



Oregon

Tina Kotek, Governor

Department of Environmental Quality
Headquarters/Portland Administrative Offices
700 NE Multnomah Street, Suite 600
Portland, OR 97232
503-229-5696
TTY 711

March 30, 2026

Georgia-Pacific Toledo LLC
1400 SE Butler Bridge Road
Toledo, OR 97391
Sent electronically only

Ann Vorderbrueggen,

DEQ called in the Georgia-Pacific LLC facility in Toledo, OR (GP Toledo) to the Cleaner Air Oregon (CAO) program on March 1, 2022, and received the submittal of the Emissions Inventory on May 31, 2022. The submittal consisted of the AQ520 form (Inventory), supporting calculations, an AQ523 Exempt Toxics Emissions Unit (TEU) form, and other supporting materials. In accordance with Oregon Administrative Rule [OAR 340-245-0030](#)(2), DEQ issued written requests on February 6, 2024, and April 24, 2024, requiring additional information and a revised Inventory to be submitted. GP Toledo submitted revisions to the Inventory and requested information on May 6, 2024, August 5, 2024, and August 22, 2024.

In response to these submittals, DEQ issued two written requests on March 24, 2025, requiring additional information and a revised Inventory be submitted. One request included information on emissions estimates for the wastewater treatment plant (WWTP), including liquid sampling of the WWTP ponds; the other request related to emissions estimates for the pulp and paper plant operations (non-WWTP). GP Toledo responded with revisions to the Inventory and requested information on June 24, 2025, and October 24, 2025. GP Toledo submitted a Liquid Sampling Plan for the WWTP on August 22, 2025. Additionally, DEQ and GP Toledo met on July 8, 2025, October 28, 2025, and February 25, 2026, to discuss emissions estimates for the WWTP.

DEQ has reviewed the Inventory and identified additional updates that are needed before approval. In accordance with [OAR 340-245-0030](#)(4)(b), DEQ is providing GP Toledo with revised deadlines for submittal of a revised Inventory and supporting materials.

General Comments

1. DEQ responses to source testing results are being provided separately.
2. GP Toledo must provide all supporting calculations in their native format, such as Microsoft Excel.
3. If GP Toledo would like to use non-publicly available information (such as NCASI Technical Bulletins) for emission estimation calculations; please submit the supplemental documentation with the emissions estimation.
4. GP Toledo should ensure they are appropriately distinguishing between point and

fugitive emissions. DEQ has addressed required updates to the Inventory or supporting calculations in the proceeding “Specific Comments” section. Please refer to the following definitions when determining if emissions are point or fugitive; TEUs may have both types of emissions:

- a. Point emissions are air contaminants which are discharged to atmosphere through an identifiable stack, vent, duct, or equivalent opening.
 - b. Fugitive emissions are emissions of any air contaminant which escape to the atmosphere from any point or area that is not identifiable as a stack, vent, duct, or equivalent opening. [[OAR 340- 200-0020](#)(70)]
5. GP Toledo may review and update the daily and annual hydrogen sulfide (CASRN 7783-06-4) emission estimates from the WWTP in the Inventory. DEQ will require compliance monitoring of the ponds to ensure the pond emissions remain below the approved emission estimates. As discussed in DEQ and GP Toledo’s February 25, 2026 meeting, GP will need to develop a formal Monitoring Plan prior to initiating compliance monitoring. DEQ provided feedback in the attached February 18, 2026, memo on compliance monitoring requirements which should be considered as GP Toledo develops the Monitoring Plan.
 6. GP Toledo has stated that many of the emissions from onsite processes are “negligible”. CAO requires all emission units that emit or have the potential to emit any Toxic Air Contaminant be included in the Inventory unless they are Categorically Exempt Toxics Emissions Units that are principally supporting primary production activities and listed in [OAR 340-245-0060](#)(3)(b).

If GP Toledo believes that certain activities meet the criteria for an Exempt TEU, GP Toledo may submit an Exempt TEU analysis for approval by DEQ. DEQ approves Exempt TEUs in aggregate and therefore the total risk from all proposed Exempt TEUs must be less than half of the Aggregate TEU Level for Existing Sources for both excess cancer risk per million and noncancer hazard index. [[OAR 340-245-8010](#) Table 1] Exempt TEUs as defined under [OAR 340-245-0060](#)(3)(a) must be listed on Worksheets 2 or 4 of the Inventory with a note that they are exempt TEUs, activity or usage information and emissions estimates do not need to be reported.

7. CAO has recently published an updated version of the AQ520 form. Since the Inventory was started in the previous version, DEQ will accept the old form for this current revised Inventory. GP Toledo may also choose to submit the revised Inventory in the new form. All future permitting actions requiring a revised Inventory should be completed using the new form. The new version, along with a detailed instructions manual, is available in Step 2 of the [Step-by-Step Guide for Facilities](#)¹ is also available on YDO.

