04 Manifold Pressure (PSIG)	1
AS-19-E04 Manifold Flowrate (CFM)	4
AS-19-E07 Manifold Pressure (PSIG)	8
AS-19-E07 Manifold Flowrate (CFM)	4
AS-19-E10 Manifold Pressure (PSIG)	6
AS-19-E10 Manifold Flowrate (CFM)	3

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	18
AS-19-G04 Manifold Flowrate (CFM)	2
AS-19-G07 Manifold Pressure (PSIG)	2
AS-19-G07 Manifold Flowrate (CFM)	3
AS-19-G10 Manifold Pressure (PSIG)	6
AS-19-G10 Manifold Flowrate (CFM)	5
AS-19-E03 Manifold Pressure (PSIG)	2
AS-19-E03 Manifold Flowrate (CFM)	4
AS-19-E06 Manifold Pressure (PSIG)	5
AS-19-E06 Manifold Flowrate (CFM)	5
AS-19-E09 Manifold Pressure (PSIG)	5
AS-19-E09 Manifold Flowrate (CFM)	4
AS-19-E12 Manifold Pressure (PSIG)	10
AS-19-E12 Manifold Flowrate (CFM)	6

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	10
AS-19-F12 Manifold Flowrate (CFM)	4
AS-19-F09 Manifold Pressure (PSIG)	7
AS-19-F09 Manifold Flowrate (CFM)	4
AS-19-F06 Manifold Pressure (PSIG)	8
AS-19-F06 Manifold Flowrate (CFM)	5
AS-19-F03 Manifold Pressure (PSIG)	10
AS-19-F03 Manifold Flowrate (CFM)	5

AS-19-B06 Manifold Pressure (PSIG)	31
AS-19-B06 Manifold Flowrate (CFM)	2
AS-19-B03 Manifold Pressure (PSIG)	11
AS-19-B03 Manifold Flowrate (CFM)	5

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	1
AS-19-E11 Manifold Flowrate (CFM)	4
AS-19-F11 Manifold Pressure (PSIG)	3
AS-19-F11 Manifold Flowrate (CFM)	4
AS-19-F08 Manifold Pressure (PSIG)	8
AS-19-F08 Manifold Flowrate (CFM)	3
AS-19-F05 Manifold Pressure (PSIG)	5
AS-19-F05 Manifold Flowrate (CFM)	4.5
AS-19-F02 Manifold Pressure (PSIG)	14
AS-19-F02 Manifold Flowrate (CFM)	4
AS-19-B05 Manifold Pressure (PSIG)	9
AS-19-B05 Manifold Flowrate (CFM)	3
AS-19-B02 Manifold Pressure (PSIG)	6
AS-19-B02 Manifold Flowrate (CFM)	4

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	8
AS-19-F10 Manifold Flowrate (CFM)	6
AS-19-F07 Manifold Pressure (PSIG)	11
AS-19-F07 Manifold Flowrate (CFM)	6
AS-19-F04 Manifold Pressure (PSIG)	12
AS-19-F04 Manifold Flowrate (CFM)	4
AS-19-F01 Manifold Pressure (PSIG)	8
AS-19-F01 Manifold Flowrate (CFM)	3
AS-19-B07 Manifold Pressure (PSIG)	6
AS-19-B07 Manifold Flowrate (CFM)	2
AS-19-B04 Manifold Pressure (PSIG)	3
AS-19-B04 Manifold Flowrate (CFM)	3
AS-19-B01 Manifold Pressure (PSIG)	5
AS-19-B01 Manifold Flowrate (CFM)	2

Outdoors and General

Propane tank level (%)	50
Number of condensate drums outside	7

Drum Photo

Electric Meter Reading (kWh)	429822
Last fire extinguisher certification date	July 3, 2022
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	All seem fine
Comments on car parkers and site accessibility:	No issues

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage
Quarterly Building Maintenance Tasks	Wipe down system components to cut down on general grime, Remove trash from the system building, Tidy up system and notify TM of unneeded sampling equipment, Take used compressor oil to Advanced Auto Parts for recycling if there is a full container of used oil

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	No
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 3/3/2023, 10:36:35 AM EST
Departure Time	13:15

Inspection Date	April 8, 2023
Last Quarterly Event Date	
Arrival Time	10:00
Personnel	Billy J Cobern
Weather	Partly Cloudy 30's-50's
FWL Electrical Meter Reading (kWh)	1430.23

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 3 and 6
Compressed air setpoint (LPM)	2000
Propane setpoint (LPM)	2.394
PIT-101 (PSIG)	51
PIT-102 (PSIA)	64.9
FQI-101 (SLPM)	2003
PIT-201 (PSIA)	93.5
PIT-300 (PSIG)	25
FQI-201 (LPM)	0.061
AE-350 (%LEL)	0
AE-351 (%LEL)	0
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
UPS enabled?	Yes
Comments	AE-351 and AE-350 disabled upon arrival

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Cooler: Check the Filter Mat, Check the cooling oil level, Control cabinet: Check Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	
Semiannual Compressor Maintenance	
Is the annual compressor inspection happening during this event?	No

Compressor Audio	1 Audio File
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	21172
Oil Pressure (PSIG)	123
Wet receiver tank loading pressure (PI-101)	130
Wet receiver tank unloading pressure (PI-101)	110
How full is the condensate drum? (Percentage)	20
PI-101 (PSIG)	125
PI-102 (PSIG)	115
PI-103 (PSIG)	49
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Verify the silencers are not clogged, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer)
MFC-101 compressed air temperature	20.33
MFC-101 standardized flow rate on display (SLPM)	2001
MFC-101 uncorrected flow rate on display (LPM)	445
Comments	Cleaned auto drain screen.

Non-XP room photo

XP-Room

First Aid Kit Expiration Date	July 6, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	90
PI-202 (PSIG)	58
MFC-201 temperature	20.37
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	6.01
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	2.62
PI-300 (PSIG)	20
Bi-Weekly XP Instrumentation Checks	AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere).
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0
AE-350 reading during propane sparge cycle	16

AE-351 reading during propane sparge cycle	0
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer)
Comments	

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	28
AS-19-G01 Manifold Flowrate (CFM)	0.5
AS-19-G03 Manifold Pressure (PSIG)	30
AS-19-G03 Manifold Flowrate (CFM)	0.5
AS-19-G06 Manifold Pressure (PSIG)	18
AS-19-G06 Manifold Flowrate (CFM)	4
AS-19-G09 Manifold Pressure (PSIG)	1
AS-19-G09 Manifold Flowrate (CFM)	2
AS-19-E02 Manifold Pressure (PSIG)	18
AS-19-E02 Manifold Flowrate (CFM)	3
AS-19-E05 Manifold Pressure (PSIG)	2
AS-19-E05 Manifold Flowrate (CFM)	3
AS-19-E08 Manifold Pressure (PSIG)	15
AS-19-E08 Manifold Flowrate (CFM)	2

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	20
AS-19-G02 Manifold Flowrate (CFM)	1
AS-19-G05 Manifold Pressure (PSIG)	10

AS-19-G05 Manifold Flowrate (CFM)	4
AS-19-G08 Manifold Pressure (PSIG)	4
AS-19-G08 Manifold Flowrate (CFM)	4
AS-19-E01 Manifold Pressure (PSIG)	2
AS-19-E01 Manifold Flowrate (CFM)	4
AS-19-E04 Manifold Pressure (PSIG)	5
AS-19-E04 Manifold Flowrate (CFM)	4
AS-19-E07 Manifold Pressure (PSIG)	17
AS-19-E07 Manifold Flowrate (CFM)	2
AS-19-E10 Manifold Pressure (PSIG)	15
AS-19-E10 Manifold Flowrate (CFM)	2

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	20
AS-19-G04 Manifold Flowrate (CFM)	1
AS-19-G07 Manifold Pressure (PSIG)	10
AS-19-G07 Manifold Flowrate (CFM)	4
AS-19-G10 Manifold Pressure (PSIG)	10
AS-19-G10 Manifold Flowrate (CFM)	4
AS-19-E03 Manifold Pressure (PSIG)	2
AS-19-E03 Manifold Flowrate (CFM)	4
AS-19-E06 Manifold Pressure (PSIG)	11
AS-19-E06 Manifold Flowrate (CFM)	4
AS-19-E09 Manifold Pressure (PSIG)	10
AS-19-E09 Manifold Flowrate (CFM)	4
AS-19-E12 Manifold Pressure (PSIG)	14
AS-19-E12 Manifold Flowrate (CFM)	4

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	20
AS-19-F12 Manifold Flowrate (CFM)	2
AS-19-F09 Manifold Pressure (PSIG)	10
AS-19-F09 Manifold Flowrate (CFM)	4
AS-19-F06 Manifold Pressure (PSIG)	8
AS-19-F06 Manifold Flowrate (CFM)	5
AS-19-F03 Manifold Pressure (PSIG)	11
AS-19-F03 Manifold Flowrate (CFM)	5

AS-19-B06 Manifold Pressure (PSIG)	35
AS-19-B06 Manifold Flowrate (CFM)	1
AS-19-B03 Manifold Pressure (PSIG)	15
AS-19-B03 Manifold Flowrate (CFM)	5

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	10
AS-19-E11 Manifold Flowrate (CFM)	2
AS-19-F11 Manifold Pressure (PSIG)	15
AS-19-F11 Manifold Flowrate (CFM)	2
AS-19-F08 Manifold Pressure (PSIG)	14
AS-19-F08 Manifold Flowrate (CFM)	3
AS-19-F05 Manifold Pressure (PSIG)	12
AS-19-F05 Manifold Flowrate (CFM)	3
AS-19-F02 Manifold Pressure (PSIG)	15
AS-19-F02 Manifold Flowrate (CFM)	4
AS-19-B05 Manifold Pressure (PSIG)	10
AS-19-B05 Manifold Flowrate (CFM)	3
AS-19-B02 Manifold Pressure (PSIG)	10
AS-19-B02 Manifold Flowrate (CFM)	4

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	15
AS-19-F10 Manifold Flowrate (CFM)	4
AS-19-F07 Manifold Pressure (PSIG)	18
AS-19-F07 Manifold Flowrate (CFM)	4
AS-19-F04 Manifold Pressure (PSIG)	19
AS-19-F04 Manifold Flowrate (CFM)	2
AS-19-F01 Manifold Pressure (PSIG)	8
AS-19-F01 Manifold Flowrate (CFM)	3
AS-19-B07 Manifold Pressure (PSIG)	12
AS-19-B07 Manifold Flowrate (CFM)	3
AS-19-B04 Manifold Pressure (PSIG)	10
AS-19-B04 Manifold Flowrate (CFM)	3
AS-19-B01 Manifold Pressure (PSIG)	16
AS-19-B01 Manifold Flowrate (CFM)	1

Outdoors and General

Propane tank level (%)	78
Number of condensate drums outside	5

Drum Photo

Electric Meter Reading (kWh)	446411
Last fire extinguisher certification date	July 3, 2022
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	All seem fine
Comments on car parkers and site accessibility:	No issues

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	No
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 4/8/2023, 11:52:42 AM EDT
Departure Time	11:55

Inspection Date	May 6, 2023
Last Quarterly Event Date	
Arrival Time	10:00
Personnel	Billy J Cobern
Weather	Partly Cloudy 50's-60's
FWL Electrical Meter Reading (kWh)	2154.62

HMI and Control Panel

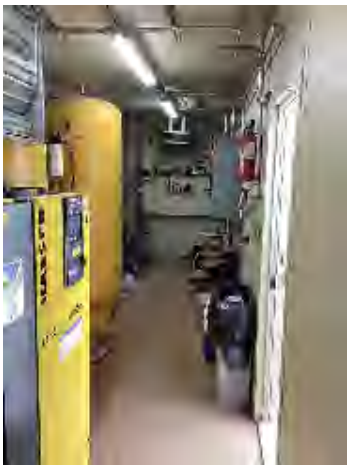
HMI display functioning (not frozen)?	Yes
Current zone	Zone 3 and 6
Compressed air setpoint (LPM)	2000
Propane setpoint (LPM)	2.394
PIT-101 (PSIG)	50.7
PIT-102 (PSIA)	64.7
FQI-101 (SLPM)	2003
PIT-201 (PSIA)	31.2
PIT-300 (PSIG)	16.3
FQI-201 (LPM)	0.212
AE-350 (%LEL)	0
AE-351 (%LEL)	0
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
UPS enabled?	Yes
Comments	AE-351 and AE-350 disabled upon arrival. Auto drain continuously open upon arrival. Cleaned the auto drain screen, called Eric, and closed valve to 30% open.

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Cooler: Check the Filter Mat, Check the cooling oil level, Control cabinet: Check Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	
Semiannual Compressor Maintenance	

Is the annual compressor inspection happening during this event?	No
Compressor Audio	1 Audio File
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	21825
Oil Pressure (PSIG)	123
Wet receiver tank loading pressure (PI-101)	130
Wet receiver tank unloading pressure (PI-101)	110
How full is the condensate drum? (Percentage)	25
PI-101 (PSIG)	125
PI-102 (PSIG)	105
PI-103 (PSIG)	48
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Verify the silencers are not clogged, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer)
MFC-101 compressed air temperature	32.08
MFC-101 standardized flow rate on display (SLPM)	2001
MFC-101 uncorrected flow rate on display (LPM)	468
Comments	

Non-XP room photo

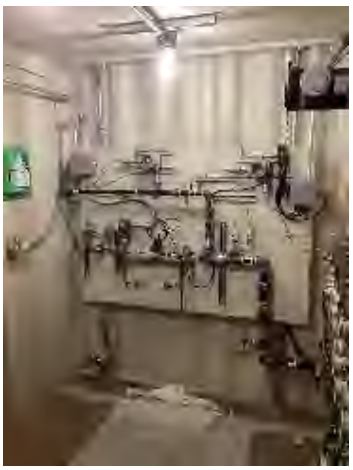



XP-Room

First Aid Kit Expiration Date	July 6, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	70
PI-202 (PSIG)	52
MFC-201 temperature	29.89
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	6.01
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	2.84
PI-300 (PSIG)	18
Bi-Weekly XP Instrumentation Checks	AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere).
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0
AE-350 reading during propane sparge cycle	0

AE-351 reading during propane sparge cycle	0
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer)
Comments	

XP-room photo



Zone 1

AS-19-G01 Manifold Pressure (PSIG)	28
AS-19-G01 Manifold Flowrate (CFM)	0.5
AS-19-G03 Manifold Pressure (PSIG)	28
AS-19-G03 Manifold Flowrate (CFM)	0.5
AS-19-G06 Manifold Pressure (PSIG)	10
AS-19-G06 Manifold Flowrate (CFM)	4
AS-19-G09 Manifold Pressure (PSIG)	1
AS-19-G09 Manifold Flowrate (CFM)	2
AS-19-E02 Manifold Pressure (PSIG)	5
AS-19-E02 Manifold Flowrate (CFM)	4
AS-19-E05 Manifold Pressure (PSIG)	2
AS-19-E05 Manifold Flowrate (CFM)	3
AS-19-E08 Manifold Pressure (PSIG)	5
AS-19-E08 Manifold Flowrate (CFM)	2

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	22
AS-19-G02 Manifold Flowrate (CFM)	1
AS-19-G05 Manifold Pressure (PSIG)	10

AS-19-G05 Manifold Flowrate (CFM)	4
AS-19-G08 Manifold Pressure (PSIG)	3
AS-19-G08 Manifold Flowrate (CFM)	4
AS-19-E01 Manifold Pressure (PSIG)	4
AS-19-E01 Manifold Flowrate (CFM)	5
AS-19-E04 Manifold Pressure (PSIG)	8
AS-19-E04 Manifold Flowrate (CFM)	4
AS-19-E07 Manifold Pressure (PSIG)	9
AS-19-E07 Manifold Flowrate (CFM)	3
AS-19-E10 Manifold Pressure (PSIG)	10
AS-19-E10 Manifold Flowrate (CFM)	2

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	15
AS-19-G04 Manifold Flowrate (CFM)	1
AS-19-G07 Manifold Pressure (PSIG)	4
AS-19-G07 Manifold Flowrate (CFM)	3
AS-19-G10 Manifold Pressure (PSIG)	8
AS-19-G10 Manifold Flowrate (CFM)	4
AS-19-E03 Manifold Pressure (PSIG)	1
AS-19-E03 Manifold Flowrate (CFM)	3
AS-19-E06 Manifold Pressure (PSIG)	5
AS-19-E06 Manifold Flowrate (CFM)	4
AS-19-E09 Manifold Pressure (PSIG)	5
AS-19-E09 Manifold Flowrate (CFM)	4
AS-19-E12 Manifold Pressure (PSIG)	10
AS-19-E12 Manifold Flowrate (CFM)	5

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	11
AS-19-F12 Manifold Flowrate (CFM)	2
AS-19-F09 Manifold Pressure (PSIG)	5
AS-19-F09 Manifold Flowrate (CFM)	4
AS-19-F06 Manifold Pressure (PSIG)	6
AS-19-F06 Manifold Flowrate (CFM)	5
AS-19-F03 Manifold Pressure (PSIG)	8
AS-19-F03 Manifold Flowrate (CFM)	5

AS-19-B06 Manifold Pressure (PSIG)	30
AS-19-B06 Manifold Flowrate (CFM)	2
AS-19-B03 Manifold Pressure (PSIG)	10
AS-19-B03 Manifold Flowrate (CFM)	5

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	2
AS-19-E11 Manifold Flowrate (CFM)	2
AS-19-F11 Manifold Pressure (PSIG)	5
AS-19-F11 Manifold Flowrate (CFM)	3
AS-19-F08 Manifold Pressure (PSIG)	8
AS-19-F08 Manifold Flowrate (CFM)	3
AS-19-F05 Manifold Pressure (PSIG)	2
AS-19-F05 Manifold Flowrate (CFM)	4
AS-19-F02 Manifold Pressure (PSIG)	9
AS-19-F02 Manifold Flowrate (CFM)	5
AS-19-B05 Manifold Pressure (PSIG)	5
AS-19-B05 Manifold Flowrate (CFM)	3
AS-19-B02 Manifold Pressure (PSIG)	3
AS-19-B02 Manifold Flowrate (CFM)	4

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	5
AS-19-F10 Manifold Flowrate (CFM)	5
AS-19-F07 Manifold Pressure (PSIG)	11
AS-19-F07 Manifold Flowrate (CFM)	5
AS-19-F04 Manifold Pressure (PSIG)	15
AS-19-F04 Manifold Flowrate (CFM)	2
AS-19-F01 Manifold Pressure (PSIG)	5
AS-19-F01 Manifold Flowrate (CFM)	3
AS-19-B07 Manifold Pressure (PSIG)	8
AS-19-B07 Manifold Flowrate (CFM)	2
AS-19-B04 Manifold Pressure (PSIG)	5
AS-19-B04 Manifold Flowrate (CFM)	3
AS-19-B01 Manifold Pressure (PSIG)	11
AS-19-B01 Manifold Flowrate (CFM)	1

Outdoors and General

Propane tank level (%)	68
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	461746
Last fire extinguisher certification date	July 3, 2022
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	All seem fine
Comments on car parkers and site accessibility:	No issues

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	No
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 5/6/2023, 11:31:46 AM EDT
Departure Time	11:55

Inspection Date	June 2, 2023
Last Quarterly Event Date	
Arrival Time	09:23
Personnel	Robert Prigge
Weather	70s-90 sunny
FWL Electrical Meter Reading (kWh)	2173.65

HMI and Control Panel

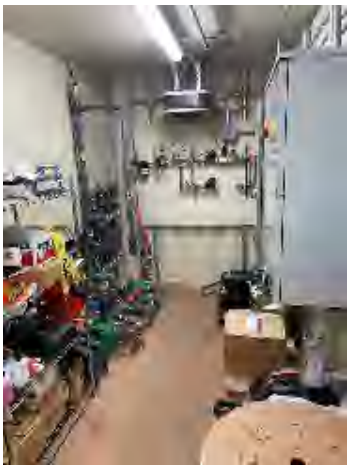
HMI display functioning (not frozen)?	No
Current zone	Zone 1 and 4
Compressed air setpoint (LPM)	1000
Propane setpoint (LPM)	5.585
PIT-101 (PSIG)	51
PIT-102 (PSIA)	6408
FQI-101 (SLPM)	1862
PIT-201 (PSIA)	4703
PIT-300 (PSIG)	3205
FQI-201 (LPM)	0.195
AE-350 (%LEL)	0.2
AE-351 (%LEL)	0
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Updated- 2 min off
UPS enabled?	Yes
Comments	HMI was frozen upon arrival. Shut off plc breaker and then back on. Reset alarm. Working properly now

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	No
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Check the cooling oil level, Cooler: Check the Filter Mat, Control cabinet: Check Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	
Semiannual Compressor Maintenance	

Is the annual compressor inspection happening during this event?	No
Compressor Audio	3 Audio Files
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	22440
Oil Pressure (PSIG)	35
Wet receiver tank loading pressure (PI-101)	108
Wet receiver tank unloading pressure (PI-101)	128
How full is the condensate drum? (Percentage)	50
PI-101 (PSIG)	128
PI-102 (PSIG)	112
PI-103 (PSIG)	48
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	TCA-101 Verify draining
Monthly Non-XP Instrument Maintenance	TCA-101 Inspect for debris sludge clean, Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., AD-101 Verify the silencers are not clogged, AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older)
MFC-101 compressed air temperature	36.55
MFC-101 standardized flow rate on display (SLPM)	2002
MFC-101 uncorrected flow rate on display (LPM)	469
Comments	

Non-XP room photo


XP-Room

First Aid Kit Expiration Date	July 2, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	No
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	70
PI-202 (PSIG)	68
MFC-201 temperature	40.21
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	6.02
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	2.88
PI-300 (PSIG)	26
Bi-Weekly XP Instrumentation Checks	AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., Aw351 not on
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0.2
AE-350 reading during propane sparge cycle	0

AE-351 reading during propane sparge cycle	0
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older)
Comments	

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	18
AS-19-G01 Manifold Flowrate (CFM)	1
AS-19-G03 Manifold Pressure (PSIG)	20
AS-19-G03 Manifold Flowrate (CFM)	3
AS-19-G06 Manifold Pressure (PSIG)	8
AS-19-G06 Manifold Flowrate (CFM)	3.5
AS-19-G09 Manifold Pressure (PSIG)	2
AS-19-G09 Manifold Flowrate (CFM)	2
AS-19-E02 Manifold Pressure (PSIG)	6
AS-19-E02 Manifold Flowrate (CFM)	3
AS-19-E05 Manifold Pressure (PSIG)	2
AS-19-E05 Manifold Flowrate (CFM)	2
AS-19-E08 Manifold Pressure (PSIG)	7
AS-19-E08 Manifold Flowrate (CFM)	1.5

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	23
AS-19-G02 Manifold Flowrate (CFM)	0
AS-19-G05 Manifold Pressure (PSIG)	10

AS-19-G05 Manifold Flowrate (CFM)	4
AS-19-G08 Manifold Pressure (PSIG)	2
AS-19-G08 Manifold Flowrate (CFM)	4
AS-19-E01 Manifold Pressure (PSIG)	2
AS-19-E01 Manifold Flowrate (CFM)	4.5
AS-19-E04 Manifold Pressure (PSIG)	5
AS-19-E04 Manifold Flowrate (CFM)	5
AS-19-E07 Manifold Pressure (PSIG)	8
AS-19-E07 Manifold Flowrate (CFM)	4
AS-19-E10 Manifold Pressure (PSIG)	7
AS-19-E10 Manifold Flowrate (CFM)	3.5

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	16
AS-19-G04 Manifold Flowrate (CFM)	1
AS-19-G07 Manifold Pressure (PSIG)	3
AS-19-G07 Manifold Flowrate (CFM)	4.5
AS-19-G10 Manifold Pressure (PSIG)	8
AS-19-G10 Manifold Flowrate (CFM)	4
AS-19-E03 Manifold Pressure (PSIG)	2
AS-19-E03 Manifold Flowrate (CFM)	3
AS-19-E06 Manifold Pressure (PSIG)	6
AS-19-E06 Manifold Flowrate (CFM)	4.5
AS-19-E09 Manifold Pressure (PSIG)	7
AS-19-E09 Manifold Flowrate (CFM)	3.5
AS-19-E12 Manifold Pressure (PSIG)	10
AS-19-E12 Manifold Flowrate (CFM)	4.5

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	11
AS-19-F12 Manifold Flowrate (CFM)	3
AS-19-F09 Manifold Pressure (PSIG)	6
AS-19-F09 Manifold Flowrate (CFM)	3.5
AS-19-F06 Manifold Pressure (PSIG)	8
AS-19-F06 Manifold Flowrate (CFM)	4
AS-19-F03 Manifold Pressure (PSIG)	8
AS-19-F03 Manifold Flowrate (CFM)	4.5

AS-19-B06 Manifold Pressure (PSIG)	29
AS-19-B06 Manifold Flowrate (CFM)	3.5
AS-19-B03 Manifold Pressure (PSIG)	10
AS-19-B03 Manifold Flowrate (CFM)	5

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	2
AS-19-E11 Manifold Flowrate (CFM)	3.5
AS-19-F11 Manifold Pressure (PSIG)	5
AS-19-F11 Manifold Flowrate (CFM)	3.5
AS-19-F08 Manifold Pressure (PSIG)	9
AS-19-F08 Manifold Flowrate (CFM)	3
AS-19-F05 Manifold Pressure (PSIG)	7
AS-19-F05 Manifold Flowrate (CFM)	4
AS-19-F02 Manifold Pressure (PSIG)	13
AS-19-F02 Manifold Flowrate (CFM)	4
AS-19-B05 Manifold Pressure (PSIG)	8
AS-19-B05 Manifold Flowrate (CFM)	3
AS-19-B02 Manifold Pressure (PSIG)	7
AS-19-B02 Manifold Flowrate (CFM)	4.5

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	7
AS-19-F10 Manifold Flowrate (CFM)	5
AS-19-F07 Manifold Pressure (PSIG)	12
AS-19-F07 Manifold Flowrate (CFM)	6
AS-19-F04 Manifold Pressure (PSIG)	14
AS-19-F04 Manifold Flowrate (CFM)	2
AS-19-F01 Manifold Pressure (PSIG)	7
AS-19-F01 Manifold Flowrate (CFM)	3
AS-19-B07 Manifold Pressure (PSIG)	8
AS-19-B07 Manifold Flowrate (CFM)	2
AS-19-B04 Manifold Pressure (PSIG)	7
AS-19-B04 Manifold Flowrate (CFM)	3
AS-19-B01 Manifold Pressure (PSIG)	12
AS-19-B01 Manifold Flowrate (CFM)	1

Outdoors and General

Propane tank level (%)	4
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	474200
Last fire extinguisher certification date	July 2, 2022
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	
Comments on car parkers and site accessibility:	Ok

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	Plant 2, 3, and 6 groundwater drums on site. 10 empty drums available. Need Fire extinguisher inspection. New auto drain installed
Signature	 Signed 6/2/2023, 1:05:52 PM EDT
Departure Time	12:35

Inspection Date	August 4, 2023
Last Quarterly Event Date	
Arrival Time	09:10
Personnel	Robert Prigge
Weather	70s-80s
FWL Electrical Meter Reading (kWh)	2368

HMI and Control Panel

Surge Suppressor Visual Checks

Main surge suppressor: all 3 green lights on?	
Main Surge Suppressor Comments	
Control panel surge suppressor: all 3 green lights on?	
Control panel Surge Suppressor Comments	
Breaker box surge suppressor: all 3 green lights on?	
Breaker box Surge Suppressor Comments	

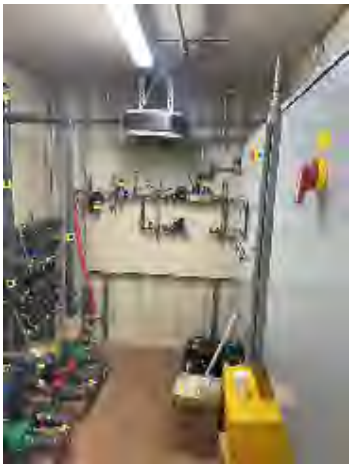
HMI display functioning (not frozen)?	Yes
Current zone	Zone 1 and 4
Compressed air setpoint (LPM)	1000
Propane setpoint (LPM)	5.584
PIT-101 (PSIG)	51.2
PIT-102 (PSIA)	64.9
FQI-101 (SLPM)	1863
PIT-201 (PSIA)	54
PIT-300 (PSIG)	39.2
FQI-201 (LPM)	0.198
AE-350 (%LEL)	0.2
AE-351 (%LEL)	0.1
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Adjusted
UPS enabled?	No
Comments	AE-351 = -0.1

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?, Expired
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Check the cooling oil level, Cooler: Check the Filter Mat, Control cabinet: Check Filter Mat, Check the condensate drain, Condensate drain not working
Quarterly Compressor Maintenance	
Semiannual Compressor Maintenance	
Is the annual compressor inspection happening during this event?	
Compressor Audio	1 Audio File
Number of air filters remaining	1
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	23077
Oil Pressure (PSIG)	13
Wet receiver tank loading pressure (PI-101)	128
Wet receiver tank unloading pressure (PI-101)	116
How full is the condensate drum? (Percentage)	25
PI-101 (PSIG)	120
PI-102 (PSIG)	114
PI-103 (PSIG)	48
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	TCA-101 Verify draining, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer)
MFC-101 compressed air temperature	28.51
MFC-101 standardized flow rate on display (SLPM)	2002

MFC-101 uncorrected flow rate on display (LPM)	459
Comments	

Non-XP room photo



XP-Room

First Aid Kit Expiration Date	July 4, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	68
PI-202 (PSIG)	48
MFC-201 temperature	30.81
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.15
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.03
PI-300 (PSIG)	30
Bi-Weekly XP Instrumentation Checks	FQI-351/352 verify rate, AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere).
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	

AE-500 Reading	16
AE-350 reading during propane sparge cycle	16
AE-351 reading during propane sparge cycle	8
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older)
Comments	Need new eye wash and fire extinguisher inspection

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	0
AS-19-G01 Manifold Flowrate (CFM)	0
AS-19-G03 Manifold Pressure (PSIG)	0
AS-19-G03 Manifold Flowrate (CFM)	0
AS-19-G06 Manifold Pressure (PSIG)	0
AS-19-G06 Manifold Flowrate (CFM)	0
AS-19-G09 Manifold Pressure (PSIG)	0
AS-19-G09 Manifold Flowrate (CFM)	0
AS-19-E02 Manifold Pressure (PSIG)	15
AS-19-E02 Manifold Flowrate (CFM)	4
AS-19-E05 Manifold Pressure (PSIG)	3
AS-19-E05 Manifold Flowrate (CFM)	3
AS-19-E08 Manifold Pressure (PSIG)	12
AS-19-E08 Manifold Flowrate (CFM)	2

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	0

AS-19-G02 Manifold Flowrate (CFM)	0
AS-19-G05 Manifold Pressure (PSIG)	0
AS-19-G05 Manifold Flowrate (CFM)	0
AS-19-G08 Manifold Pressure (PSIG)	0
AS-19-G08 Manifold Flowrate (CFM)	0
AS-19-E01 Manifold Pressure (PSIG)	3
AS-19-E01 Manifold Flowrate (CFM)	5
AS-19-E04 Manifold Pressure (PSIG)	6
AS-19-E04 Manifold Flowrate (CFM)	4.5
AS-19-E07 Manifold Pressure (PSIG)	10
AS-19-E07 Manifold Flowrate (CFM)	5
AS-19-E10 Manifold Pressure (PSIG)	8
AS-19-E10 Manifold Flowrate (CFM)	3.5

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	0
AS-19-G04 Manifold Flowrate (CFM)	0
AS-19-G07 Manifold Pressure (PSIG)	0
AS-19-G07 Manifold Flowrate (CFM)	0
AS-19-G10 Manifold Pressure (PSIG)	0
AS-19-G10 Manifold Flowrate (CFM)	0
AS-19-E03 Manifold Pressure (PSIG)	4
AS-19-E03 Manifold Flowrate (CFM)	3
AS-19-E06 Manifold Pressure (PSIG)	10
AS-19-E06 Manifold Flowrate (CFM)	7.5
AS-19-E09 Manifold Pressure (PSIG)	10
AS-19-E09 Manifold Flowrate (CFM)	4
AS-19-E12 Manifold Pressure (PSIG)	13
AS-19-E12 Manifold Flowrate (CFM)	5

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	15
AS-19-F12 Manifold Flowrate (CFM)	4
AS-19-F09 Manifold Pressure (PSIG)	8
AS-19-F09 Manifold Flowrate (CFM)	4.5
AS-19-F06 Manifold Pressure (PSIG)	9
AS-19-F06 Manifold Flowrate (CFM)	5.5

AS-19-F03 Manifold Pressure (PSIG)	10
AS-19-F03 Manifold Flowrate (CFM)	6
AS-19-B06 Manifold Pressure (PSIG)	37
AS-19-B06 Manifold Flowrate (CFM)	5
AS-19-B03 Manifold Pressure (PSIG)	10
AS-19-B03 Manifold Flowrate (CFM)	6

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	3
AS-19-E11 Manifold Flowrate (CFM)	5
AS-19-F11 Manifold Pressure (PSIG)	6
AS-19-F11 Manifold Flowrate (CFM)	4
AS-19-F08 Manifold Pressure (PSIG)	10
AS-19-F08 Manifold Flowrate (CFM)	3.5
AS-19-F05 Manifold Pressure (PSIG)	7
AS-19-F05 Manifold Flowrate (CFM)	5
AS-19-F02 Manifold Pressure (PSIG)	15
AS-19-F02 Manifold Flowrate (CFM)	4
AS-19-B05 Manifold Pressure (PSIG)	8
AS-19-B05 Manifold Flowrate (CFM)	3.5
AS-19-B02 Manifold Pressure (PSIG)	10
AS-19-B02 Manifold Flowrate (CFM)	6

