



Oregon

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Sent electronically only

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Microchip Technology Incorporated (Microchip) in Gresham, OR submitted a Cleaner Air Oregon (CAO) Emissions Inventory (the Inventory) to DEQ on December 23, 2025 (Your DEQ Online [YDO] submittal 69889). DEQ has completed an initial review, and in accordance with [Oregon Administrative Rule \(OAR\) 340-245-0030\(2\)](#), has determined that the following additional information, corrections, and updates are required to be submitted by **60** days after the issuance date of this letter, or **May 26, 2026**.

General Comments

Microchip's Inventory currently indicates that for the "Semiconductor Fab" Toxics Emissions Unit (TEU), each Toxics Emissions Sub-Unit (TESU) may emit Toxic Air Contaminants (TACs) through a combination of several stacks. Typically, DEQ requires emissions to be split into the appropriate individual emission points at the Inventory stage in order to facilitate future recordkeeping and modeling review. However, based on discussion during DEQ's site visit at Microchip on February 12, 2026, DEQ understands that Microchip currently expects to model process emissions conservatively by assuming all TACs from each TESU are emitted through the worst-case listed stack for that TESU. Based on this approach, DEQ is not requiring emissions to be split into individual emission points at this time. DEQ may reevaluate the need for this analysis at the Modeling Protocol review stage of the CAO process, depending on the modeling strategy Microchip proposes.

The supporting documentation file "Microchip Gresham CAO EI Workbook v1.0" ("EI Workbook") contains calculations related to criteria pollutants and other compounds that are not listed TACs. [[OAR 340-247-8010 Table 1](#)] DEQ has not reviewed non-TAC calculations as they will not be addressed in the CAO review process.

Specific Comments

Submit to DEQ a revised AQ520 Inventory Form, along with all supporting calculations in Excel format and all information required under [OAR 340-245-0040\(4\)](#). Include the following updates to the AQ520 and supporting calculations:

1. **TEU IDs:** Update the Toxics Emission unit (TEU) ID and Toxics Emissions Sub-Unit (TESU) IDs on Worksheet 2 of the AQ520 form as follows, for consistency with the current air permit and to facilitate future emissions tracking:
 - a. TEU "Building 1 Boilers NG", with TESUs "B1", "B2", "B3", "B7", and "B8";
 - b. TEU "Building 2 Boilers NG", with TESUs "B4", "B5", and "B6";
 - c. TEU "Building 1 Boilers Diesel", with TESUs "B1", "B2", "B3", "B7", and "B8";

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- d. TEU “Building 2 Boilers Diesel”, with TESUs “B4”, “B5”, and “B6”;
 - e. TEU “Building 1 Generators Diesel”, with TESUs “Emergency Generator 1” and “Emergency Generator 2”; and
 - f. TEU “Building 2 Generators Diesel”, with TESUs “Emergency Generator 3”, “Emergency Generator 4”, and “Emergency Generator 5”.
2. Diesel Boilers (TEU “Boilers”, TESUs including “Diesel”):
 - a. On Worksheet 2 of the AQ520 form, update both “Is Requested PTE Capacity” columns to “No”, because the requested potential to emit (PTE) is based on 8 hours per day and 24 hours per year of operation;
 - b. Provide manufacturer’s documentation of the maximum fuel flow rate of 63.55 gallons per hour for the two newest boilers (Boilers 4 and 5 in Fab 4-1); and
 - c. Remove emissions for benzo(a)pyrene (CASRN 50-32-8) from the Inventory, because it is applicable to internal combustion diesel engines rather than external combustion diesel engines.¹
 3. Emergency Generators (TEU “Emergency Generators”) and Fire Pump (TEU “Fire Pump”):
 - a. On Worksheet 2 of the AQ520 form, update both “Is Requested PTE Capacity” columns to “No”, because the requested potential to emit (PTE) is based on 8 hours per day and 30 hours per year of operation; and
 - b. Include all toxic air contaminants with emission factors in Worksheet 3 of the AQ520 form. Currently only 23 of the 34 total TACs listed in Table 4 of the EI Workbook are included for each engine.
 - c. For cold start emissions, incorporate the “Emission Ratio on Hourly Basis” for CO and Formaldehyde (0.064) into the calculations for formaldehyde (CASRN 50-00-0) – currently all TACs are using the “PM and Organics” ratio of 0.054.
 - d. To facilitate recordkeeping of emission factors, update the AQ520 form as follows:
 - i. In the “EF Value” column, list the exact emission factor from the cited reference, instead of adjusting the emission factor to include cold start emissions;
 - ii. Maintain the values in the “Calculated Emissions” column as they are (that is, including cold start emissions; the default emissions calculation will not give an exact match for emissions in columns, so the emissions can be hard-coded in these cells); and
 - iii. Update the “Reference/Note” column to indicate the emissions include cold starts but the emission factors have not been adjusted.
 - e. Provide manufacturer’s specifications documenting the “100% fuel consumption rate” used in Table 16 of the EI Workbook.
 - f. In Table 16 of the EI Workbook, update the header for the Max Daily Fuel Usage column to be units of thousand gallons per day (Mgal/day).
 4. RCTOs (TEU “RCTOs):
 - a. On Worksheet 2, estimate actual usage for each of the RCTOs that operated in 2024 rather than assigning all usage to RCTO 1;
 - b. Include benzo(a)pyrene (CASRN 50-32-8) in the Inventory using an emission factor of $1.2E^{-6}$ lb/MMscf;² and