Specific Comments

1. DEQ approves the Liquid Sampling Plan for the Wastewater Treatment Facility TEUs (EU129A-EU129E), with the following conditions:

¹ Oregon DEQ. June 5, 2025. “AQ520 Form – Version 2.0”
<https://www.oregon.gov/deq/aq/cao/pages/cao-risk-assessment-resources.aspx>

- a. As discussed in the meeting with DEQ and GP Toledo representatives on February 25, 2026, GP Toledo does not have to include sulfide and sulfate sampling in the liquid sampling plan.
- b. In the Sampling Plan, GP Toledo presents concerns with the sampling logistics. DEQ would like to reiterate the GP Toledo was given the opportunity to propose alternative sampling locations and/or methodologies and elected not to.
- c. GP Toledo must start liquid sampling by **60 days** after issuance date of this letter, or **May 29, 2026**.
- d. GP Toledo must submit analytical reports to DEQ within 60 days of sampling.
- e. GP Toledo must submit the results of the updated Water9 models within **90 days** of completing the final quarterly liquid sampling.
- f. DEQ approves delaying sampling for per- and polyfluoroalkyl substances (PFAS) to obtain site specific PFAS concentrations. However, if GP Toledo elects to defer PFAS sampling, GP must use published PFAS data for the pulp and paper industry and estimate PFAS emission as follows:
 - i. Use the average concentration in Table 11 of EPA's *Multi-Industry Per- and Polyfluoroalkyl Substances (PFAS) Study – Preliminary Report*.² If GP Toledo would like to propose alternative data to support the PFAS emission estimates, provide supporting justification such as laboratory data.
 - ii. Include emissions of the following TACs: [[OAR 340-247-8010](#) Table 1]
 1. Perfluorinated compounds (PFCs, DEQ ID 489). Include all analytes listed in Table 11, for which data is available^{3,4};
 2. Perfluorooctanesulfonic acid (PFOS, CASRN 1763-23-1); and
 3. Perfluorooctanoic acid (PFOA, CASRN 335-67-1).
 - iii. Provide a table of the physiochemical properties selected and reference for each PFAS to be used in the WATER9 model. DEQ is available to review the list of properties prior to running the WATER9 model. Physiochemical properties for PFAS can be obtained through the following resources. In situations where a range of values are presented for a physiochemical property, the average value should be used.
 1. Interstate Technology Regulatory Council (ITRC) [Data Tables](#).⁵
 2. US EPA [CompTox](#)⁶ Chemicals Dashboard.
 3. In silico prediction of physiochemical properties using a quantum chemical-thermodynamic model, [COSMOtherm](#)⁷. Recent

² EPA. September 2021. "Table 11. Pulp, Paper, and Paperboard Wastewater PFAS Concentrations." *Multi-Industry Per- and Polyfluoroalkyl Substances (PFAS) Study – 2021 Preliminary Report*. (https://www.epa.gov/system/files/documents/2021-09/multi-industry-pfas-study_preliminary-2021-report_508_2021.09.08.pdf)

³ EPA. What are PFCs and How Do They Relate to Per- and Polyfluoroalkyl Substances (PFASs)? (https://19january2017snapshot.epa.gov/pfas/what-are-pfcs-and-how-do-they-relate-and-polyfluoroalkyl-substances-pfass_.html)

⁴ ATSDR. The family tree of perfluoroalkyl and polyfluoroalkyl substances (PFAS) (<https://www.atsdr.cdc.gov/pfas/docs/pfas-familytree-community.pdf>)

⁵ Interstate Technology Regulatory Council. August 2025. "Table 4-1, Physical and Chemical Properties Table." PFAS – Per- and Polyfluoroalkyl Substances Data Tables. (<https://pfas-1.itrcweb.org/external-data-tables/>)

⁶ EPA. October 2025. Comptox Chemicals Dashboard. (<https://comptox.epa.gov/dashboard/>)

⁷ BIOVIA COSMOtherm. (<https://www.3ds.com/products/biovia/cosmo-rs/cosmotherm>)

investigations using COSMOtherm for PFAS have concluded high accuracy of the model compared to experimental data.^{8,9}

2. In a letter dated October 24, 2025, GP Toledo indicated that they will no longer routinely run the **Advanced Materials Recycling System (AMRS)**, also known as the Juno system. In a March 24, 2025, letter DEQ requested GP Toledo perform source testing of the AMRS. GP Toledo requested that DEQ remove the source test requirements for the AMRS with the condition that the AMRS will be run only one additional time. DEQ will remove the request for source testing if GP Toledo meets the following conditions:
 - a. Future operation of AMRS must be limited to one occasion for demonstration purposes exclusively. The operation must occur before June 30, 2026, and will last for no more than three total hours;
 - b. GP Toledo must provide DEQ with at least 14 days' notice of the final operation; and
 - c. GP Toledo must submit to DEQ a permit modification to remove the AMRS from the facility's Title V operating permit within 60 days following the final operation of AMRS or by August 29, 2026, if no final operation of AMRS is performed.

