RAMBOLL

ENVIRONMENT
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NOTICE OF CONSTRUCTION APPLICATION FOR
REDUCED GENERATORS TECHNICAL AMENDMENT
CYRUSONE
QUINCY, WASHINGTON

August 6, 2025

Ramboll
901 5th Ave
Suite 3900
Seattle, WA 98164
USA

https://ramboll.com

To Whom It May Concern,

CyrusOne owns and operates a data center in Quincy, WA (PNW1) under Approval Order (AO) No. 24AQ-E036, issued by Ecology on August 12, 2024, replacing AO No. 19AQ-E052, issued by Ecology on October 23, 2019. The permit allows for construction and operation of 40 MTU Model 16V4000G84S diesel engines rated 2.25-MW and two (2) MTU Model 12V1600G71S diesel engines rated 750-kW used to power emergency electrical generators. However, 19 of the 40 diesel engines rated 2.25-MW and one (1) of the two (2) diesel engines rated 750-kW have not yet been constructed or installed. CyrusOne has no imminent plans to install the remaining 20 engines that are permitted but not yet installed. Ramboll is submitting this permit amendment request on behalf of CyrusOne to: (1) Reduce the number of emergency generators to align with the 22 emergency generators that are currently installed at the facility; and (2) Streamline and clarify Approval Conditions 2.b.ii-iv, in alignment with the accompanying updated air dispersion modeling demonstration. The following sections provide an analysis of the emissions, regulatory applicability, and air dispersion modeling for the proposed changes.

The Notice of Construction (NOC) application form and Check No. 194012009 in the amount of $1,190 for payment of the application complex change initial fee are provided in Attachment A.

1. AIR POLLUTANT EMISSION ESTIMATES

(Sections V and VI of NOC application form)

Air pollutant emission rates were calculated for the emergency generators per the requirements of WAC 173-400-103 and WAC 173-460-050. Detailed emission calculations are provided in Attachment B. Emissions are calculated using the same methodology outlined in the original NOC application dated December 26, 2018, and in the house generator permit amendment NOC application dated May 9, 2024, including annual operating hours and "black-puff" emissions scaling for cold start-up.

Due to the reduced number of emergency generators at the facility, the facility-wide emissions and fuel usage decreased across all time periods; therefore, the emissions

of nitrogen oxides (NO_X), nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter (PM), volatile organic compounds (VOCs), diesel engine exhaust particulate (DEEP), the fuel-based emissions for sulfur dioxide (SO_2) and toxic air pollutants decreased compared to AO 24AQ-E036. The potential emissions from the reduced quantity of generators and the emissions change from the previous application are provided in Table B-5 in Attachment B and summarized in Table 1 below. As shown, there are emissions decreases for each pollutant.

Table 1. Comparison of Annual Potential Emissions

Pollutant	Previous Potential Emissions (tons per year; tpy)	Proposed Potential Emissions (tpy)	Change due to Reduced Generator Update (tpy)
NO_X	36	19	-17
CO	7.9	4.1	-3.8
SO_2	0.027	0.014	-0.013
PM	2.3	1.2	-1.1
NO_2	3.6	1.9	-1.7
VOCs	1.8	0.93	-0.87
DEEP	0.62	0.33	-0.29

The potential fuel consumption from the reduced quantity of generators is provided in Table B-4 in Attachment B and summarized in Table 2 below.

Table 2. Comparison of Annual Fuel Consumption

Generator Input	Previous Potential Fuel Consumption (gallons/yr)	Proposed Potential Fuel Consumption (gallons/yr)	Change due to Reduced Generator Update (gallons/yr)
Fuel Usage	252,153	132,016	-120,137

In addition to changes in the generator count, the facility layout that underlies the accompanying updated air dispersion model has changed compared to the layout submitted previously. Specifically: (1) A second building that was contemplated in original site design, but has not yet been constructed, has been removed from the layout and accompanying model; and (2) The 20 emergency generators that have not been installed have similarly been removed from the layout and accompanying model, and minor adjustments have been made to the location of the installed emergency generators, to align with as-built design. An updated facility layout is shown in Figure 1. Stack parameters for the house generator and emergency generators have not changed since the previous modeling.

Figure 1. Site Map

2. REGULATORY APPLICABILITY

The currently installed emergency generators comply with all regulatory requirements, such as NSPS/NESHAP and BACT, established in Approval Order No. 24AQ-E036. CyrusOne is requesting lower annual emission limits (see Table 1) and annual fuel limits (see Table 2) due to the reduced quantity of emergency generators.

