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The Boeing Company
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Sent electronically only

Russell Bardwell,

DEQ received the submittal of the Cleaner Air Oregon (CAO) Emissions Inventory (Inventory) for The Boeing Company (Boeing) in Portland, OR on May 29, 2025, and has completed an initial review. In accordance with Oregon Administrative Rule (OAR) 340-245-0030(2), DEQ 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 **November 14, 2025**:

General Comments

1. Actual Emissions: Per OAR 340-245-0040(4)(a)(B)(i)(I), existing sources are required to submit actual annual and maximum daily production activities and usage for the calendar year preceding the DEQ call in. Boeing is not required to submit emissions estimates for these "actual" activity levels and these may be omitted from the revised Inventory requested under Specific Comment 9.
2. Crystalline Silica: The CAS registry number (CASRN) of 7631-86-9 is for silica of both amorphous and crystalline form. However, currently, only crystalline silica (of respirable size) is a listed toxic air contaminant (TAC). The following silica materials are of the crystalline form: quartz (CASRN 14808-60-7), cristobalite (CASRN 14464-46-1), and tridymite (CASRN 15468-32-3). Materials under these CASRNs should be evaluated as crystalline silica and are reportable as "silica, crystalline (respirable)" (CASRN 7631-86-9) for CAO. DEQ has reviewed Safety Data Sheets (SDSs) for materials used at Boeing and found multiple materials which contain crystalline silica. DEQ has addressed required updates to the Inventory or supporting calculations in the proceeding "Specific Comments" section.
3. Short-term variability: Boeing has assumed the average annual in estimating maximum daily throughput or usage rate for the PTE basis. DEQ requires modeling of the worst-case maximum daily emissions for acute risk – provide documentation supporting the development of the maximum daily throughputs and usage rates.

Specific Comments

1. **Process Flow Diagrams:** Provide a copy of the facility's process flow diagram which meets the requirements of OAR 340-245-0040(4)(b)(C)(i).
2. **SDSs**:
    a. Provide SDSs for all miscellaneous materials used at your facility which are included as the TEU-FW-MISC TEU.
    b. Provide SDSs for all materials used at the Degreasing TEU.

c. Provide updated SDSs for the following coating materials as the SDSs provided with the May 29, 2025, submittal may be out of date:
    i. H.S. Gloss Red/BAC101 (Boeing Code 92827); and
    ii. ERTHGRD HS PU White BAC 702 (Boeing Code 96590).
d. Provide SDSs for all cooling tower chemicals.
e. Provide SDS(s) for penetrant dye(s) used at FPI line.

3. **Environmental Data Sheets**: Provide environmental data sheets (EDSs) for the following products:
    a. ECLIPSE High Solids Polyurethane Enamel PC-233 (Boeing Code 92002).

4. **TEU-HVAC**: Provide a list of the natural gas HVAC units that are included in TEU-HVAC. Include the Boeing identification name/number for the unit, a description of the unit, and the size of the individual units (heat capacity).

5. **Categorically Insignificant Activities Equipment List**: Boeing provided a file titled "Insignificant_Source_List.pdf" which includes a table of equipment at the facility which Boeing has termed "Categorically Insignificant Activities." Provide the following additional information regarding this equipment:
    a. If Boeing is claiming this equipment as exempt under OAR 340-245-0060(3), provide the appropriate subsection/paragraph for the exemption;
    b. If equipment is fuel burning:
        i. Indicate the type of fuel; and
        ii. For fuel burning equipment exempted under OAR 340-245-0060(3)(b)(B), provide the aggregate emissions of the equipment identified to confirm these emissions do not exceed the de minimis level for any regulated pollutant. Per OAR 340-245-0060(3)(b)(B) "if a source's expected emissions from all such equipment exceed the de minimis levels, then the source may identify a subgroup of such equipment as an exempt TEU with the remainder not designated as an exempt TEU." Include any non-exempt units in the Inventory.