Please submit the information specified below by **60 days** after the issuance date of this letter, **May 29, 2026**.

3. Provide a revised **Process Flow Diagram (PFD)** that includes the following updates and revisions:
 - a. Figure 1: Update the TEU ID(s) for "Washers Nos. 1-3" to "EU128A to C" or similar.
 - b. Figure 2: Revise the Green Liquor System TEU ID(s) to match the information in the Inventory. The PFD has EU101-A to D, while the Inventory includes only EU101-A through C.
 - c. Figure 3: This figure indicates Power Boiler No. 4 (EU11) emits to an ESP, however, the Inventory notes that the ESP is not in use. Revise to reflect the actual configuration.
4. Provide a revised **CAO Emissions Inventory AQ520 form** that includes the following updates and revisions:
 - a. Any updates needed to reflect updated emissions estimates as a result of satisfying the Specific Comments 5 through 7, below.
 - b. The following TEUs have emission type listed as 100% point through various stacks in Worksheet 2 of the Inventory. However, as indicated in GP Toledo's October 24, 2025, letter, a part of these emissions will be emitted as fugitives into the general building instead of being directly vented through a stack. Update the Inventory to account for this fugitive percentage of emissions that will not be emitted through a stack for the following TEUs. Each TEU may have an added

⁸ Endo, S., Hammer, J., and Matsuzawa, S. 2023. "Experimental Determination of Air/Water Partition Coefficients for 21 Per- and Polyfluoroalkyl Substances Reveals Variable Performance of Property Prediction Models." *Environmental Science & Technology* 57 (22): 8406-8413. (<https://pubs.acs.org/doi/full/10.1021/acs.est.3c02545>)

⁹ Licul-Kucera, V., van Wezel, A.P., Arp, H.P.H., and ter Laak, T.L. 2025. "Determining the Temperature-Dependent Air–Water Partitioning of Ether- and Thioether-Alcohol Perfluoroalkyl and Polyfluoroalkyl Substances Using a Modified Static Headspace Method." *Environmental Science & Technology* 59 (31): 16513–16520. (<https://pubs.acs.org/doi/10.1021/acs.est.4c11447>)

line in Worksheet 2 of the Inventory, one for point emissions and one for fugitive emissions. The percentage of each should be noted in Column E. GP Toledo must provide supporting justification for the percentages used:

- i. OCC Pulping Plants (EU80 and EU81);
 - ii. Paper Machines 1, 2, and 3 (EU105/106, EU107/108, EU109/110);
 - iii. Leaks in the LVHC lines (see Specific Comment 3.c); and
 - iv. Open storage tanks and chests (see Specific Comment 3.d).
- c. DEQ does not concur with GP Toledo's assessment that leaks from the LVHC lines do not need to be included in the Inventory based on "negligible" emissions. Estimate leaks in the **LVHC lines** using TCEQ APDG 6422 guidance¹⁰ and EPA's Protocol for Equipment Leak Emission Estimates¹¹. GP Toledo may provide an Exempt TEU analysis for this source in accordance with General Comment 6.
- d. DEQ does not concur with GP Toledo's assessment that emissions from the following open storage tanks and/or chests do not need to be included in the Inventory based on "negligible" emissions. Estimate emissions from the following **open storage tanks and/or chests**. For tanks without emission factors, use the tank emission calculations in AP-42 Chapter 7.1. GP Toledo may provide an Exempt TEU analysis for these sources in accordance with General Comment 6.
- i. Mix Tank;
 - ii. Floc Tank;
 - iii. Head Tank;
 - iv. No. 7 High Density (HD) storage tank;
 - v. No. 4 HD storage tank; and
 - vi. Central White Water Tank.
- e. Based on the maintenance welding usage rates presented in supporting tables submitted to DEQ on October 24, 2025, maintenance welding is not an Exempt TEU, and emission estimates must be included in the Inventory. Include maintenance welding emissions as follows:
- i. When preparing the emission estimates, include all toxic air contaminants (TACs) in Table 12.19-2 of AP-42¹²:
 1. For Lincoln5P18 (SMAW 6010) include the following:
 - a. Hexavalent chromium (CASRN 18540-29-9) at 0.001 lb/1,000 lb electrode consumed; and
 - b. Insoluble nickel (DEQ SEQ ID 365) at 0.004 lb/1,000 lb electrode consumed; and
 2. For Lincoln 7018 (SMAW 7018) include the following:

¹⁰ Texas Commission on Environmental Quality. June 2018. "Air Permit Technical Guidance for Chemical Sources Fugitive Guidance."

(<https://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/fugitive-guidance.pdf>)

¹¹ EPA. November 1995. "Protocol for Equipment Leak Emission Estimates."