3. MODELING ANALYSIS

(Section IX of NOC application form)

The project change results in a decrease in emissions, which would not normally trigger a modeling analysis. However, CyrusOne is requesting updated AO Conditions, which requires an updated modeling analysis. AO Conditions 2.b.ii and 2.b.iii were written in response to the previously-submitted 24-hour impact modeling for PM with an aerodynamic diameter less than or equal to 10 microns (PM_{10}) and PM with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$). Therefore, updated modeling demonstrations for both PM standards are necessary. The modeling methodology is the same as that of the 2024 permit amendment, except Monte Carlo analyses are applied to the short-term $PM_{2.5}$ and PM_{10} NAAQS. The following sections describe these modeling methodology updates as well as the modeling results.

3.1. Modeling Methodology Updates

Since the submission of the original application in 2018 and the amendment application in 2024, there have been numerous updates affecting air quality dispersion modeling analyses, including updates in modeling software and the acceptance of Monte Carlo analyses for the 24-hour PM_{10} and $PM_{2.5}$ NAAQS. A summary of these updates is provided below.

Environmental Protection Agency (EPA) updated model processors AERSURFACE (Version 24142), AERMAP (Version 24142), AERMET (Version 24142), and AERMOD (Version 24142) since the original 2018 and subsequent 2024 analyses were conducted. Additionally, Ecology updated their Monte Carlo R script in August 2024 and provided this script upon request from Ramboll. These modeling software updates have been included in the new modeling submitted with this application.

Ecology has also accepted the use of Monte Carlo to demonstrate compliance with the 24-hour PM_{10} and $PM_{2.5}$ NAAQS. On December 14, 2021, Trinity Consultants (Trinity) submitted an NOC application on behalf of Sabey Data Centers. Within their modeling demonstration of compliance with the NAAQS, Trinity presented a basis for using a Monte Carlo analysis for the 24-hour PM_{10} NAAQS. The 24-hour PM_{10} standard is not a probabilistic standard. However, Trinity stated that PM_{10} emissions from their project are similarly intermittent in nature and are assumed as equal to $PM_{2.5}$ emissions. Hence, they suggested modifying Ecology's Monte Carlo R script from the 98th percentile to the 99.7th percentile. This modification represents the form of the PM_{10} standard: "Not to be exceeded more than once per year on average over 3 years." Ecology agreed with Trinity's NAAQS compliance demonstration and issued their Approval Order 22AQ-E016 on August 16, 2022. CyrusOne's PM_{10} emissions are also intermittent and assumed equal to their $PM_{2.5}$ emissions, thus Ramboll modified Ecology's Monte Carlo R script to be used for the 24-hour PM_{10} standard. Lastly, to demonstrate compliance with the probabilistic 24-hour $PM_{2.5}$ NAAQS, Ramboll ran Ecology's Monte Carlo R script.

The updated Monte Carlo scenarios for this facility can be found in Tables B-7 and B-8 in Attachment B. Scheduled monthly maintenance and testing, including annual testing that takes place of the twelfth month of scheduled testing, conservatively occurs for up to 55 days per year. Additionally, every 60 months, CyrusOne performs periodic stack testing (1-in-5 year stack testing), which conservatively takes four days to complete.

3.2. Stack Parameters

As discussed earlier, stack parameters for the house generator and emergency generators have not changed since the previous modeling. This includes using manufacturer data and adjusting for rain cap impacts on stack parameters. Ecology has required consideration of the effect that stack rain caps have on the vertical momentum of the plume at low loads in more recent applications submitted for data centers in Quincy. At low loads, the rain cap flapper does not fully open, which impedes vertical momentum of the plume and reduces vertical velocity. The current analysis for runs dependent on 10% loads incorporate this reduced velocity by using exhaust flow adjustment factors provided by Ecology. This methodology is consistent with the previous two NOC permit applications.

3.3. Runtime Scenarios

There are four different runtime scenarios that the emergency generators will take part of:

1. **Power outage:** During a power outage at the site, all installed generators will activate to supplement power to the server system and the building. All 22 generators are assumed to operate concurrently using the worst-case at or near full load (≥ 50%).