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	7
AS-19-F10 Manifold Flowrate (CFM)	6.5
AS-19-F07 Manifold Pressure (PSIG)	15
AS-19-F07 Manifold Flowrate (CFM)	8.5
AS-19-F04 Manifold Pressure (PSIG)	16
AS-19-F04 Manifold Flowrate (CFM)	5
AS-19-F01 Manifold Pressure (PSIG)	11
AS-19-F01 Manifold Flowrate (CFM)	2.5
AS-19-B07 Manifold Pressure (PSIG)	10
AS-19-B07 Manifold Flowrate (CFM)	2
AS-19-B04 Manifold Pressure (PSIG)	8
AS-19-B04 Manifold Flowrate (CFM)	3.5
AS-19-B01 Manifold Pressure (PSIG)	13

AS-19-B01 Manifold Flowrate (CFM)	2

Outdoors and General

Propane tank level (%)	76
Number of condensate drums outside	2

Drum Photo

Electric Meter Reading (kWh)	486893
Last fire extinguisher certification date	July 4, 2022
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	
Comments on car parkers and site accessibility:	Fair number of SUVs. Fair amount of semi traffic. Security indicated that drivers are not the best

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	
Signature	Signed 8/4/2023, 11:59:07 AM EDT
Departure Time	12:10

Inspection Date	September 14, 2023
Last Quarterly Event Date	
Arrival Time	09:00
Personnel	Robert Prigge
Weather	50-70s sunny
FWL Electrical Meter Reading (kWh)	2523

HMI and Control Panel

Surge Suppressor Visual Checks

Main surge suppressor: all 3 green lights on?	
Main Surge Suppressor Comments	
Control panel surge suppressor: all 3 green lights on?	
Control panel Surge Suppressor Comments	
Breaker box surge suppressor: all 3 green lights on?	
Breaker box Surge Suppressor Comments	

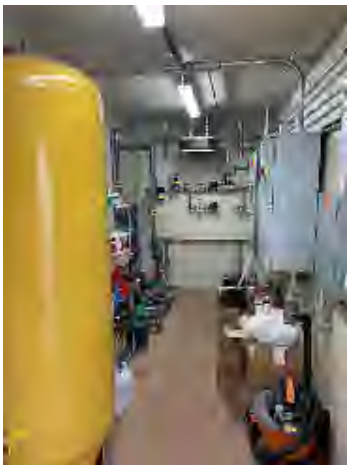
HMI display functioning (not frozen)?	Yes
Current zone	Zone 3 and 6
Compressed air setpoint (LPM)	1000
Propane setpoint (LPM)	6.006
PIT-101 (PSIG)	51.2
PIT-102 (PSIA)	65.1
FQI-101 (SLPM)	2003
PIT-201 (PSIA)	68.2
PIT-300 (PSIG)	20.7
FQI-201 (LPM)	0
AE-350 (%LEL)	0.2
AE-351 (%LEL)	0.1
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
UPS enabled?	No
Comments	

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?, New fire extinguisher installed
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Check the cooling oil level, Cooler: Check the Filter Mat, Control cabinet: Check Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	Cooler: Change filter mat, Control Cabinet: Change filter mat, No oil due to being out of 5 year Kaeser
Semiannual Compressor Maintenance	Condensate drain: Change the service unit, Display: Sigma Control 2: Maintain the drive belt, Display: Sigma Control 2: Change the air filter
Is the annual compressor inspection happening during this event?	Yes
Annual Compressor Inspection	Display Sigma Control 2: Change the oil filter, Check The safety Valve, Check the overheating safety function, Check the Emergency Stop, Refrigerated Dryer: check pressure monitor, Check the cooler for leaks, Maintain the heat recovery system, Check the electrical connections are tight, Biennial: Display Sigma Control 2: Change the oil separator cartridge
Compressor Audio	
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	23950
Oil Pressure (PSIG)	13
Wet receiver tank loading pressure (PI-101)	116
Wet receiver tank unloading pressure (PI-101)	129
How full is the condensate drum? (Percentage)	50
PI-101 (PSIG)	124
PI-102 (PSIG)	108
PI-103 (PSIG)	49
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	TCA-101 Verify draining, S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure

Monthly Non-XP Instrument Maintenance	Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., TCA-101 Inspect for debris sludge clean, AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Verify the silencers are not clogged, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer)
MFC-101 compressed air temperature	29.02
MFC-101 standardized flow rate on display (SLPM)	1861
MFC-101 uncorrected flow rate on display (LPM)	424
Comments	Auto drain strainer clogged. Cleaned and manually drained 11 gallons from wet receiver tank

Non-XP room photo

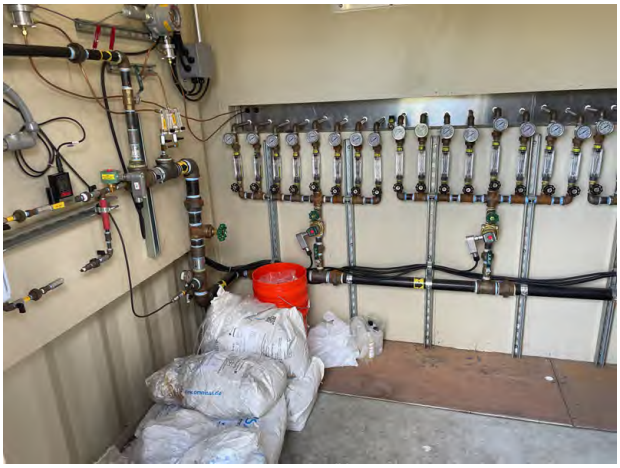


XP-Room

First Aid Kit Expiration Date	July 14, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?, New Fire Extinguisher installed
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	68
PI-202 (PSIG)	49

MFC-201 temperature	36.52
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	5.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	1.57
PI-300 (PSIG)	42
Bi-Weekly XP Instrumentation Checks	AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere).
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0
AE-350 reading during propane sparge cycle	16
AE-351 reading during propane sparge cycle	18
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer)
Comments	

XP-room photo



Zone 1

AS-19-G01 Manifold Pressure (PSIG)	14
AS-19-G01 Manifold Flowrate (CFM)	2

AS-19-G03 Manifold Pressure (PSIG)	14
AS-19-G03 Manifold Flowrate (CFM)	2.5
AS-19-G06 Manifold Pressure (PSIG)	8
AS-19-G06 Manifold Flowrate (CFM)	2
AS-19-G09 Manifold Pressure (PSIG)	7
AS-19-G09 Manifold Flowrate (CFM)	2.5
AS-19-E02 Manifold Pressure (PSIG)	13
AS-19-E02 Manifold Flowrate (CFM)	3.5
AS-19-E05 Manifold Pressure (PSIG)	2
AS-19-E05 Manifold Flowrate (CFM)	2
AS-19-E08 Manifold Pressure (PSIG)	7
AS-19-E08 Manifold Flowrate (CFM)	2

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	2
AS-19-G02 Manifold Flowrate (CFM)	3
AS-19-G05 Manifold Pressure (PSIG)	7
AS-19-G05 Manifold Flowrate (CFM)	2.5
AS-19-G08 Manifold Pressure (PSIG)	4
AS-19-G08 Manifold Flowrate (CFM)	3
AS-19-E01 Manifold Pressure (PSIG)	3
AS-19-E01 Manifold Flowrate (CFM)	4
AS-19-E04 Manifold Pressure (PSIG)	6
AS-19-E04 Manifold Flowrate (CFM)	4.5
AS-19-E07 Manifold Pressure (PSIG)	12
AS-19-E07 Manifold Flowrate (CFM)	3.5
AS-19-E10 Manifold Pressure (PSIG)	13
AS-19-E10 Manifold Flowrate (CFM)	2

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	10
AS-19-G04 Manifold Flowrate (CFM)	3
AS-19-G07 Manifold Pressure (PSIG)	5
AS-19-G07 Manifold Flowrate (CFM)	3
AS-19-G10 Manifold Pressure (PSIG)	4
AS-19-G10 Manifold Flowrate (CFM)	3
AS-19-E03 Manifold Pressure (PSIG)	4

AS-19-E03 Manifold Flowrate (CFM)	3
AS-19-E06 Manifold Pressure (PSIG)	5
AS-19-E06 Manifold Flowrate (CFM)	8
AS-19-E09 Manifold Pressure (PSIG)	9
AS-19-E09 Manifold Flowrate (CFM)	4
AS-19-E12 Manifold Pressure (PSIG)	10
AS-19-E12 Manifold Flowrate (CFM)	4.5

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	10
AS-19-F12 Manifold Flowrate (CFM)	4
AS-19-F09 Manifold Pressure (PSIG)	6
AS-19-F09 Manifold Flowrate (CFM)	4
AS-19-F06 Manifold Pressure (PSIG)	8
AS-19-F06 Manifold Flowrate (CFM)	4
AS-19-F03 Manifold Pressure (PSIG)	8
AS-19-F03 Manifold Flowrate (CFM)	5
AS-19-B06 Manifold Pressure (PSIG)	28
AS-19-B06 Manifold Flowrate (CFM)	2
AS-19-B03 Manifold Pressure (PSIG)	11
AS-19-B03 Manifold Flowrate (CFM)	4.2

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	4
AS-19-E11 Manifold Flowrate (CFM)	3
AS-19-F11 Manifold Pressure (PSIG)	8
AS-19-F11 Manifold Flowrate (CFM)	3
AS-19-F08 Manifold Pressure (PSIG)	12
AS-19-F08 Manifold Flowrate (CFM)	2.5
AS-19-F05 Manifold Pressure (PSIG)	5
AS-19-F05 Manifold Flowrate (CFM)	4.5
AS-19-F02 Manifold Pressure (PSIG)	12
AS-19-F02 Manifold Flowrate (CFM)	4
AS-19-B05 Manifold Pressure (PSIG)	7
AS-19-B05 Manifold Flowrate (CFM)	4
AS-19-B02 Manifold Pressure (PSIG)	7
AS-19-B02 Manifold Flowrate (CFM)	4

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	7
AS-19-F10 Manifold Flowrate (CFM)	5
AS-19-F07 Manifold Pressure (PSIG)	12
AS-19-F07 Manifold Flowrate (CFM)	7
AS-19-F04 Manifold Pressure (PSIG)	14
AS-19-F04 Manifold Flowrate (CFM)	4
AS-19-F01 Manifold Pressure (PSIG)	10
AS-19-F01 Manifold Flowrate (CFM)	2
AS-19-B07 Manifold Pressure (PSIG)	10
AS-19-B07 Manifold Flowrate (CFM)	1
AS-19-B04 Manifold Pressure (PSIG)	6
AS-19-B04 Manifold Flowrate (CFM)	3
AS-19-B01 Manifold Pressure (PSIG)	10
AS-19-B01 Manifold Flowrate (CFM)	2

Outdoors and General

Propane tank level (%)	65
Number of condensate drums outside	6

Drum Photo

Electric Meter Reading (kWh)	504265
Last fire extinguisher certification date	September 14, 2023
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	

Comments on car parkers and site accessibility:	No issues

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage
Quarterly Building Maintenance Tasks	Wipe down system components to cut down on general grime, Remove trash from the system building, Tidy up system and notify TM of unneeded sampling equipment, Take used compressor oil to Advanced Auto Parts for recycling if there is a full container of used oil

System building photo

Photos

Videos	1 Video
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	

Signature	 Signed 9/14/2023, 4:16:13 PM EDT
Departure Time	16:50

Inspection Date	October 3, 2023
Last Quarterly Event Date	
Arrival Time	10:00
Personnel	Robert Prigge
Weather	70-80 sunny
FWL Electrical Meter Reading (kWh)	2605.86

HMI and Control Panel

Surge Suppressor Visual Checks

Main surge suppressor: all 3 green lights on?	
Main Surge Suppressor Comments	
Control panel surge suppressor: all 3 green lights on?	
Control panel Surge Suppressor Comments	
Breaker box surge suppressor: all 3 green lights on?	
Breaker box Surge Suppressor Comments	

HMI display functioning (not frozen)?	Yes
Current zone	Zone 2 and 5
Compressed air setpoint (LPM)	1000
Propane setpoint (LPM)	4.073
PIT-101 (PSIG)	50.8
PIT-102 (PSIA)	64.9
FQI-101 (SLPM)	199
PIT-201 (PSIA)	69
PIT-300 (PSIG)	26.2
FQI-201 (LPM)	0.036
AE-350 (%LEL)	0.1
AE-351 (%LEL)	0.1
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Adjusted
UPS enabled?	No
Comments	

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Check the cooling oil level, Control cabinet: Check Filter Mat, Check the condensate drain, Cooler: Check the Filter Mat
Quarterly Compressor Maintenance	
Semiannual Compressor Maintenance	
Is the annual compressor inspection happening during this event?	No
Compressor Audio	
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	24387
Oil Pressure (PSIG)	13
Wet receiver tank loading pressure (PI-101)	112
Wet receiver tank unloading pressure (PI-101)	128
How full is the condensate drum? (Percentage)	0.1
PI-101 (PSIG)	127
PI-102 (PSIG)	112
PI-103 (PSIG)	48
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	TCA-101 Verify draining, S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	TCA-101 Inspect for debris sludge clean, Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Verify the silencers are not clogged, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	
Quarterly Filter Maintenance	

Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer)
MFC-101 compressed air temperature	27.82
MFC-101 standardized flow rate on display (SLPM)	2000
MFC-101 uncorrected flow rate on display (LPM)	458
Comments	

Non-XP room photo

XP-Room

First Aid Kit Expiration Date	September 3, 2024
Fire Extinguisher Check	All moving parts appear intact?, Needle in the green?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	70
PI-202 (PSIG)	55
MFC-201 temperature	39.9
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	5.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	2.22
PI-300 (PSIG)	26
Bi-Weekly XP Instrumentation Checks	AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere).

Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0
AE-350 reading during propane sparge cycle	16
AE-351 reading during propane sparge cycle	25
Quarterly LEL Meter Calibration	AE-350 calibrated, AE-351 calibrated, AE-500 calibrated
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer)
Comments	

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	25
AS-19-G01 Manifold Flowrate (CFM)	0
AS-19-G03 Manifold Pressure (PSIG)	25
AS-19-G03 Manifold Flowrate (CFM)	0
AS-19-G06 Manifold Pressure (PSIG)	10
AS-19-G06 Manifold Flowrate (CFM)	4
AS-19-G09 Manifold Pressure (PSIG)	2
AS-19-G09 Manifold Flowrate (CFM)	2.5
AS-19-E02 Manifold Pressure (PSIG)	11
AS-19-E02 Manifold Flowrate (CFM)	3
AS-19-E05 Manifold Pressure (PSIG)	2
AS-19-E05 Manifold Flowrate (CFM)	2

AS-19-E08 Manifold Pressure (PSIG)	25
AS-19-E08 Manifold Flowrate (CFM)	20

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	16
AS-19-G02 Manifold Flowrate (CFM)	0
AS-19-G05 Manifold Pressure (PSIG)	8
AS-19-G05 Manifold Flowrate (CFM)	2
AS-19-G08 Manifold Pressure (PSIG)	5
AS-19-G08 Manifold Flowrate (CFM)	3
AS-19-E01 Manifold Pressure (PSIG)	3
AS-19-E01 Manifold Flowrate (CFM)	5
AS-19-E04 Manifold Pressure (PSIG)	5
AS-19-E04 Manifold Flowrate (CFM)	5
AS-19-E07 Manifold Pressure (PSIG)	9
AS-19-E07 Manifold Flowrate (CFM)	4
AS-19-E10 Manifold Pressure (PSIG)	7
AS-19-E10 Manifold Flowrate (CFM)	4

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	16
AS-19-G04 Manifold Flowrate (CFM)	14
AS-19-G07 Manifold Pressure (PSIG)	8
AS-19-G07 Manifold Flowrate (CFM)	5
AS-19-G10 Manifold Pressure (PSIG)	12
AS-19-G10 Manifold Flowrate (CFM)	3
AS-19-E03 Manifold Pressure (PSIG)	5
AS-19-E03 Manifold Flowrate (CFM)	3.5
AS-19-E06 Manifold Pressure (PSIG)	10
AS-19-E06 Manifold Flowrate (CFM)	6
AS-19-E09 Manifold Pressure (PSIG)	10
AS-19-E09 Manifold Flowrate (CFM)	3
AS-19-E12 Manifold Pressure (PSIG)	1
AS-19-E12 Manifold Flowrate (CFM)	4.5

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	7
AS-19-F12 Manifold Flowrate (CFM)	2
AS-19-F09 Manifold Pressure (PSIG)	5
AS-19-F09 Manifold Flowrate (CFM)	2.5
AS-19-F06 Manifold Pressure (PSIG)	6
AS-19-F06 Manifold Flowrate (CFM)	2.5
AS-19-F03 Manifold Pressure (PSIG)	6
AS-19-F03 Manifold Flowrate (CFM)	3
AS-19-B06 Manifold Pressure (PSIG)	15
AS-19-B06 Manifold Flowrate (CFM)	3
AS-19-B03 Manifold Pressure (PSIG)	7
AS-19-B03 Manifold Flowrate (CFM)	3.2

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	3
AS-19-E11 Manifold Flowrate (CFM)	3
AS-19-F11 Manifold Pressure (PSIG)	8
AS-19-F11 Manifold Flowrate (CFM)	3
AS-19-F08 Manifold Pressure (PSIG)	14
AS-19-F08 Manifold Flowrate (CFM)	2.5
AS-19-F05 Manifold Pressure (PSIG)	7
AS-19-F05 Manifold Flowrate (CFM)	4.5
AS-19-F02 Manifold Pressure (PSIG)	16
AS-19-F02 Manifold Flowrate (CFM)	3.5
AS-19-B05 Manifold Pressure (PSIG)	8
AS-19-B05 Manifold Flowrate (CFM)	3.5
AS-19-B02 Manifold Pressure (PSIG)	8
AS-19-B02 Manifold Flowrate (CFM)	4.5

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	10
AS-19-F10 Manifold Flowrate (CFM)	5.5
AS-19-F07 Manifold Pressure (PSIG)	14
AS-19-F07 Manifold Flowrate (CFM)	6
AS-19-F04 Manifold Pressure (PSIG)	16
AS-19-F04 Manifold Flowrate (CFM)	3.5
AS-19-F01 Manifold Pressure (PSIG)	8

AS-19-F01 Manifold Flowrate (CFM)	2
AS-19-B07 Manifold Pressure (PSIG)	8
AS-19-B07 Manifold Flowrate (CFM)	3
AS-19-B04 Manifold Pressure (PSIG)	8
AS-19-B04 Manifold Flowrate (CFM)	3.5
AS-19-B01 Manifold Pressure (PSIG)	15
AS-19-B01 Manifold Flowrate (CFM)	1.5

Outdoors and General

Propane tank level (%)	48
Number of condensate drums outside	9

Drum Photo

Electric Meter Reading (kWh)	5128
Last fire extinguisher certification date	September 3, 2023
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	
Comments on car parkers and site accessibility:	No issues

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage
Quarterly Building Maintenance Tasks	Wipe down system components to cut down on general grime, Remove trash from the system building, Tidy up system and notify TM of unneeded sampling equipment, Take used compressor oil to Advanced Auto Parts for recycling if there is a full container of used oil

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 10/3/2023, 1:02:13 PM EDT
Departure Time	13:15

Inspection Date	November 1, 2023
Last Quarterly Event Date	
Arrival Time	10:36
Personnel	Robert Prigge
Weather	30s sunny
FWL Electrical Meter Reading (kWh)	2862.37

HMI and Control Panel

Surge Suppressor Visual Checks

Main surge suppressor: all 3 green lights on?	Yes
Main Surge Suppressor Comments	
Control panel surge suppressor: all 3 green lights on?	Yes
Control panel Surge Suppressor Comments	
Breaker box surge suppressor: all 3 green lights on?	Yes
Breaker box Surge Suppressor Comments	

HMI display functioning (not frozen)?	Yes
Current zone	Zone 2 and 5
Compressed air setpoint (LPM)	1000
Propane setpoint (LPM)	5.571
PIT-101 (PSIG)	51.2
PIT-102 (PSIA)	65.3
FQI-101 (SLPM)	2000
PIT-201 (PSIA)	75.9
PIT-300 (PSIG)	25.4
FQI-201 (LPM)	0.028
AE-350 (%LEL)	0.1
AE-351 (%LEL)	0.2
AE-500 (%LEL)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
UPS enabled?	No
Comments	

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Check the cooling oil level, Control cabinet: Check Filter Mat, Cooler: Check the Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	Cooler: Change filter mat, Control Cabinet: Change filter mat
Semiannual Compressor Maintenance	
Is the annual compressor inspection happening during this event?	No
Compressor Audio	
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	25032
Oil Pressure (PSIG)	13
Wet receiver tank loading pressure (PI-101)	109
Wet receiver tank unloading pressure (PI-101)	125
How full is the condensate drum? (Percentage)	50
PI-101 (PSIG)	123
PI-102 (PSIG)	112
PI-103 (PSIG)	49
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	TCA-101 Verify draining, S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	TCA-101 Inspect for debris sludge clean, Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Verify the silencers are not clogged, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	

Quarterly Filter Maintenance	PF-101 Check and clean filter (knock out dirt and rinse with DI water). Replace filter if necessary., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge
Desiccant Media Replaced?	No
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older)
MFC-101 compressed air temperature	17.07
MFC-101 standardized flow rate on display (SLPM)	2001
MFC-101 uncorrected flow rate on display (LPM)	439
Comments	

Non-XP room photo

XP-Room

First Aid Kit Expiration Date	July 1, 2024
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	74
PI-202 (PSIG)	50
MFC-201 temperature	26.69
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	2.19
PI-300 (PSIG)	28

Bi-Weekly XP Instrumentation Checks	AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere).
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0
AE-350 reading during propane sparge cycle	14
AE-351 reading during propane sparge cycle	8
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older)
Comments	

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	10
AS-19-G01 Manifold Flowrate (CFM)	3.5
AS-19-G03 Manifold Pressure (PSIG)	12
AS-19-G03 Manifold Flowrate (CFM)	2
AS-19-G06 Manifold Pressure (PSIG)	7
AS-19-G06 Manifold Flowrate (CFM)	4.5
AS-19-G09 Manifold Pressure (PSIG)	2
AS-19-G09 Manifold Flowrate (CFM)	2

AS-19-E02 Manifold Pressure (PSIG)	6
AS-19-E02 Manifold Flowrate (CFM)	3
AS-19-E05 Manifold Pressure (PSIG)	3
AS-19-E05 Manifold Flowrate (CFM)	2
AS-19-E08 Manifold Pressure (PSIG)	6
AS-19-E08 Manifold Flowrate (CFM)	3

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	25
AS-19-G02 Manifold Flowrate (CFM)	0
AS-19-G05 Manifold Pressure (PSIG)	10
AS-19-G05 Manifold Flowrate (CFM)	2
AS-19-G08 Manifold Pressure (PSIG)	3
AS-19-G08 Manifold Flowrate (CFM)	3
AS-19-E01 Manifold Pressure (PSIG)	4
AS-19-E01 Manifold Flowrate (CFM)	4
AS-19-E04 Manifold Pressure (PSIG)	5
AS-19-E04 Manifold Flowrate (CFM)	4
AS-19-E07 Manifold Pressure (PSIG)	10
AS-19-E07 Manifold Flowrate (CFM)	4
AS-19-E10 Manifold Pressure (PSIG)	8
AS-19-E10 Manifold Flowrate (CFM)	3.5

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	6
AS-19-G04 Manifold Flowrate (CFM)	12
AS-19-G07 Manifold Pressure (PSIG)	5
AS-19-G07 Manifold Flowrate (CFM)	4
AS-19-G10 Manifold Pressure (PSIG)	8
AS-19-G10 Manifold Flowrate (CFM)	2
AS-19-E03 Manifold Pressure (PSIG)	3
AS-19-E03 Manifold Flowrate (CFM)	2
AS-19-E06 Manifold Pressure (PSIG)	7
AS-19-E06 Manifold Flowrate (CFM)	3
AS-19-E09 Manifold Pressure (PSIG)	14
AS-19-E09 Manifold Flowrate (CFM)	2
AS-19-E12 Manifold Pressure (PSIG)	12

AS-19-E12 Manifold Flowrate (CFM)	2

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	12
AS-19-F12 Manifold Flowrate (CFM)	2
AS-19-F09 Manifold Pressure (PSIG)	6
AS-19-F09 Manifold Flowrate (CFM)	3
AS-19-F06 Manifold Pressure (PSIG)	8
AS-19-F06 Manifold Flowrate (CFM)	4
AS-19-F03 Manifold Pressure (PSIG)	9
AS-19-F03 Manifold Flowrate (CFM)	4
AS-19-B06 Manifold Pressure (PSIG)	25
AS-19-B06 Manifold Flowrate (CFM)	1
AS-19-B03 Manifold Pressure (PSIG)	8
AS-19-B03 Manifold Flowrate (CFM)	4

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	5
AS-19-E11 Manifold Flowrate (CFM)	3
AS-19-F11 Manifold Pressure (PSIG)	10
AS-19-F11 Manifold Flowrate (CFM)	3
AS-19-F08 Manifold Pressure (PSIG)	13
AS-19-F08 Manifold Flowrate (CFM)	3
AS-19-F05 Manifold Pressure (PSIG)	7
AS-19-F05 Manifold Flowrate (CFM)	5
AS-19-F02 Manifold Pressure (PSIG)	15
AS-19-F02 Manifold Flowrate (CFM)	4
AS-19-B05 Manifold Pressure (PSIG)	8
AS-19-B05 Manifold Flowrate (CFM)	3.5
AS-19-B02 Manifold Pressure (PSIG)	8
AS-19-B02 Manifold Flowrate (CFM)	5

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	7
AS-19-F10 Manifold Flowrate (CFM)	4
AS-19-F07 Manifold Pressure (PSIG)	12

AS-19-F07 Manifold Flowrate (CFM)	5.5
AS-19-F04 Manifold Pressure (PSIG)	15
AS-19-F04 Manifold Flowrate (CFM)	5
AS-19-F01 Manifold Pressure (PSIG)	8
AS-19-F01 Manifold Flowrate (CFM)	2
AS-19-B07 Manifold Pressure (PSIG)	8
AS-19-B07 Manifold Flowrate (CFM)	2.5
AS-19-B04 Manifold Pressure (PSIG)	7
AS-19-B04 Manifold Flowrate (CFM)	3.5
AS-19-B01 Manifold Pressure (PSIG)	13
AS-19-B01 Manifold Flowrate (CFM)	1

Outdoors and General

Propane tank level (%)	30
Number of condensate drums outside	9

Drum Photo

Electric Meter Reading (kWh)	526932
Last fire extinguisher certification date	September 1, 2023
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	
Comments on car parkers and site accessibility:	No issues

Car parking photos if near buildings

Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage

Quarterly Building Maintenance Tasks	Wipe down system components to cut down on general grime, Remove trash from the system building, Tidy up system and notify TM of unneeded sampling equipment

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	Cabinet air filter
Signature	 Signed 11/1/2023, 12:37:32 PM EDT
Departure Time	12:39

Inspection Date	December 8, 2023
Last Quarterly Event Date	
Arrival Time	09:10
Personnel	Robert Prigge
Weather	40s sunny
FWL Electrical Meter Reading (kWh)	3259.18

HMI and Control Panel

Surge Suppressor Visual Checks

Main surge suppressor: all 3 green lights on?	Yes
Main Surge Suppressor Comments	
Control panel surge suppressor: all 3 green lights on?	Yes
Control panel Surge Suppressor Comments	
Breaker box surge suppressor: all 3 green lights on?	Yes
Breaker box Surge Suppressor Comments	

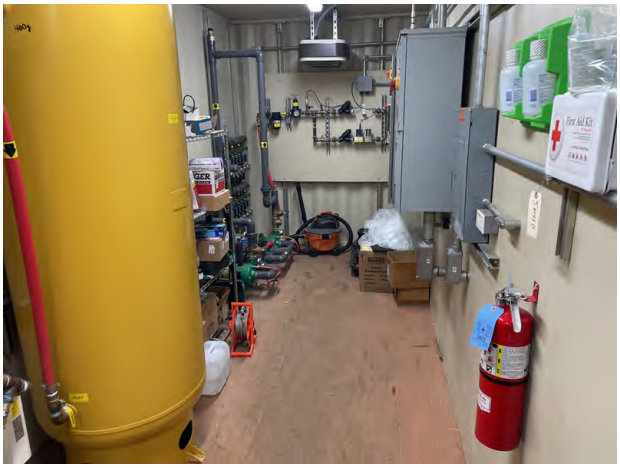
HMI display functioning (not frozen)?	Yes
Current zone	Zone 2 and 5
Compressed air setpoint (LPM)	1000
Propane setpoint (LPM)	5.584
PIT-101 (PSIG)	54.9
PIT-102 (PSIA)	69
FQI-101 (SLPM)	1999
PIT-201 (PSIA)	121.9
PIT-300 (PSIG)	26.4
FQI-201 (LPM)	0.099
AE-350 (%LEL)	0
AE-351 (%LEL)	0
AE-500 (%LEL)	0.1
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Changed- day lights savings
UPS enabled?	No
Comments	

Non-XP Room

Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Bi-Weekly Compressor Maintenance	Check the cooling oil level, Cooler: Check the Filter Mat, Control cabinet: Check Filter Mat, Check the condensate drain
Quarterly Compressor Maintenance	Cooler: Change filter mat, Control Cabinet: Change filter mat, Oil change and air filter change on 12/6 by Air components
Semiannual Compressor Maintenance	
Is the annual compressor inspection happening during this event?	No
Compressor Audio	2 Audio Files
Number of air filters remaining	0
Do we need more compressor oil? (Less than a half gallon remaining)	No
Motor Runtime (hours)	25851
Oil Pressure (PSIG)	4.5
Wet receiver tank loading pressure (PI-101)	110
Wet receiver tank unloading pressure (PI-101)	125
How full is the condensate drum? (Percentage)	5
PI-101 (PSIG)	122
PI-102 (PSIG)	120
PI-103 (PSIG)	53
Are the trident desiccant dryer meters green?	Yes
Bi-Weekly Non-XP Instrument Maintenance	TCA-101 Verify draining, S-101 Verify autodrain is functioning (makes a loud noise when it turns on and water drains into the condensate drum), PF-101 Verify auto drain operational, CF-101 Verify auto drain operational, TCA-102 Check for moisture, PR-101 Verify pressure
Monthly Non-XP Instrument Maintenance	TCA-101 Inspect for debris sludge clean, Tote Transfer contents of condensate drum into outdoor drum when it is 2/3 full. It will fill up quickly during humid summer months., AD-101 Verify the drying-and-regeneration cycle is normal, AD-101 Verify the silencers are not clogged, AD-101 Inspect and determine the state of the desiccant. Brown (oil-polluted) or dusty desiccant needs to be replaced., PI-103 Verify pressure, PT-103 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, MFC-101 / PIT-102 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well., S-101 Actuate valves and ensure they are working properly (turn on and off and listen for the click), Electric box Open panel to ensure there are no tripped circuit breakers, Close valve on autodrain and clean strainer. Re-open valve to place back into operation.
Semiannual Non-XP Instrument Maintenance	

Quarterly Filter Maintenance	
Desiccant Media Replaced?	
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older)
MFC-101 compressed air temperature	19.77
MFC-101 standardized flow rate on display (SLPM)	2001
MFC-101 uncorrected flow rate on display (LPM)	444
Comments	

Non-XP room photo



XP-Room

First Aid Kit Expiration Date	December 8, 2023
Fire Extinguisher Check	Needle in the green?, All moving parts appear intact?, No deformation?
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
PI-201 (PSIG)	74
PI-202 (PSIG)	49
MFC-201 temperature	33.3
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	6.01
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	2.42
PI-300 (PSIG)	25

Bi-Weekly XP Instrumentation Checks	AE-350 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-351 Investigate significant changes in the reading. Check the LEL during a propane sparging cycle. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-500 Investigate significant changes in the reading. Check to make sure the reading is accurate for the conditions (should read 0% in the atmosphere)., AE-350 and AE-351 are likely bad
Monthly XP Instrumentation Checks	MFC-201 / PIT-202 Check the flow rate to make sure it matches the setpoint on the PLC. Check the pressure reading as well, S-201 Actuate valves and ensure it is working properly (turn on and off and listen for the click), PIT-300 Check pressure reading on HMI and make sure it is close to a manual pressure gauge, FQI-301 Check flow reading to make sure it is close to the flow reading on the HMI, S-301 to S-306 Actuate valves and ensure they are working properly (turn on and off and listen for the click)
Semiannual XP Instrumentation Checks	
AE-500 Reading	0.1
AE-350 reading during propane sparge cycle	0
AE-351 reading during propane sparge cycle	0
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older)
Comments	

XP-room photo

Zone 1

AS-19-G01 Manifold Pressure (PSIG)	9
AS-19-G01 Manifold Flowrate (CFM)	3.5
AS-19-G03 Manifold Pressure (PSIG)	10
AS-19-G03 Manifold Flowrate (CFM)	2
AS-19-G06 Manifold Pressure (PSIG)	10
AS-19-G06 Manifold Flowrate (CFM)	4
AS-19-G09 Manifold Pressure (PSIG)	3
AS-19-G09 Manifold Flowrate (CFM)	1.5

AS-19-E02 Manifold Pressure (PSIG)	13
AS-19-E02 Manifold Flowrate (CFM)	2.5
AS-19-E05 Manifold Pressure (PSIG)	6
AS-19-E05 Manifold Flowrate (CFM)	1.5
AS-19-E08 Manifold Pressure (PSIG)	12
AS-19-E08 Manifold Flowrate (CFM)	2

Zone 2

AS-19-G02 Manifold Pressure (PSIG)	25
AS-19-G02 Manifold Flowrate (CFM)	0
AS-19-G05 Manifold Pressure (PSIG)	12
AS-19-G05 Manifold Flowrate (CFM)	2
AS-19-G08 Manifold Pressure (PSIG)	5
AS-19-G08 Manifold Flowrate (CFM)	3
AS-19-E01 Manifold Pressure (PSIG)	4
AS-19-E01 Manifold Flowrate (CFM)	5
AS-19-E04 Manifold Pressure (PSIG)	10
AS-19-E04 Manifold Flowrate (CFM)	4
AS-19-E07 Manifold Pressure (PSIG)	8
AS-19-E07 Manifold Flowrate (CFM)	4
AS-19-E10 Manifold Pressure (PSIG)	2
AS-19-E10 Manifold Flowrate (CFM)	0