¹ DEQ will be updating the AQ104B Toxics Reporting Combustion Emission Factor Search Tool to remove this emission factor from the list.

² AP-42, Table 1.4-3, “Emission Factors for Speciated Organic Compounds from Natural Gas Combustion”. https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf [Accessed February 6, 2026]

- c. Based on discussion during DEQ’s site visit at Microchip on February 12, 2026, DEQ understands that Microchip no longer requires the RCTOs to have the flexibility to combust propane in addition to natural gas, as is permitted by Addendum R-02 of Standard ACDP 26-3240-ST-01. Please confirm this, or include RCTO propane usage in the Inventory.
5. Point of use (POU) abatement devices (natural gas usage): Footnote (2) in Table 4 of the EI Workbook indicates that POU abatement device emissions are included with boiler emissions; however, the POU abatement device natural gas activity has not been included in the requested PTE, which is noted to be at capacity in the Inventory.
- a. Resolve this discrepancy by either including the POU abatement device activity in the activity calculation, separating the POU abatement devices into a new TEU, or updating the “Is Requested PTE Capacity?” to “No”;
 - b. DEQ understands that emissions from the POU abatement devices are exhausted through the scrubber or RCTO stacks. Assuming that emissions exhaust through the boiler stacks for the purposes of the risk assessment will be acceptable only if the risk assessment modeling demonstrates that the boiler release points are worst-case relative to the actual release points:
 - i. In the event that the boilers are not the worst-case release points, the Inventory will need to be updated to estimate the emissions for POU devices separately as a new TEU using the correct release points.
 - ii. If the POU devices will be retained as part of the “Boilers” TEU, update the TEU description to note that POU device natural gas emissions are also included.³
6. Process Emissions (TEU “Semiconductor Fab”):
- a. POU abatement devices: Provide a list of all POU abatement devices serving process exhaust streams, including:
 - i. Abatement device ID;
 - ii. Process served (for example: Dry Etch or Chemical Vapor Deposition);
 - iii. Type of abatement (for example: wet scrubbing, thermal combustion);
 - iv. TAC-specific justification for each DRE used (for example, engineering test data or published reference); and
 - v. Any uptime assumptions used.
 - b. Centralized control units:
 - i. Provide justification for each of the scrubber control efficiencies used in Tables 1, 2, and 3 of the EI Workbook. Justification may include stack test data, published references, or engineering calculations.
 - ii. Provide a current copy of Microchip’s Operation & Maintenance Plan, which is required by Condition 4.1 of the Air Contaminant Discharge Permit (Permit Number 26-3240-ST-01).
 - c. Emission factor assumptions: Several utilization factors, emission factors, and destruction and removal efficiencies (DREs) in the Emission Factor Documentation are assumed without citation or supporting documentation. For each item listed in Table 1 of Attachment A, provide justification such as:
 - i. Tool specifications documenting reaction assumptions;
 - ii. Stack testing data;
 - iii. Published industry ranges; and
 - iv. Engineering basis for the assumption.

³ Alternatively, if the POU abatement device natural gas emissions meet the criteria for an exempt TEU under OAR 340-245-0060(3)(a) or (b)(B), Microchip may provide justification for exemption (such as a Level 1 Risk Assessment analysis, or emissions calculations if categorically exempt).