2. **Monthly maintenance and testing:** Routine monthly maintenance and testing of the emergency generators consists of monthly confidence testing for 30 to 60 minutes at no load. This testing occurs for up to 12 hours per day. Each engine is tested monthly, and the annual maintenance and testing event replaces one of the monthly events, so this operating scenario takes place 11 months per year. To test all 22 generators in a given month, it is conservatively assumed that the testing may take up to 3 calendar days per month, up to 12 hours per day, and up to 1 hour per generator per test, for a total of 33 days for monthly testing over the course of each year. All monthly maintenance and testing occurs between the hours of 7:00 AM and 7:00 PM, at the worst-case load identified in Table B-1 in Attachment B.

3. **Annual maintenance and testing:** Routine annual maintenance and testing of the emergency generators consists of annual load bank testing for 4 to 6 hours per generator at variable load. Annual testing, when conducted, also meets the need for the regular monthly test during which the test is conducted. To test all 22 generators in a given year, it is conservatively assumed that the testing will occur on up to 22 days per year, up to two tests per day, and up to 6 hours per test. All annual maintenance and testing occurs between the hours of 7:00 AM and 7:00 PM, at the worst-case load identified in Table B-1 in Attachment B.

4. **Stack testing:** Every 60 months, CyrusOne is required to test at least one engine of each size (i.e., one 750 kW engine and one 2,250 kW engine), including the engine with the most operating hours. It is assumed that each stack test can take up to 8 hours. If a generator failed the stack test, a follow-up test would be required in the same year. The worst-case runtime that could occur in a single year from stack testing would be operation of a 2,250-kW

generator and a 750-kW generator for two days per year and for 8 hours each testing day. It is assumed that one cold-start event will occur per test.

3.4. Load Screening

A load screening analysis was completed to assess the updated short-term $PM_{2.5}$ and PM_{10} NAAQS analyses. This screening analysis was used to identify the worst-case operating load for each modeled scenario, given a unit emission rate of 1 pound per hour and stack parameters at each operating load. One of the 2.25-MW generators and the 750-kW generator were screened for the worst-case load.

Within Table B-1 in Attachment B, highlighted cells indicate the worst-case load for each pollutant and averaging period. The worst-case load for 24-hour $PM_{2.5}$ and PM_{10} was 10% load for both the 2.25-MW generator and the 750-kW generator.

While the monthly and annual maintenance and testing and the stack testing scenarios uses the overall worst-case load, the engines run at or near full capacity during a power outage. Therefore, the power outage scenario is modeled using the worst-case load between 50%, 75%, and 100% load, which is 50% load.

3.5. Generator Screening

A secondary screening analysis was completed to identify which generator is the most conservative to model in the single engine scheduled maintenance and testing and stack testing operating scenarios given the emission rates and stack parameters at the worst-case load. The worst-case generator was generator ID 240E (permit ID 2) on the west side of the building.

3.6. NAAQS

NAAQS have been promulgated for six (6) criteria air pollutants. Each pollutant standard is categorized as health-based and/or public welfare-based, primary and/or secondary, respectively. To amend the permit conditions as requested, new modeling demonstrations have been prepared for 24-hour PM_{10} and 24-hour $PM_{2.5}$, since the permit conditions CyrusOne is requesting an amendment for are based on the modeling assumptions for these two pollutants.

3.6.1. Regional Background Concentrations

For demonstrations of compliance with the NAAQS, regional background concentrations are added to model predicted concentrations. Per the prior 2024 amendment application, several resources were reviewed to determine the most representative regional background for the facility location for each modeled pollutant.

For $PM_{2.5}$, recent monitoring data from Ecology's air quality station in Quincy, WA from the 2024 amendment application provides the most representative background for the $PM_{2.5}$ demonstration.

The closest and most active air quality monitor measuring PM_{10} is in Yakima, WA as implemented in the 2024 amendment application. The high-first-high measurement with exceptional events excluded from the most recent full year of data (2023) serves as a conservative basis for the Quincy, WA background concentrations. The monitor location is also considered conservative, as $PM_{2.5}$ measurements in Yakima are higher than those measured at the Quincy, WA monitor.

3.6.2. Updated Results

As shown in Table 3 below, the updated modeling shows that the reduced generator facility configuration does not affect compliance with the NAAQS. Dispersion modeling input and output files will be provided via an electronic download link emailed concurrently with this letter, labeled in this letter as Attachment C.