Zone 3

AS-19-G04 Manifold Pressure (PSIG)	12
AS-19-G04 Manifold Flowrate (CFM)	13
AS-19-G07 Manifold Pressure (PSIG)	7
AS-19-G07 Manifold Flowrate (CFM)	3.5
AS-19-G10 Manifold Pressure (PSIG)	9
AS-19-G10 Manifold Flowrate (CFM)	1
AS-19-E03 Manifold Pressure (PSIG)	3
AS-19-E03 Manifold Flowrate (CFM)	2
AS-19-E06 Manifold Pressure (PSIG)	8
AS-19-E06 Manifold Flowrate (CFM)	4
AS-19-E09 Manifold Pressure (PSIG)	16
AS-19-E09 Manifold Flowrate (CFM)	3
AS-19-E12 Manifold Pressure (PSIG)	13

AS-19-E12 Manifold Flowrate (CFM)	3

Zone 4

AS-19-F12 Manifold Pressure (PSIG)	17
AS-19-F12 Manifold Flowrate (CFM)	2
AS-19-F09 Manifold Pressure (PSIG)	8
AS-19-F09 Manifold Flowrate (CFM)	3
AS-19-F06 Manifold Pressure (PSIG)	9
AS-19-F06 Manifold Flowrate (CFM)	4
AS-19-F03 Manifold Pressure (PSIG)	10
AS-19-F03 Manifold Flowrate (CFM)	3.5
AS-19-B06 Manifold Pressure (PSIG)	27
AS-19-B06 Manifold Flowrate (CFM)	1
AS-19-B03 Manifold Pressure (PSIG)	10
AS-19-B03 Manifold Flowrate (CFM)	4

Zone 5

AS-19-E11 Manifold Pressure (PSIG)	10
AS-19-E11 Manifold Flowrate (CFM)	3
AS-19-F11 Manifold Pressure (PSIG)	9
AS-19-F11 Manifold Flowrate (CFM)	3
AS-19-F08 Manifold Pressure (PSIG)	15
AS-19-F08 Manifold Flowrate (CFM)	2.5
AS-19-F05 Manifold Pressure (PSIG)	8
AS-19-F05 Manifold Flowrate (CFM)	4.5
AS-19-F02 Manifold Pressure (PSIG)	17
AS-19-F02 Manifold Flowrate (CFM)	4
AS-19-B05 Manifold Pressure (PSIG)	9
AS-19-B05 Manifold Flowrate (CFM)	3.5
AS-19-B02 Manifold Pressure (PSIG)	7
AS-19-B02 Manifold Flowrate (CFM)	4

Zone 6

AS-19-F10 Manifold Pressure (PSIG)	10
AS-19-F10 Manifold Flowrate (CFM)	4
AS-19-F07 Manifold Pressure (PSIG)	14

AS-19-F07 Manifold Flowrate (CFM)	5
AS-19-F04 Manifold Pressure (PSIG)	19
AS-19-F04 Manifold Flowrate (CFM)	3
AS-19-F01 Manifold Pressure (PSIG)	10
AS-19-F01 Manifold Flowrate (CFM)	3
AS-19-B07 Manifold Pressure (PSIG)	12
AS-19-B07 Manifold Flowrate (CFM)	3
AS-19-B04 Manifold Pressure (PSIG)	8
AS-19-B04 Manifold Flowrate (CFM)	3.5
AS-19-B01 Manifold Pressure (PSIG)	12
AS-19-B01 Manifold Flowrate (CFM)	2.5

Outdoors and General

Propane tank level (%)	22
Number of condensate drums outside	4

Drum Photo

Electric Meter Reading (kWh)	549259
Last fire extinguisher certification date	July 8, 2023
Walked hose corridors and fixed fallen barrels?	Yes
Checked wellheads for leaks/hissing?	Yes
Comments on wellheads:	
Comments on car parkers and site accessibility:	No cars
Car parking photos if near buildings	
Monthly Outdoor Maintenance Tasks	PR-201 Check pressure on regulator, PSH-201 Check settings, ENC198 Check electric meter at the property boundary pole to track overall electrical usage

Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 12/8/2023, 11:48:45 AM EST
Departure Time	12:00

Inspection Date	January 5, 2023
Last Quarterly Event Date	
Arrival Time	11:28
Personnel	Eric Feenstra, Robert Prigge
Weather	Cloudy 35 deg F

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 1
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	21.2
PIT-102 (PSIA)	28
FQI-101 (SLPM)	300.5
FQI-201 (SLPM)	0
PIT-202 (PSIA)	16
FE-301 (LPM)	300
AE-350 (%LEL)	0
PIT-300 (PSIG)	15.3
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	No
Comments	Bypass ups

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	16680.04
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	Change the intake filter, Change the oil (Q1 and Q3). Use only Mattei Rotoroil 8000F2
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	Done

Oil sample taken?	No
Number of routine maintenance kits remaining	0
Number of air filters remaining	0
Compressor Audio	1 Audio File
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	230
Motor Current while loading (amps)	14.65
Motor RPMs while loading	1800
VFD thermal state	65
VFD line voltage in (while compressor is loading)	230
Wet receiver tank loading pressure (PI-101)	77
Wet receiver tank unloading pressure (PI-101)	66
How full is the condensate drum? (Gallons)	21
PI-102 (PSIG)	20
PI-103 (PSIG)	22
Trident Desiccant Dryer Pressure (PSIG)	4.5
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	PF-102 needle green, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle green, CF-102 needle green, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	Check and clean PF-101, Check, clean, and replace filter element on CF-101, Check PF-102 filter element and inform TM if it needs to be replaced, Check PF-103 filter element and inform TM if it needs to be replaced, Open and clean CF-102, inform TM if element needs to be replaced, Open and check PF-104, inform TM if element needs to be replaced
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	65
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer, use August through February)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	54.99
MFC-101 standardized flow rate on display (SLPM)	300
MFC-101 uncorrected flow rate on display (LPM)	145.8
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 5, 2024
Fire Extinguisher Check	Needle in the green
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Complete
PI-201 (PSIG)	78
PI-202 (PSIG)	48
MFC-201 temperature (Fahrenheit)	77.94
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.296
PI-300 (PSIG)	14
PI-301 Z1 (PSIG)	11
PI-302 Z2 (PSIG)	13
PI-303 Z3 (PSIG)	11
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	5
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer, use August through February)
Comments	

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	13
AS-19-A02 Wellhead Pressure (PSIG)	13
AS-19-A03 Wellhead Pressure (PSIG)	13
AS-19-A04 Wellhead Pressure (PSIG)	13
AS-19-A05 Wellhead Pressure (PSIG)	13
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	143117
Electric meter power draw (kW) while compressor is on	11.43
Walked hose corridors and fixed fallen barrels?	
Listened for leaks/hissing at wellheads?	

Comments on car parkers and site accessibility:	

Car parking photos if near buildings

Last fire extinguisher certification date	July 1, 2022
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	Compressor filter kit
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 1/5/2023, 12:11:04 PM EST
Departure Time	13:00

Inspection Date	February 3, 2023
Last Quarterly Event Date	
Arrival Time	12:03
Personnel	Robert Prigge
Weather	Overcast snow 12 degree

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Rest
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	25.9
PIT-102 (PSIA)	13.8
FQI-101 (SLPM)	-0.1
FQI-201 (SLPM)	0
PIT-202 (PSIA)	17.1
FE-301 (LPM)	-0.1
AE-350 (%LEL)	0.1
PIT-300 (PSIG)	0.3
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	Yes
Comments	

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	17137.49
Biweekly Compressor Maintenance	Listen for the wet receiver tank auto-drain to turn on to confirm it is working, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Open and check the condensate drain, clean if necessary, Clean the aftercooler with compressed air, Clean the intake filter with compressed air
Quarterly Compressor Maintenance	
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	Na

Oil sample taken?	No
Number of routine maintenance kits remaining	0
Number of air filters remaining	0
Compressor Audio	3 Audio Files
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	220
Motor Current while loading (amps)	7.12
Motor RPMs while loading	1800
VFD thermal state	35
VFD line voltage in (while compressor is loading)	223
Wet receiver tank loading pressure (PI-101)	77
Wet receiver tank unloading pressure (PI-101)	67
How full is the condensate drum? (Gallons)	21
PI-102 (PSIG)	26
PI-103 (PSIG)	25
Trident Desiccant Dryer Pressure (PSIG)	4.5
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	PF-102 needle green, Verify the desiccant dryer is cycling properly, PF-103 needle green, Actuate S-101 to ensure it is working properly, CF-102 needle green, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	65
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer, use August through February)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	74.77
MFC-101 standardized flow rate on display (SLPM)	300.1
MFC-101 uncorrected flow rate on display (LPM)	145.3
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 3, 2024
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Complete
PI-201 (PSIG)	60
PI-202 (PSIG)	48
MFC-201 temperature (Fahrenheit)	65.17
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.292
PI-300 (PSIG)	14
PI-301 Z1 (PSIG)	13
PI-302 Z2 (PSIG)	10
PI-303 Z3 (PSIG)	13
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0.1
AE-350 reading during propane sparge cycle	6
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer, use August through February)
Comments	

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	11
AS-19-A02 Wellhead Pressure (PSIG)	13
AS-19-A03 Wellhead Pressure (PSIG)	11
AS-19-A04 Wellhead Pressure (PSIG)	13
AS-19-A05 Wellhead Pressure (PSIG)	10
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	147355
Electric meter power draw (kW) while compressor is on	10.58
Walked hose corridors and fixed fallen barrels?	Yes
Listened for leaks/hissing at wellheads?	Yes

Wellhead comments:	
Comments on car parkers and site accessibility:	No issues

Car parking photos if near buildings

Last fire extinguisher certification date	July 3, 2022
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	Air compressor maintenance
Comments, questions, ruminations, suggestions for improvement?	

Signature	 Signed 2/7/2023, 1:48:32 PM EST
Departure Time	14:25

Inspection Date	March 3, 2023
Last Quarterly Event Date	
Arrival Time	13:25
Personnel	Billy J Cobern
Weather	Cloudy, 30's

HMI and Control Panel

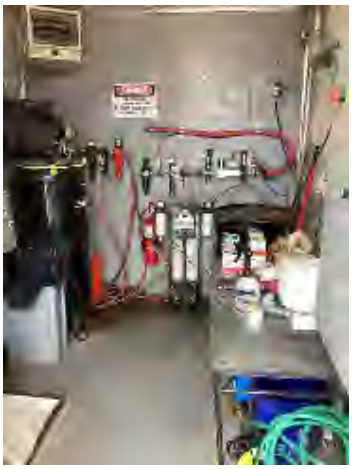
HMI display functioning (not frozen)?	Yes
Current zone	Zone 1
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	20.9
PIT-102 (PSIA)	27.3
FQI-101 (SLPM)	299.9
FQI-201 (SLPM)	0
PIT-202 (PSIA)	15.1
FE-301 (LPM)	300
AE-350 (%LEL)	0.1
PIT-300 (PSIG)	14.9
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	Yes
Comments	

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	1760113
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	N/A

Oil sample taken?	No
Number of routine maintenance kits remaining	0
Number of air filters remaining	0
Compressor Audio	1 Audio File
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	219
Motor Current while loading (amps)	7.15
Motor RPMs while loading	1800
VFD thermal state	53
VFD line voltage in (while compressor is loading)	225
Wet receiver tank loading pressure (PI-101)	70
Wet receiver tank unloading pressure (PI-101)	60
How full is the condensate drum? (Gallons)	21
PI-102 (PSIG)	2
PI-103 (PSIG)	20
Trident Desiccant Dryer Pressure (PSIG)	54
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	System depressurized to drain filter chambers, PF-101 drained manually, PF-102 needle yellow or red, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle yellow or red, Actuate S-101 to ensure it is working properly, PF-103 needle green, CF-102 needle green, CF-102 needle yellow or red, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	75
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older, use February through August)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	66.18
MFC-101 standardized flow rate on display (SLPM)	300.23
MFC-101 uncorrected flow rate on display (LPM)	148.02
Comments	

Non-XP room photo



Classified Room

First Aid Kit Expiration Date	July 3, 2024
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	No
PI-201 (PSIG)	80
PI-202 (PSIG)	40
MFC-201 temperature (Fahrenheit)	70.97
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.296
PI-300 (PSIG)	10
PI-301 Z1 (PSIG)	12
PI-302 Z2 (PSIG)	11
PI-303 Z3 (PSIG)	12
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	8
Quarterly LEL Meter Calibration	AE-350 calibrated, AE-401 calibrated
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older, use February through August)
Comments	Calibrated AE-401 and AE-350

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	11
AS-19-A02 Wellhead Pressure (PSIG)	13
AS-19-A03 Wellhead Pressure (PSIG)	12
AS-19-A04 Wellhead Pressure (PSIG)	13
AS-19-A05 Wellhead Pressure (PSIG)	10
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	151104
Electric meter power draw (kW) while compressor is on	5.73
Walked hose corridors and fixed fallen barrels?	Yes
Listened for leaks/hissing at wellheads?	Yes

Wellhead comments:	All seem ok
Comments on car parkers and site accessibility:	No issues
Car parking photos if near buildings	
Last fire extinguisher certification date	July 3, 2022
Quarterly Building Maintenance Tasks	Wipe down system components to cut down on general grime, Remove trash from the system building, Tidy up system and notify TM of unneeded sampling equipment, Take used compressor oil to Advanced Auto Parts for recycling if there is a full container of used oil

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	No
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 3/3/2023, 1:55:23 PM EST
Departure Time	14:30

Inspection Date	April 8, 2023
Last Quarterly Event Date	
Arrival Time	12:15
Personnel	Billy J Cobern
Weather	Partly Cloudy 40’s

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 1
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	27.4
PIT-102 (PSIA)	13.6
FQI-101 (SLPM)	0
FQI-201 (SLPM)	0
PIT-202 (PSIA)	13.5
FE-301 (LPM)	0
AE-350 (%LEL)	99
PIT-300 (PSIG)	0.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	Yes
Comments	System down upon arrival. System will not reset do to high LEL. AE-350 will not calibrate. System will remain off.

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	18201900
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	

Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	N/A
Oil sample taken?	No
Number of routine maintenance kits remaining	0
Number of air filters remaining	0
Compressor Audio	
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	0
Motor Current while loading (amps)	0
Motor RPMs while loading	0
VFD thermal state	0
VFD line voltage in (while compressor is loading)	0
Wet receiver tank loading pressure (PI-101)	70
Wet receiver tank unloading pressure (PI-101)	60
How full is the condensate drum? (Gallons)	24
PI-102 (PSIG)	0
PI-103 (PSIG)	0
Trident Desiccant Dryer Pressure (PSIG)	0
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	System depressurized to drain filter chambers, PF-101 drained manually, PF-102 needle yellow or red, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle yellow or red, Actuate S-101 to ensure it is working properly, PF-103 needle green, CF-102 needle green, CF-102 needle yellow or red, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	0
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older, use February through August)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	32
MFC-101 standardized flow rate on display (SLPM)	0
MFC-101 uncorrected flow rate on display (LPM)	0
Comments	System down

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 3, 2024
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Complete
PI-201 (PSIG)	0
PI-202 (PSIG)	0
MFC-201 temperature (Fahrenheit)	32
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0
PI-300 (PSIG)	0
PI-301 Z1 (PSIG)	0
PI-302 Z2 (PSIG)	0
PI-303 Z3 (PSIG)	0
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	100
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older, use February through August)
Comments	AE 350 will not calibrate

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	0
AS-19-A02 Wellhead Pressure (PSIG)	0
AS-19-A03 Wellhead Pressure (PSIG)	0
AS-19-A04 Wellhead Pressure (PSIG)	0
AS-19-A05 Wellhead Pressure (PSIG)	0
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	154921
Electric meter power draw (kW) while compressor is on	0
Walked hose corridors and fixed fallen barrels?	No
Listened for leaks/hissing at wellheads?	No

Comments on car parkers and site accessibility:	No issues
Car parking photos if near buildings	
Last fire extinguisher certification date	July 3, 2022
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	No
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 4/8/2023, 1:11:38 PM EDT
Departure Time	13:45

Inspection Date	May 6, 2023
Last Quarterly Event Date	
Arrival Time	12:00
Personnel	Billy J Cobern
Weather	Partly Cloudy 50’s-60’s

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Rest
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	21.4
PIT-102 (PSIA)	27.1
FQI-101 (SLPM)	300
FQI-201 (SLPM)	0.6
PIT-202 (PSIA)	27.3
FE-301 (LPM)	300.5
AE-350 (%LEL)	6.7
PIT-300 (PSIG)	14.6
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	Yes
Comments	

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	1868511
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	N/A

Oil sample taken?	No
Number of routine maintenance kits remaining	0
Number of air filters remaining	0
Compressor Audio	1 Audio File
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	232
Motor Current while loading (amps)	14.42
Motor RPMs while loading	1800
VFD thermal state	52
VFD line voltage in (while compressor is loading)	230
Wet receiver tank loading pressure (PI-101)	70
Wet receiver tank unloading pressure (PI-101)	60
How full is the condensate drum? (Gallons)	27
PI-102 (PSIG)	20
PI-103 (PSIG)	20
Trident Desiccant Dryer Pressure (PSIG)	5
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	System depressurized to drain filter chambers, PF-101 drained manually, PF-102 needle yellow or red, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle yellow or red, Actuate S-101 to ensure it is working properly, PF-103 needle green, CF-102 needle green, CF-102 needle yellow or red, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	75
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older, use February through August)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	77.13
MFC-101 standardized flow rate on display (SLPM)	299.85
MFC-101 uncorrected flow rate on display (LPM)	150.31
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 3, 2024
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Switched positions of tanks. 1 tank was at 40% and 1 tank was at 70%.
PI-201 (PSIG)	100
PI-202 (PSIG)	40
MFC-201 temperature (Fahrenheit)	80.35
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.601
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.301
PI-300 (PSIG)	12
PI-301 Z1 (PSIG)	12
PI-302 Z2 (PSIG)	12
PI-303 Z3 (PSIG)	12
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	7
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older, use February through August)
Comments	

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	12
AS-19-A02 Wellhead Pressure (PSIG)	12
AS-19-A03 Wellhead Pressure (PSIG)	13
AS-19-A04 Wellhead Pressure (PSIG)	11
AS-19-A05 Wellhead Pressure (PSIG)	12
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	157478
Electric meter power draw (kW) while compressor is on	6.21
Walked hose corridors and fixed fallen barrels?	No
Listened for leaks/hissing at wellheads?	No

Comments on car parkers and site accessibility:	No issues
Car parking photos if near buildings	
Last fire extinguisher certification date	July 3, 2022
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	No
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 5/6/2023, 12:22:41 PM EDT
Departure Time	13:00

Inspection Date	June 2, 2023
Last Quarterly Event Date	
Arrival Time	13:06
Personnel	Robert Prigge
Weather	80s-90 sunny

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 1
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	2108
PIT-102 (PSIA)	27.5
FQI-101 (SLPM)	299.9
FQI-201 (SLPM)	0
PIT-202 (PSIA)	13.8
FE-301 (LPM)	299
AE-350 (%LEL)	0
PIT-300 (PSIG)	15
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	Yes
Comments	Adjusted time. Need fire extinguisher inspection

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	19196.34
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	Done

Oil sample taken?	No
Number of routine maintenance kits remaining	0
Number of air filters remaining	0
Compressor Audio	1 Audio File
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	210
Motor Current while loading (amps)	14.33
Motor RPMs while loading	1800
VFD thermal state	54
VFD line voltage in (while compressor is loading)	209
Wet receiver tank loading pressure (PI-101)	81
Wet receiver tank unloading pressure (PI-101)	65
How full is the condensate drum? (Gallons)	29
PI-102 (PSIG)	22
PI-103 (PSIG)	20
Trident Desiccant Dryer Pressure (PSIG)	4.5
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	System depressurized to drain filter chambers, PF-102 needle green, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle green, Actuate S-101 to ensure it is working properly, CF-102 needle green, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on, PF-101 drained manually
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	70
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older, use February through August)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	99.01
MFC-101 standardized flow rate on display (SLPM)	300.22
MFC-101 uncorrected flow rate on display (LPM)	156.7
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 2, 2024
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Complete
PI-201 (PSIG)	142
PI-202 (PSIG)	50
MFC-201 temperature (Fahrenheit)	95.67
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.311
PI-300 (PSIG)	12
PI-301 Z1 (PSIG)	12
PI-302 Z2 (PSIG)	13
PI-303 Z3 (PSIG)	0
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	6
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older, use February through August)
Comments	Cleared alarm on AE-350. Reset low level AE-350 on plc

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	11
AS-19-A02 Wellhead Pressure (PSIG)	13
AS-19-A03 Wellhead Pressure (PSIG)	11
AS-19-A04 Wellhead Pressure (PSIG)	13
AS-19-A05 Wellhead Pressure (PSIG)	11
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0
Drum Photo	
Electric Meter Reading (kWh)	159787
Electric meter power draw (kW) while compressor is on	6.05
Walked hose corridors and fixed fallen barrels?	Yes
Listened for leaks/hissing at wellheads?	Yes
Wellhead comments:	
Comments on car parkers and site accessibility:	None
Car parking photos if near buildings	
Last fire extinguisher certification date	July 2, 2022
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	Compressor maintenance parts
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 6/2/2023, 3:15:35 PM EDT
Departure Time	15:15

Inspection Date	July 10, 2023
Last Quarterly Event Date	
Arrival Time	14:28
Personnel	Robert Prigge
Weather	90 sunny

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 2
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	21.7
PIT-102 (PSIA)	26.7
FQI-101 (SLPM)	299.9
FQI-201 (SLPM)	0
PIT-202 (PSIA)	13.8
FE-301 (LPM)	2.99
AE-350 (%LEL)	0.1
PIT-300 (PSIG)	14.2
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	Yes
Comments	

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	19887.28
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	Done

Oil sample taken?	No
Number of routine maintenance kits remaining	0
Number of air filters remaining	0
Compressor Audio	2 Audio Files
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	209
Motor Current while loading (amps)	14.4
Motor RPMs while loading	1736
VFD thermal state	61
VFD line voltage in (while compressor is loading)	234.7
Wet receiver tank loading pressure (PI-101)	76
Wet receiver tank unloading pressure (PI-101)	65
How full is the condensate drum? (Gallons)	38
PI-102 (PSIG)	22
PI-103 (PSIG)	20
Trident Desiccant Dryer Pressure (PSIG)	4
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	PF-102 needle green, PF-101 drained manually, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle green, Actuate S-101 to ensure it is working properly, CF-102 needle yellow or red, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	75
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older, use February through August)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	92.17
MFC-101 standardized flow rate on display (SLPM)	300.33
MFC-101 uncorrected flow rate on display (LPM)	160.23
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 10, 2023
Fire Extinguisher Check	
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Not switched. Still lots of propane
PI-201 (PSIG)	140
PI-202 (PSIG)	48
MFC-201 temperature (Fahrenheit)	91.94
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.317
PI-300 (PSIG)	11
PI-301 Z1 (PSIG)	11
PI-302 Z2 (PSIG)	12
PI-303 Z3 (PSIG)	13
Monthly XP Instrumentation Checks	Zone solenoids actuating properly, Propane pressure switch set to 85PSI, LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	-0.2
AE-350 reading during propane sparge cycle	7.5
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older, use February through August)
Comments	

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	12
AS-19-A02 Wellhead Pressure (PSIG)	13
AS-19-A03 Wellhead Pressure (PSIG)	12
AS-19-A04 Wellhead Pressure (PSIG)	12
AS-19-A05 Wellhead Pressure (PSIG)	14
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	162642
Electric meter power draw (kW) while compressor is on	5.58
Walked hose corridors and fixed fallen barrels?	Yes
Listened for leaks/hissing at wellheads?	Yes

Wellhead comments:	
Comments on car parkers and site accessibility:	Ok

Car parking photos if near buildings

Last fire extinguisher certification date	July 10, 2023
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	Maintenance for compressor
Comments, questions, ruminations, suggestions for improvement?	

Signature	 Signed 7/10/2023, 3:27:31 PM EDT
Departure Time	15:40

Inspection Date	August 4, 2023
Last Quarterly Event Date	
Arrival Time	12:30
Personnel	Robert Prigge
Weather	80 sunny

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Rest
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	28.8
PIT-102 (PSIA)	13.8
FQI-101 (SLPM)	-0.1
FQI-201 (SLPM)	0
PIT-202 (PSIA)	13.5
FE-301 (LPM)	-0.1
AE-350 (%LEL)	0.1
PIT-300 (PSIG)	0.8
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	No
Comments	

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	20328.7
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	Done

Oil sample taken?	No
Number of routine maintenance kits remaining	0
Number of air filters remaining	0
Compressor Audio	1 Audio File
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	208
Motor Current while loading (amps)	14.55
Motor RPMs while loading	1800
VFD thermal state	42
VFD line voltage in (while compressor is loading)	316
Wet receiver tank loading pressure (PI-101)	78
Wet receiver tank unloading pressure (PI-101)	66
How full is the condensate drum? (Gallons)	1
PI-102 (PSIG)	30
PI-103 (PSIG)	26
Trident Desiccant Dryer Pressure (PSIG)	5
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	System depressurized to drain filter chambers, PF-101 drained manually, PF-102 needle green, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle green, Actuate S-101 to ensure it is working properly, CF-102 needle green, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	70
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older, use February through August)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	95.65
MFC-101 standardized flow rate on display (SLPM)	300.88
MFC-101 uncorrected flow rate on display (LPM)	162.44
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 4, 2024
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation, Need inspection
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Complete
PI-201 (PSIG)	155
PI-202 (PSIG)	50
MFC-201 temperature (Fahrenheit)	89.33
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.314
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.314
PI-300 (PSIG)	10
PI-301 Z1 (PSIG)	12
PI-302 Z2 (PSIG)	10
PI-303 Z3 (PSIG)	12
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	8
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older, use February through August)
Comments	

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	11
AS-19-A02 Wellhead Pressure (PSIG)	12
AS-19-A03 Wellhead Pressure (PSIG)	11
AS-19-A04 Wellhead Pressure (PSIG)	12
AS-19-A05 Wellhead Pressure (PSIG)	11
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	164407
Electric meter power draw (kW) while compressor is on	5.41
Walked hose corridors and fixed fallen barrels?	Yes
Listened for leaks/hissing at wellheads?	Yes

Wellhead comments:	
Comments on car parkers and site accessibility:	No cars is vaginitis
Car parking photos if near buildings	
Last fire extinguisher certification date	July 4, 2023
Quarterly Building Maintenance Tasks	

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 8/4/2023, 2:58:25 PM EDT
Departure Time	15:20

Inspection Date	September 14, 2023
Last Quarterly Event Date	
Arrival Time	13:39
Personnel	Robert Prigge
Weather	60s sunny

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 1
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	21.6
PIT-102 (PSIA)	27.3
FQI-101 (SLPM)	299.9
FQI-201 (SLPM)	0
PIT-202 (PSIA)	14.6
FE-301 (LPM)	300
AE-350 (%LEL)	0.1
PIT-300 (PSIG)	14.6
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	No
Comments	

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation, New Fire extinguisher installed
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	21022
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	Change the intake filter, Clean the oil filter and replace O-rings, Clean oil return valves with non-flammable solvent and replace O-rings, Change the oil (Q1 and Q3). Use only Mattei Rotoroil 8000F2

Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	Done
Oil sample taken?	No
Number of routine maintenance kits remaining	1
Number of air filters remaining	0
Compressor Audio	1 Audio File
Do we need more compressor oil? (Less than a gallon remaining)	Yes
Motor voltage while loading	235.1
Motor Current while loading (amps)	14.45
Motor RPMs while loading	1787
VFD thermal state	37
VFD line voltage in (while compressor is loading)	322.1
Wet receiver tank loading pressure (PI-101)	65
Wet receiver tank unloading pressure (PI-101)	77
How full is the condensate drum? (Gallons)	14
PI-102 (PSIG)	22
PI-103 (PSIG)	22
Trident Desiccant Dryer Pressure (PSIG)	4.5
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	PF-101 drained manually, PF-102 needle green, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle green, Actuate S-101 to ensure it is working properly, CF-102 needle green, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	Check and clean PF-101, Open desiccant dryer towers, take picture, note condition in the comments (Q2 and Q4)
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	65
Which compressed air Alicat is in use (upon leaving system)?	MFC-101A (older, use February through August)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	74.59
MFC-101 standardized flow rate on display (SLPM)	300.1
MFC-101 uncorrected flow rate on display (LPM)	152.6
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 14, 2024
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation, New fire extinguisher installed
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Not yet swapped
PI-201 (PSIG)	120
PI-202 (PSIG)	45
MFC-201 temperature (Fahrenheit)	87.15
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.315
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.315
PI-300 (PSIG)	11
PI-301 Z1 (PSIG)	11
PI-302 Z2 (PSIG)	12
PI-303 Z3 (PSIG)	12
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	8
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201A (older, use February through August)

Comments	

XP-room photo

Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	13
AS-19-A02 Wellhead Pressure (PSIG)	11
AS-19-A03 Wellhead Pressure (PSIG)	9
AS-19-A04 Wellhead Pressure (PSIG)	10
AS-19-A05 Wellhead Pressure (PSIG)	12
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	166984
Electric meter power draw (kW) while compressor is on	5.38
Walked hose corridors and fixed fallen barrels?	Yes

Listened for leaks/hissing at wellheads?	Yes
Wellhead comments:	
Comments on car parkers and site accessibility:	No issues
Car parking photos if near buildings	
Last fire extinguisher certification date	September 14, 2023
Quarterly Building Maintenance Tasks	Wipe down system components to cut down on general grime, Remove trash from the system building, Tidy up system and notify TM of unneeded sampling equipment, Take used compressor oil to Advanced Auto Parts for recycling if there is a full container of used oil

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	Spare compressor filters
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 9/14/2023, 2:35:09 PM EDT
Departure Time	14:45

Inspection Date	November 1, 2023
Last Quarterly Event Date	
Arrival Time	13:02
Personnel	Robert Prigge
Weather	30s cloudy

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 1
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	21.5
PIT-102 (PSIA)	27.5
FQI-101 (SLPM)	300
FQI-201 (SLPM)	0
PIT-202 (PSIA)	14.1
FE-301 (LPM)	299.9
AE-350 (%LEL)	0.1
PIT-300 (PSIG)	14.5
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Verified
XP fan set to AUTO?	Yes
UPS enabled?	No
Comments	

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	21758.6
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	Done

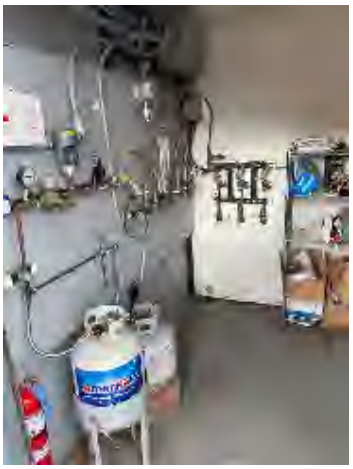
Oil sample taken?	No
Number of routine maintenance kits remaining	1
Number of air filters remaining	1
Compressor Audio	
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	208
Motor Current while loading (amps)	14.71
Motor RPMs while loading	1734
VFD thermal state	28
VFD line voltage in (while compressor is loading)	237.9
Wet receiver tank loading pressure (PI-101)	67
Wet receiver tank unloading pressure (PI-101)	78
How full is the condensate drum? (Gallons)	19
PI-102 (PSIG)	20
PI-103 (PSIG)	22
Trident Desiccant Dryer Pressure (PSIG)	4.5
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	System depressurized to drain filter chambers, PF-101 drained manually, PF-102 needle green, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle green, Actuate S-101 to ensure it is working properly, CF-102 needle green, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	
Desiccant Media Replaced?	No
Dried air tank pressure (PSIG)	70
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer, use August through February)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	56.44
MFC-101 standardized flow rate on display (SLPM)	300
MFC-101 uncorrected flow rate on display (LPM)	145
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	September 1, 2023
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Complete
PI-201 (PSIG)	85
PI-202 (PSIG)	50
MFC-201 temperature (Fahrenheit)	82.8
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.343
PI-300 (PSIG)	12
PI-301 Z1 (PSIG)	13
PI-302 Z2 (PSIG)	10
PI-303 Z3 (PSIG)	12
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	0
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer, use August through February)
Comments	

XP-room photo



Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	11
AS-19-A02 Wellhead Pressure (PSIG)	13
AS-19-A03 Wellhead Pressure (PSIG)	8
AS-19-A04 Wellhead Pressure (PSIG)	13
AS-19-A05 Wellhead Pressure (PSIG)	10
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0

Drum Photo

Electric Meter Reading (kWh)	170277
Electric meter power draw (kW) while compressor is on	10.43
Walked hose corridors and fixed fallen barrels?	Yes
Listened for leaks/hissing at wellheads?	Yes

Wellhead comments:	
Comments on car parkers and site accessibility:	No issues
Car parking photos if near buildings	
Last fire extinguisher certification date	September 1, 2023
Quarterly Building Maintenance Tasks	Wipe down system components to cut down on general grime, Remove trash from the system building, Tidy up system and notify TM of unneeded sampling equipment

System building photo

Photos

Videos	
Any equipment that needs to be ordered?	Security light
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 11/1/2023, 3:06:25 PM EDT
Departure Time	15:15

Inspection Date	December 8, 2023
Last Quarterly Event Date	
Arrival Time	00:10
Personnel	Robert Prigge
Weather	40s Sunny

HMI and Control Panel

HMI display functioning (not frozen)?	Yes
Current zone	Zone 1
Compressed air setpoint (LPM)	300
Propane setpoint (LPM)	0.6
PIT-101 (PSIG)	21.6
PIT-102 (PSIA)	27.7
FQI-101 (SLPM)	301.7
FQI-201 (SLPM)	0.6
PIT-202 (PSIA)	25
FE-301 (LPM)	299.9
AE-350 (%LEL)	0.1
PIT-300 (PSIG)	15.1
Ensure the time on the HMI is accurate to the minute, adjust if necessary	Adjusted for daylights savings
XP fan set to AUTO?	Yes
UPS enabled?	No
Comments	

