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November 14, 2023

Ms. Julia Degagné via email: [Julia.degagne@deq.state.or.us](mailto:Julia.degagne@deq.state.or.us)

Air Toxics Project Manager  
Oregon Department of Environmental Quality  
Northwest Region  
700 NE Multnomah Street, Suite 600  
Portland, OR 97232

**Re: Cascade Steel Rolling Mills, Inc.  
CAO Emissions Inventory**

Dear Ms. Degagné:

Cascade Steel Rolling Mills (“CSRM”) is in receipt of your September 29 and October 3, 2023 letters relating to our Cleaner Air Oregon Air Toxics Emissions Inventory (the “emissions inventory”) most recently submitted to the Department on August 9, 2023. Both of these letters identified specific items that you requested be submitted to the Department, and your October 18, 2023 letter established a response deadline of November 14, 2023. This letter and the associated attachments constitute our response to your request.

Please note that we have incorporated all requested changes to our emissions inventory outlined in your two letters with the exception of comment 1.g in the October 3, 2023 letter relating to the use of the “drop equation”. We address this item immediately below followed by information in response to the other items in your September 29, 2023 letter.

### **Use of the Drop Equation<sup>1</sup> for Estimating Emissions from Metal Scrap Handling**

During the development of our emissions inventory we have previously proposed two alternatives to using the drop equation to estimate potential emissions from steel scrap handling at CSRM, and we appreciate the Department’s consideration of those approaches. We also appreciate the Department’s recognition that the drop equation may overestimate fugitive emissions from scrap handling, and that emissions from scrap handling may differ from

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<sup>1</sup> The Drop Equation refers to Equation 1 provided in Section 13.2.4 – Aggregate Handling and Storage Piles in EPA’s AP-42 Compilation of Emission Factors  
[https://www.epa.gov/sites/default/files/2020-10/documents/13.2.4\\_aggregate\\_handling\\_and\\_storage\\_piles.pdf](https://www.epa.gov/sites/default/files/2020-10/documents/13.2.4_aggregate_handling_and_storage_piles.pdf)

other raw material types, as you pointed out in your October 3<sup>rd</sup> letter.

CSRM is aligned with DEQ on reasons why the drop equation is likely to overestimate emissions and is not appropriate to use for scrap steel handling activities. As we have discussed with the Department previously, the primary reasons the drop equation is not applicable to estimate fugitive emissions from CSRM's scrap handling activities include:

1. The drop equation was derived by measuring emissions from handling minerals in aggregate form, not steel.
2. The drop equation was empirically derived and the moisture content of the material handled was designated as a significant parameter in determining emissions. But scrap metal does not hold appreciable amounts of water, as do mineral aggregates. Therefore, moisture content is certainly not a significant parameter for scrap metal, rendering the use of the drop equation for steel scrap of little scientific value.<sup>2</sup>
3. Similarly, the materials handled to derive the drop equation had a silt content (mass fraction of particles < 75um in diameter) of 0.44%-19%. Silt content is not normally a parameter used to characterize steel but, if measured, it would likely be much less than 0.44%. Scrap metal is so dissimilar from the materials used to derive the drop equation, and its silt content falls so far outside the range of materials tested to derive the drop equation, that it is not possible for the drop equation (or its silt content assumptions) to accurately describe emissions from scrap metal handling activities.
4. The drop equation estimates emissions based on the mass of the material handled (lb/ton emission factor). Without a steel specific emission factor, the drop equation will always overestimate emissions because steel weighs much more than aggregate relative to its ability to become friable and produce emissions. A large portion of the steel mass is locked into its matrix (e.g., large steel objects) and is not available to be emitted.

The Department previously requested that CSRM use the drop equation in the emissions inventory because, despite its flaws, the drop equation was the only published methodology known to DEQ for estimating scrap metal handling emissions,<sup>3</sup> However, we are pleased to report that our technical consultants at Bridgewater Group identified an alternative published methodology for the Department's consideration, which we describe below and have used in this iteration of CSRM's emissions inventory.

Bridgewater Group recently learned that our Oakland, California metal scrap recycling facility previously submitted to the Bay Area Air Quality Management District (BAAQMD) an emissions inventory that estimates emissions (PM10 and metals) from that facility's scrap metal and other outdoor material handling activities. The emission estimates used by Radius

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<sup>2</sup> The RTI International "Emission Estimation Protocol for Iron and Steel Foundries" (December, 2012) (the "RTI protocol") highlights the moisture content issue, concluding in Section 2.1 that "measurements of moisture content are recommended for more accurate results." See RTI protocol, at 2-1.