Table 3. Modeled Cumulative Impacts Compared to Air Quality Standards and Previous Values

Pollutant and Averaging Period	NAAQS (µg/m³)	Concentration (µg/m³)			
		2025 Modeled Project	2025 Regional Background[1]	2025 Cumulative	Prior Cumulative
PM_{10} 24-hour	150	78	61	139	136
$PM_{2.5}$ 24-hour	35	8.3	20	29	32

1. The regional background for 24-hour PM_{10} is the 2023 Yakima, WA monitor high-first-high value. The regional background for 24-hour $PM_{2.5}$ is from the Quincy, WA monitor average of 2021 to 2023 24-hour values.

4. REQUESTED AMENDMENTS

1. CyrusOne requests an amendment to change the total generator count from 42 generators to 22 generators, the 2,250-kW generator count from 40 generators to 21 generators, and the 750-kW generator count from two generators to one generator throughout the entire permit.

2. CyrusOne also requests the removal of Conditions 2.b.ii and 2.b.iii, as the updated NAAQS compliance demonstration in this application has shown that these conditions are not necessary to demonstrate compliance with the NAAQS.

3. CyrusOne also requests a clarifying amendment to the limits on single engine operations and removal of the limit of 10 hours per day based on the updated modeling analyses. The existing and requested condition is as follows:

   Existing Condition 2.b.iv. Operating a single engine at one time, must be limited to 10 hours per day and must operate only between the hours of 7:00 a.m. to 7:00 p.m.

   Proposed Condition 2.b.ii. Operating a single engine at one time for the purposes of scheduled monthly and annual maintenance and testing must occur only between the hours of 7:00 a.m. to 7:00 p.m.

* * *

If you have any questions regarding this submittal, please feel free to contact Eri Ottersburg at eottersburg@ramboll.com or 206-336-1677.

Sincerely,

Steven Branoff
Principal
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Eri Ottersburg
Managing Consultant
D 206-336-1677
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cc:
Laura Cottrell, CyrusOne
Mike Lake, CyrusOne
Marcus Westra, CyrusOne
Steven Stump, CyrusOne

ATTACHMENT A: DEPARTMENT OF ECOLOGY NOTICE OF CONSTRUCTION APPLICATION FORM AND FEE

Notice of Construction Application

A notice of construction permit is required before installing a new source of air pollution or modifying an existing source of air pollution. This application applies to facilities in Ecology's jurisdiction. Submit this application for review of your project. For general information about completing the application, refer to Ecology Forms ECY 070-410a-g, "Instructions for Ecology's Notice of Construction Application."

Ecology offers up to two hours of free pre-application assistance. We encourage you to schedule a pre-application meeting with the contact person specified for the location of your proposal, below. If you use up your two hours of free pre-application assistance, we will continue to assist you after you submit Part 1 of the application and the application fee. You may schedule a meeting with us at any point in the process.

Upon completion of the application, please enclose a check for the initial fee and mail to:

Department of Ecology
Cashiering Unit
PO Box 47611
Olympia, WA 98504-7611

For Fiscal Office Use Only: 0299-3030404-B00-216--001--000404

Check the box for the location of your proposal. For assistance, call the appropriate office listed below:

Check box	Ecology Permitting Office	Contact
☐	**Chelan, Douglas, Kittitas, Klickitat, or Okanogan County** Ecology Central Regional Office (509) 575-2490	Lynnette Haller (509) 457-7126 lynnette.haller@ecy.wa.gov
☐	**Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla, or Whitman County** Ecology Eastern Regional Office (509) 329-3400	Karin Baldwin (509) 329-3452 karin.baldwin@ecy.wa.gov
☐	**San Juan County** Ecology Northwest Regional Office (206) 594-0000	David Adler (425) 649-7267 david.adler@ecy.wa.gov
☐	**For actions taken at Kraft and Sulfite Paper Mills and Aluminum Smelters Only** Ecology Industrial Section (360) 407-6900	James DeMay (360) 407-6868 james.demay@ecy.wa.gov
☐	**For actions taken on the US Department of Energy Hanford Reservation Only** Ecology Nuclear Waste Program (509) 372-7950	Lilyann Murphy (509) 372-7951 lilyann.murphy@ecy.wa.gov

Check the box below for the fee that applies to your application.

New project or equipment:

- ☐ **$1,904: Basic project** initial fee covers up to 16 hours of review.
- ☐ **$12,614: Complex project** initial fee covers up to 106 hours of review.