Non-classified Room

Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater set to turn on and operation verified?	Yes
Room fan set to turn on and operation verified?	Yes
Compressor operating hours	22285.3
Biweekly Compressor Maintenance	Clean the intake filter with compressed air, Clean the aftercooler with compressed air, Open and check the condensate drain, clean if necessary, Check oil levels while the compressor is turned off - oil should be at the end of the plug threads. Top off if necessary, Listen for the wet receiver tank auto-drain to turn on to confirm it is working
Quarterly Compressor Maintenance	Change the intake filter, Clean oil return valves with non-flammable solvent and replace O-rings, Clean the oil filter and replace O-rings, Added oil 12/6/23

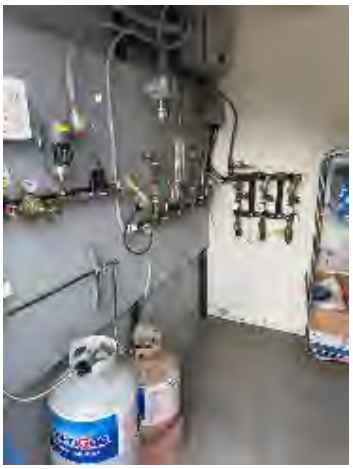
Fill out the Mattei Compressor Oil Change and Sample Tracking form on Teams	Done
Oil sample taken?	No
Number of routine maintenance kits remaining	1
Number of air filters remaining	0
Compressor Audio	2 Audio Files
Do we need more compressor oil? (Less than a gallon remaining)	No
Motor voltage while loading	230.1
Motor Current while loading (amps)	7.08
Motor RPMs while loading	1734
VFD thermal state	39
VFD line voltage in (while compressor is loading)	222
Wet receiver tank loading pressure (PI-101)	65
Wet receiver tank unloading pressure (PI-101)	82
How full is the condensate drum? (Gallons)	19
PI-102 (PSIG)	21
PI-103 (PSIG)	1
Trident Desiccant Dryer Pressure (PSIG)	4
Are the trident desiccant dryer meters green?	Yes
Biweekly Non-XP Instrument Maintenance	PF-101 drained manually, PF-102 needle green, Verify the desiccant dryer is cycling properly, Verify the silencers on the desiccant dryer are not clogged, PF-103 needle green, Actuate S-101 to ensure it is working properly, CF-102 needle green, Make sure there are no tripped breakers in the breaker panel, Breaker panel surge protector green light on
Quarterly Filter Maintenance	
Desiccant Media Replaced?	
Dried air tank pressure (PSIG)	70
Which compressed air Alicat is in use (upon leaving system)?	MFC-101B (newer, use August through February)
Verify MFC-101 flow rate	Complete
MFC-101 temperature (Fahrenheit)	66.52
MFC-101 standardized flow rate on display (SLPM)	298.5
MFC-101 uncorrected flow rate on display (LPM)	14601
Comments	

Non-XP room photo

Classified Room

First Aid Kit Expiration Date	July 8, 2024
Fire Extinguisher Check	Needle in the green, All moving parts appear intact, No deformation
Heater turned on and verified to be operating?	Yes
Fan turned on and verified to be operating?	Yes
Swap out the propane tanks	Complete
PI-201 (PSIG)	90
PI-202 (PSIG)	45
MFC-201 temperature (Fahrenheit)	75.92
MFC-201 standard flow rate on alicat display during propane cycle (SLPM)	0.6
MFC-201 uncorrected flow rate on alicat display during propane cycle (LPM)	0.338
PI-300 (PSIG)	14
PI-301 Z1 (PSIG)	12
PI-302 Z2 (PSIG)	10
PI-303 Z3 (PSIG)	12
Monthly XP Instrumentation Checks	Propane pressure switch set to 85PSI, Zone solenoids actuating properly, Manual flow meter checked against alicat flow rate (divide LPM by 28 for SCFM), LEL vent line flow set between 1 and 3 LPM
AE-401 Reading	0
AE-350 reading during propane sparge cycle	0
Quarterly LEL Meter Calibration	
Which propane Alicat is in use (upon leaving system)?	MFC-201B (newer, use August through February)
Comments	

XP-room photo



Outdoors and General

AS-19-A01 Wellhead Pressure (PSIG)	11
AS-19-A02 Wellhead Pressure (PSIG)	13
AS-19-A03 Wellhead Pressure (PSIG)	8
AS-19-A04 Wellhead Pressure (PSIG)	13
AS-19-A05 Wellhead Pressure (PSIG)	10
AS-19-A06 Wellhead Pressure (PSIG)	0
AS-19-A07 Wellhead Pressure (PSIG)	0
Number of condensate drums outside	0
Drum Photo	
Electric Meter Reading (kWh)	175013
Electric meter power draw (kW) while compressor is on	10.19
Walked hose corridors and fixed fallen barrels?	Yes
Listened for leaks/hissing at wellheads?	Yes
Wellhead comments:	
Comments on car parkers and site accessibility:	No cars
Car parking photos if near buildings	
Last fire extinguisher certification date	
Quarterly Building Maintenance Tasks	

System building photo

Photos

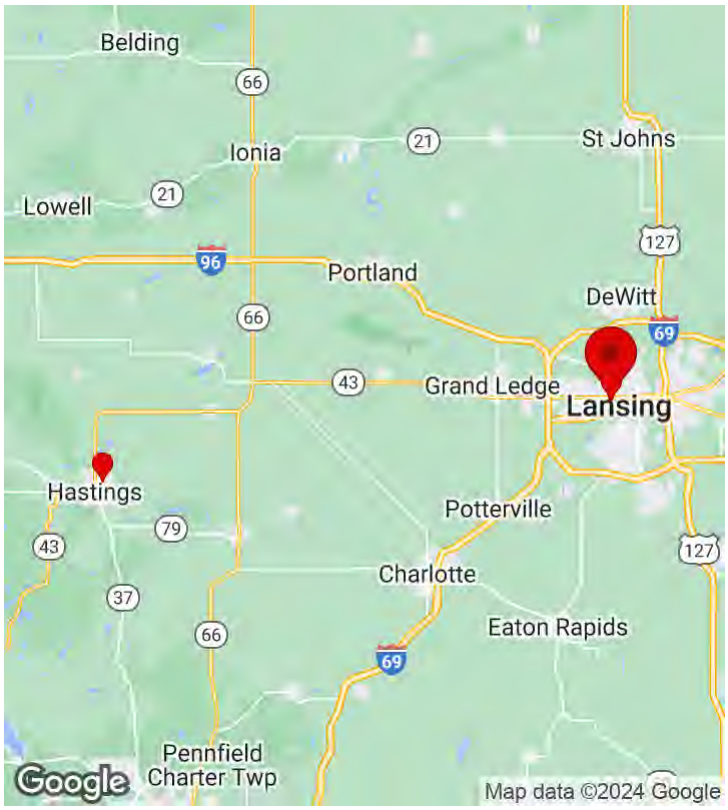
Videos	
Any equipment that needs to be ordered?	
Comments, questions, ruminations, suggestions for improvement?	
Signature	 Signed 12/8/2023, 1:23:09 PM EST
Departure Time	14:50

FieldNow - Daily Field Log (Tier 1)

Daily log for field activities to be used to chronicle your daily activities on site. SME: Ian Drost Developer: Brian Webb Updated 2019-12-23 to include equipment section with calibration details

March 27, 2023, RACER Trust, Nutrient injections , Billy Cobern, RACER Lansing 2023

3/27/2023, 10:54:07 PM UTC



CREATED

3/27/2023, 1:34:39 PM UTC
by Billy Cobern

UPDATED

3/27/2023, 10:54:07 PM UTC
by Billy Cobern

STATUS

QC Complete

LOCATION

42.737722, -84.583415

ASSIGNED TO

Billy Cobern

Have you read the Quality Procedure (QP) and/or Technical Guidance Instruction (TGI) relevant to this use case?	Yes
Selecting "Yes" confirms your digital signature as having read the QP and/or TGI relevant to this use case.	

Basic Information

Select Project Number	30171056, RACER Trust, RACER Lansing 2023
Project Name	RACER Lansing 2023
Project Number	30171056
Client	RACER Trust
Date	March 27, 2023
Completed By	Billy Cobern
Purpose	Nutrient injections
Weather	Cloudy, windy, rain early, 30's-40's
PPE	Level D

Daily Log of Activities

Notes (7 Items)

Notes - 1. 06:30, Field work preparation: Complete COVID assessment, complete vehicle inspection, load vehicle

Time	06:30
Description of Task	Field work preparation: Complete COVID assessment, complete vehicle inspection, load vehicle

Notes - 2. 07:00, Depart office

Time	07:00
Description of Task	Depart office

Notes - 3. 08:05, Arrive on site

Time	08:05
Description of Task	Arrive on site

Notes - 4. 08:15, Prepare Tailgate Safety

Time	08:15
Description of Task	Prepare Tailgate Safety

Notes - 5. 08:30, Anyssa on site

Time	08:30
Description of Task	Anyssa on site

Notes - 6. 17:00, Depart site

Time	17:00
Description of Task	Depart site

Notes - 7. 18:00, Arrive at office

Time	18:00
Description of Task	Arrive at office

Equipment & Calibration Information

Are you using equipment?	No
List of Equipment Used	

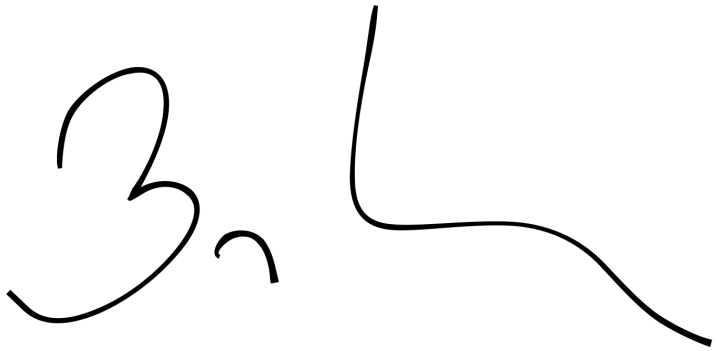
Waste Management

Are there any waste drums on site?	No
Did you drum any waste today?	No
General Waste Comments	
For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)	

COC Photos

Photos

Other Photos

Signature	 Signed 3/27/2023, 1:37:36 PM UTC
Have you performed work in accordance with the applicable QP/TGI?	Yes

FieldNow - Daily Field Log (Tier 1)

Daily log for field activities to be used to chronicle your daily activities on site. SME: Ian Drost Developer: Brian Webb Updated 2019-12-23 to include equipment section with calibration details

March 28, 2023, RACER Trust, Nutrient injections , Billy Cobern, RACER Lansing 2023

3/28/2023, 7:53:13 PM UTC

CREATED

3/28/2023, 12:02:02 PM UTC
by Billy Cobern

UPDATED

3/28/2023, 7:53:13 PM UTC
by Billy Cobern

STATUS

QC Complete

LOCATION

42.737722, -84.583415

ASSIGNED TO

Billy Cobern

Have you read the Quality Procedure (QP) and/or Technical Guidance Instruction (TGI) relevant to this use case?	Yes
Selecting "Yes" confirms your digital signature as having read the QP and/or TGI relevant to this use case.	

Basic Information

Select Project Number	30171056, RACER Trust, RACER Lansing 2023
Project Name	RACER Lansing 2023
Project Number	30171056
Client	RACER Trust
Date	March 28, 2023
Completed By	Billy Cobern
Purpose	Nutrient injections
Weather	Partly cloudy, 20’s-40’s
PPE	Level D

Daily Log of Activities

Notes (8 Items)

Notes - 1. 06:45, Field work preparation: Complete COVID assessment, complete vehicle inspection, load vehicle

Time	06:45
Description of Task	Field work preparation: Complete COVID assessment, complete vehicle inspection, load vehicle

Notes - 2. 07:00, Depart office

Time	07:00
Description of Task	Depart office

Notes - 3. 07:55, Arrive on site

Time	07:55
Description of Task	Arrive on site

Notes - 4. 08:00, Prepare Tailgate Safety, Anyssa on site

Time	08:00
Description of Task	Prepare Tailgate Safety, Anyssa on site

Notes - 5. 12:30, Depart site

Time	12:30
Description of Task	Depart site

Notes - 6. 12:45, Arrived at GeoTech

Time	12:45
Description of Task	Arrived at GeoTech

Notes - 7. 14:00, Arrive at office

Time	14:00
Description of Task	Arrive at office

Notes - 8. 14:15, Vehicle unloaded

Time	14:15
Description of Task	Vehicle unloaded

Equipment & Calibration Information

Are you using equipment?	No
List of Equipment Used	

Waste Management

Are there any waste drums on site?	No
Did you drum any waste today?	No
General Waste Comments	
For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)	

COC Photos

Photos

Other Photos

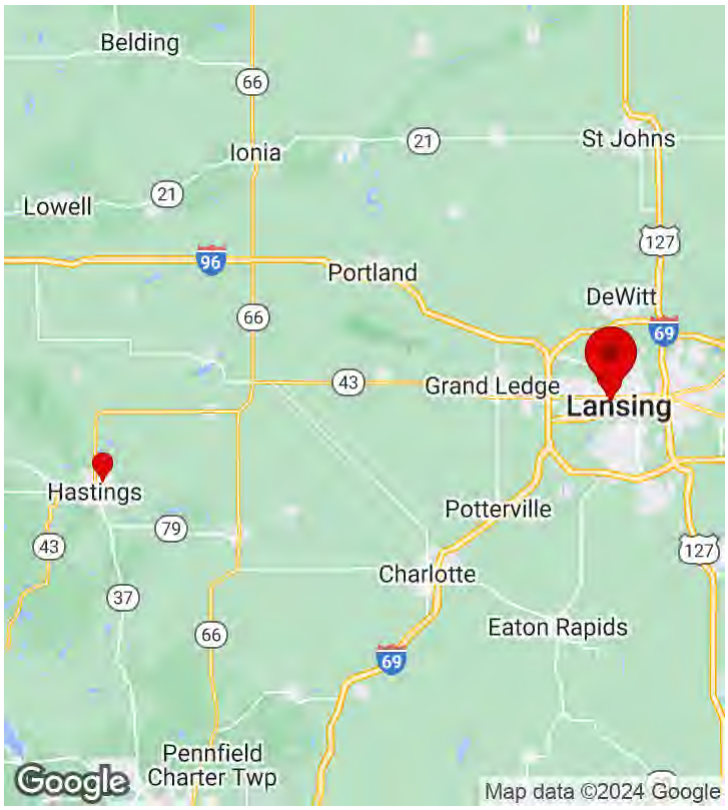
Signature	
Have you performed work in accordance with the applicable QP/TGI?	Yes

FieldNow - Daily Field Log (Tier 1)

Daily log for field activities to be used to chronicle your daily activities on site. SME: Ian Drost Developer: Brian Webb Updated 2019-12-23 to include equipment section with calibration details

September 26, 2023, RACER Trust, Nutrient injections , Billy Cobern, RACER Lansing 2023

9/27/2023, 10:00:19 AM UTC



CREATED

9/26/2023, 11:48:06 AM UTC
by Billy Cobern

UPDATED

9/27/2023, 10:00:19 AM UTC
by Billy Cobern

STATUS

QC Complete

LOCATION

42.737719, -84.583508

ASSIGNED TO

Billy Cobern

Have you read the Quality Procedure (QP) and/or Technical Guidance Instruction (TGI) relevant to this use case?	Yes
Selecting "Yes" confirms your digital signature as having read the QP and/or TGI relevant to this use case.	

Basic Information

Select Project Number	30171056, RACER Trust, RACER Lansing 2023
Project Name	RACER Lansing 2023
Project Number	30171056
Client	RACER Trust
Date	September 26, 2023
Completed By	Billy Cobern
Purpose	Nutrient injections
Weather	Cloudy, rain, 60’s
PPE	Level D

Daily Log of Activities

Notes (22 Items)

Notes - 1. 06:15, Field work preparation: Complete health assessment, complete vehicle inspection, load vehicle

Time	06:15
Description of Task	Field work preparation: Complete health assessment, complete vehicle inspection, load vehicle

Notes - 2. 06:30, Depart office

Time	06:30
Description of Task	Depart office

Notes - 3. 07:30, Arrive on site, check in at Security

Time	07:30
Description of Task	Arrive on site, check in at Security

Notes - 4. 07:45, Tailgate safety completed

Time	07:45
Description of Task	Tailgate safety completed

Notes - 5. 07:50, Begin circulating tank 1

Time	07:50
Description of Task	Begin circulating tank 1

Notes - 6. 07:55, Switch hoses to remaining wells

Time	07:55
Description of Task	Switch hoses to remaining wells

Notes - 7. 08:20, Begin injecting into remaining 5 wells

Time	08:20
Description of Task	Begin injecting into remaining 5 wells

Notes - 8. 08:50, Nutrient injections complete at Plant 2

Time	08:50
Description of Task	Nutrient injections complete at Plant 2

Notes - 9. 09:10, Setting up at Plant 3

Time	09:10
Description of Task	Setting up at Plant 3

Notes - 10. 09:45, Begin injecting into Zone 1 (AS-19-A02, AS-19-A04) @ 8 GPM

Time	09:45
Description of Task	Begin injecting into Zone 1 (AS-19-A02, AS-19-A04) @ 8 GPM

Notes - 11. 10:35, Zone 1 nutrient injections complete. (750 gallons of water and 25 lbs of DAP)

Time	10:35
Description of Task	Zone 1 nutrient injections complete. (750 gallons of water and 25 lbs of DAP)

Notes - 12. 10:40, Begin transferring water from the totes into the injection tanks.

Time	10:40
Description of Task	Begin transferring water from the totes into the injection tanks.

Notes - 13. 11:40, Begin injecting into zone 2(AS-AS-19-A05, AS-19-A03, AS-19-A01)

Time	11:40
Description of Task	Begin injecting into zone 2(AS-AS-19-A05, AS-19-A03, AS-19-A01)

Notes - 14. 13:20, Zone 2 injections completed

Time	13:20
Description of Task	Zone 2 injections completed

Notes - 15. 14:15, Replaced Ali Cats on plant 2

Time	14:15
Description of Task	Replaced Ali Cats on plant 2

Notes - 16. 14:30, Restarted plant 2 system and walked transects

Time	14:30
Description of Task	Restarted plant 2 system and walked transects

Notes - 17. 15:15, Mob to Plant 3

Time	15:15
Description of Task	Mob to Plant 3

Notes - 18. 15:25, Replace Ali Cats and calibrated LELs

Time	15:25
Description of Task	Replace Ali Cats and calibrated LELs

Notes - 19. 16:30, Restarted plant 3 system and walked transects

Time	16:30
Description of Task	Restarted plant 3 system and walked transects

Notes - 20. 16:45, Returned plant 3 system to normal operation

Time	16:45
Description of Task	Returned plant 3 system to normal operation

Notes - 21. 17:15, Depart site

Time	17:15
Description of Task	Depart site

Notes - 22. 18:15, Arrive at office

Time	18:15
Description of Task	Arrive at office

Equipment & Calibration Information

Are you using equipment?	No
List of Equipment Used	

Waste Management

Are there any waste drums on site?	No
Did you drum any waste today?	No
General Waste Comments	
For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)	

COC Photos

Photos

Other Photos

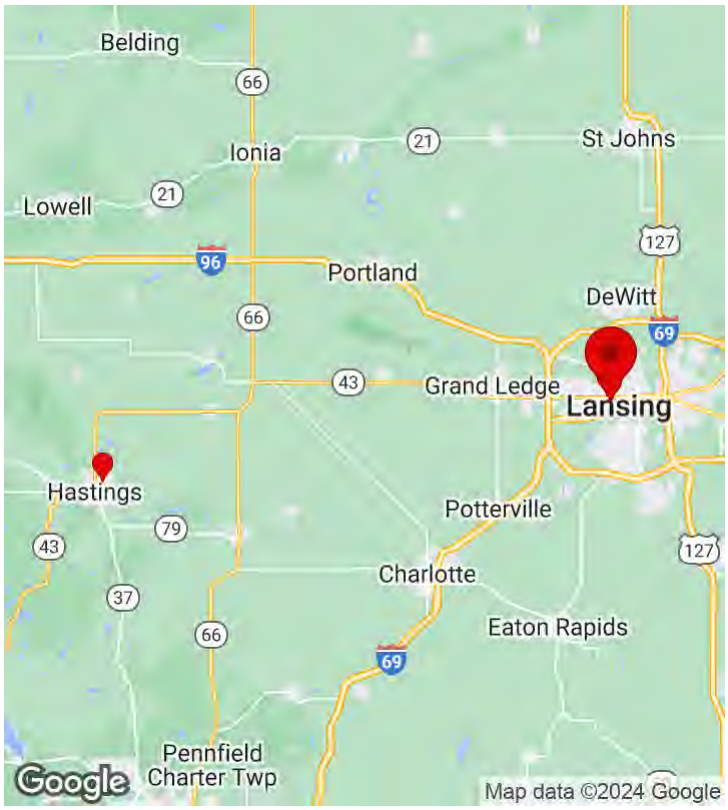
Signature	 Signed 9/26/2023, 11:49:06 AM UTC
Have you performed work in accordance with the applicable QP/TGI?	Yes

FieldNow - Daily Field Log (Tier 1)

Daily log for field activities to be used to chronicle your daily activities on site. SME: Ian Drost Developer: Brian Webb Updated 2019-12-23 to include equipment section with calibration details

September 26, 2023, RACER Trust, Nutrient injections , Billy Cobern, RACER Lansing 2023

9/27/2023, 10:00:19 AM UTC



CREATED

9/26/2023, 11:48:06 AM UTC
by Billy Cobern

UPDATED

9/27/2023, 10:00:19 AM UTC
by Billy Cobern

STATUS

QC Complete

LOCATION

42.737719, -84.583508

ASSIGNED TO

Billy Cobern

Have you read the Quality Procedure (QP) and/or Technical Guidance Instruction (TGI) relevant to this use case?	Yes
Selecting "Yes" confirms your digital signature as having read the QP and/or TGI relevant to this use case.	

Basic Information

Select Project Number	30171056, RACER Trust, RACER Lansing 2023
Project Name	RACER Lansing 2023
Project Number	30171056
Client	RACER Trust
Date	September 26, 2023
Completed By	Billy Cobern
Purpose	Nutrient injections
Weather	Cloudy, rain, 60’s
PPE	Level D

Daily Log of Activities

Notes (22 Items)

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Are there any waste drums on site?	No
Did you drum any waste today?	No
General Waste Comments	
For a more comprehensive drum inventory, please use the Fulcrum app: FieldNow - Waste Log/Inventory (Tier 1)	

COC Photos

Photos

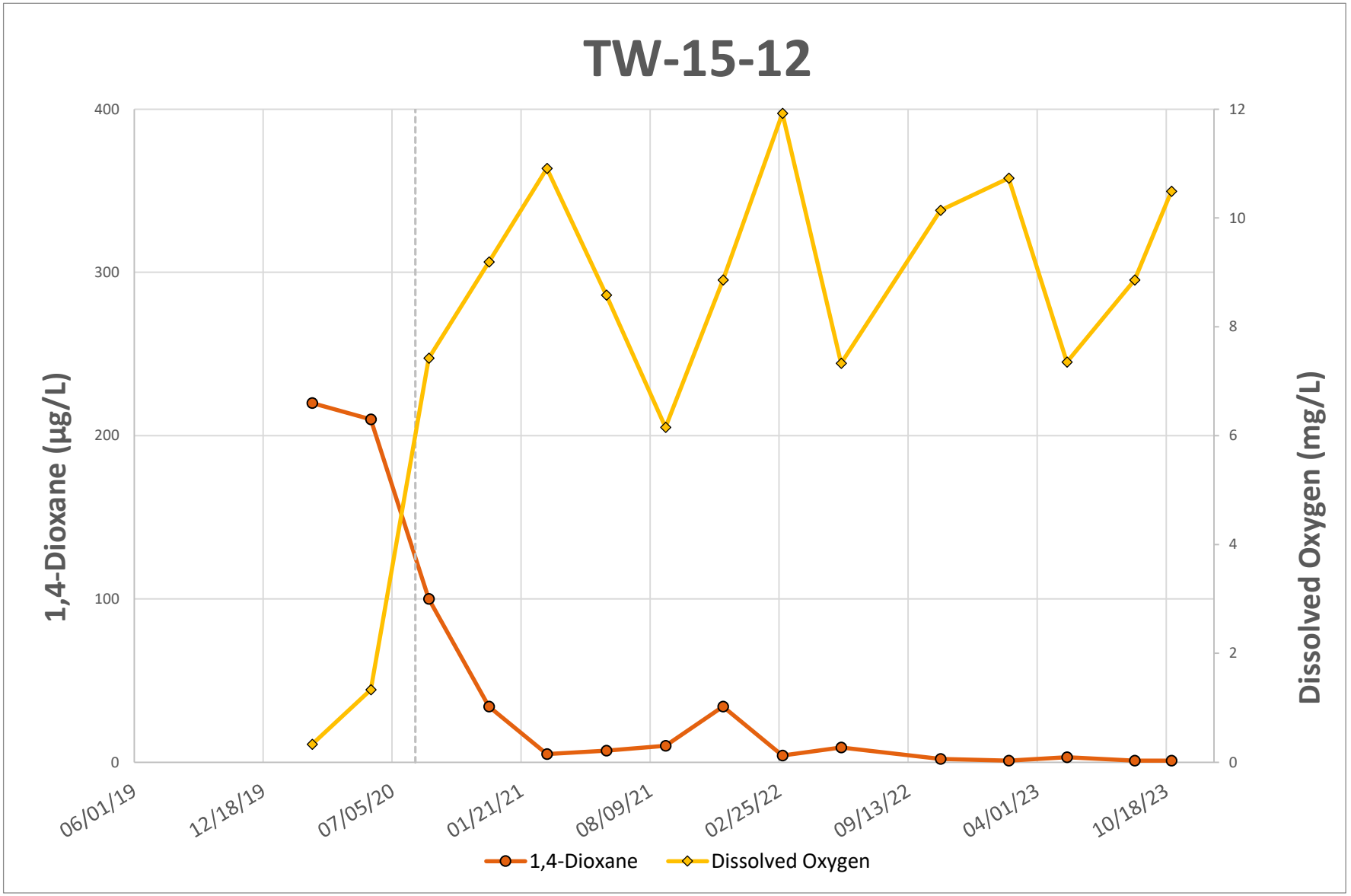
Other Photos

Signature	 Signed 9/26/2023, 11:49:06 AM UTC
Have you performed work in accordance with the applicable QP/TGI?	Yes

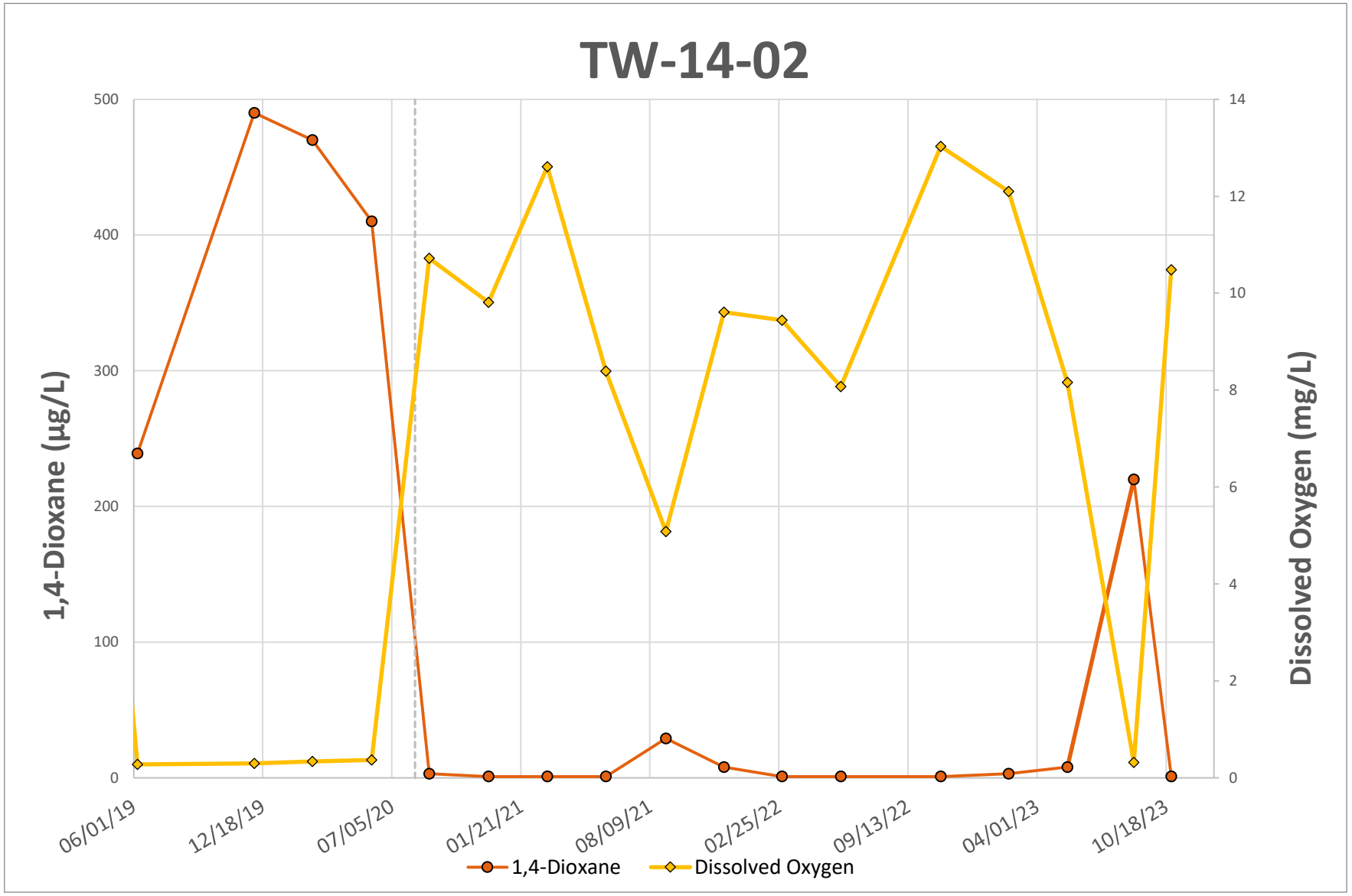
Appendix B

Performance Graphs

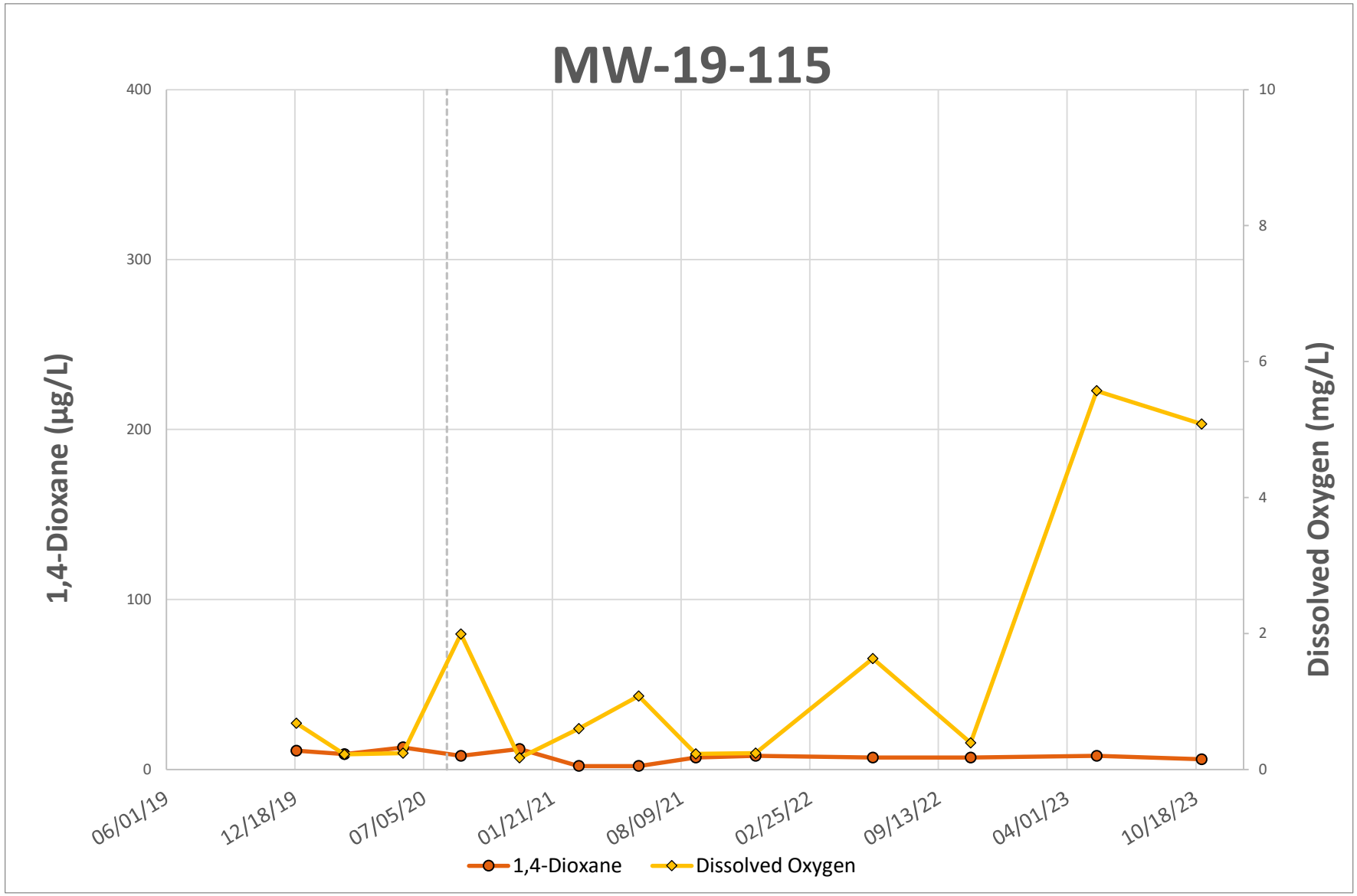
Plant 2 Transect B ROI Well
Performance Graph