<sup>3</sup> The RTI protocol does not "recommend" the use of the drop equation. Rather, given RTI's recognition there are "no direct emission measurement methodologies commonly employed by foundries for routine measurement of emissions from outdoor fugitive dust sources," RTI identified the drop equation as "only essentially one methodology (equivalent to Methodology Rank 4)" of relatively low quality to estimate emissions from these sources. See RTI protocol, at 2-1.

Recycling in its submittals to BAAQMD were, we understand, regarded by BAAQMD as conservative, potentially overly so. The company's emission estimation methodology in use with the BAAQMD is based on an active stockpile emission factor included in a Texas Commission on Environmental Quality (TCEQ) Guidance for Rock Crushing Plants which we specifically reference in our enclosed emissions inventory submittal. It is likely that this guidance will also overestimate emissions from steel scrap handling because, like the drop equation, the TCEQ emission factor was derived from an analysis of fugitive emissions from aggregate stockpiles, not piles of scrap steel. Nonetheless, the emission factor was used by the company in its BAAQMD air permitting analyses to account for loading, equipment traffic, and wind erosion, and the emission estimates have been applied to both short-term and long-term emission estimates.

Bridgewater Group has opined that the TCEQ emission factor is more appropriate to use than the drop equation for several reasons. The TCEQ emission factor is based on the size of an active material storage pile. The factor does not rely directly on a material's moisture content or the material having a certain range of silt content. As previously described, these two characteristics cannot be used to describe scrap steel, and application of these significant characteristics for use in the drop equation will overestimate emissions from scrap steel handling activities. Further, using the drop equation to estimate particulate matter emissions from scrap handling does not align with our observed reality. Such emissions would be clearly visible as airborne particles and as deposited materials, the likes of which have not been observed at the facility.

We recognize that the factor used with BAAQMD, which was based on handling crushed rock, likely will not produce emission estimates as accurate as if site-specific information was available. Like the drop equation, we expect the BAAQMD factor will over-estimate scrap handling fugitive emissions. Accordingly, we are committed to conducting our own material specific emissions study that we will use in a future update to our emissions inventory. Our plan is to complete that study as soon as possible and, in any event, before – based on DEQ's schedule – the mill's risk assessment will need to be submitted.

In the meantime, before site-specific information resulting from that study is available for DEQ's consideration, we propose that the company's emission estimation methodology in use with BAAQMD be used as a "placeholder" in our emissions inventory.

#### **Additional Information in Response to the Other Items in the September 29, 2023 Letter**

For ease of reference, we have reproduced verbatim each of your requests from the September 29, 2023 letter below in italics followed by our response.

1. *Submit to DEQ a revised Inventory (AQ520 form), along with all supporting calculations in Excel format, as well as all information required under [OAR 340-245-0040\(4\)](#), including the following updates:*
  - a. *Melt shop fugitives (TEU EU-3 MF):*
    - i. *Revise the emissions estimate for hydrogen fluoride (CASRN 7664-39-3) as follows: back-calculate fugitive emissions using the emission factors for TEU EU-1 (BH01 and BH01A), assuming 0 percent control efficiency and 95 percent capture efficiency for the*

*baghouses, with uncaptured emissions allocated to the TEU EU-3\_MF;*

- ii. *Update emissions and emission factors in Tab 3 of the AQ520 form for the following TACs to be consistent with the supporting calculations submitted on August 9, 2023:*
  1. *Polychlorinated dibenzo-p-dioxins (PCDDs) & dibenzofurans (PCDFs) TEQ (DEQ ID 646);*
  2. *Polychlorinated biphenyls (PCBs) TEQ (DEQ ID 645); and*
  3. *Benzo[a]pyrene (CASRN 50-32-8); and*
- iii. *In Tab 3 of the AQ520 form, include emissions for total PCBs (CASRN 1336-36-3) to be consistent with the supporting calculations submitted on August 9, 2023;*

The requested updates have been reflected in the revised inventory and supporting calculations as well as the revised AQ520 form included with this letter.

- b. *Melt shop (TEUs EU-1 and EU-3): In Tab 3 of the AQ520 form, remove the line item for polycyclic aromatic hydrocarbons (PAHs) (DEQ ID 401) and report mass emissions in pounds for the following PAHs by individual CASRN:*

1. *Acenaphthylene (CASRN 208-96-8);*
2. *Acenaphthene (CASRN 83-32-9);*
3. *Fluorene (CASRN 86-73-7);*
4. *Phenanthrene (CASRN 85-01-8);*
5. *Anthracene (CASRN 120-12-7);*
6. *Fluoranthene (206-44-0)*
7. *Pyrene (CASRN 129-00-0);*
8. *Benzo[a]anthracene (CASRN 56-55-3);*
9. *Chrysene (CASRN 218-01-9);*
10. *Benzo[b]fluoranthene (CASRN 205-99-2);*
11. *Benzo[k]fluoranthene (CASRN 207-08-9);*
12. *Benzo[e]pyrene (CASRN 192-97-2);*
13. *Perylene (CASRN 198-55-0);*
14. *Indeno[1,2,3-cd]pyrene CASRN (193-39-5);*
15. *Dibenz[a,h]anthracene (CASRN 53-70-3); and*
16. *Benzo[g,h,i]perylene (CASRN 191-24-2);*

The requested updates have been reflected in the revised AQ520 form and the supporting calculations included with this letter.