Change to an existing permit or equipment:

- ☐ **$357: Administrative or simple change** initial fee covers up to 3 hours of review. Ecology may determine your change is complex during the completeness review of your application. If you project is complex, you must pay the additional xxx before we will continue working on your application
- ☐ **$1,190: Complex** change initial fee covers up to 10 hours of review
- ☐ **$350flat fee**: Replace or alter control technology equipment under WAC 173-400-114. Ecology will contact you if we determine your change belongs in another fee category. You must pay the fee associated with that category before we will continue working on your application.

Read each statement below, then check the box next to it to acknowledge that you agree.

- ☐ The initial fee you submitted may not cover the cost of processing your application. Ecology will track the number of hours spent on your project. If the number of hours Ecology spends exceeds the hours included in your initial fee, Ecology will bill you $119 per hour for the extra time.
- ☐ You must include all information requested by this application. Ecology may not process your application if it does not include all the information requested.
- ☐ Submittal of this application allows Ecology staff to visit and inspect your facility.

Part 1: General Information

I. Project, Facility, and Company Information

1. Project Name: Reduced Generators Technical Amendment
2. Facility Name: CyrusOne PNW1
3. Facility Street Address:
   1025 D Street NW, Quincy, WA 98848
4. Facility Legal Description: Data center
5. Company Legal Name (if different from Facility Name):
   CyrusOne LLC
6. Company Mailing Address (street, city, state, zip)

   2850 N Harwood St, Suite 2200, Dallas TX 75201

II. Contact Information and Certification

1. Facility Contact Name (who will be onsite): Marcus Westra
2. Facility Contact Mailing Address (if different than Company Mailing Address:
   1025 D Street NW, Quincy, WA 98848

3. Facility Contact Phone Number: +1 509-398-5012
4. Facility Contact E-mail: mwestra@cyrusone.com
5. Billing Contact Name (who should receive billing information):
Laura Correll
6. Billing Contact Mailing Address (if different Company Mailing Address):

7. Billing contact Phone Number: +1 603-793-0534
8. Billing Contact E-mail: lcottrell@cyrusone.com
9. Consultant Name (optional – if 3rd party hired to complete application elements):
Eri Ottersburg
10. Consultant Organization/Company: Ramboll Americas Engineering Solutions, Inc.
11. Consultant Mailing Address (street, city, state, zip): 901 5th Avenue #3900, Seattle, WA 98164
12. Consultant Phone Number: +1 206-336-1677
13. Consultant E-mail: eottersburg@ramboll.com
14. Responsible Official Name and Title (who is responsible for project policy or decision making):
Chris Napier, SVP US Operations
15. Responsible Official Phone: +1 480-800-9207
16. Responsible Official E-mail: cnapier@cyrusone.com
17. Responsible Official Certification and Signature:

I certify that the information on this application is accurate and complete.

Signature: Chris Napier Date: 8/1/2024

Part 2: Technical Information

The Technical Information may be sent with this application form to the Cashiering Unit, or may be sent directly to the Ecology regional office with jurisdiction along with a copy of this application form.

For all sections, check the box next to each item as you complete it.

III. Project Description

- [4] Written narrative describing your proposed project.
- [4] Projected construction start and completion dates.
- [4] Operating schedule and production rates.
- [4] List of all major process equipment and manufacturer and maximum rated capacity.
- [ ] Process flow diagram with all emission points identified.
- [4] Plan view site map.
- [ ] Manufacturer specification sheets for major process equipment components
- [ ] Manufacturer specification sheets for pollution control equipment.
- [4] Fuel specifications, including type, consumption (per hour and per year) and percent sulfur.

IV. State Environmental Policy Act (SEPA) Compliance

Check the appropriate box below.

- [4] SEPA review is complete. Include a copy of the final SEPA checklist and SEPA determination (e.g., DNS, MDNS, and EIS) with your application.
- [ ] SEPA review has not been conducted:
  - [ ] If review will be conducted by another agency, list the agency. You must provide a copy of the final SEPA checklist and SEPA determination before Ecology will issue your permit. Agency reviewing SEPA: _____
  - [ ] If the review will be conducted by Ecology, fill out a SEPA checklist and submit it with your application. You can find a SEPA checklist online at https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-document-templates

V. Emissions Estimations of Criteria Pollutants

Does your project generate criteria air pollutant emissions? [4] **Yes** [ ] **No**

If yes, please proved the following information regarding your criteria emissions in the application.