(https://www.epa.gov/sites/default/files/2020-09/documents/protocol_for_equipment_leak_emission_estimates.pdf)

¹² EPA. January 1995. AP-42 Chapter 12.19 "Electric Arc Welding."
(<https://www.epa.gov/sites/default/files/2020-11/documents/c12s19.pdf>)

- a. Hexavalent chromium (CASRN 18540-29-9) at 55% (per SDAPCD Welding Operations¹³) of 0.006 lb/1,000 lb electrode consumed (the emission factor for Total Chromium);
 - b. Cobalt and compounds (CASRN 7440-48-4) at 0.001 lb/1,000 lb electrode consumed; and
 - c. Insoluble nickel (DEQ SEQ ID 365) at 0.02 lb/1,000 lb electrode consumed.
 - ii. A subset of the maintenance welding may be approved as an Exempt TEU by DEQ if GP Toledo provides supporting documentation showing that usage rates of this subset are below usage thresholds provided by DEQ in the Cleaner Air Oregon Exempt TEU Reporting document¹⁴. In preparing an Exempt TEU analysis, GP Toledo must clearly note the type of welding and include the electrode classification for each electrode included.
5. Provide a revised version of the **“Maintenance Chemical Usage Estimates” table**, submitted to DEQ on October 24, 2025, that includes the updates and revisions required below:
- a. Provide a copy of the “Maintenance Chemical Usage Estimates” table in the native file format (Microsoft Excel).
 - b. Based on usage rates and chemical composition information provided, the maintenance chemical usage exceeds thresholds provided in the Cleaner Air Oregon Exempt TEU Reporting document and emissions from the use of these chemicals must be added to the Inventory. Specifically, emissions from usage of materials containing the following TACs exceed reporting thresholds and therefore emissions of all TACs from maintenance materials containing these TACs must be reported in the Inventory:
 - i. Ethyl benzene (CASRN 100-41-4); and,
 - ii. Diethylene glycol monobutyl ether (CASRN 112-34-5).
 - c. Per General Comment 6, a subset of the maintenance materials may be approved as an Exempt TEU by DEQ if GP Toledo provides supporting documentation showing that usage rates of this subset of materials does not materially contribute to risk.
 - d. The toluene (CASRN 108-88-3) content for the following maintenance materials was mis-labeled as methyl isobutyl ketone; update to fix this discrepancy:
 - i. Promark Alkyd Zone Marking Paint White;
 - ii. Promark Alkyd Zone Marking Paint Yellow; and
 - iii. GP Wash Solvent.
 - e. For GP Wash Solvent, update the toluene percent content. The toluene percent content was reported as 50%; however, the SDS provides a range of 50-70% for toluene in this material. In instances with a range of percentages, CAO allows

¹³ San Diego County Air Pollution Control District. October 16, 1998 (revised July 11, 2022). “Welding Operations.” (<https://www.sdapcd.org/content/dam/sdapcd/documents/permits/emissions-calculation/welding/APCD-Welding-Operations.pdf>)

¹⁴ Oregon DEQ. March 21, 2022. “Cleaner Air Oregon Exempt TEU Reporting.” (<https://www.oregon.gov/deq/aq/cao/Documents/ExemptTEUReporting-Appendices.pdf>)

use of the average percentage or the maximum percentage which would be 60% or 70%, respectively.

- f. The reporting threshold for tetrachloroethylene (CASRN 127-18-4) is listed as 500 pounds per year in GP Toledo's table. Update this to the correct threshold of 100 pounds per year.¹⁴
6. Provide revised versions of the "**Table 1: Maintenance Welding Input Data**" and "**Table 2: Maintenance Welding TAC Emission Estimates**" submitted to DEQ on October 24, 2025, that includes the updates and revisions required below.
 - a. Provide copies of both tables in their native format (Microsoft Excel).
 - b. Update Table 2 to include the electrode classification type and if GP Toledo considers any of the welding activities to be exempt and justification for the proposed exemption.
7. For the **EUSWL** Landfill TEU, provide a copy of the NCASI Technical Bulletin No. 970 referenced. Per General Comment 3, GP Toledo must provide DEQ copies of all references which are otherwise not publicly available.

DEQ is requesting that you submit additional information to complete your Inventory. If you think that any of that information is confidential, trade secret or otherwise exempt from disclosure, in whole or in part, you must comply with the requirements in [OAR 340-214-0130](#) to identify this information. This includes clearly marking each page of the writing with a request for exemption from disclosure and stating the specific statutory provision under which you claim exemption. Emissions data is not exempt from disclosure.

DEQ remains available to discuss this information request with you and answer any questions you may have. Failure to provide additional information, corrections, or updates to DEQ by the deadlines above may result in a violation of [OAR 340-245-0030\(1\)](#).

If you have any questions regarding this letter, please contact me directly (503-407-7596, heather.kuoppamaki@deq.oregon.gov), and I look forward to your continued assistance with this process.

Sincerely,



Heather Kuoppamaki, P.E.
Cleaner Air Oregon Project Manager

Cc: Michael Eisele, DEQ
Amy DeVita McBride, DEQ
J.R. Giska, DEQ
File

Attachments:

DEQ memorandum. February 18, 2026. Subject: Requirements for Compliance Air Monitoring at the Georgia-Pacific Toledo facility.