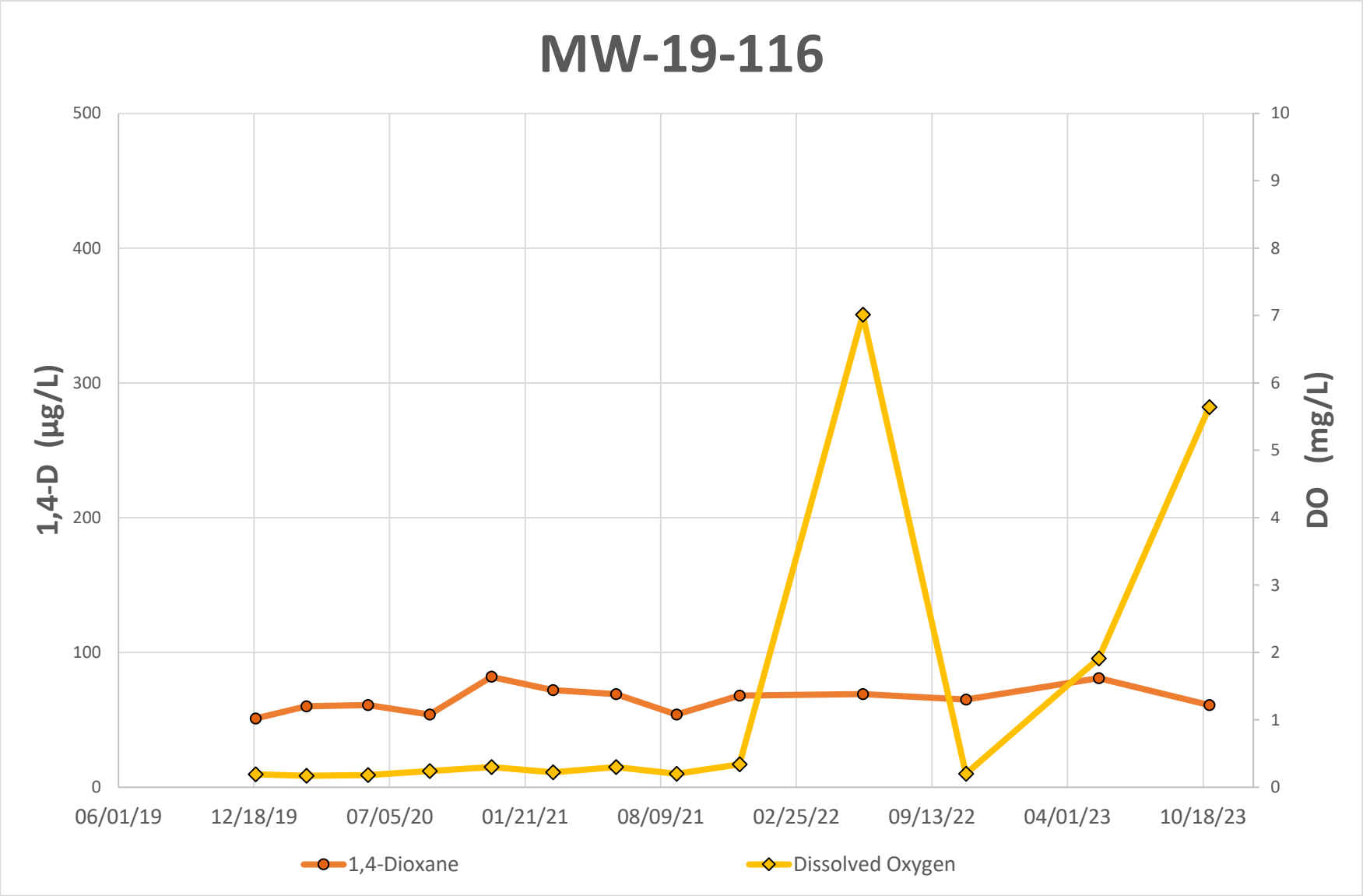
Plant 2 Transect B Downgradient Well 50 ft
Performance Graph



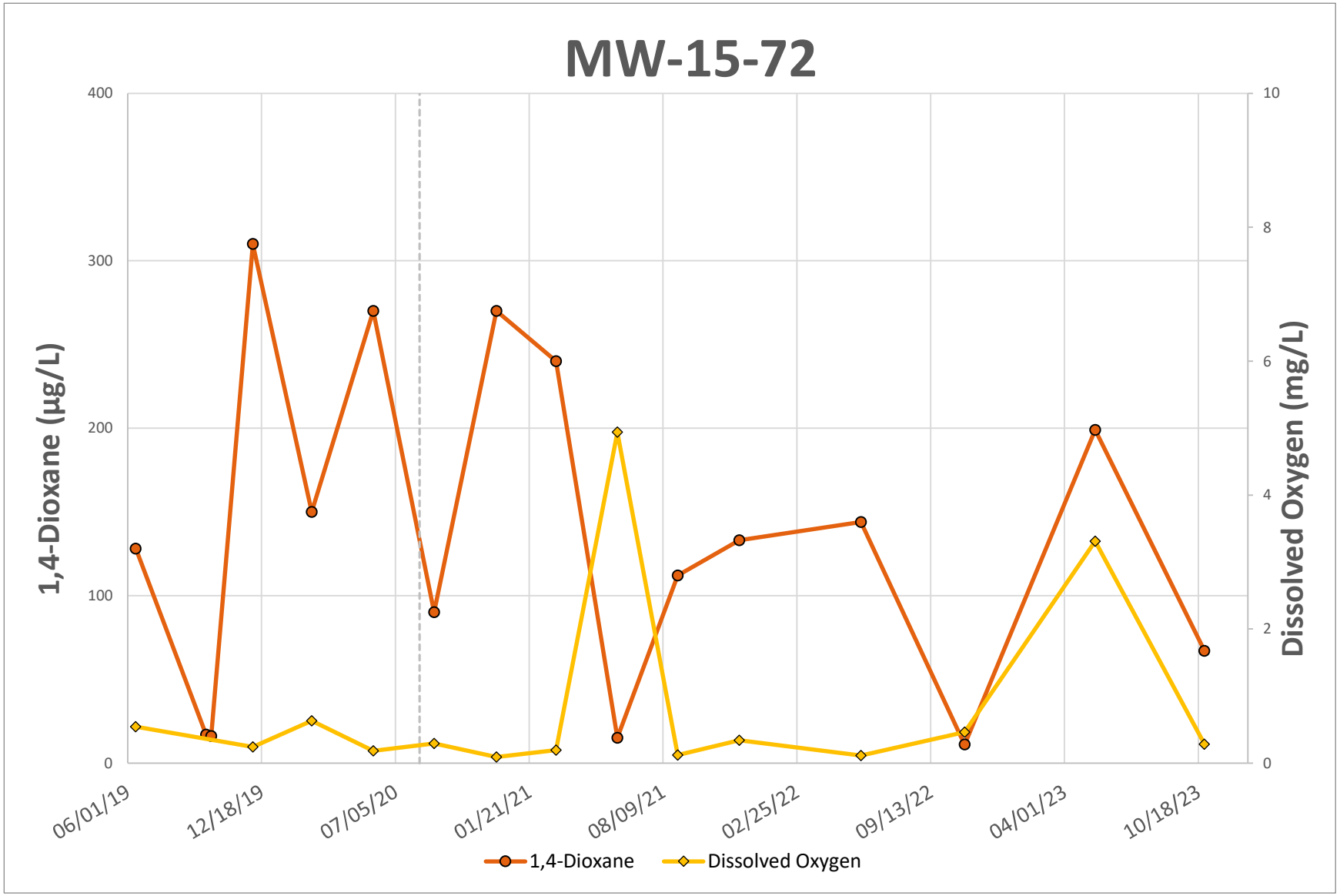
Plant 2 Transect C Monitoring Well
Performance Graph



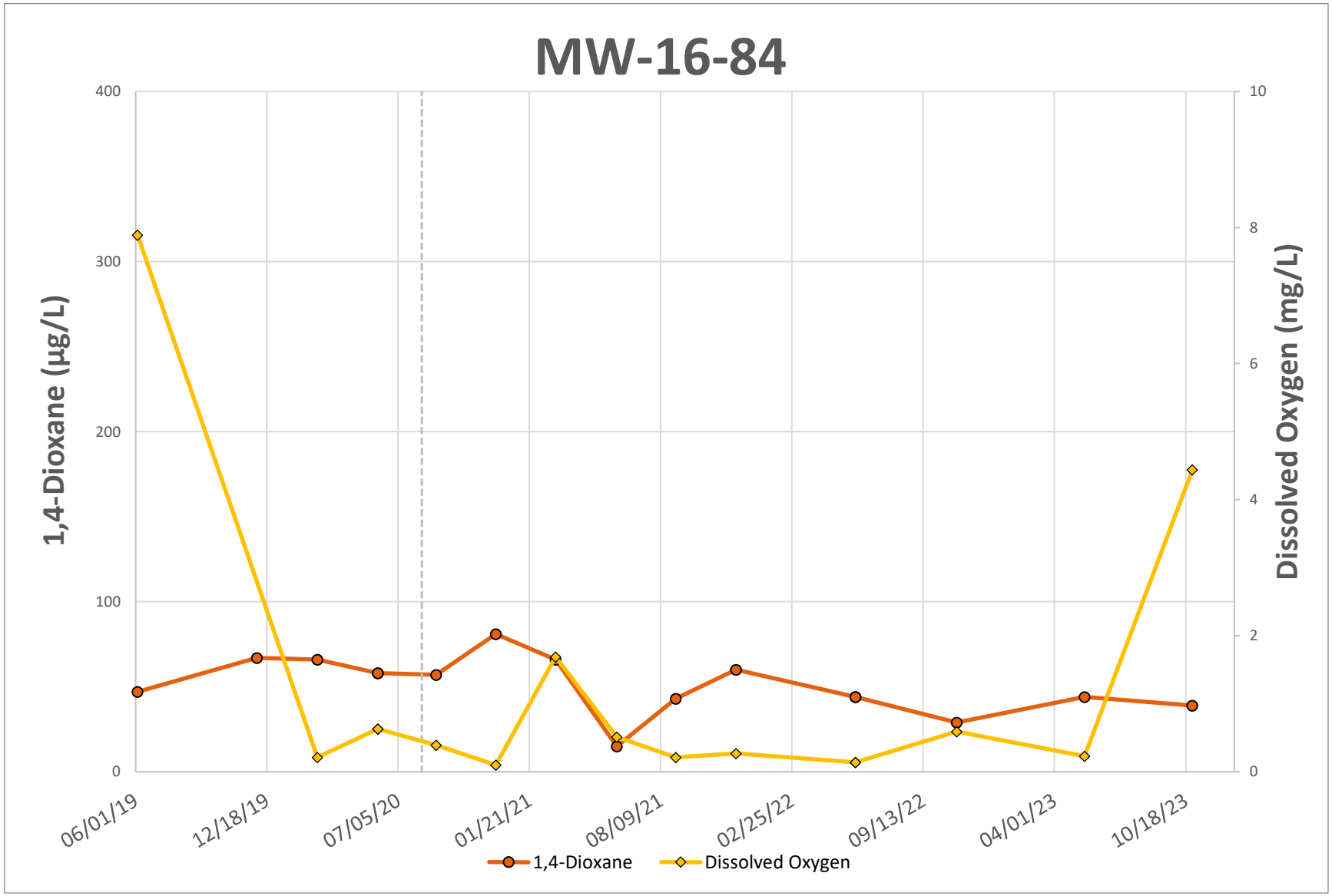
Plant 2 Transect C Monitoring Well
Performance Graph



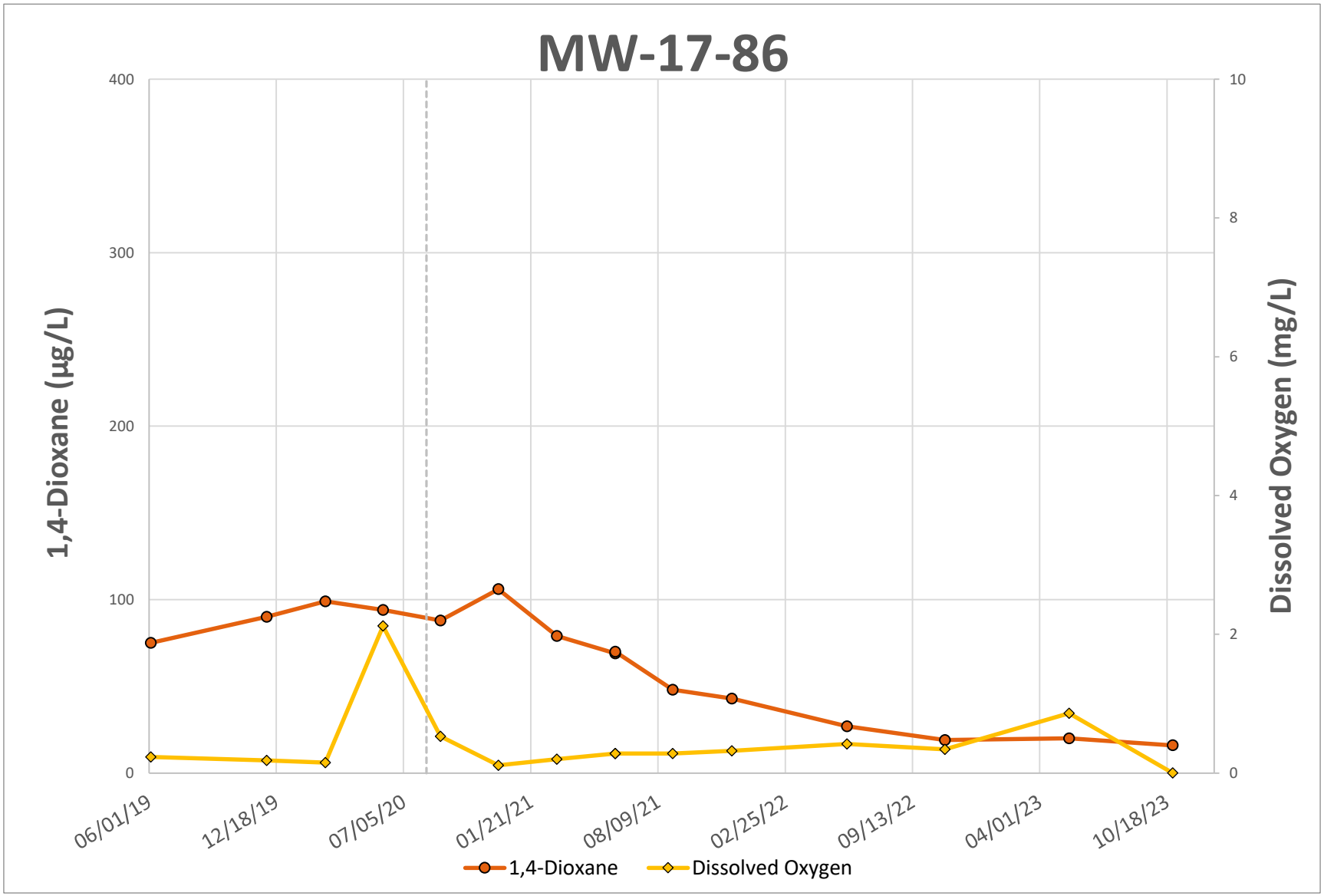
Plant 2 Transect C Monitoring Well
Performance Graph



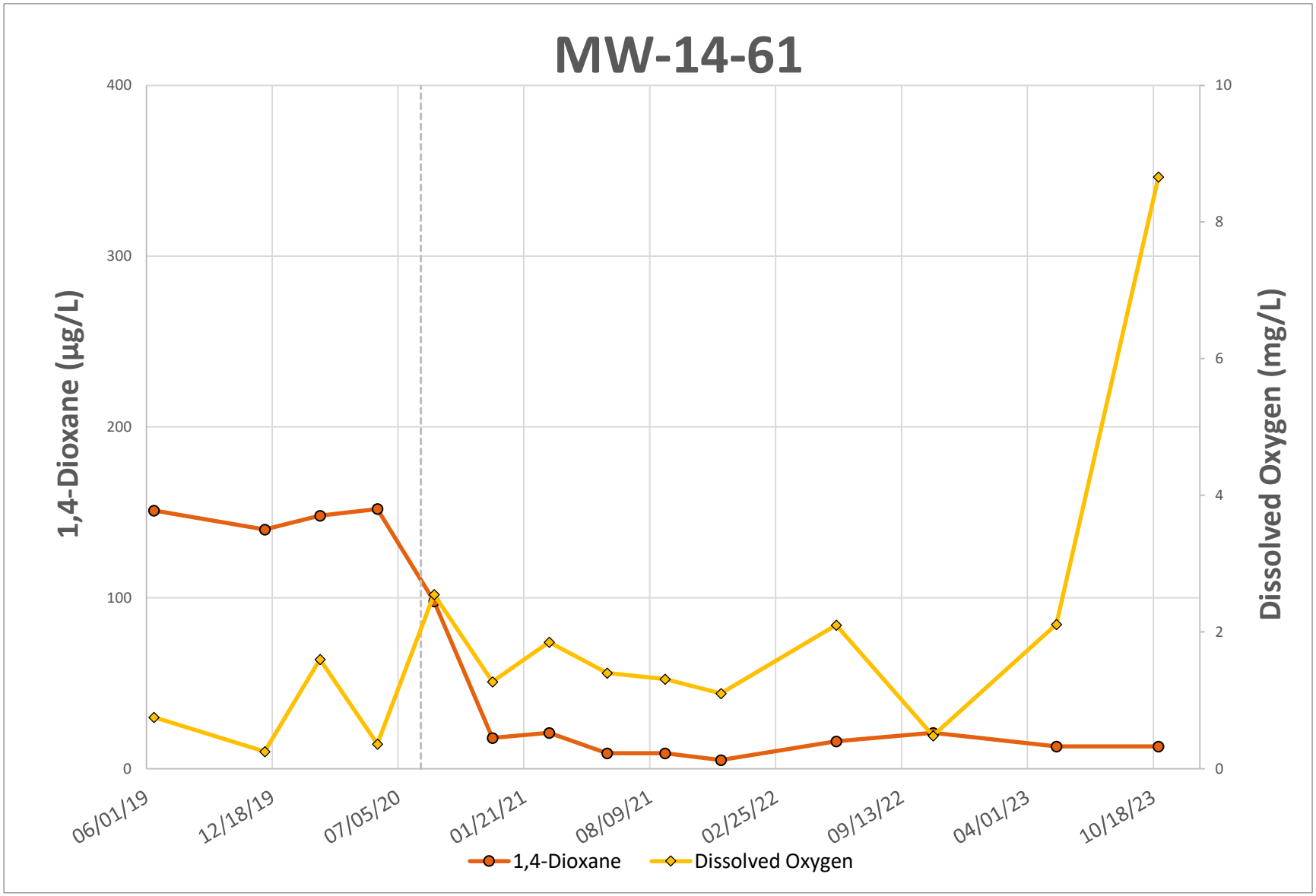
Plant 2 Transect F Downgradient Well 50 ft
Performance Graph



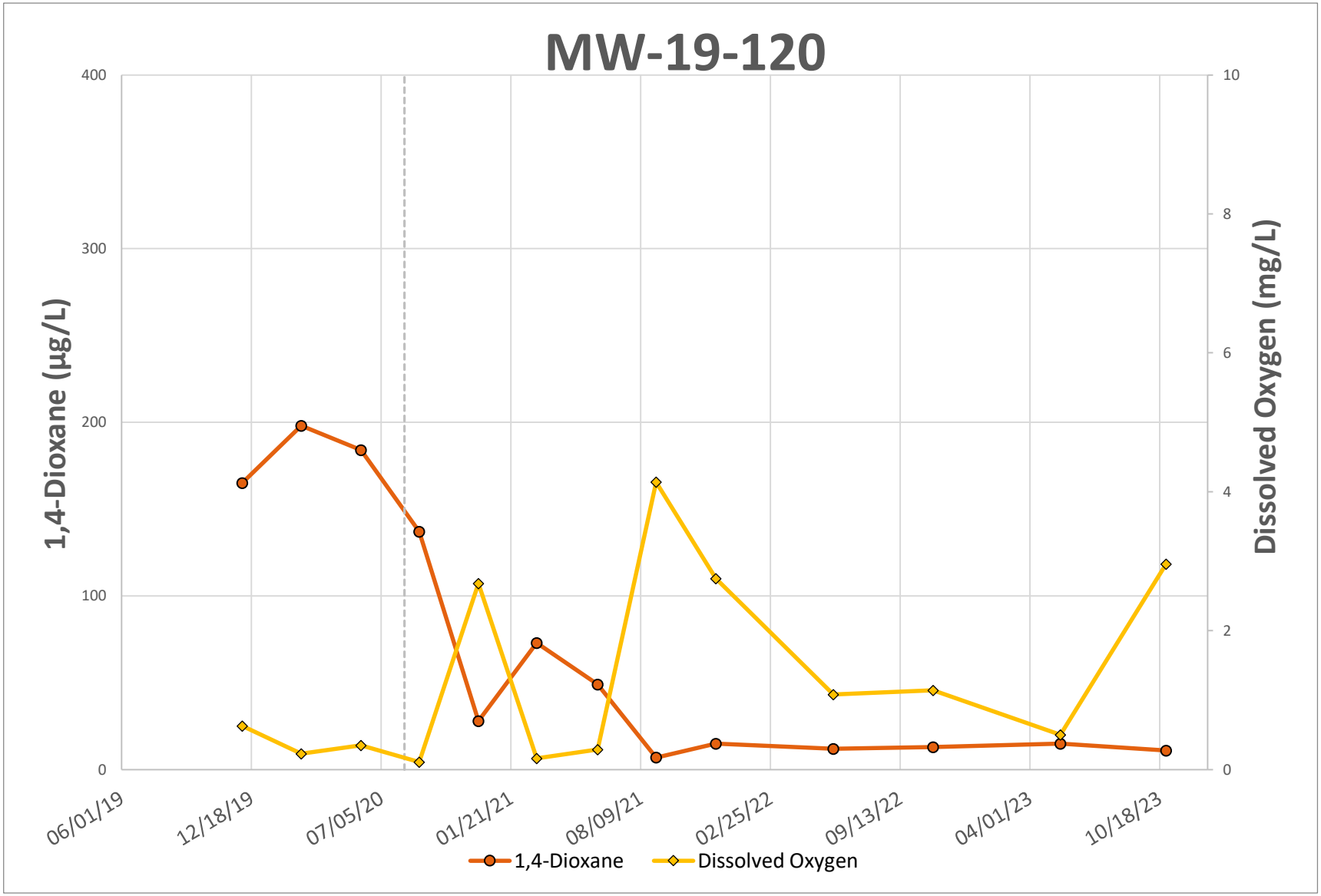
Plant 2 Transect F Downgradient Well 100 ft
Performance Graph



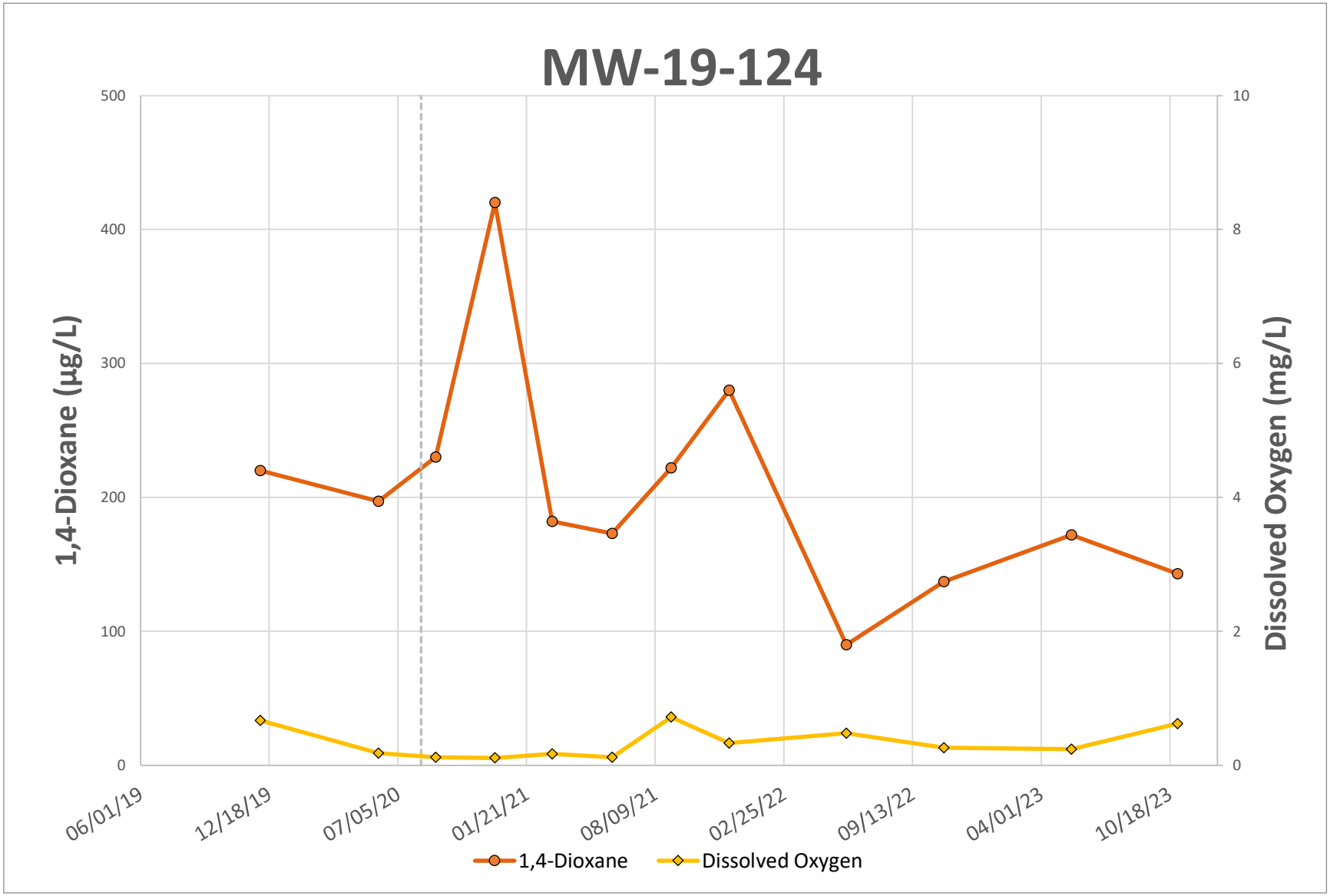
Plant 2 Transect F ROI Well
Performance Graph



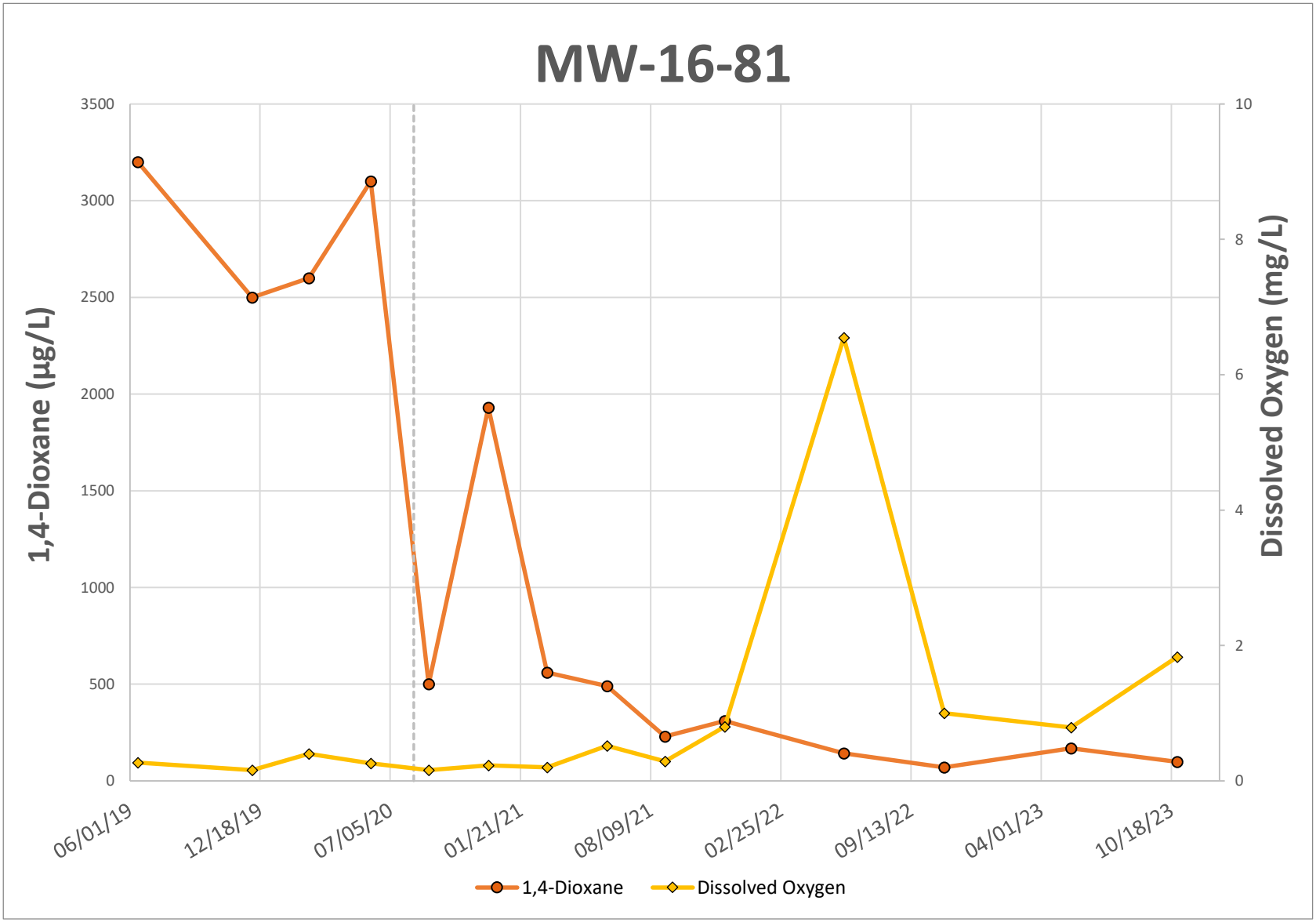
Plant 2 Transect E Downgradient Well 40 ft
Performance Graph



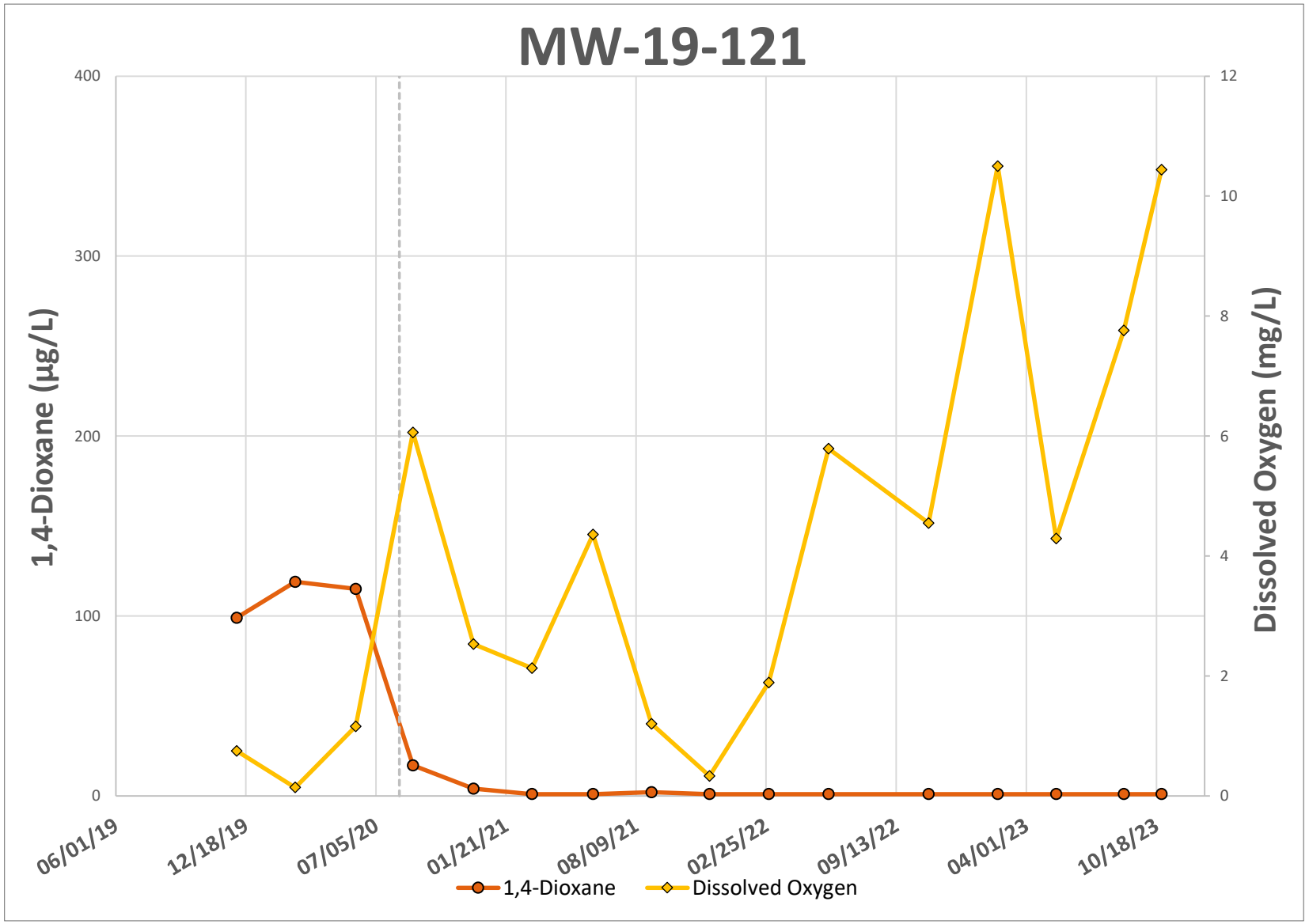
Plant 2 Transect E Upgradient Well 80 ft
Performance Graph