- [4] The names of the criteria air pollutants emitted (i.e., NO_X, SO_2, CO, $PM_{2.5}$, PM_{10}, TSP, VOC, and Pb)
- [4] Potential emissions of criteria air pollutants in tons per hour, tons per day, and tons per year (include calculations)
- [ ] If there will be any fugitive criteria pollutant emissions, clearly identify the pollutant and quantity

VI. Emissions Estimations of Toxic Air Pollutants

Does your project generate toxic air pollutant emissions? [4] **Yes** [ ] **No**

If yes, please provide the following information regarding your toxic air pollutant emissions in your application.

Ramboll: See previous application for list of TAPs and potential emissions.

[4] The names of the toxic air pollutants emitted (specified in WAC 173-460-150[1])

[4] Potential emissions of toxic air pollutants in pounds per hour, pounds per day, and pounds per year (include calculations)

[ ] If there will be any fugitive toxic air pollutant emissions, clearly identify the pollutant and quantity

VII. Emission Standard Compliance

[4] Provide a list of all applicable new source performance standards, national emission standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, and emission standards adopted under Chapter 70A.15 RCW.

Does your project comply with all applicable standards identified? [4] **Yes** [ ] **No**

VIII. Best Available Control Technology

[4] Provide a complete evaluation of Best Available Control Technology (BACT) for your proposal.

Ramboll: See previous applications for BACT evaluation.

IX. Ambient Air Impacts Analyses

Ramboll: Stack parameters and receptor locations have not changed as part of this application.

Please provide the following:

[4] Ambient air impacts analyses for Criteria Air Pollutants (including fugitive emissions)

[ ] Ambient air impacts analyses for Toxic Air Pollutants (including fugitive emissions)

[4] Discharge point data for each point included in air impacts analyses (include only if modeling is required)

- [4] Exhaust height
- [4] Exhaust inside dimensions (ex. diameter or length and width)
- [4] Exhaust gas velocity or volumetric flow rate
- [4] Exhaust gas exit temperature
- [4] The volumetric flow rate
- [4] Description of the discharges (i.e., vertically or horizontally) and whether there are any obstructions (ex., raincap)
- [4] Identification of the emission unit(s) discharging from the point
- [4] The distance from the stack to the nearest property line
- [4] Emission unit building height, width, and length
- [4] Height of tallest building on-site or in the vicinity and the nearest distance of that building to the exhaust
- [4] Whether the facility is in an urban or rural location

Does your project cause or contribute to a violation of any ambient air quality standard or acceptable source impact level? [ ] **Yes** [4] **No**

To request ADA accommodation, call Ecology at (360) 407-6800, 711 (relay service), or (877) 833-6341 (TTY)

[1] http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460-150

ATTACHMENT B: DETAILED EMISSION CALCULATIONS AND MODELING DATA

Table B-1
Load Screening Results and Comparison
CyrusOne
Quincy, Washington

2.25-MW Load Screening Model Results for Reduced Generator Count Project

Load	Dispersion Factor	Model Results[1]
	24-hour	$PM_{10}/PM_{2.5}$ 24-hour
	(µg/m³ per lb/hr)	(µg/m³)
10%[2]	10	20
25%	6.6	19
50%	5.5	14
75%	5.0	13
100%	4.6	9.7

750-kW Load Screening Model Results for Reduced Generator Count Project

Load	Dispersion Factor	Model Results[1]
	24-hour	$PM_{10}/PM_{2.5}$ 24-hour
	(µg/m³ per lb/hr)	(µg/m³)
10%[2]	21	24
25%	15	10
50%	11	4.7
75%	10	4.2
100%	9.2	4.0

Notes:

1. Highlighted cells indicate which operating load correlates to the highest modeled impact for each pollutant and averaging period.
2. The 10% load screening uses adjusted velocity and effective stack diameter to account for impacts of rain caps on the stacks. Ecology had provided a list exhaust flow adjustment factors over various degrees of damper openings, which Ramboll had used to derive the equivalent velocity and effective stack diameter.