Memorandum

To: Georgia-Pacific Toledo representatives

From: Oregon DEQ Cleaner Air Oregon

Date: February 18, 2026

Subject: Requirements for Compliance Air Monitoring at the Georgia-Pacific Toledo facility.

DEQ has prepared this memo to summarize concerns with the approach used by the Georgia-Pacific Toledo (GP-Toledo) facility to estimate the hydrogen sulfide (H₂S) emissions from the wastewater treatment ponds (WWTP) at the facility. DEQ is providing these concerns to assist GP Toledo with preparation of an approvable Ambient Air Monitoring Plan (Monitoring Plan) to be developed with the aim of confirming H₂S emission estimates from the WWTP. The Monitoring Plan should include a Quality Assurance Project Plan (QAPP) and H₂S Modeling Procedures (Modeling Procedures). These documents are intended to detail how ambient monitoring concentration data will be collected and used to develop H₂S emission rates from the WWTP. Prior to conducting air monitoring for CAO Risk Assessment purposes; DEQ requires that the concerns outlined in this memo be addressed in a Monitoring Plan submitted to DEQ.

DEQ's current concerns with the previous analysis are primarily related to the monitors and the methodology and are provided below. GP Toledo should address these concerns in the preparation of the Monitoring Plan and supporting documents. To-date, what DEQ has been provided is considered incomplete and DEQ has provided comments on what DEQ has been able to review. DEQ requires more robust analysis for this Monitoring Plan to be approvable; and DEQ will likely have additional comments and feedback when we receive additional information.

At the end of this memo, DEQ has provided links to other pulp and paper facilities conducting similar monitoring. These facilities developed comprehensive QAPPs for the investigations. DEQ recommends GP Toledo review these references when developing a site specific QAPP. DEQ requires the QAPP submitted for the GP Toledo facility to be of a similar level of detail.

Monitor Concerns

1. Monitor Selection

DEQ has concerns about the suitability of the AcruLog H₂S Parts Per Billion Monitors (the monitors) for the intended purpose. These include:

- a. The monitors use an electrochemical sensor which has interferences listed for ammonia, CO, Cl₂, CH₄, H₂, NO, NO₂, SO₂ – if any of these are present at the site, accuracy may be compromised. Typically, ambient air monitors do not use electrochemical sensors and employ a variety of filtering techniques for this reason, to accurately quantify the specific compounds without being affected by interferences.

Cleaner Air Oregon

700 NE Multnomah Street, Suite 600, Portland, OR 97232
503-229-5263, Toll-free in Oregon: 800-452-4011

DEQ's mission is to be a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

- b. The monitors' specifications list high zero drift (10 ppb) characteristics on a daily basis. This is problematic if QA/QC is only performed monthly; measured concentrations could drift significantly between checks and the frequency and magnitude of that drift would not be known without checking, resulting in unknowable accuracy of measurements.
- c. Under typical monitoring programs, monitors are selected with respect to the concentrations of concern for the pollutant being monitored. The chronic noncancer residential Risk-Based Concentration (RBC) for H₂S is 2 micrograms per cubic meter (µg/m³).¹ Therefore, DEQ would expect H₂S monitors to be able to measure concentrations accurately as low as 70 percent of the RBC, or 1.4 parts per billion (ppb). The brochure for the monitors says it records levels of H₂S down to 3 ppb².
- d. Additional information on the low/blank/zero performance of the monitors must be provided and incorporated into the Monitoring Plan.

2. Monitor Placement

DEQ has concerns about the suitability of the proposed monitor placements as presented to DEQ on November 24, 2025 in the "H₂S Monitor locations.pdf" document. These include:

- a. GP Toledo states that the monitor coverage is similar to EPA Method 325A - VOLATILE ORGANIC COMPOUNDS FROM FUGITIVE AND AREA SOURCES (Method 325A) with minor changes. GP Toledo does not detail what these "minor changes" are. Any modifications to method references used should be clearly spelled out in the Monitoring Plan. DEQ is unable to review the applicability of this EPA Method to the project without detailed information on project applicability and changes made for site-specific purposes. Differences between GP Toledo's monitor placement and EPA Method 325A noted by DEQ include:
 - i. GP Toledo is proposing to install fewer monitors than is required in Method 325A for areas of less than or equal to 750 acres per Section 8.2.2.2.1.³ Method 325A requires a minimum of 12 monitors, approximately every 30 degrees from center. GP Toledo proposes 8 monitors, approximately every 45 degrees from center.
 - ii. Method 325A requires specific meteorological data be collected either by an on-site meteorological station that follows calibration and standardization procedures in EPA 454/B-08-002 or a National Weather Service meteorological station within 40 kilometers of the facility. GP Toledo has used meteorological data collected from an on-site station located on the other side of the mill. The suitability of this data was not documented and the data from this station may not meet project objectives.
 - iii. GP does not address use of duplicate monitors. Section 8.5 of Method 325A discusses the requirement for co-located/duplicate sampling assemblies.
- b. The provided wind rose analysis was insufficient to support the placement of the new monitor locations. GP Toledo provided aerial images which included an overlay of GP Toledo's wind rose (prepared for previous AERMOD modeling efforts) and the locations of the new monitoring locations. GP Toledo did not include a discussion of the wind rose analysis conducted. GP Toledo should also consider seasonal changes in their wind rose to ensure appropriate coverage around the WWTP throughout the year.
- c. Based on the current wind rose analysis, DEQ believes the location of the new monitor at the SE corner of Treatment Pond A ("Treatment Point Acrulog Sensor") is poorly located with consideration of dominant wind directions.