- c. *Scrap handling (TEU EU-09sh Main and TEU EU-09sh Sec): In Tab 2 of the AQ520 form, update the annual actual throughput values to be consistent with Part B of the 2021 Annual Report, which lists a total of*

502,562 tons of scrap handled;

No longer applicable. The emission estimates are now based on storage pile size and not throughput.

d. Welding (TEU EU-17):

- i. *In Tab 2 of the AQ520 form:*
  1. *Add a note describing the proposed control device (fume extractor with MERV-14 filters) to column C; and*
  2. *Update actual annual usage estimate to be consistent with the general assumption that actual usage is 80 percent of Requested Potential to Emit, or provide the rationale for the value reported;*
- ii. *For the FCAW E71T electrode type, update emissions to include:*
  1. *Molybdenum trioxide (CASRN 1313-27-5), assuming 100 percent conversion of molybdenum to molybdenum trioxide; and*
  2. *Crystalline silica (listed in the Safety Data Sheet as CASRN 14808-60- 7) – report this on the AQ520 form as “Silica, crystalline (respirable)” (CASRN 7631-86-9); and*
- iii. *For the FCAW E71T and SMAW E7018 electrode types, report emissions for aluminum oxide as “aluminum and compounds” (CASRN 7429-90-5) rather than “aluminum oxide (fibrous forms)” (CASRN 1344-28-1), as welding emissions are not known to be fibrous;*

The requested updates have been reflected in the revised inventory and supporting calculations as well as the revised AQ520 form included with this letter.

e. Raw materials handling (TEU EU-18): update raw materials handling emissions as follows:

- i. *For TEUs EU-18\_ATDSiMn and EU-18\_ATDFeMn (alloy truck dump to storage bunker):*
  1. *Update the PM10 control efficiency for the three-sided enclosure to 63 percent, based on the Nebraska Department of Environment and Energy’s three-sided enclosure particulate matter (PM) control efficiency for grain handling (revised to account for the assumed particle size distribution for raw materials handling – see Attachment A); and*
  2. *In Tab 2 of the AQ520 form, add a note describing the proposed control device (three-sided enclosure) in column C;*
- ii. *For TEUs EU-18\_ATDSiMn and EU-18\_AULDSiMn, update the composition to 75.5 percent manganese by weight, which*

*represents the midpoint of the range provided in the Safety Data Sheet (SDS) (the product is greater than 65 percent manganese and greater than 14 percent silicon; therefore the potential range for manganese is between 65 and 86 percent);*

- iii. *For TEUs EU-18\_ATDFeMn and EU-18\_AULDFeMn, update the composition to 89 percent manganese by weight, which represents the midpoint of the range provided in the SDS (the product is greater than 78 percent manganese; therefore the potential range for manganese is between 78 and 100 percent);*
- iv. *For TEU EU-18\_AULDFeMn: In Tab 3 of the AQ520 form, include emissions for manganese (CASRN 7439-96-5), chromium VI (CASRN 18540-29-9) and nickel (DEQ ID 365) and remove emissions for phosphorus (DEQ ID 504), for consistency with the supporting calculations; and*

The requested updates have been reflected in the revised inventory and supporting calculations as well as the revised AQ520 form included with this letter. Please note that CSRM is completing a water spray system for both the SiMn and FeMn truck unloading areas (EU-18\_ATDSiMn and EU-18\_AULDSiMn), and a revised control efficiency to account for the additional control provided by this system is included in the revised inventory and supporting calculations.

- f. *Slag handling (TEU EU-5):* *In Tab 3 of the AQ520 form, include emissions for fluorides (DEQ ID 239) as reported in the supporting calculations submitted on August 9, 2023.*

The requested updates have been reflected in the revised AQ520 form included with this letter.

We appreciate maintaining a productive dialog as we work with DEQ to finalize our emissions inventory using the best data and science and in an expeditious manner. Please let us know if you have any questions or would like to discuss these revisions further.

Sincerely,



Jim Spahr

CC: Geoff Tichenor  
John Browning, P.E.