- d. Chemical composition: Provide the following chemical composition information and updates:
- i. Provide the Specific Safety Data Sheets (SDSs) requested in Table 2a of Attachment A;
 - ii. Provide SDSs for all chemicals used in the wafer fabrication process, regardless of whether they include TACs (for example, “SF-10” and “FC-40” which are listed in the 2024 Annual Report);
 - iii. Update the Inventory to include all TACs and to use accurate weight percentages, as specified in Tables 2b and 2c of Attachment A; and
 - iv. Provide documentation of all proprietary or trade secret chemicals, including but not limited to those listed in Table 2d of Attachment A, and include them in the Inventory if they are TACs. Documentation may include:
 1. Identification of the specific chemicals, which may be submitted as Confidential Business Information if the information complies with the requirements in [OAR 340-214-0130](#); or
 2. A statement from the manufacturer guaranteeing that the proprietary components listed are not included in the Priority Toxic Air Contaminant List in [OAR 340-247-8010](#) Table 1, including as part of a chemical category (for example, the Perfluorinated compounds (PFCs) category [DEQ ID 489] or any of several metal “and compounds” categories).
- e. Capture and Exhaust Routing:
- i. Clarify the exhaust routing for chemical part number "01000-064292, 01000-068780": hydrogen fluoride from this chemical is routed to the general acid scrubber while nitric acid is routed to the nitric acid scrubber;
 - ii. Clarify the exhaust routing for “50:1 BOE Use” and “7:1 BOE Use”: in the AQ520 form, the process is split between two different stacks: ammonia emissions are sent to the ammonia scrubber and hydrogen fluoride emissions are sent to the acid scrubber.
 - iii. Confirm that any processes that are routed to general building exhaust rather than a control device are designated as such in the “Stack or Fugitive ID” column in Worksheet 2 of the AQ520;
 - iv. Clarify the exhaust routing for the following processes – Worksheet 2 indicates these exhaust to the RCTOs, but no control efficiency is applied in the calculations:
 1. Ethylene Glycol Use;
 2. Methanol Use; and
 3. Acetone Use; and
 - v. Source tests indicate that some hydrogen fluoride (CASRN 7664-39-3) is emitted through the nitric acid scrubber, but in the Inventory all hydrogen fluoride emissions are routed through the acid scrubbers. Update the Inventory and documentation to either:
 1. Identify where emissions of hydrogen fluoride and fluorides may be routed to the nitric acid scrubber; or
 2. Indicate how the emissions will be modeled conservatively (for example, through a worst-case overall scrubber stack).
- f. For the TESUs “Hexafluoroethane Use”, “Nitrogen Trifluoride Use (Process 1)”, “Nitrogen Trifluoride Use (Process 2)”, “Octafluoropropane Use”, and

“Tetrafluoromethane (CF₄) (Process 1)”: clarify the POU abatement process or processes for these units:

- i. The EI Workbook calculations include HF resulting from the abatement of C₂F₆, C₃F₈ and CF₄; however, the EI workbook lists “0 percent” in the “POU Removal” column for C₂F₆ and CF₄.
- ii. Describe the type(s) of abatement and, if multiple abatement steps are used, their sequence.
- g. TESU “Sulfuric Acid Use” combines usage for two processes with different Centralized Control Efficiencies listed in the EI Workbook: one process (Part Number “Sulfuric Acid 93% - Facilities”) does not include any controls, and the other (Part number “01000-060051, 01000-063920”) includes 40 percent control:
 - i. Clarify which processes this chemical is used in; and
 - ii. Either confirm all emissions are routed to acid scrubbers or update the Inventory to separate these processes into multiple TESUs.
- h. For TESUs “Hydrofluoric Acid Wk Soln Use” and “Hydrofluoric Acid 49% Soln Use”, the Requested PTE in Worksheet 2 of the AQ520 represents the weight of hydrofluoric acid used rather than the weight of the solution used – update the TESU ID [for example, to “Hydrofluoric Acid Wk Soln Use (as HF)” or similar] to clarify.
- i. Update the Reference/Notes column for the “Fluorides” TESU to include the date of the source test or source tests used to develop the emission factor.
- j. For the “Semiconductor Fab” TEU, update the “Is PTE Requested Capacity?” column to “No”, or provide documentation that the requested PTE represents the maximum physical and operational design of the equipment.⁴ [[OAR 340-200-0020\(20\)](#)]
- k. Ensure that the actual 2024 usage is consistent with the 2024 Annual Report for the following TESUs:
 - i. 50:1 BOE Use (NH₃ Emissions) and 50:1 BOE Use (HF Emissions): The annual report lists 12,106 pounds and the Inventory lists 59,412 pounds;
 - ii. 7:1 BOE Use (NH₃ Emissions) and 7:1 BOE Use (HF Emissions): The annual report lists 57,629 pounds and the Inventory total is 12,142 pounds);
 - iii. Boron trifluoride Use: The annual report lists 29 pounds received and 27 pounds used, and the Inventory lists 16.6 pounds;
 - iv. Difluoromethane Use: Including the "CH₂F₂ (70 lb)" row, the annual report lists 420 pounds received and used, and the Inventory lists 16.6 pounds; and
 - v. Trifluoromethane Use: Including the "CHF₃ (70 lbs)" row, the annual report lists 446 pounds received and 408 pounds used, and the Inventory lists 376 pounds.
7. Hydrogen Chloride Tank (TESU “HCl Storage Tank”):
 - a. In the Worksheet 2 of the AQ520, update the Units Description/Type to specify the throughput provided is for the HCl solution (31 percent aqueous HCl);
 - b. Currently the daily Requested PTE throughput is calculated as the annual throughput divided by 365 – please update to reflect the maximum volume that the tank could be filled with in a day (conservatively, this would be the tank capacity);

⁴ Capacity may be difficult or impossible to assess for these complex processes, and a capacity determination may not impact permitting outcomes. This column is generally used in the CAO program to indicate a source is being evaluated for *de minimis* status, which requires that a source have risk below the Source Permit Level Risk Action Level while operating at capacity for *all* TEUs. If Microchip is not seeking a *de minimis* source determination, answering “No” here is preferred.