¹ OAR 340-245-8010 Table 2. <https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=283416>

² Acrulog, "Acrulog H₂S Parts Per Billion Monitor." <https://www.acrulog.com/wp-content/uploads/2024/07/Acrulog-PPB-Logger-Brochure.pdf>

³ EPA. January 14, 2019. "Method 325a—Volatile Organic Compounds from Fugitive and Area Sources." https://www.epa.gov/sites/default/files/2019-08/documents/method_325a.pdf

- d. DEQ will require GP Toledo to include at minimum one or two additional downwind offsite monitor locations to confirm that the perimeter monitors are capturing emissions and that receptors are not adversely affected.

3. Monitor QA/QC

DEQ has concerns with both: (1) the lack of a Quality Assurance and Quality Control (QA/QC) program when collecting historic H₂S data used in GP Toledo's previous WWTP H₂S estimates; and (2) insufficiencies in the proposed QA/QC plan for future data collection as presented to DEQ on November 24, 2025, in the "Acrulog Masen QA QC Program.pdf" document.

- a. Historic data collection:
 - i. GP Toledo has not provided field notes or any other form of confirmation that QA/QC was conducted during the historic (2021-2023) H₂S monitoring.
 - ii. One of the monitors (Loc 4, 1100410019) included in the analysis has only "0" readings throughout the time period. Given this monitor is located adjacent to the ponds, this repeated reading indicates a potential malfunction in the monitor, which was not addressed or commented on.
 - iii. There were instances of readings repeating over multiple time periods (even days) at an individual monitor. This is indicative of data quality issues or instrumentation not suited for the intended task, as ambient air concentrations typically vary on a minute-to-minute basis, even when the compound in question is present at a regional scale.
- b. Future data collection QA/QC:
 - i. The QA/QC plan should include more information on the sampling intervals. The sampling intervals are listed as 10-minute but does not detail if this equates to one sample per 10 minutes or continuous data averaged over 10 minutes. DEQ was not able to confirm which was the correct sampling interval. Information on sampling intervals must be clearly articulated in the Monitoring Plan.
 - ii. DEQ has concerns regarding the use of 20% of gas standard as acceptable performance. Typical recommendations include a percentage **or** absolute value such as 15% **or** 2 ppb.
 - iii. The QA/QC plan notes that corrective action is triggered if acceptance criteria is not met; the corrective action listed is another response test and device calibration. Additional information is not provided on what happens to the data – e.g., is the data discarded to the last passing test?
 - iv. The QA/QC plan does not address how bias and precision for these monitors is assessed over the measurement period.
 - v. The QA/QC plan does not provide sufficient information on what the actual MDL or lower detectable level is for the instruments. The MDL or lower detectable levels of monitors used must meet the project objectives.
 - vi. The QA/QC plan does not establish how data are stored and maintained. Information regarding how data is obtained from the monitors, stored, and maintained must be established.
 - vii. The monthly single-point response tests at 50 ppb does not address the overall problem of zero drift. The QA/QC plan should quantify expected/normal zero drift since the manual/specs describes it as 10 ppb per day.
 - viii. The QA/QC plan does not provide information on QA/QC documentation. At a minimum, the following should be documented as part of regular QA/QC:
 - 1. Comprehensive calibration records, including multipoint checks and records of standards used to perform calibrations and checks;
 - 2. Complete records of span tests;
 - 3. Instrumentation down time; and

- 4. Notes about instrument repair and maintenance.
- ix. The QA/QC plan does not provide information about data validation; how data will be reviewed/analyzed and validated for accuracy after collection.
- x. Given the lack of needed detail in QA/QC plans to date, DEQ requires a comprehensive Quality Assurance Project Plan (QAPP), in line with EPA requirements for similar sampling and monitoring work undertaken by other GP facilities or other similar facilities in the past.