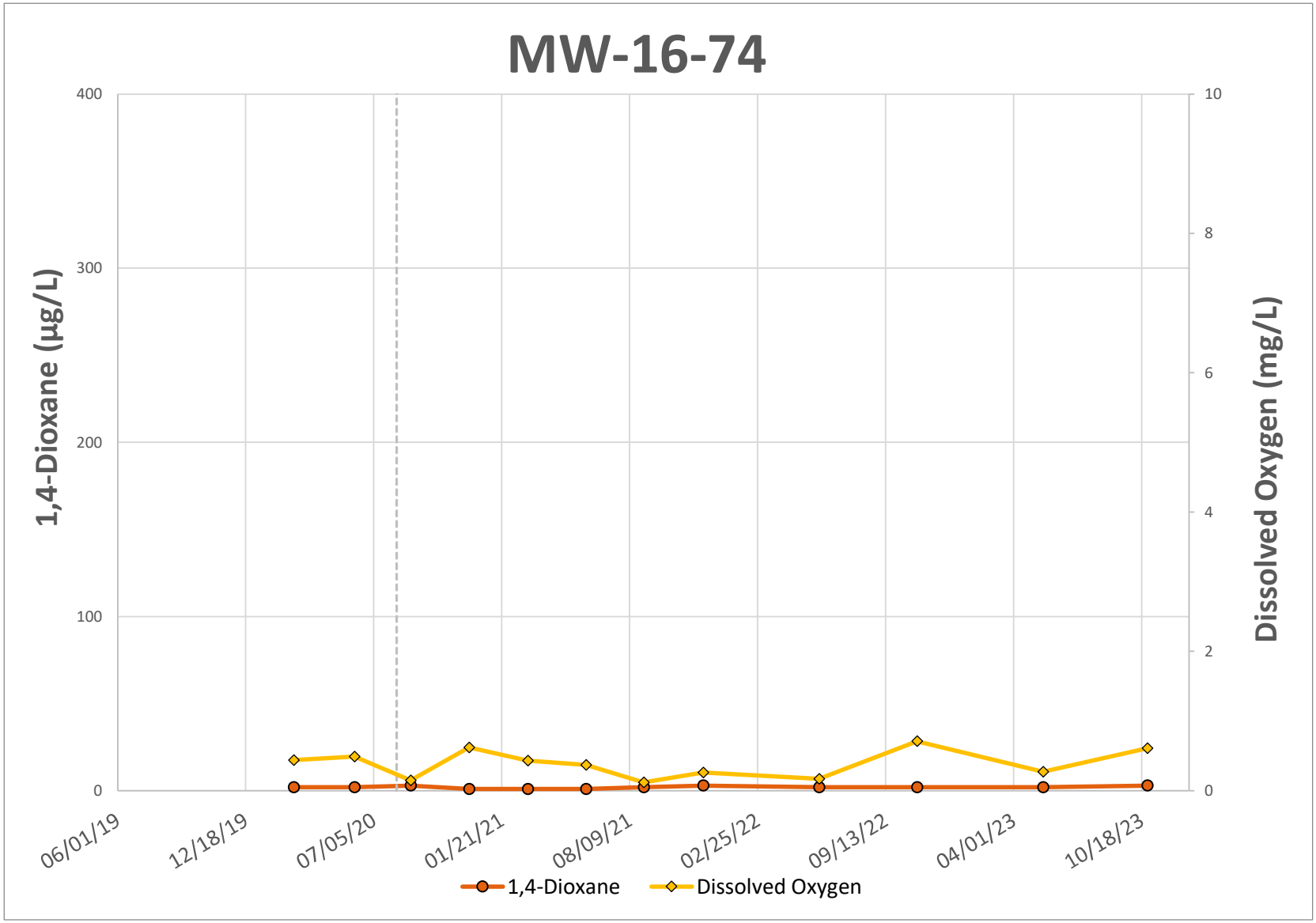
Plant 2 Transect E Upgradient Well 80 ft
Performance Graph



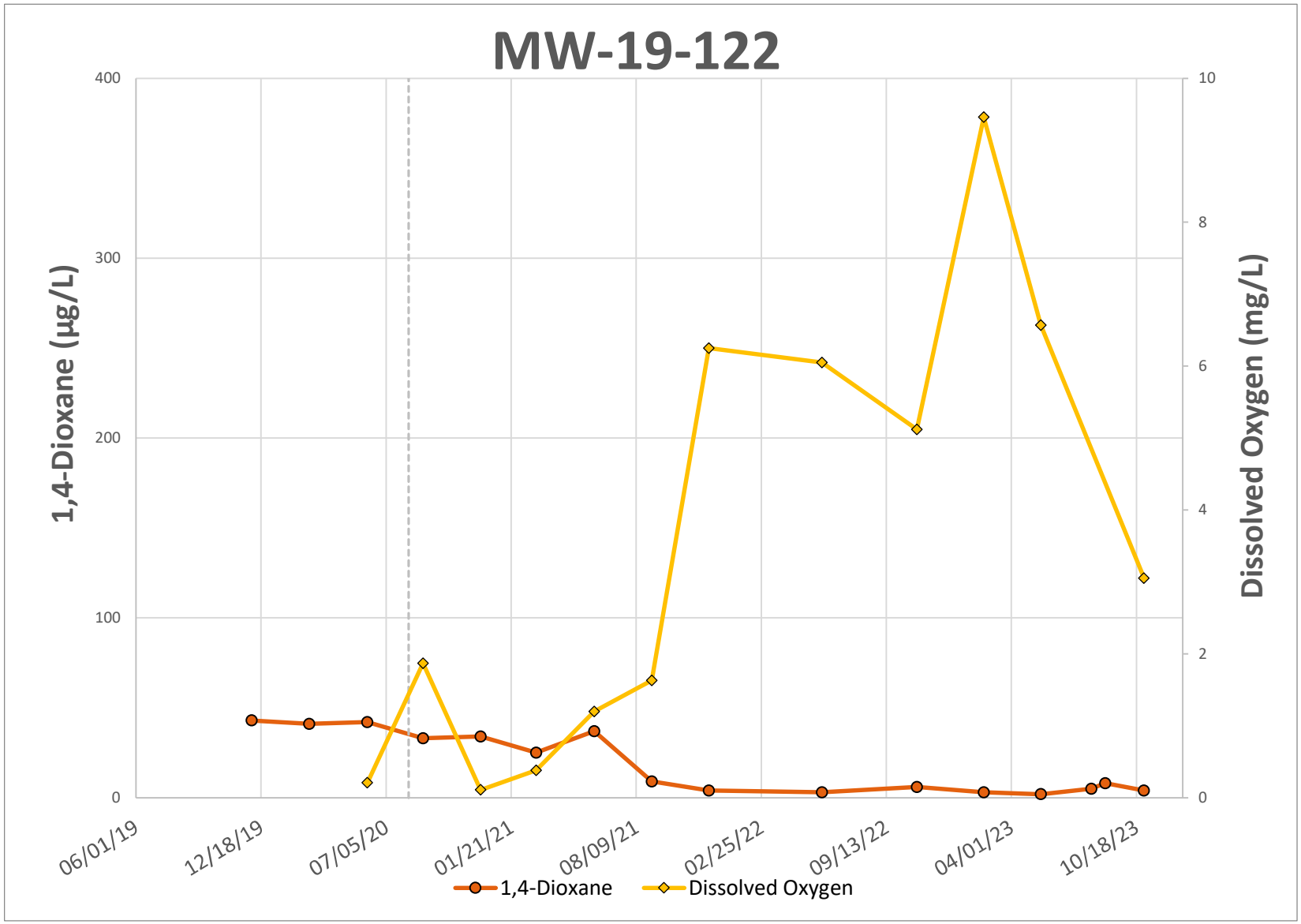
Plant 2 Transect E ROI Well
Performance Graph



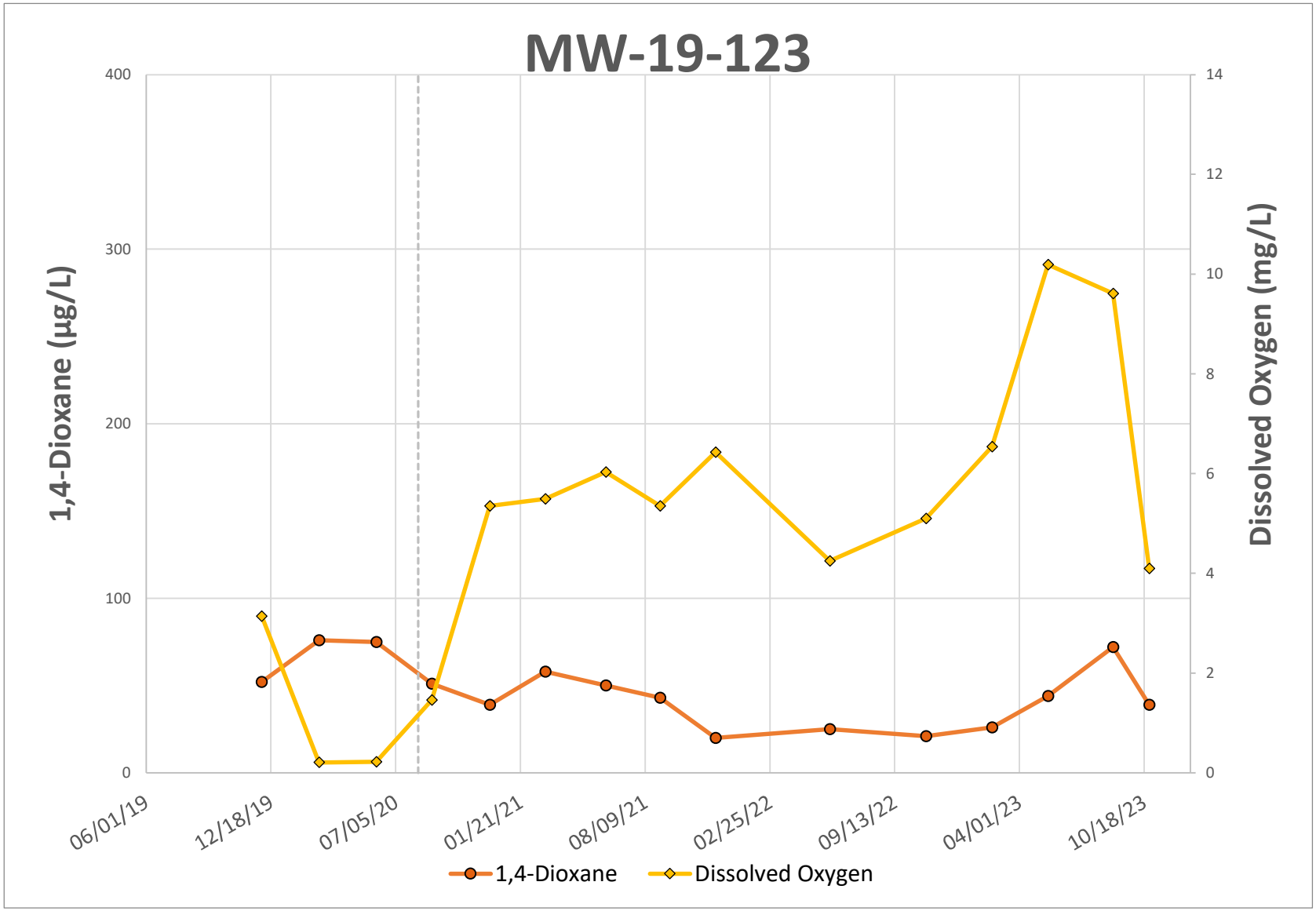
Plant 2 Transect G Downgradient Well 50 ft
Performance Graph



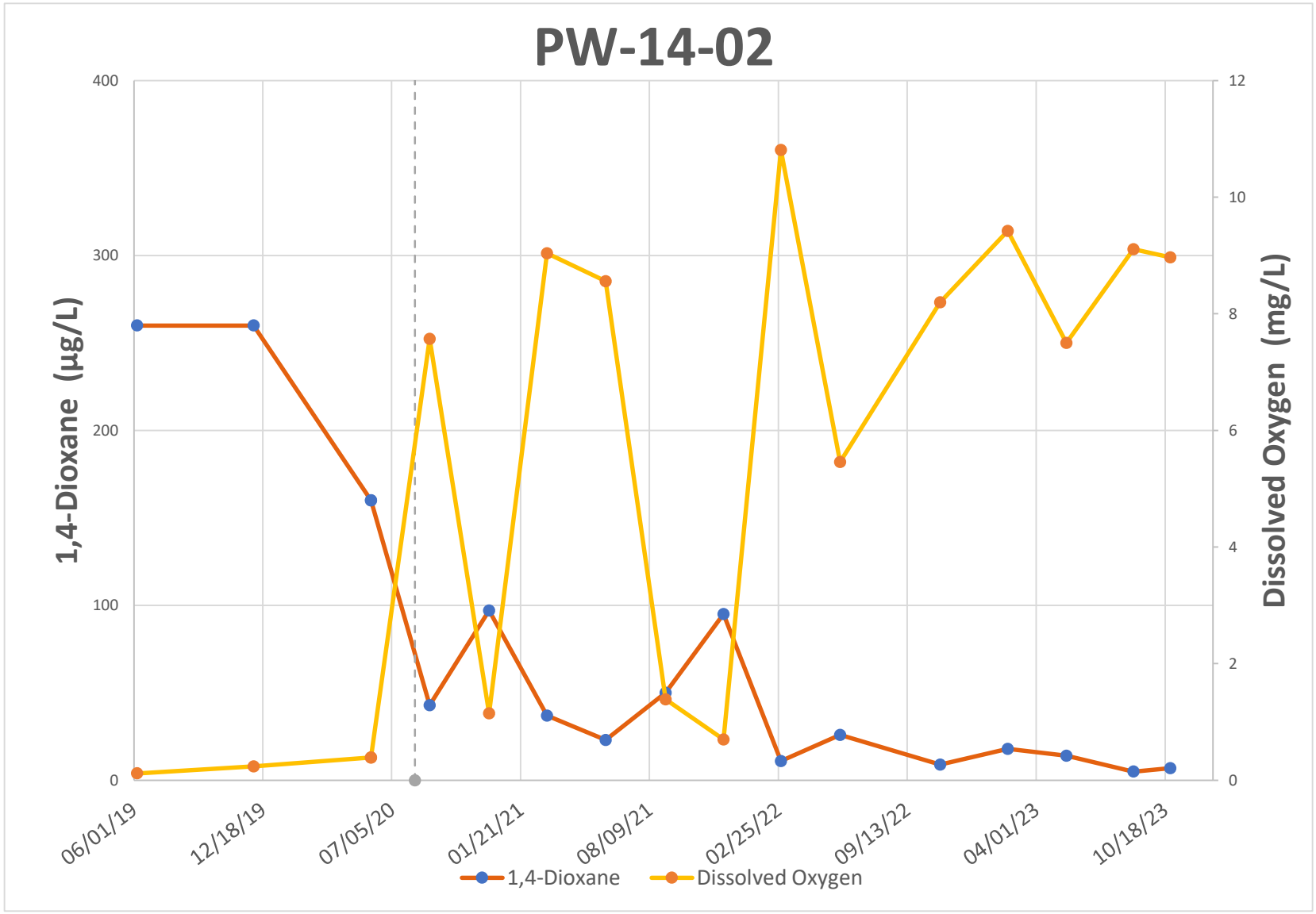
Plant 2 Transect G Upgradient Well 60 ft
Performance Graph



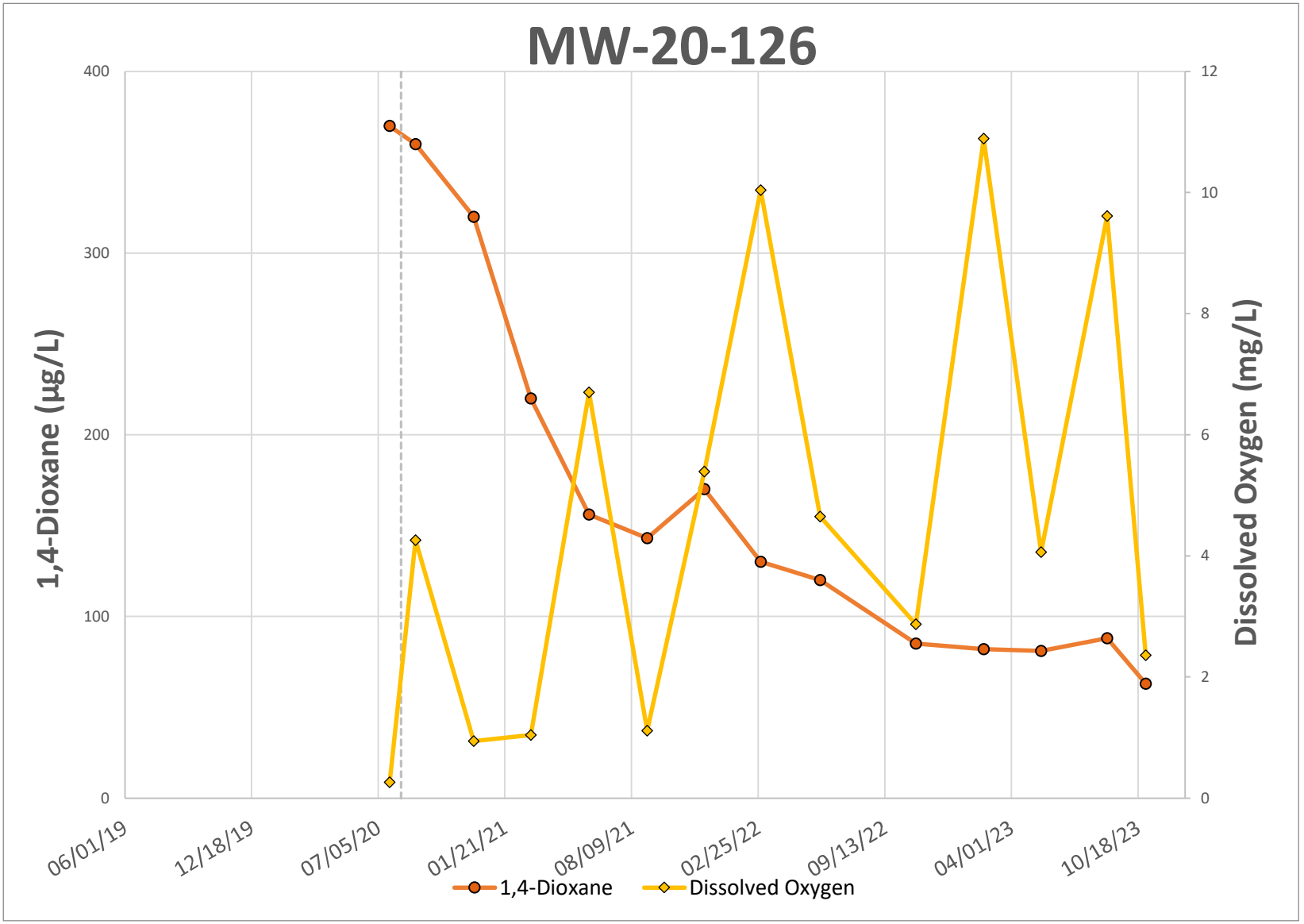
Plant 2 Transect G Downgradient Well 50 ft
Performance Graph



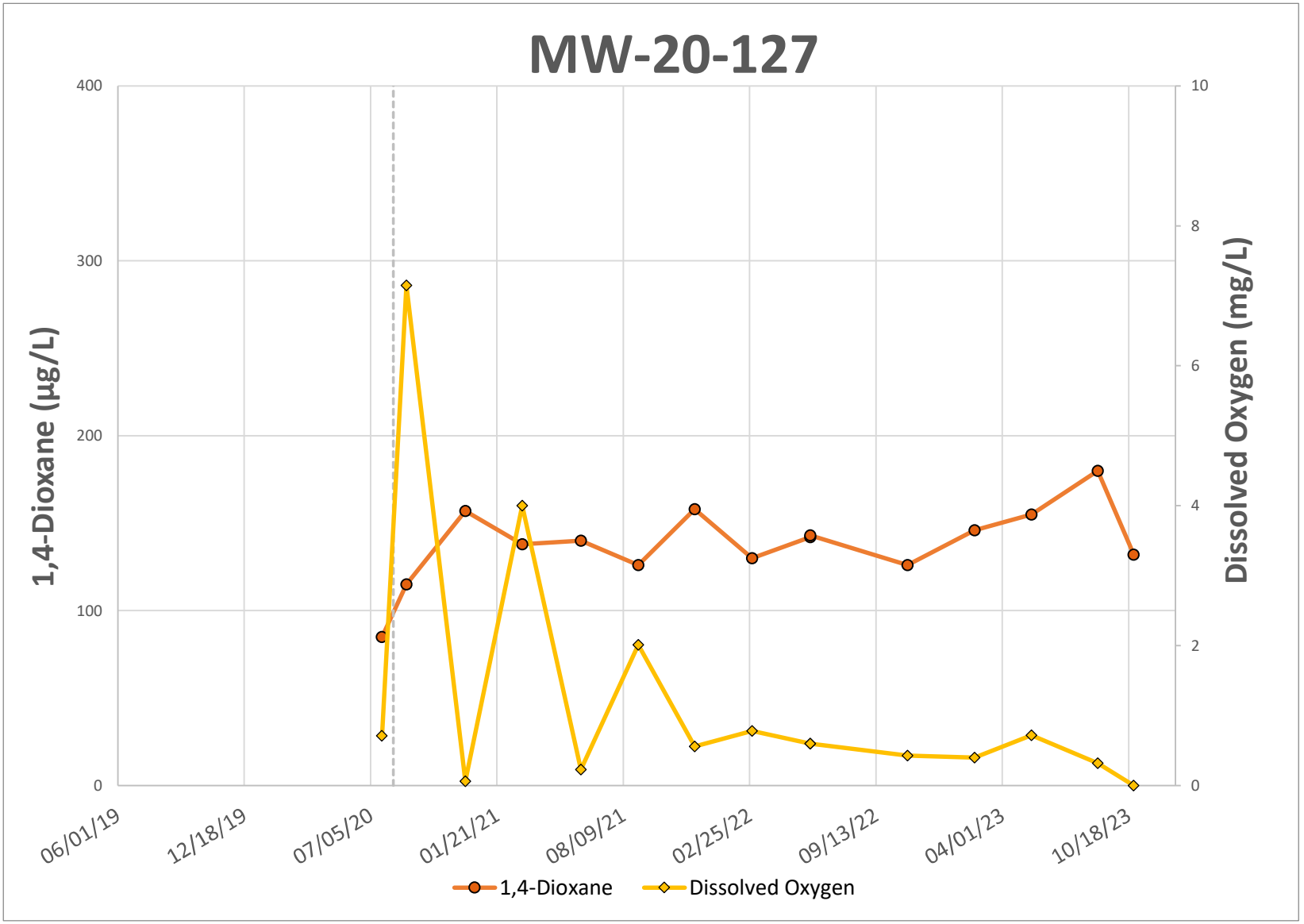
Plant 2 Transect G ROI Well
Performance Graph



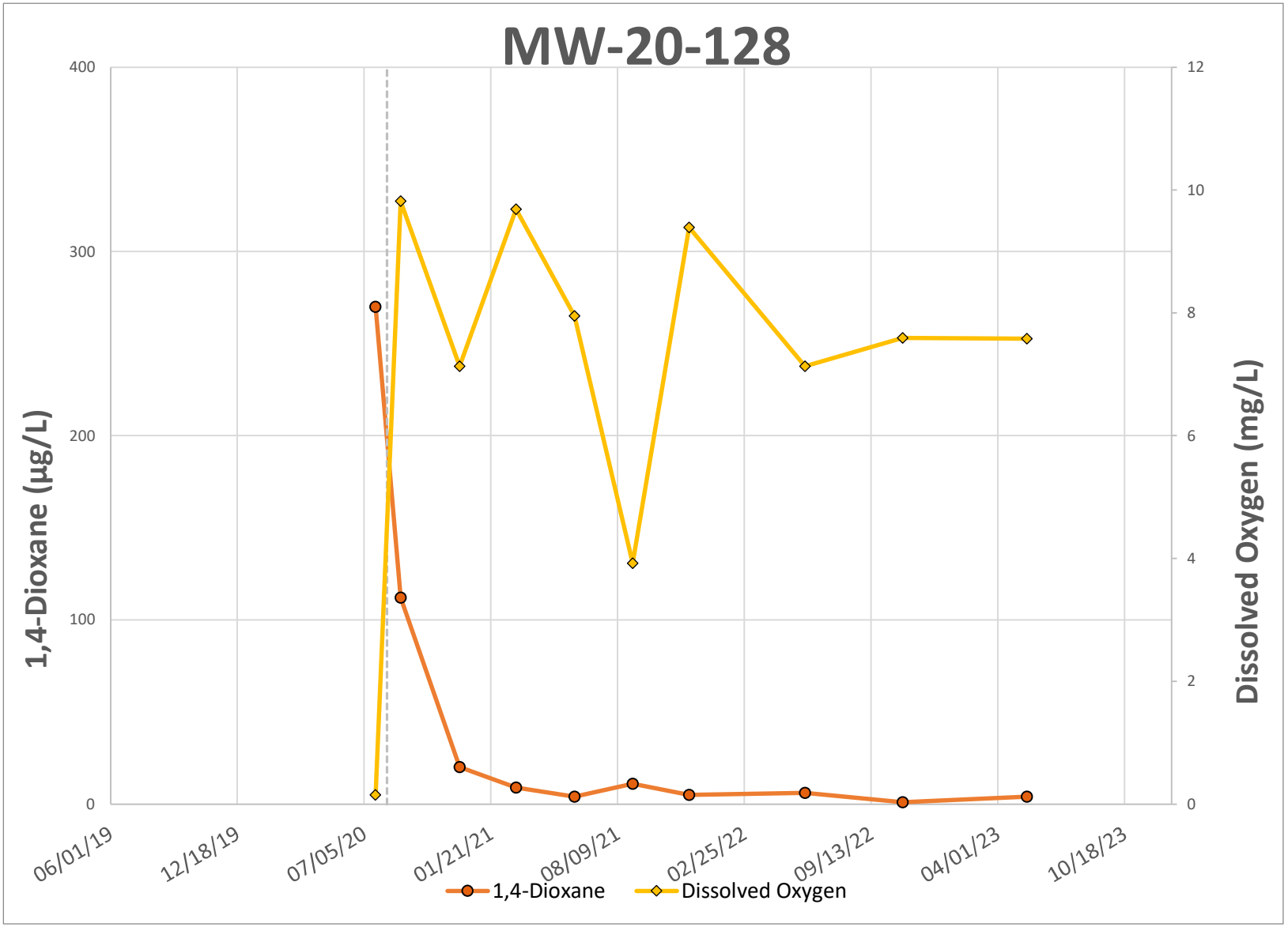
Plant 2 Transect B Upgradient Well 40 ft
Performance Graph



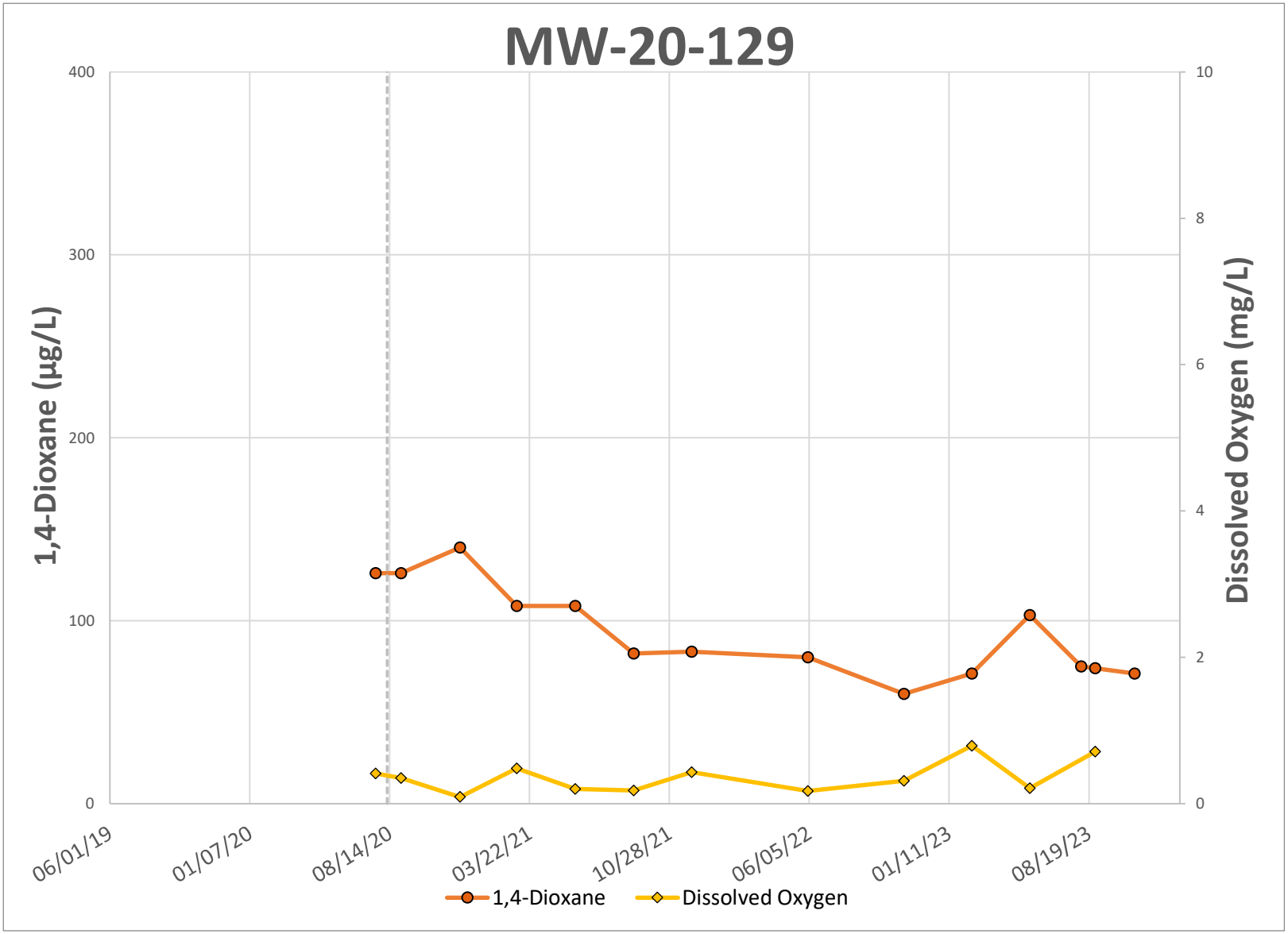
Plant 2 Transect B Downgradient Well 100 ft
Performance Graph



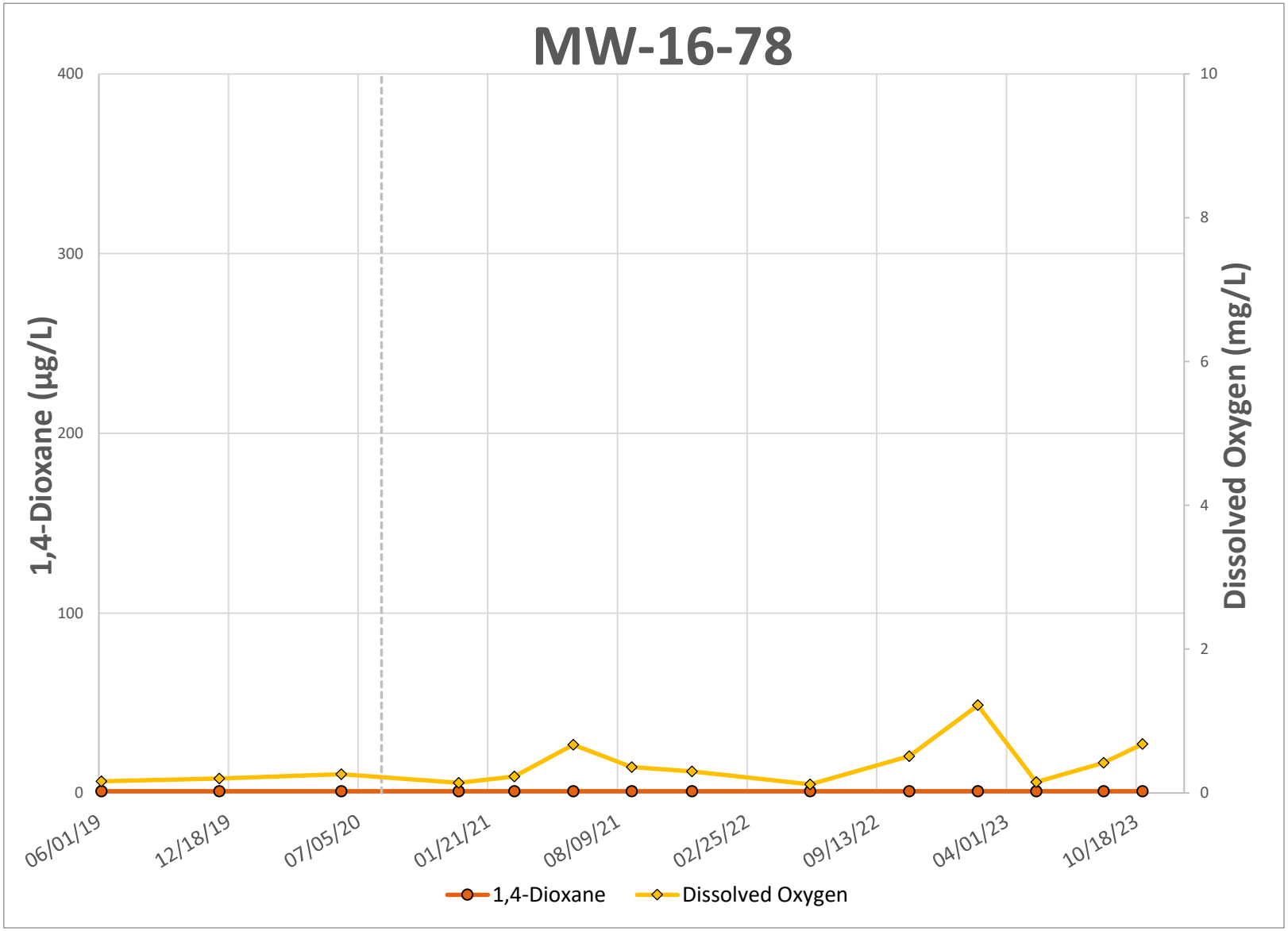
Plant 2 Transect F ROI Well
Performance Graph