6. **Plating Lines**:
    a. Provide a list of all tanks and their contents (materials and concentrations) for both the 85-001 and 85-105 plating lines. Indicate to which control device the tanks exhaust.
    b. Provide justification for excluding Demisters 001SCBR1 and 001SCBR6 from the Inventory. If these units have no emissions of TACs and are therefore not a TEU, provide justification as necessary. Revise the Inventory as needed to include these units.
    c. Per the material's SDS, Oakite 160 Tank Solution (Boeing Code 306826) contains a trade secret ingredient. Confirm if this component is a TAC and revise the Inventory to include emissions of this TAC if so.
    d. Confirm if any chemical fume suppressants are used in the plating tanks. If so, provide copies of the SDSs for these materials.
    e. Emission Calculations:
        i. Provide documentation to support the control efficiencies assumed for individual TACs at the demisters and scrubbers;
        ii. Provide the source of the equations used to estimate the following temperature dependent parameters:
            1. Bath surface tension; and
            2. Speed of sound; and

iii. Note any assumptions that were incorporated into these calculations – for example, assumptions regarding liquid properties or bath contents for obtaining the necessary parameters.

7. **TEU-Booth TEU**:
    a. Provide a description of the coating activities at Boeing. This should include an explanation of the coating categories used in the Inventory.
    b. Provide supplemental calculations which demonstrate the development of the emissions estimates for the Paint Booth Operations TEU. The Inventory references the mass balance calculations from the ACDP, but information presented in the ACDP renewal application are insufficient for DEQ's review purposes.
    c. Provide documentation as appropriate to support the coating emissions calculations. This should include the following:
        i. Vendor specifications for spray guns to support transfer efficiencies; and
        ii. Vendor specifications or guarantees for paint booth filters to support removal efficiencies.
    d. DEQ has reviewed SDSs for surface coating materials and found multiple TACs missing from the Inventory. Include these missing TACs in the Inventory or provide justification for excluding.
        i. For the "10-11 Coatings" category, the missing TACs include:
            1. 2-Butanone (CASRN 78-93-3);
            2. Propylene glycol monomethyl ether (CASRN 107-98-2);
            3. 1,2,4-Trimethylbenzene (CASRN 95-63-6);
            4. n-Butyl alcohol (CASRN 71-36-3);
            5. Crystalline silica (CASRN 7631-86-9, reported as CASRN 14808-60-7 in SDS);
            6. sec-Butyl alcohol (CASRN 78-92-2);
            7. Barium and compounds (CASRN 7440-39-3). Report the barium content of barium chromate (CASRN 10294-40-3); and
            8. Aluminum and compounds (CASRN 7429-90-5). Report the aluminum content of aluminum hydroxide (CASRN 21645-51-2).
        ii. For the "10-20 Coatings" category, the missing TACs include:
            1. 2-Butanone (CASRN 78-93-3);
            2. Isopropyl alcohol (CASRN 67-63-0);
            3. n-Butyl alcohol (CASRN 71-36-3); and
            4. Crystalline silica (CASRN 7631-86-9, reported as CASRN 14808-60-7 in SDS).
        iii. For the "10-60 Coatings" category, the missing TACs include:
            1. 2-Butanone (CASRN 78-93-3);
            2. Crystalline silica (CASRN 7631-86-9, reported as CASRN 14808-60-7 in SDS);
            3. Barium and compounds (CASRN 7440-39-3). Report the barium content of barium sulfate (CASRN 7727-43-7); and
            4. Aluminum and compounds (CASRN 7429-90-5). Report the aluminum content of aluminum hydroxide (CASRN 21645-51-2).
        iv. For the "10-79 Coatings" category, the missing TACs include:
            1. 2-Butanone (CASRN 78-93-3);
            2. n-Butyl alcohol (CASRN 71-36-3);

3. Hydroquinone (CASRN 123-31-9);
4. Acetone (CASRN 67-64-1);
5. Crystalline silica (CASRN 7631-86-9, reported as CASRN 14808-60-7 in SDS); and
6. Barium and compounds (CASRN 7440-39-3). Report the barium content of barium chromate (CASRN 10294-40-3).

8. **Degreasing TEU**:
    a. Provide a description of degreasing activities at the facility.
    b. Provide a copy of the supporting calculations used to develop emission estimates for the vapor degreasing units.