- c. Update the emission factor and EI Workbook calculations to use partial pressure of 60 millimeters of mercury for HCl in a 32 percent aqueous solution at 35 degrees Celsius (Reference: Perry's Chemical Engineers' Handbook, 7th Ed., Table 2-10 "Partial Pressure of HCl over Aqueous Solutions of HCl"); and
 - d. The EI Workbook includes a 60 percent scrubber control but this is not reflected in the AQ520 form – please update either the Workbook or the AQ520 for consistency.
8. Wastewater Treatment: Include any non-categorically exempt TAC emissions from wastewater treatment in the Inventory. The following are exempt under [OAR 340-245-0060\(3\)\(b\)\(DD\)](#): “emissions from wastewater discharges to publicly owned treatment works (POTW) provided the source is authorized to discharge to the POTW, not including on-site wastewater treatment and/or holding facilities.” At a minimum, include the following supporting documentation:
- a. Description of the on-site wastewater treatment system processes, including a process flow diagram;
 - b. Maximum annual and daily throughput volumes;
 - c. Any available analytical data (TAC concentrations, pH, temperature, etc.); and
 - d. Supporting documentation of engineering calculations and assumptions used to derive emissions estimates.
9. Exempt TEUs:
- a. To confirm the Exempt TEU status of the Ultra Pure Water System, provide documentation demonstrating that:
 - i. The proprietary chemicals listed in the Safety Data Sheets are not listed TACs; or
 - ii. The system does not have potential for emissions of TACs to the atmosphere; or
 - iii. Emissions of TACs do not materially contribute to risk.
 - b. Cooling Towers: Update Table 2 of Attachment 4, which incorrectly indicates that sodium hydroxide (CASRN 1310-73-2) is not “Present on Oregon DEQ List of Reportable Chemicals.” Sodium hydroxide is on the Priority Toxic Air Contaminant List [[OAR 340-247-8010 Table 1](#)]. Sodium hydroxide is not expected to be emitted at a typical cooling tower operating pH, so the cooling towers may still be considered Exempt TEUs.
 - c. Welding: DEQ’s exemption thresholds are based on annual usage of welding materials and assume that the usage is distributed over the year. The Inventory currently lists a maximum daily requested PTE of 40 pounds per day for each welding rod – at this rate, welding would not be exempt. Please provide a more accurate daily maximum usage for welding activities (a value of three pounds per day or lower for both rod types combined could be considered exempt without further justification).
 - d. The Emission Factor Documentation notes that it does not include “Facilities chemicals, lab chemicals and other small use chemicals ... which are usually considered insignificant and trivial activities” – confirm that justification for exemption for all such chemical use has been included in Attachment 4, or include additional justification if needed.
 - e. Include the following as Exempt TEUs on the AQ520 form – only columns A and C on Worksheet 2 need to be completed for Exempt TEUs and emissions calculations are not required:
 - i. Welding: Include TEU description "Exempt TEU - 40 lb/yr SMAW E6010 and 40 lb/yr SMAW E7018";
 - ii. Cooling Towers: Include TEU description “Exempt TEU”;
 - iii. Ultra Pure Water System: Include TEU description “Exempt TEU” (pending DEQ approval per Item 6.a above); and

- iv. Any onsite diesel tanks: Include TEU description “Exempt TEU” and indicate the tank capacity and maximum annual throughput.

DEQ requests that you submit additional information to complete your Emissions 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 and answer any questions you may have. Failure to provide additional information, corrections, or updates to DEQ by the deadlines in this letter may result in a violation of [OAR 340-245-0030\(2\)](#).

If you have any questions regarding this letter please contact me directly at 503-866-9643 or julia.degagne@deq.oregon.gov. I look forward to your continued assistance with this process.

Sincerely,



Julia DeGagné
Cleaner Air Oregon Project Engineer

Enc: Confidential Business Information Attachment A: Comment Details containing Confidential Business Information
Public Attachment A: Comment Details containing Confidential Business Information [Redacted]

Cc: Weston Li, DEQ
J.R. Giska, DEQ
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