NCASI method

DEQ has concerns about the NCASI method used to estimate H₂S emissions from the WWTP – primarily, the lack of detail provided by NCASI to support the use of the method. Information on the NCASI method was provided in a memo from NCASI (“GP Toledo - H₂S Emission Estimates - 2023.docx”, the memo) and a copy of NCASI’s calculations workbook (“GP Toledo - H₂S Emission Estimates - All 2023.xlsx”). Both of these documents were provided to DEQ in GP Toledo’s May 6, 2024, emissions inventory submittal. DEQ staff has reviewed these documents, along with NCASI’s Technical Bulletins (TBs) 956 and 957, and lacking a thorough documentation of the calculations methodology from GP, has had to infer the calculation methodology based on this, with no way to confirm assumptions and methodologies. DEQ will require GP Toledo to submit a detailed documentation of the proposed calculations methodology for review and DEQ will likely have additional comments on the NCASI method at this time. DEQ’s initial comments include:

1. General concerns

- a. The maximum cross-wind distance is listed as 600 meters. Based on DEQ estimates the maximum distance is closer to 650 meters.
- b. DEQ has significant concerns about the vertical concentration profile used in the analysis.
 - i. The average “b” value is obtained from NCASI Technical Bulletin (TB) 956. The “b” value is listed in NCASI TB 956 as 3.9 with a standard deviation of 1.8. In NCASI TB 956 Table 6.19, a range of estimated H₂S emissions is provided varying the “b” value to plus or minus one standard deviation. For a single run, this variation of the “b” value results in a range of H₂S emission estimates between 0.77 to 1.83 g/s. This is a significant variation and does not appear to meet the project objective of reducing uncertainty in estimating H₂S emissions.
 - ii. All reference documents should be submitted as well if they are not publicly available. DEQ was unable to locate a copy of the “Esplin 1989” report referenced in NCASI TB 956.
- c. DEQ noted numerous inconsistencies between the data provided in the memo and the actual analysis done as presented in the calculations workbook.
 - i. The memo states concentrations were measured in 10-minute intervals. Data in the workbook are recorded in 15-minute intervals.
 - ii. Date ranges for the analysis included in the memo are inconsistent and differ from the date range shown in the calculations workbook. The memo says emissions were estimated for “January to December 2023” but elsewhere the date range is reported as “October 2021 to December 2023.” The calculations workbook includes data for only the period of 1/30/2023 through 11/12/2023.
 - iii. Memo says data compilation resulted in “~55,000 discrete time blocks”, however DEQ was provided data with ~22,000 time blocks that were then screened to removed approximately 13,500 time blocks.
 - iv. The memo indicates there was some designation of a “downwind” monitor for data analysis purposes. However, data provided shows a wind direction of 0 at all time stamps. It does not appear that directionality was included in the final analysis.

2. Data Screening

- a. The memo does not provide rationale for excluding periods with rain. DEQ is unaware of any reason that rainy periods should be excluded from this analysis. In fact, the highest measurable value from “Loc 2” was during a period of rain.
 - i. The memo does not provide rationale for not generating an emission estimate for periods of “unstable wind conditions”.
 - ii. The memo does not provide criteria for establishing what conditions qualify as “unstable wind conditions”.
 - iii. The memo states that no emissions were calculated for periods without monitored H₂S concentrations at any of the analyzed monitors. Additional documentation of how to deal with non-detects should be provided given the limitations of the analyzer being used.

3. Data Validation and Verification

- a. One of the monitors (Loc 4, 1100410019) included in the analysis has only “0” readings throughout the time period. Given this monitor is located adjacent to the ponds, this repeated reading indicates a potential malfunction in the monitor.
- b. There were instances of readings repeating over multiple time periods (even days) at an individual. This is indicative of data quality issues or instrumentation not suited for the intended task.
- c. H₂S concentrations up to 2,500 ppb were reported in the data set. According to the documentation on the Acrulog H₂S Parts Per Billion Monitors have a measurement range of 0-2,000 ppb. Therefore, the monitors may not accurately report some of the highest H₂S concentrations from the ponds.
- d. The Acrulog monitor brochure states the monitor records as low as 3 ppb. The Residential chronic noncancer risk-based concentration (RBC) for H₂S is 2 ug/m³ (~1.4 ppb), therefore, DEQ is concerned with concentrations of H₂S below 3 ppb. The memo does not provide methodology for accurately capturing these lower and non-detect concentrations.

4. Pasquill Stability Classification

- a. NCASI uses the Pasquill Stability Classification methodology to assign stability classes. The analysis done by NCASI assigns stability class based on the time of day, the wind speed at 2 meters, and whether there was rain during that time block. Based on review of the NCASI following criteria are used to assign classification based:
 - i. Rain = if any precipitation;
 - ii. A = if “High” radiation and wind speed at 2 meters (U₂) is less than or equal to 5 m/s;
 - iii. B = if “Low” radiation and U₂ is less than or equal to 3 m/s;
 - iv. C = if “High” radiation and U₂ is greater than 5 m/s;
 - v. D = if “Low” radiation and U₂ is greater than 3 m/s or if “Night” and U₂ greater than 5 m/s; and
 - vi. E = if “Night” and U₂ less than or equal to 5 m/s.
- b. Stability classification is used to calculate other parameters used in the emissions estimates.
- c. No emissions rates are calculated for periods assigned as “Rain.”
- d. No emission rates are calculated for “unstable” periods which have an A or B classification. However, the analysis seems to preferentially assign A and B classifications.