9. **Revised Inventory**: Submit to DEQ a revised AQ520 Inventory Form, along with all supporting calculations in Excel format, as well as all information required under OAR 340-245-0040(4). Include the following updates to the AQ520:
    a. Per General Comment 1, Boeing may omit emission estimates for the Actual basis from both Worksheets 3 and 5.
    b. Per General Comment 3, update PTE maximum daily throughputs or usage rates as appropriate to reflect worst-case short-term conditions.
    c. Update the Inventory as appropriate with any new information gathered during the review of SDSs requested under Specific Comment 2.
    d. Update the Inventory as appropriate with any additional TEUs based on analysis requested under Specific Comments 5.b and 6.
    e. Update the Inventory as appropriate based on requests under Specific Comment 7.
    f. Actual Maximum Daily Activity Information: For those TEUs for which actual annual activity information was reported, provide activity information for actual maximum daily. Where available (such as for surface coating usage), use recorded daily throughputs. Where daily information is unavailable, provide and document best estimates based on information available.
    g. Natural Gas TEUs:
        i. For all natural gas TEUs, review emission factors in Worksheet 3 and ensure the following:
            1. Unless the TEU is equipped with a SCR or SNCR, use the emission factor of 3.2 lb/MMscf for ammonia (CASRN 7664-41-7)[1]; and
            2. Include emissions estimates for benzo[a]pyrene (CASRN 50-32-8) using an emission factor of 0.0000012 lb/MMscf.[2]
    h. TEU-PBO-3: The heat input capacity noted in the TEU description and used to estimate PTE natural gas usage for this TEU differs from information in the facility's Air Quality Discharge Permit (ACDP). Review and revise as appropriate.
    i. TEU-PBO-4: The heat input capacity noted in the TEU description and used to estimate PTE natural gas usage for this TEU differs from information in the facility's ACDP. Review and revise as appropriate.

[1] DEQ. March 1, 2024. "AQ104B Toxics Reporting and Air Toxics Emissions Inventory: Combustion Emission Factor Search Tool." https://www.oregon.gov/deq/aq/air-toxics/Pages/Air-Toxics-Emissions-Inventory.aspx
[2] EPA. September 1998. AP-42 Chapter 1, Table 1.4-3 "Emission Factors for Speciated Organic Compounds from Natural Gas Combustion." https://www.epa.gov/sites/production/files/2020-09/documents/1.4_natural_gas_combustion.pdf

j. TEU-PBO-5: The heat input capacity noted in the TEU description and used to estimate PTE natural gas usage for this TEU differs from information in the facility's ACDP. Review and revise as appropriate.
k. TEU-BPBO-1: The heat input capacity noted in the TEU description and used to estimate the maximum daily PTE natural gas usage for this TEU differs from information in the facility's ACDP. The heat input capacity used in the annual PTE natural gas usage estimate matches information in the ACDP but differs from the heat input capacity used for the maximum daily usage estimate. Review and revise as appropriate.
l. TEU-BPBO-2: The heat input capacity noted in the TEU description and used to estimate the maximum daily PTE natural gas usage for this TEU differs from information in the facility's ACDP. The heat input capacity used in the annual PTE natural gas usage estimate matches information in the ACDP but differs from the heat input capacity used for the maximum daily usage estimate. Review and revise as appropriate.
m. TEU-Gen 1: Correct the naming discrepancy for this TEU between Worksheet 2 and Worksheet 3. On Worksheet 2, the TEU is named "TEU-Gen 1" while on Worksheet 3 the TEU is "TEU-GEN-1." Either naming is acceptable, but the TEU names should be consistent throughout all CAO submittals.
n. Natural Gas Generators (TEU-NG Gen 2, TEU- NG Gen 3, and TEU-NG Gen 7): Confirm that all three natural gas generators are 4-Stroke Lean Burn. Revise emission factors as needed.
o. TEU-Gen 4: Information in Boeing's permit Review Report indicates that this emergency engine was installed in 1996. Update TAC emission factors to those for pre-2006/Tier 0/Tier 1 engines in DEQ's Combustion Emission Factor Search Tool[1] or provide justification for using the post-2006/Tier 2/Tier 3/Tier 4 engine emission factors.
p. TEU-Gen 5: Information in Boeing's permit Review Report indicates that this emergency engine was installed in 1993. Update TAC emission factors to those for pre-2006/Tier 0/Tier 1 engines in DEQ's Combustion Emission Factor Search Tool[1] or provide justification for using the post-2006/Tier 2/Tier 3/Tier 4 engine emission factors.
q. TEU-Gen 6: Information in Boeing's permit Review Report indicates that this emergency engine was installed in 2002. Update TAC emission factors to those for pre-2006/Tier 0/Tier 1 engines in DEQ's Combustion Emission Factor Search Tool[1] or provide justification for using the post-2006/Tier 2/Tier 3/Tier 4 engine emission factors.
r. TEU-AB:
    i. Boeing referenced California Air Resources Board's (CARB) California Air Toxics Emission Factor (CATEF) for the Abrasive Blasting TEU emission factors. The emission factors in the CATEF database were developed from source test data collected for CARB's Air Toxics Hots Spots Program during the 1990's. For each pollutant a mean, median, maximum, and minimum value is presented. Review of the database indicates that Boeing elected to use the median value for each TAC. DEQ typically uses the mean value of source test data. Update the emission factors to reflect the mean value from the CATEF database or provide justification for using the median value. Justification should include an analysis of the source test data used by CARB in the development of the abrasive blasting emission factors and an explanation as to why the median is more reflective of abrasive blasting operations at Boeing.
    ii. The facility's 2023 Air Toxics Emissions Inventory (ATEI) accounts for a 91.0 percent control efficiency from baghouses and pleated filters. If Boeing would