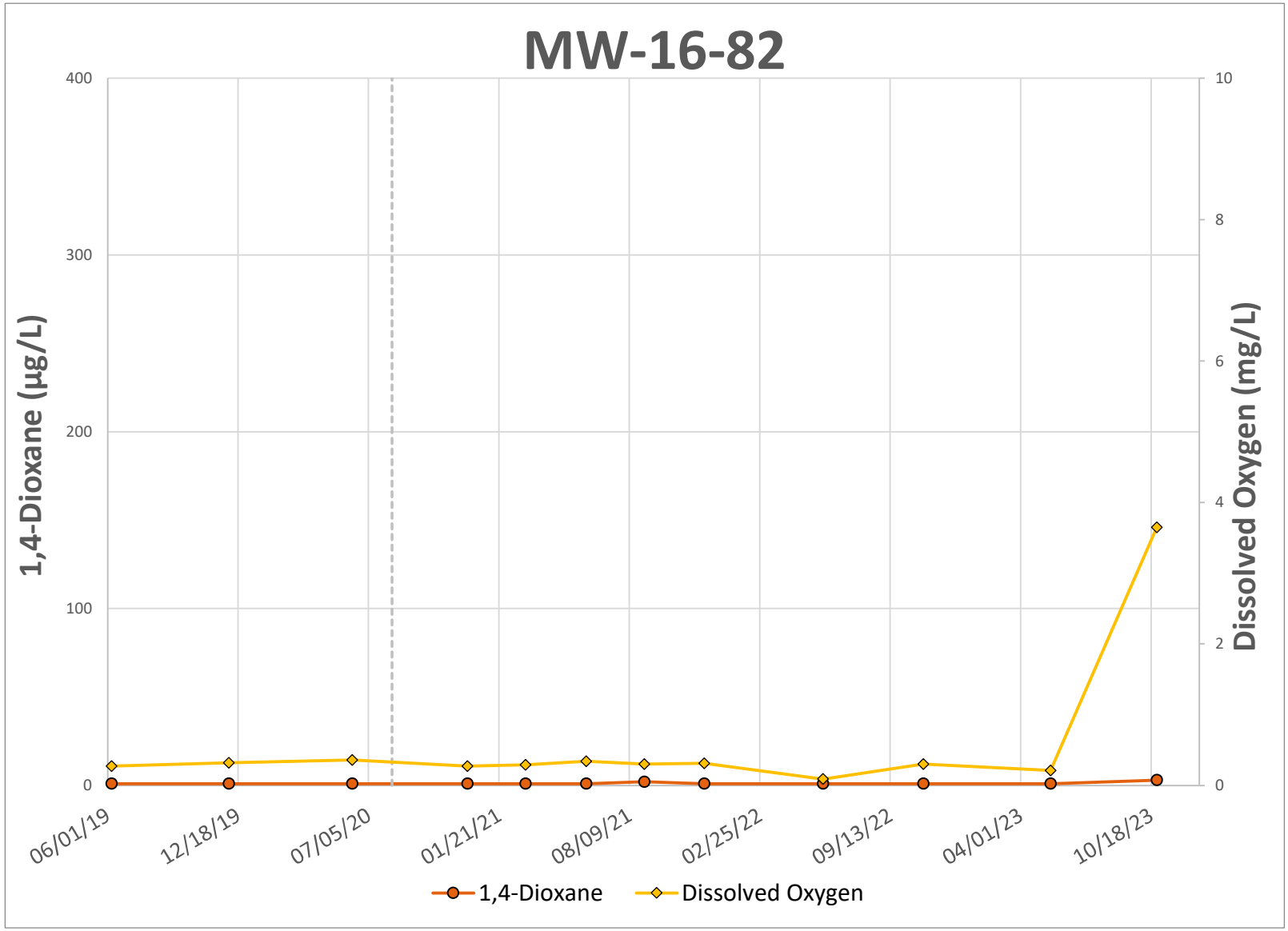
Plant 2 Transect G Upgradient Well 100 ft
Performance Graph



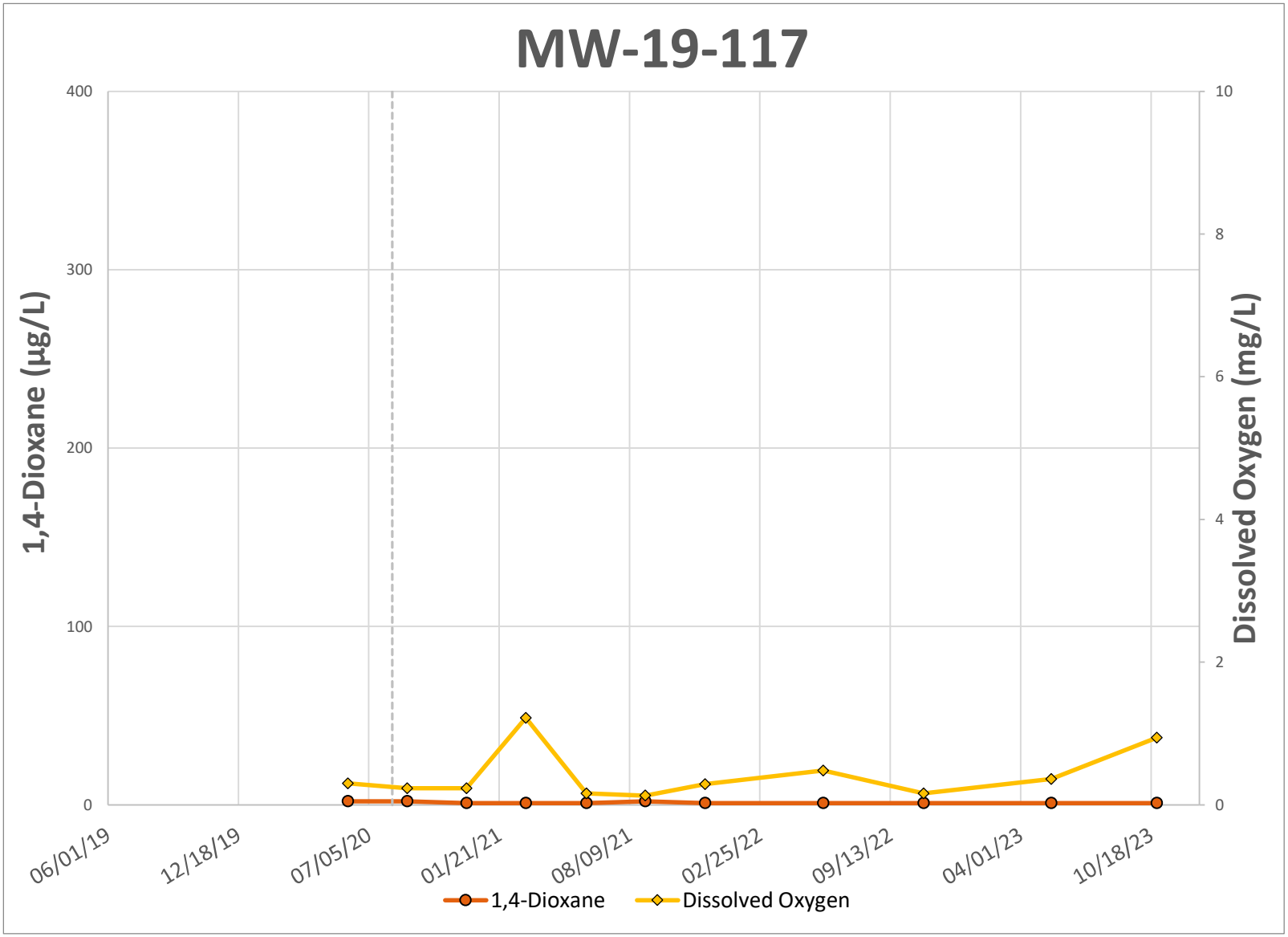
Plant 2 Transect E Downgradient Well 150 ft
Performance Graph



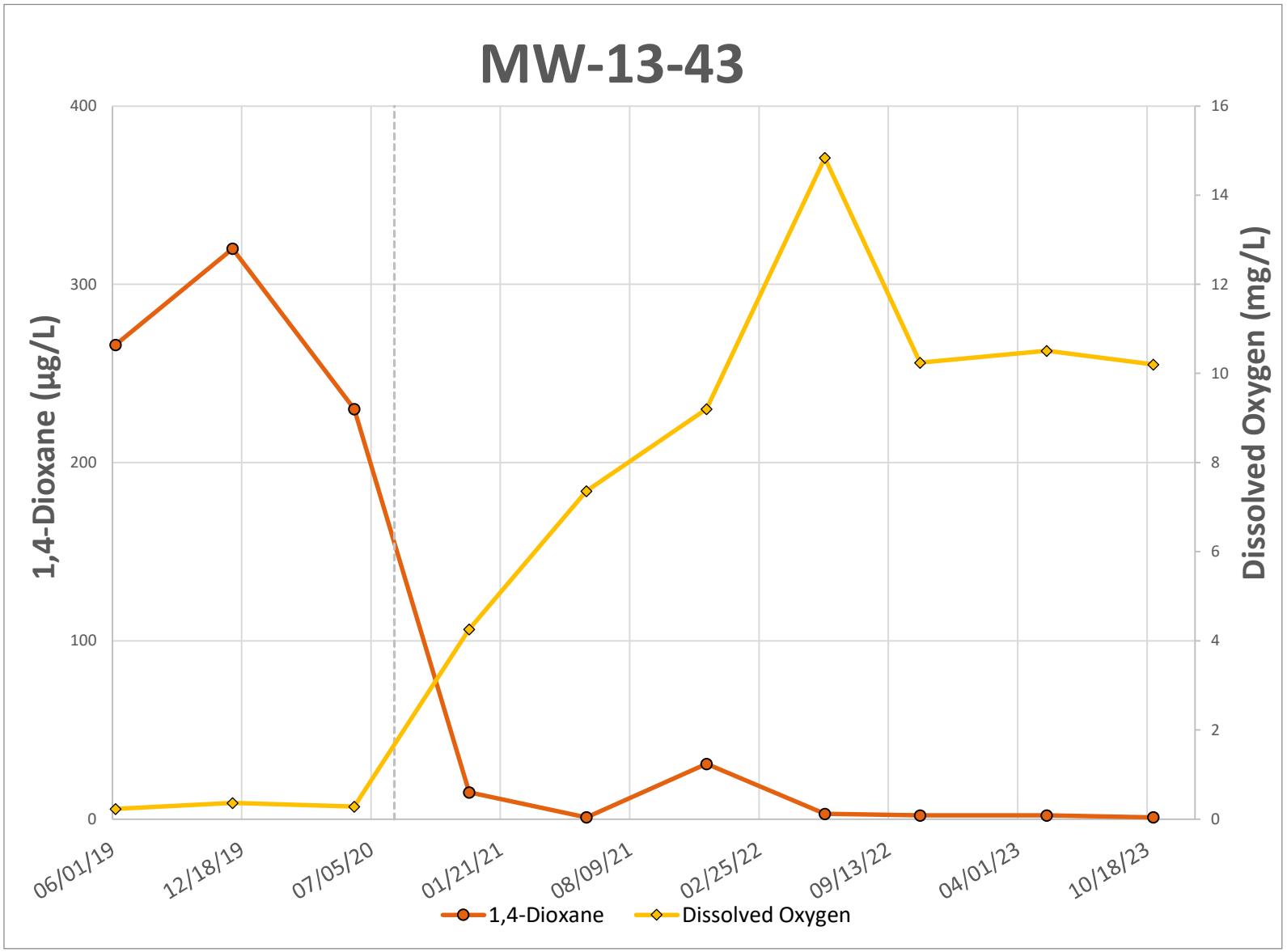
Plant 2 Transect G Upgradient Well 140 ft
Performance Graph



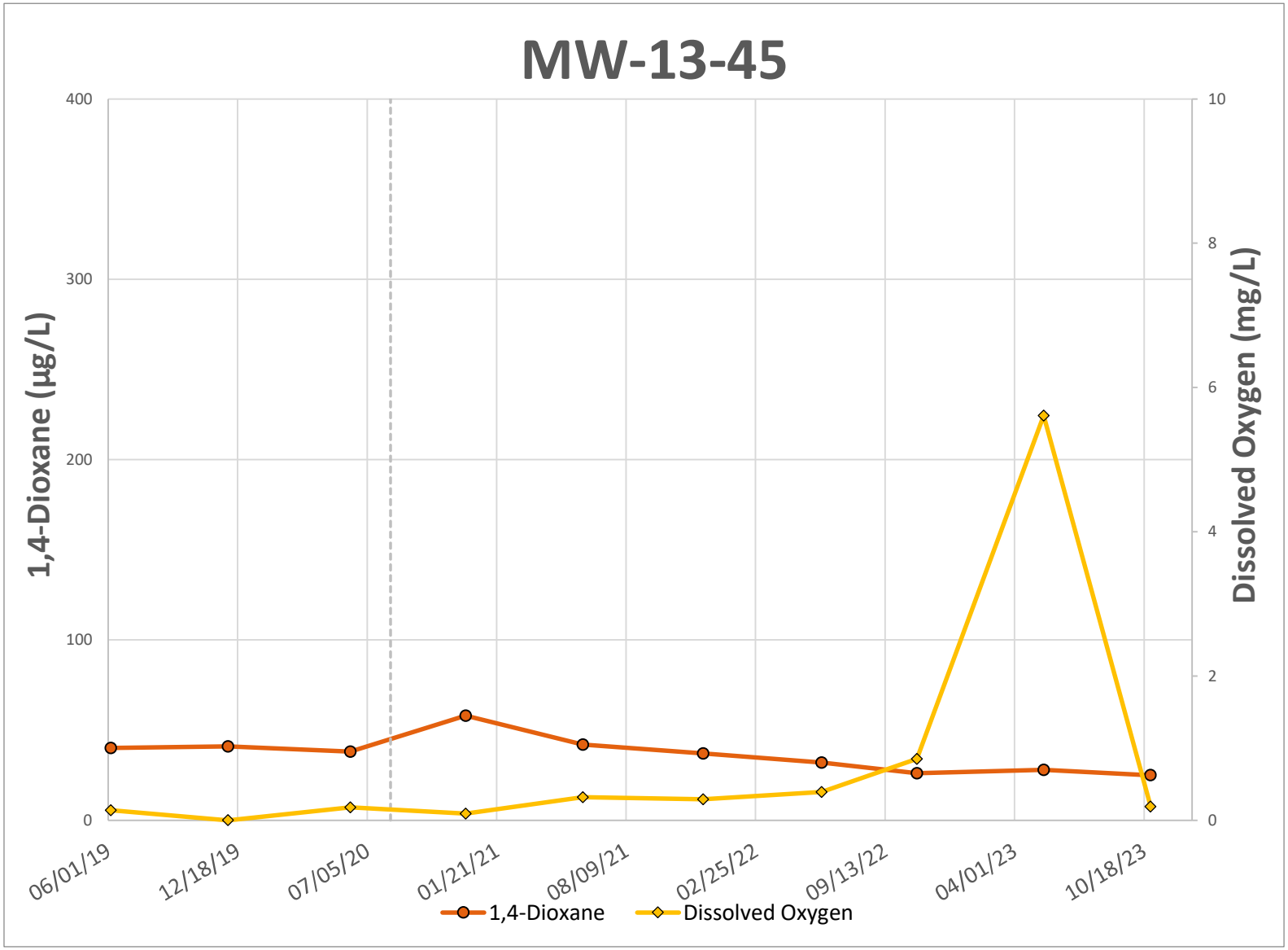
Plant 2 Transect C Monitoring Well
Performance Graph



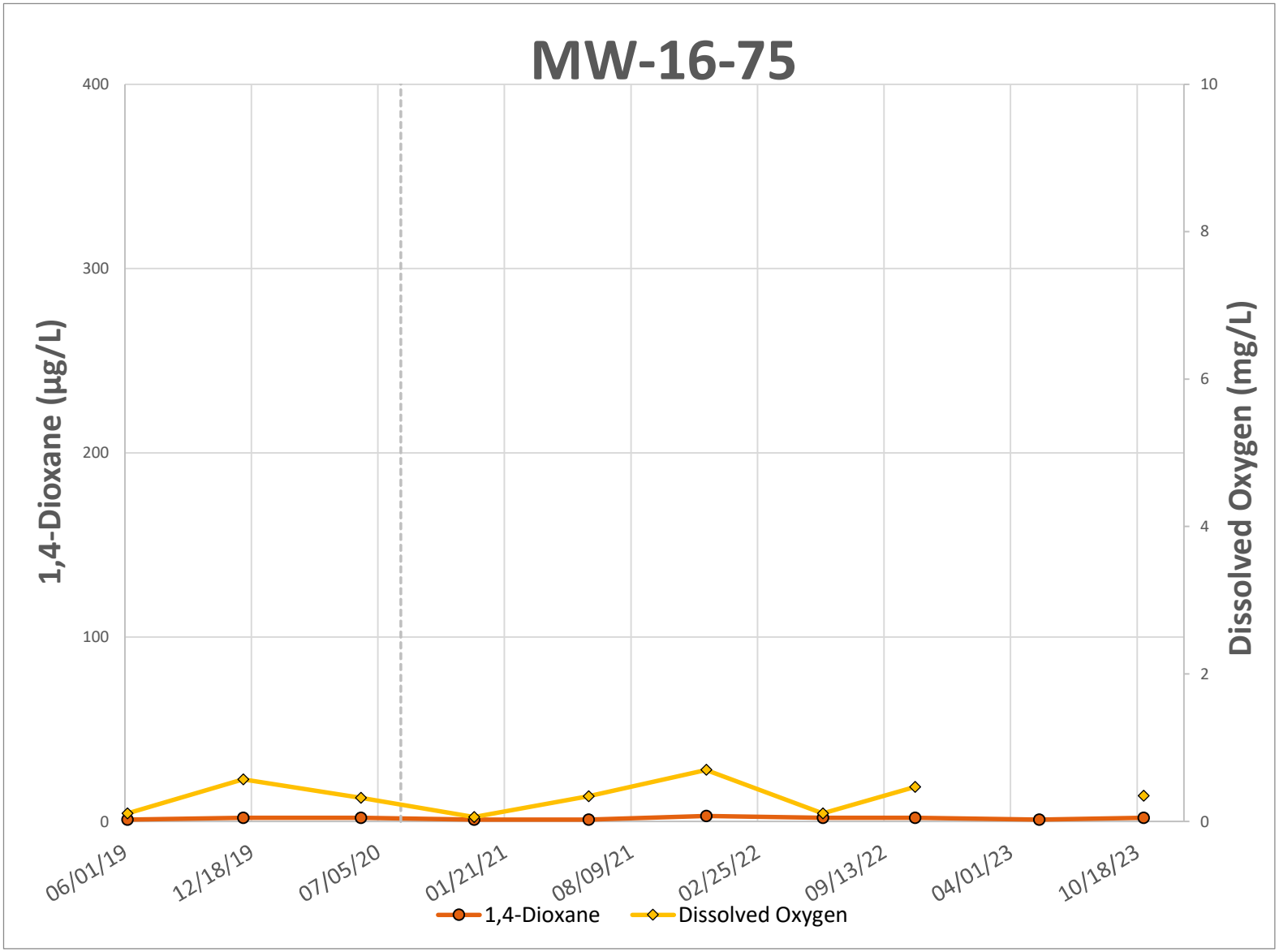
Plant 2 Transect B ROI Well
Performance Graph



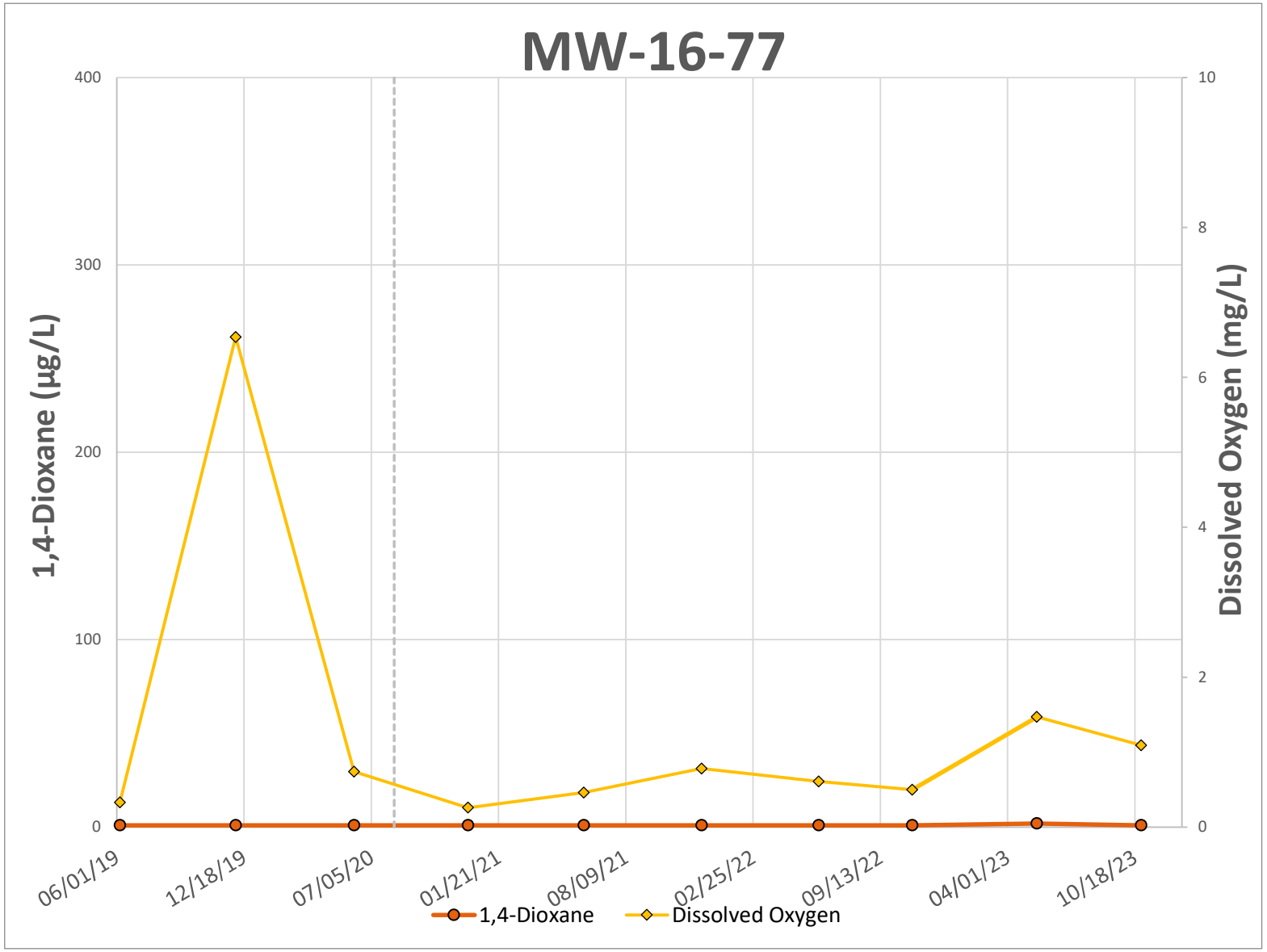
Plant 2 Transect B Cross-Gradient Well 200 ft
Performance Graph



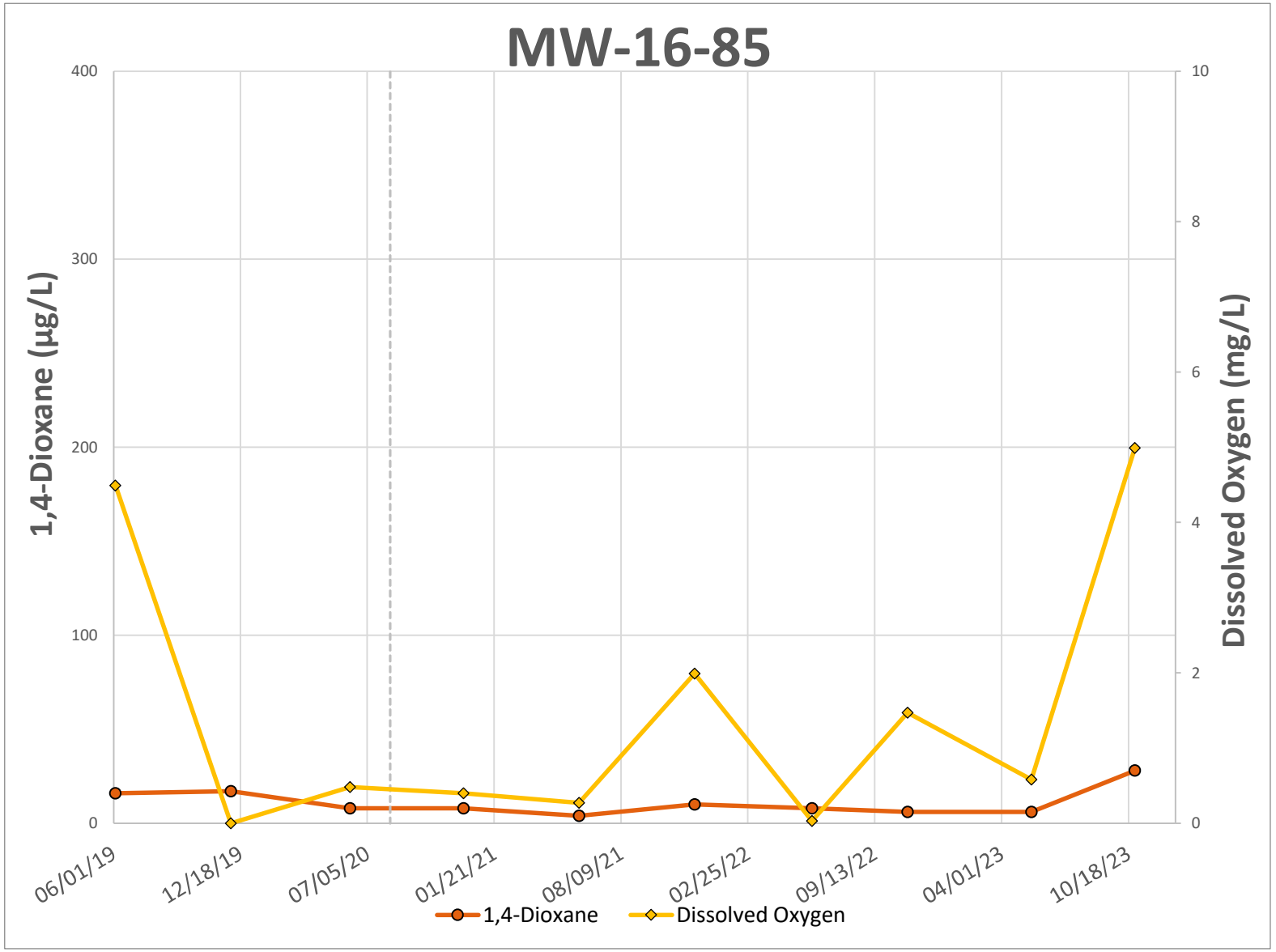
Plant 2 Transect G Downgradient Well 200 ft
Performance Graph



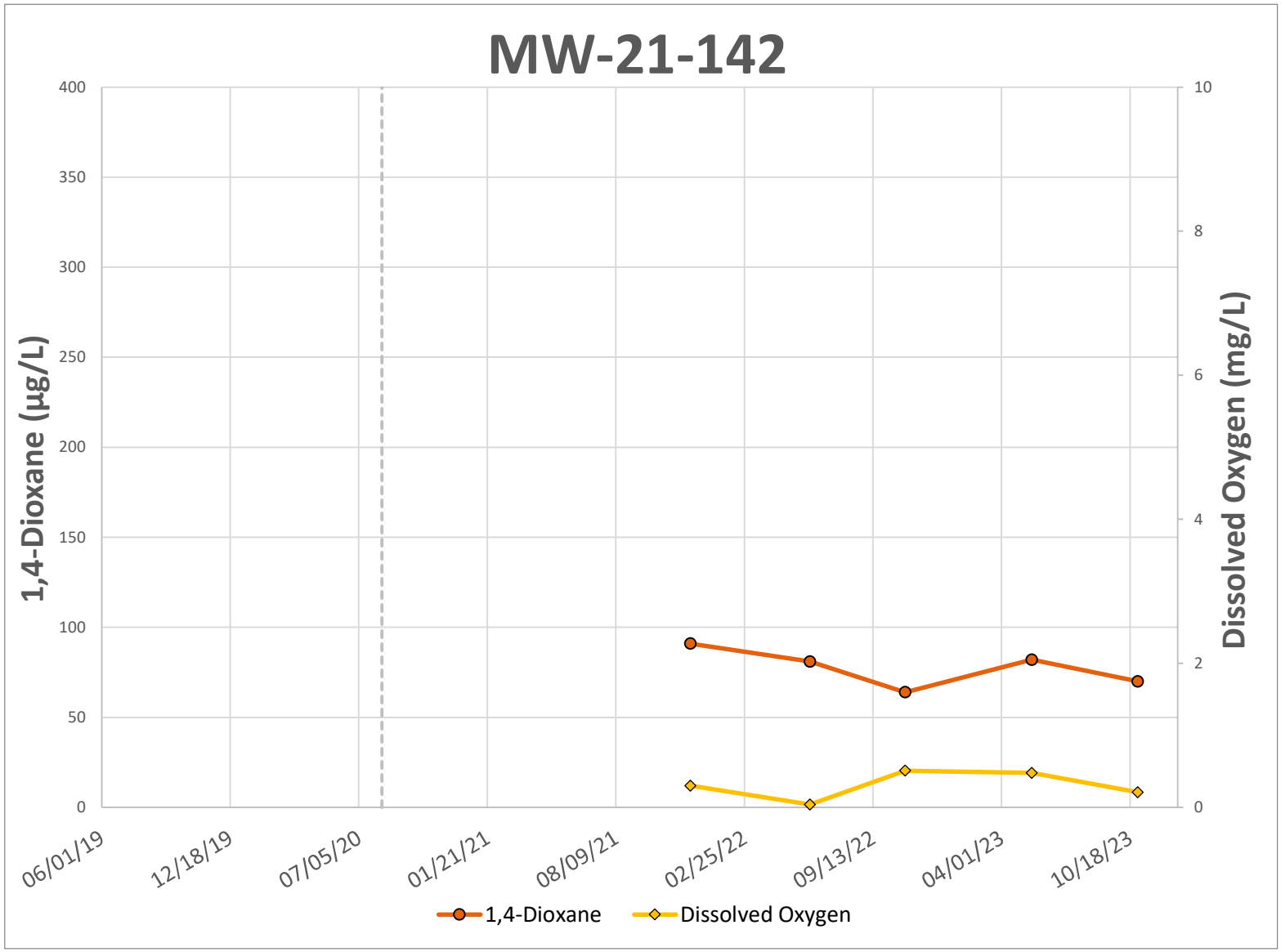
Plant 2 Transect G Cross-Gradient Well 160 ft
Performance Graph