- i. Information on NOAA's webpage⁴ indicates that wind speeds for A and B assignment are lower than used by NCASI which would result in more A and B assignments using NCASI's criteria.
- ii. NOAA also indicates that the "neutral category D should also be used, regardless of wind speed, for overcast conditions during day or night and for any sky conditions during the hour preceding or following night as defined above."⁴ Including these criteria in the stability analysis would result in less assignment of B stability and therefore more data being included in the analysis.
- iii. This analysis relies heavily on solar radiation information which in NCASI's workbook is based exclusively on the time of day (i.e., no basis on actual weather conditions at the site) with no consideration to seasonal variations in daylight hours. This also assumes every day has 3.5 hours of high radiation, which given the location From NCASI's analysis the following is the solar radiation assignment criteria:
 1. Night = Time stamps between 1 pm and 2:30 am
 2. Low = Time stamp between 2:45 am and 5:45 am & 9:45 am and 12:45 pm
 3. High = Time stamp between 6 am and 9:30 am
- iv. Conditions set by NCASI assigns time blocks to the higher stability class when a condition is between classes.
- v. From the review of TB 956, stability classification should be based on the wind speed at 10 meters, which is higher than wind speed at 2 meters. Since stability increases with wind speed, these assumptions would favor assignment to a less stable class.

5. "Downwind" monitor selection

- a. The memo from NCASI presented four options to determine a representative ground level concentration:
 - i. Option "a" is to use the downwind monitor. NCASI stated that "this approach resulted in a large number of discarded time blocks due to monitor downtime or due to periods where the wind direction fell between monitors". DEQ is concerned that the use of 3 monitors would result in significant maximum concentrations not being detected; this is confirmed here.
 - ii. Option "b" is to use the maximum perimeter monitor concentration.
 - iii. Option "c" is to use the average monitor concentration from the three perimeter monitors. NCASI selected this option without justification. However, based on a review of the calculations workbook provided, it appears that the maximum of these concentrations was used.
 - iv. Option "d" is to use the middle monitor for all time blocks. NCASI states here that this monitor generally recorded the highest concentrations.
- b. The analysis did not use the monitor in the center of the ponds, even though it frequently had the highest concentration.
- c. The memo states concentrations were collected at nine locations. Only 3 were used. Further, only data on the 3 monitors used were provided to DEQ.

6. Results

- a. NCASI states that the "individual daily emission estimates for a given period were ranked and an outlier test was applied to the dataset." No additional information or justification was provided for this. NCASI states they use the 99th percentile daily emission rate. DEQ requires use of the maximum daily emission rate; no statistical treatment is allowed. Additionally, given the small number of monitors the coverage of the permitter is limited and likely not capturing the highest concentration at the monitors.

⁴ NOAA. Pasquill Stability Classes (May 12, 2025). <https://www.ready.noaa.gov/READYpgclass.php>

- b. The NCASI memo provides concentration ranges for the “downwind monitor.” However, NCASI has not provided any downwind analysis to DEQ and based on information provided to DEQ, no wind direction was recorded during the time blocks analyzed.
- c. NCASI has not provided supporting justification for all the parameters used in the calculations. DEQ was able to associate most of the calculations with the NCASI data, but the full approach with assumptions, justifications, and rationale, must be provided.

Other H₂S studies

1. Hydrogen Sulfide monitoring at Georgia-Pacific in Crossett, Arkansas:

Ambient air monitoring for hydrogen sulfide was conducted at the Georgia-Pacific facility in Crossett, Arkansas. The monitoring consisted of continuous air monitors and passive air monitoring on the facility grounds and in the nearby community.

- ADEQ website: https://www.adeg.state.ar.us/air/compliance/georgia_pacific.aspx
- EPA website: <https://www.epa.gov/ar/crossett-hydrogen-sulfide-air-sampling-report>
- QAPP: https://www.epa.gov/sites/default/files/2017-12/documents/appendix_b-epa_hydrogen_sulfide_monitoring_qapp.pdf

2. Hydrogen Sulfide monitoring in South and North Carolina

Ambient air monitoring in the Rock Hill, South Carolina area was conducted by EPA in response to odor complaints associated with the New Indy Containerboard pulp and paper mill.

- EPA website: https://response.epa.gov/site/site_profile.aspx?site_id=15198
- New-Indy website: <https://newindycatawba.com/#daily-reporting>
- SC Department of Environmental Services website: <https://www.des.sc.gov/community/community-engagement/environmental-sites-projects/new-indy-catawba>
- On-site QAPP: https://response.epa.gov/sites/15198/files/New-Indy_H2S_Onsite%20Monitoring%20QAPP_%20Version%202.2_2022-1031%20EPA%20APPROVED.pdf

Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age, sex, religion, sexual orientation, gender identity, or marital status in the administration of its programs and activities. For translations or alternate formats, visit DEQ's [Civil Rights and Environmental Justice page](#).