like to account for these controls in the Inventory, provide manufacturer specifications to support the indicated removal efficiency.

s. Scrubbers and Demisters (TEUs 001SC2, 001SC3, 001SC4, 001SC5, 105SC1, and 105SC2):
    i. During DEQ's visit of the facility in May 2025, Boeing had indicated that the tanks in the coating lines were continuously vented regardless of use. However, Boeing has reported only 2,551 hours of operation for the Scrubbers and Demisters for the Actual Annual activity basis. Provide a description of the plating line tank ventilation and update the actual annual activity if appropriate.
    ii. Chromium VI emissions from the plating lines should be reported under CASRN 7738-94-5 for "Chromic(VI) acid, including chromic acid aerosol mist and chromium trioxide." Revise or provide justification for reporting as the particulate form.
    iii. Update the emission factor reference on Worksheet 3 to include reference to the emission factor calculation method used (AP-42 Chapter 12.20).
    iv. 85-001 Scrubbers (TEUs 001SC2, 001SC3, 001SC4, and 001SC5): The following TAC was reported for the 85-001 plating line in the 2023 ATEI but excluded from the Inventory – update the Inventory to include these TACs or provide justification for excluding fluorides (DEQ ID 239).
    v. 85-105 Scrubbers (TEUs 105SC1 and 105SC2): The following TACs were reported for the 85-105 plating line in the 2023 ATEI but excluded from the Inventory – update the Inventory to include these TACs or provide justification for excluding:
        1. Barium and compounds (CASRN 7440-39-3);
        2. Copper and compounds (CASRN 7440-50-8);
        3. Fluorides (DEQ ID 239);
        4. Lead and compounds (CASRN 7439-92-1);
        5. Manganese and compounds (CASRN 7439-96-5);
        6. Nickel and compounds (CASRN 7440-02-0); and
        7. Silver and compounds (CASRN 7440-22-4).

t. Degreasing: Include material usage information for the Degreasing TEU on Worksheet 4. Emissions for tetrachloroethene (CASRN 127-18-4) from Degreasing are included in Worksheet 5, but no corresponding entry was included in Worksheet 4.

u. Hand Finishing Operations: Include emission estimates for metal TACs from hand finishing operations. Provide documentation to support emissions estimates including control efficiencies and TAC composition of particulate.

DEQ requests 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 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 (971) 300-3653 or amy.devita-mcbride@deq.oregon.gov. I look forward to your continued assistance with this process.

Sincerely,

Amy DeVita-McBride

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Cleaner Air Oregon Project Engineer

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