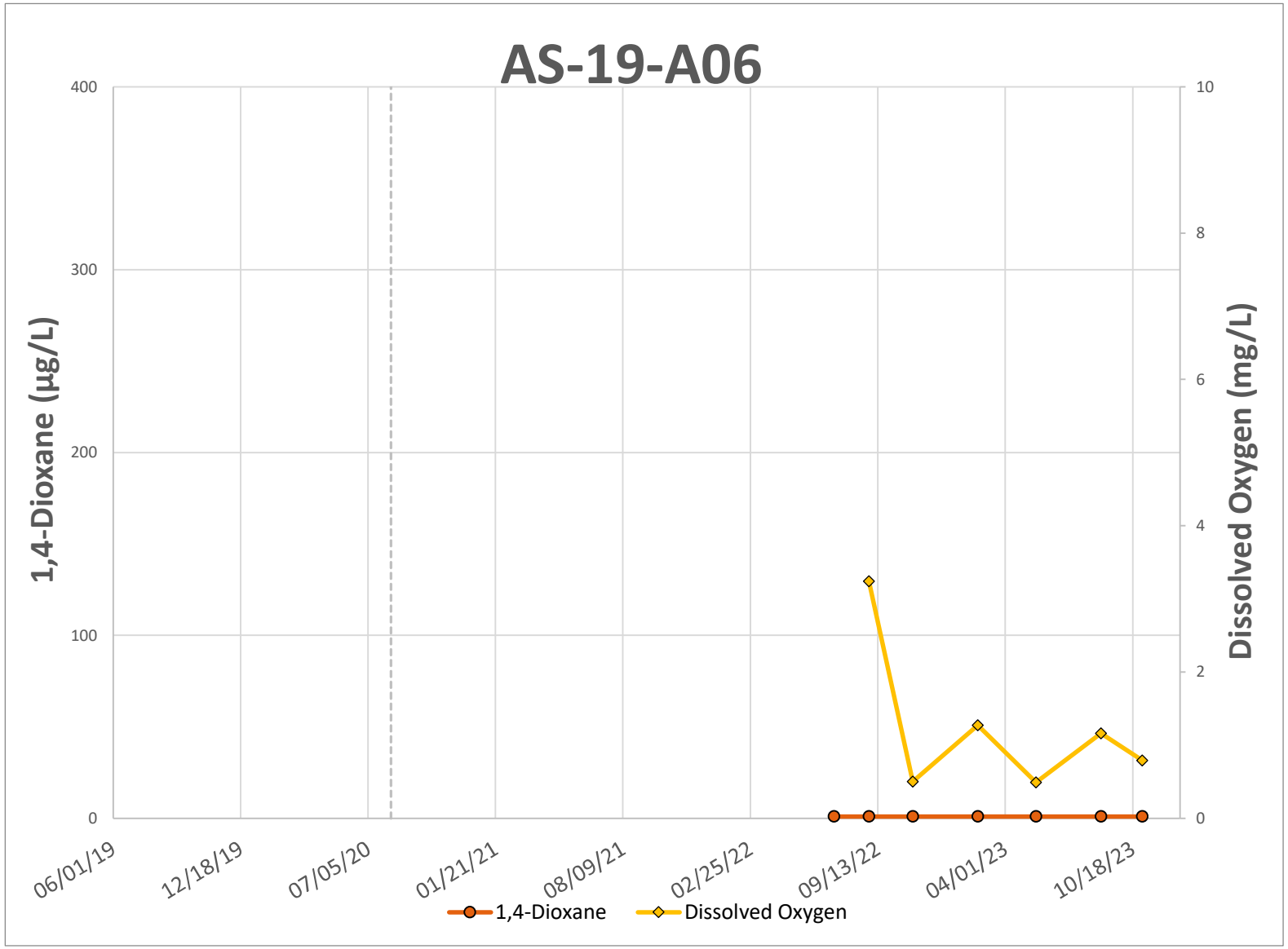


Plant 2 Transect F Downgradient Well 170 ft
Performance Graph

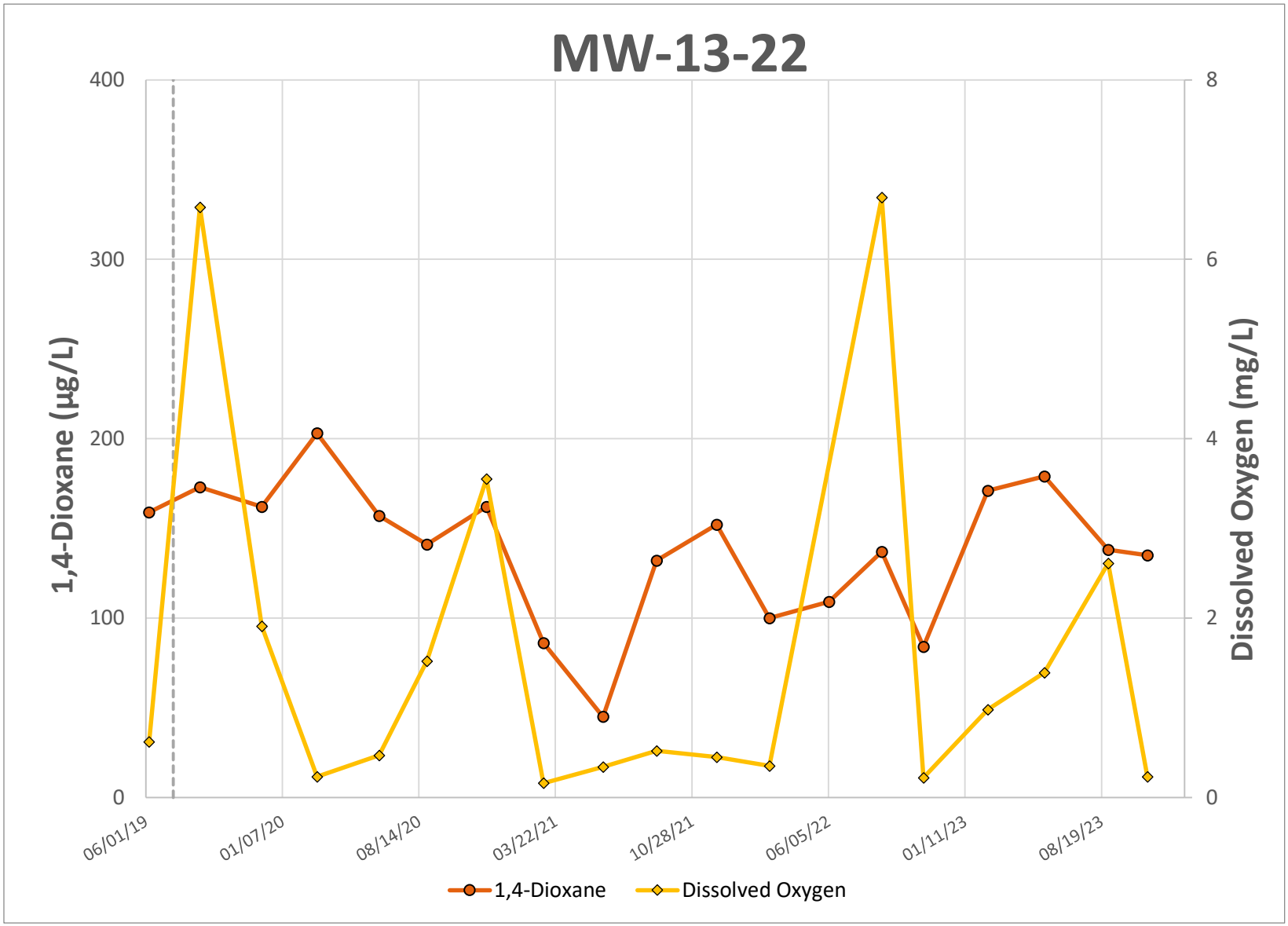


Plant 2 Transect B Upgradient Well 650 ft
Performance Graph

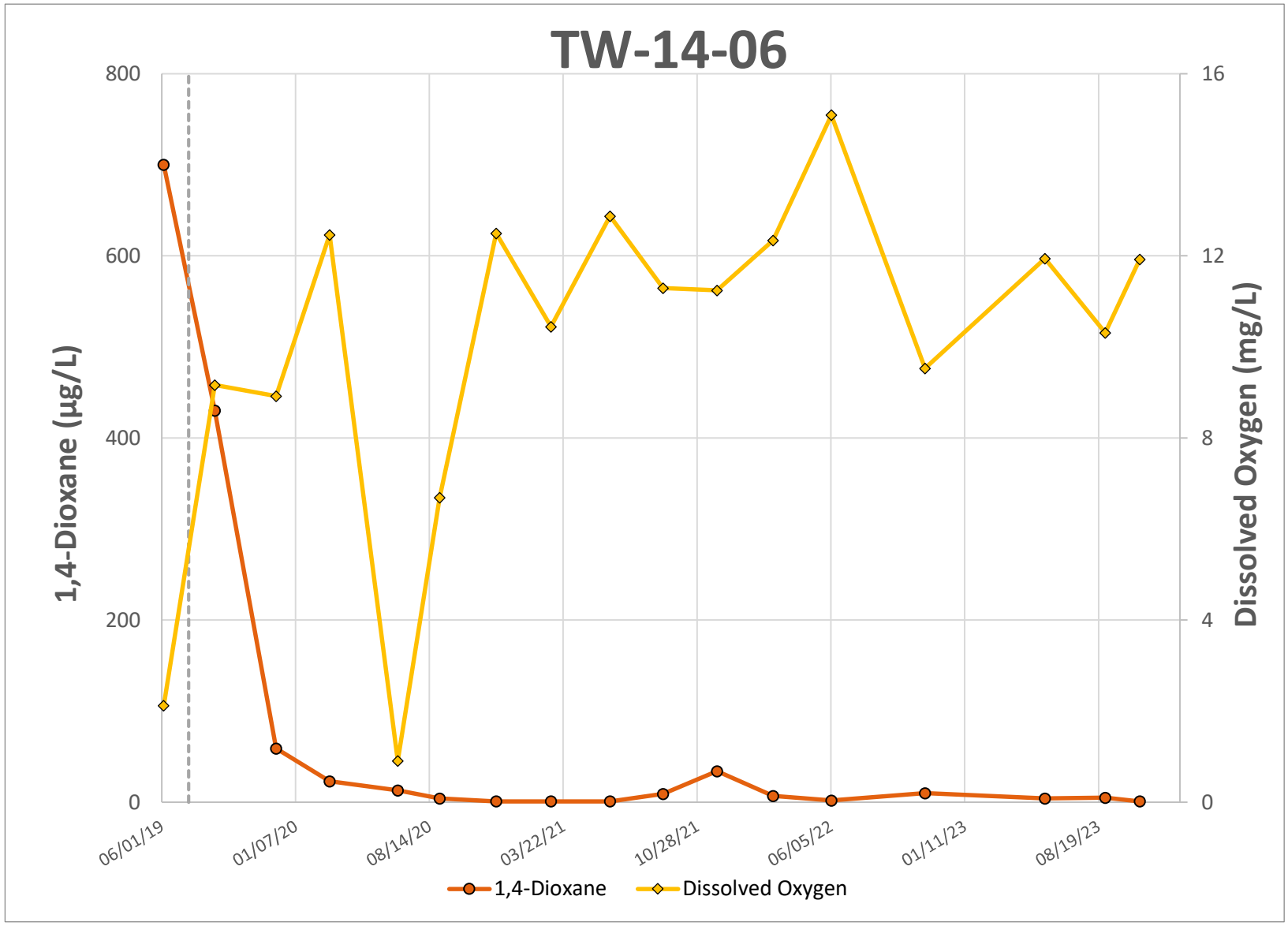



AS-19-A06
1,4-Dioxane (µg/L)
Dissolved Oxygen (mg/L)
400
300
200
100
0
10
8
6
4
2
0
06/01/19
12/18/19
07/05/20
01/21/21
08/09/21
02/25/22
09/13/22
04/01/23
10/18/23
1,4-Dioxane
Dissolved Oxygen

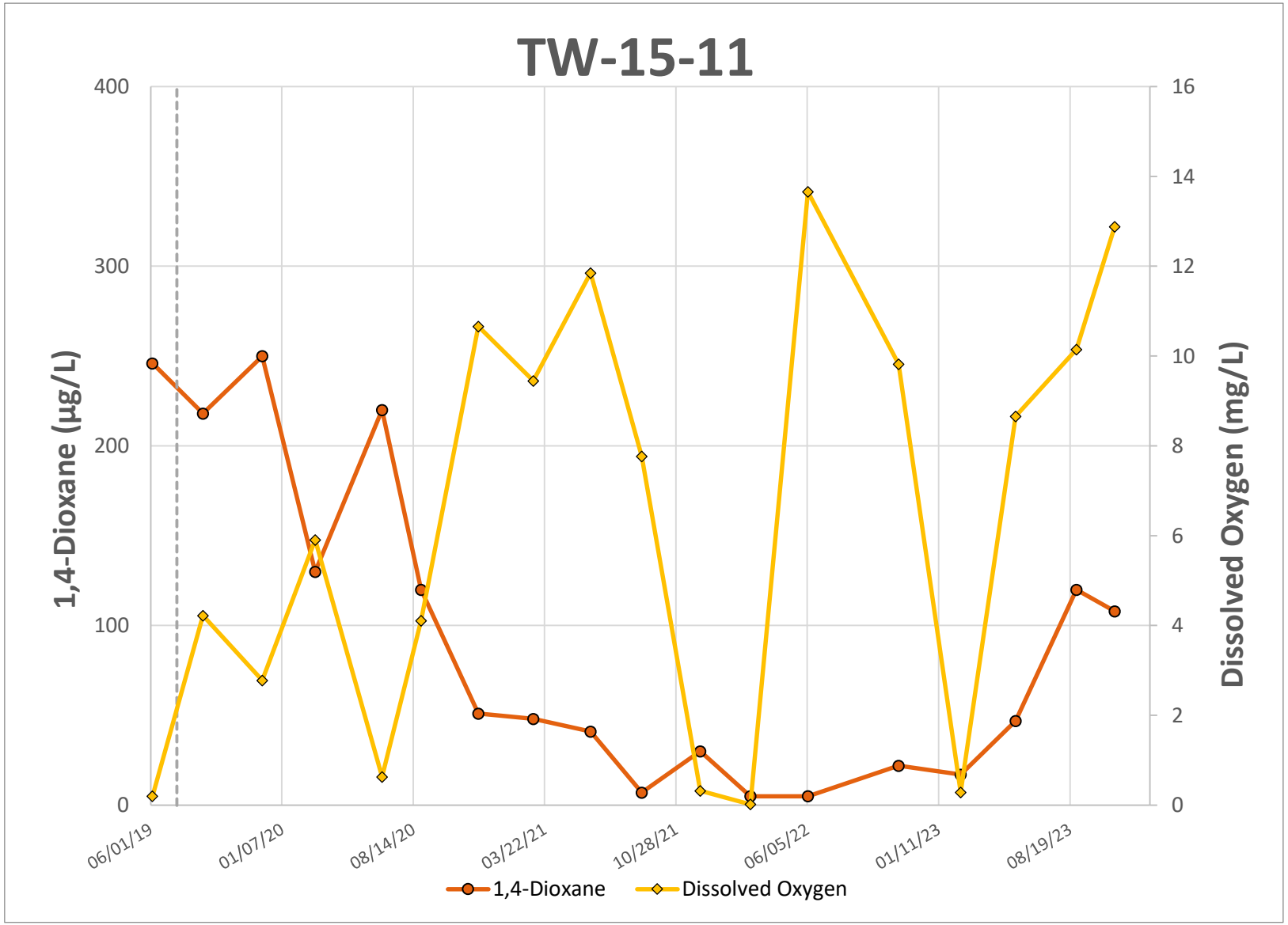
Plant 3 Transect A Upgradient Well 50 ft
Performance Graph



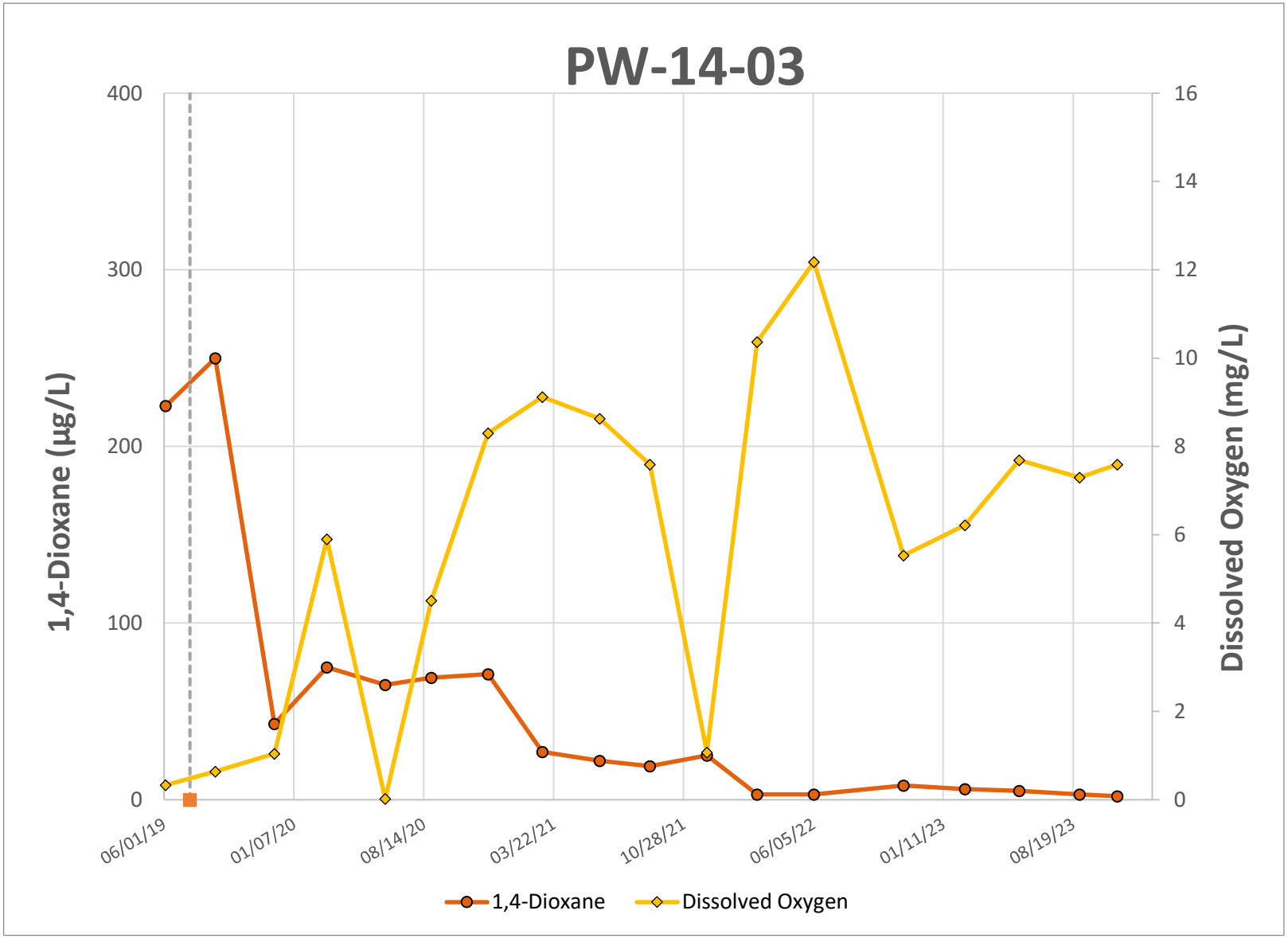
Plant 3 Transect A ROI Well
Performance Graph



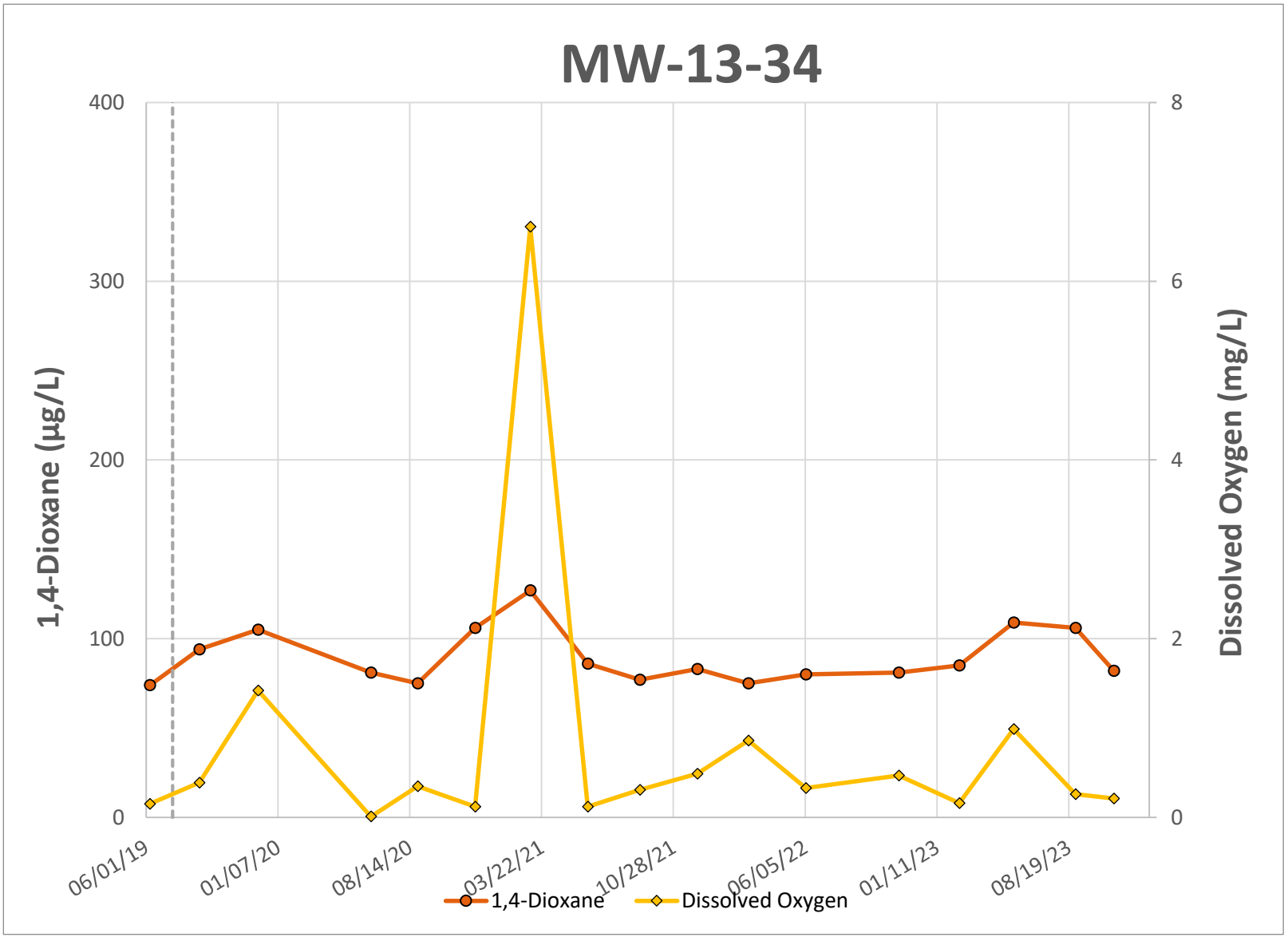
Plant 3 Transect A Downgradient Well 35 ft
Performance Graph



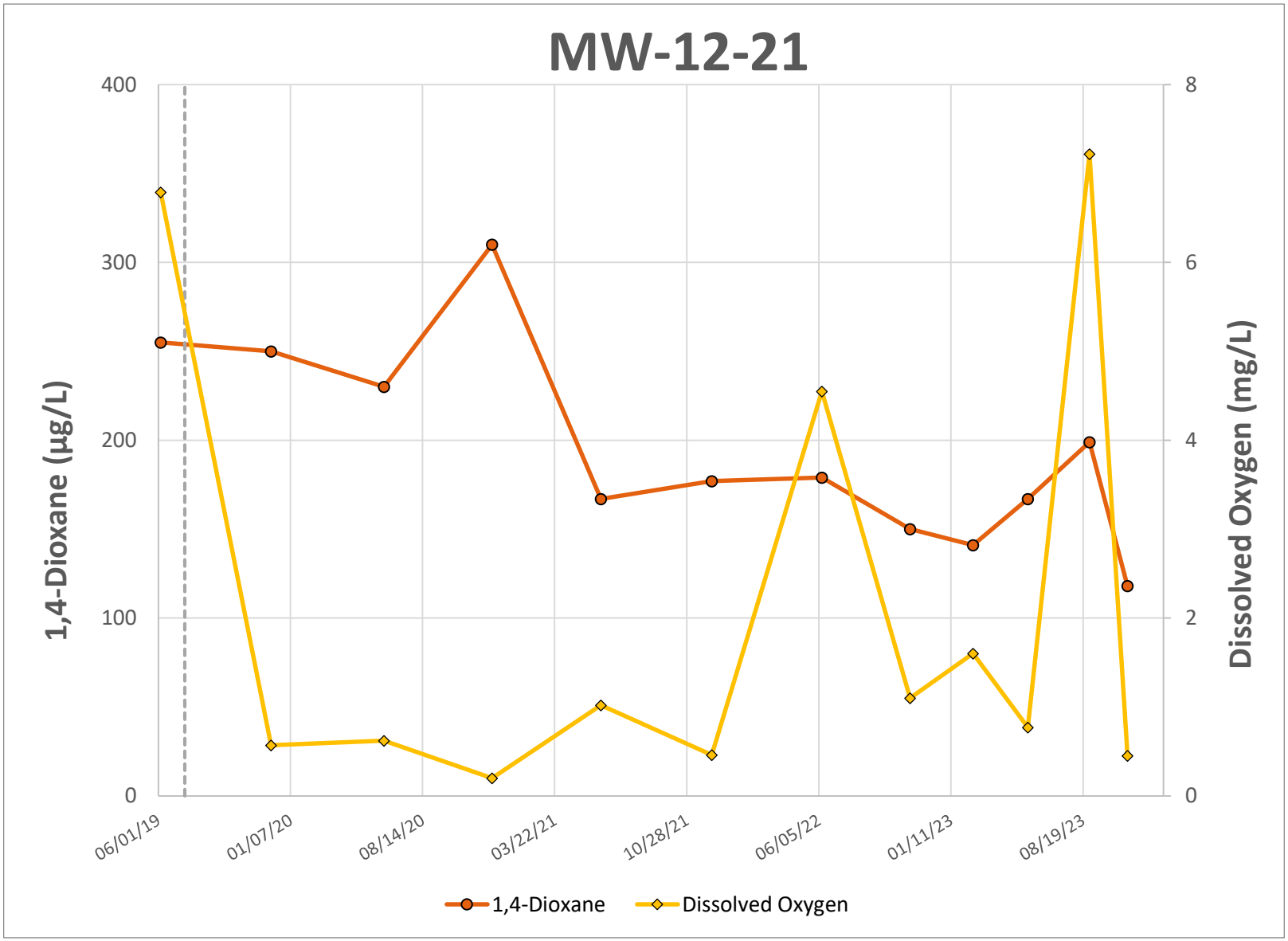
Plant 3 Transect A Downgradient Well 40 ft
Performance Graph



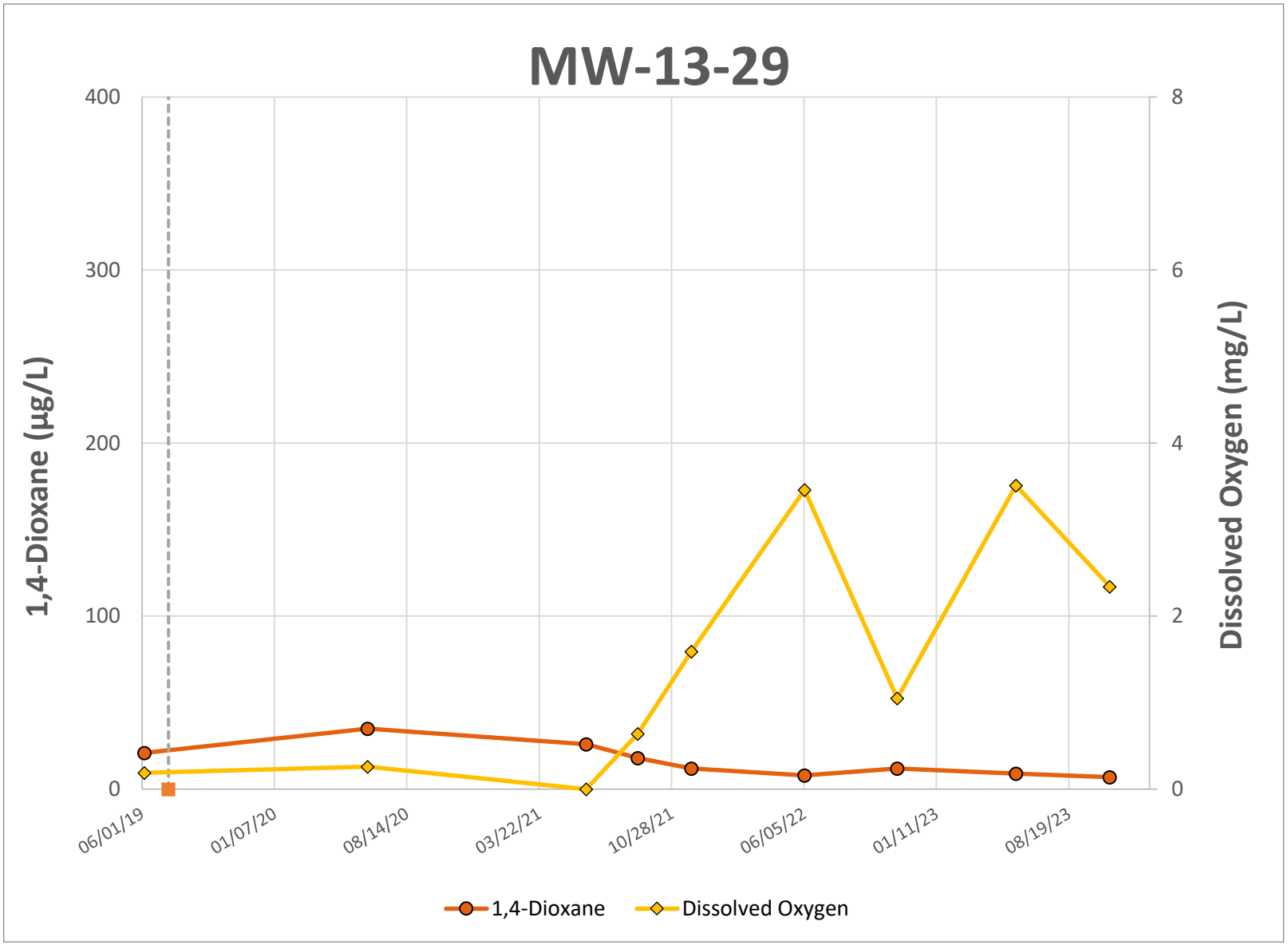
Plant 3 Transect A Downgradient Well 460 ft
Performance Graph



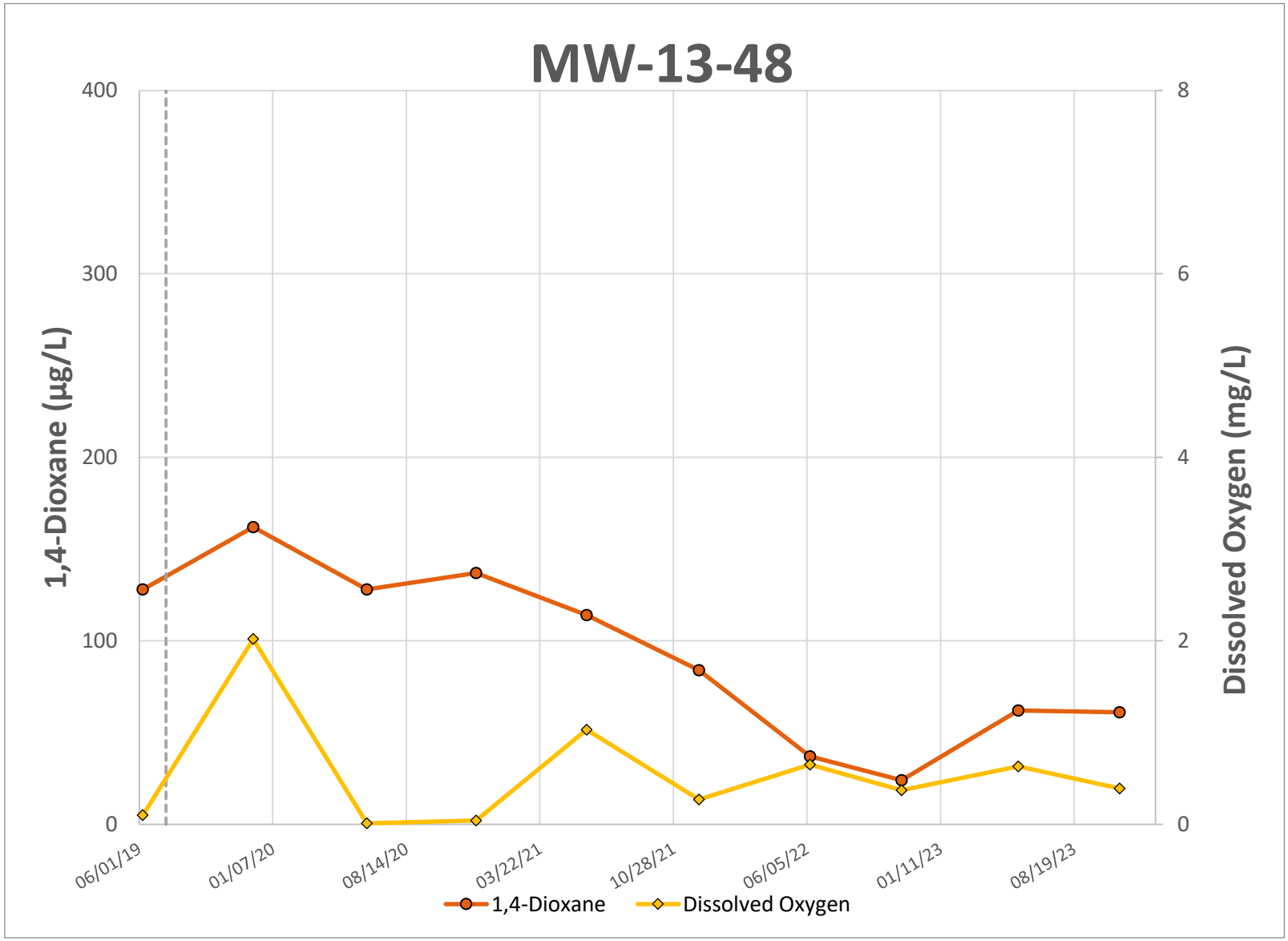
Plant 3 Transect A Well
Performance Graph



Plant 3 Transect A Well Performance Graph



Plant 3 Transect A Well Performance Graph



Appendix C

Treatment Cost Evaluation

Appendix C
Biosparge Performance Cost Tracking

Lower 1,4-Dioxane Biosparge Progress Report
Lansing Industrial Land, Lansing, Michigan

Total annual O&M cost for both systems =	$200,000
Plant 2 (80%)	$160,000
Plant 3 (20%)	$40,000

Plant 3 Operations Cost Per ug/L Treated (without up-gradient well, with deep overburden wells)

Year	Months of Operation	Yearly Operation Price	Annual Avg Reduction in Plume Concentration	Unit Treatment Cost ($ per ug/L)
2019*	7	$23,333	108	$216
2020	12	$40,000	51	$784
2021	12	$40,000	29	$1,379
2022	12	$40,000	19	$2,105
2023	12	$40,000	-17	($2,353)

*Plant 3 system began operation in June 2019 – concentrations and costs were based on 7 months of operation (June – December 2019)

Plant 2 Operations Cost Per ug/L Treated

			P2 North - B		P2 South - G&E		P2 East - E&F	
Year	Months of Operation	Yearly Operation Price	Annual Avg Reduction in Plume Concentration	Unit Treatment Cost ($ per ug/L)	Annual Avg Reduction in Plume Concentration	Unit Treatment Cost ($ per ug/L)	Annual Avg Reduction in Plume Concentration	Unit Treatment Cost ($ per ug/L)
2020*	5	$66,667	54	$211	215	$121	47	$623
2021	12	$160,000	38	$719	215	$290	44	$1,596
2022	12	$160,000	59	$463	34	$1,836	31	$2,266
2023	12	$160,000	5	$5,463	-7	($8,920)	0	--

*Plant 2 system began operation in August 2020 – concentrations and costs were based on 5 months of operation (Aug – Dec 2020)

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