Abbreviations:

PM - Particulate matter
$PM_{2.5}$ - PM with an aerodynamic diameter less than 2.5 microns
PM_{10} - PM with an aerodynamic diameter less than 10 microns

Table B-2
Manufacturer Specifications and Not-To-Exceed Emissions
CyrusOne
Quincy, Washington

750-kW genset

Pollutant/ Parameter	Load-Specific					Full-variable Load[1]
	10%	25%	50%	75%	100%	≤ 100%
NO_X (lb/hr)	1.6	2.6	5.2	10	14	14
Primary NO_2[2] (lb/hr)	0.16	0.26	0.52	1.0	1.4	1.4
CO (lb/hr)	1.7	2.1	1.2	1.8	1.9	2.1
HC (lb/hr)	1.0	0.61	0.33	0.30	0.35	1.0
DEEP[3] (lb/hr)	0.14	0.042	0.085	0.11	0.088	0.14
PM (FH+BH)[4] (lb/hr)	1.2	0.65	0.42	0.41	0.44	1.2
Exhaust Temp. (°F)	592	772	865	878	883	592
Exhaust Flow (cfm)	1,401	2,237	3,471	4,496	5,706	1,401
Fuel Flow (gal/hr)	--	--	28.3	38.1	51.1	51.1

2,250-kW genset

Pollutant/ Parameter	Load-Specific					Full-variable Load[1]
	10%	25%	50%	75%	100%	≤ 100%
NO_X (lb/hr)	5.5	6.2	16	31	47	47
Primary NO_2[2] (lb/hr)	0.55	0.62	1.57	3.1	4.7	4.7
CO (lb/hr)	4.2	3.6	3.9	5.8	9.4	9.4
HC (lb/hr)	1.3	2.2	2.0	1.9	1.6	2.2
DEEP[3] (lb/hr)	0.58	0.66	0.50	0.78	0.50	0.78
PM (FH+BH)[4] (lb/hr)	1.9	2.9	2.5	2.6	2.1	2.9
Exhaust Temp. (°F)	464	635	703	795	934	464
Exhaust Flow (cfm)	4,719	8,474	12,075	15,196	18,443	4,719
Fuel Flow (gal/hr)	--	--	86	123	163	163

Notes:

1. "Full-variable load" is the pollutant-specific worst-case emission rate at any load ≤100 percent.
2. Primary NO_2 is assumed to be 10% of the NO_X.
3. DEEP is assumed equal to front-half NTE particulate emissions, as reported by the vendors.
4. PM attributable to front-half and back-half emissions is assumed equal to the sum of vendor NTE values for PM and HC.

Abbreviations:

BH - "Back-half" condensable emissions
cfm - Cubic feet per minute
CO - Carbon monoxide
DEEP - Diesel engine exhaust particulate matter
°F - degrees Fahrenheit
FH - "Front-half" filterable emissions
gal/hr - gallons per hour
HC - Hydrocarbons
lb/hr - pounds per hour
NO_2 - Nitrogen dioxide
NO_X - Nitrogen oxides
NTE - Not to exceed
PM - Particulate matter

Table B-3
"Black-Puff" Emissions for Cold Start-Up
CyrusOne
Quincy, Washington

Black-Puff Emissions Test Data [1]

Pollutant	Spike Duration (seconds)	Measured Concentration (ppm)		Cold-Start Emission Factor
		Cold-Start Emission Spike	Steady-State (Warm) Emissions	
PM+HC	14	900	30	4.3
NO_X [2]	8.0	40	38	0.94
CO	20	750	30	9.0

Hourly Rate During Warm and Cold Conditions

Pollutant	Worst-Case Emission Rate (lb/hr)			
	2,250-kW genset		750-kW genset	
	Warm	Cold-start	Warm	Cold-start
HC	2.2	9.4	1.0	4.4
NO_x	47	47	14	14
CO	9.4	84	2.1	19
DEEP	0.78	3.3	0.14	0.58
PM (FH+BH)	2.9	12	1.2	5.0

Maximum Emission Rate for Each Hour Including Startup

Pollutant	2,250-kW Single Hour Emissions[3] (lb/hr)			750-kW Single Hour Emissions[3] (lb/hr)		
	Startup (1 min)	Warm (59 min)	Total (1 hr)	Startup (1 min)	Warm (59 min)	Total (1 hr)
HC	0.16	2.2	2.3	0.073	1.0	1.1
NO_X	0.78	46	47	0.24	14	14
CO	1.4	9.2	11	0.32	2.1	2.4
DEEP	0.056	0.77	0.83	0.010	0.13	0.14
PM (FH+BH)	0.20	2.8	3.0	0.083	1.1	1.2

Notes:

1. See Appendix B of Notice of Construction Application Report, December 26, 2018.
2. Although the cold-start emission factor derived for NO_X is less than 1 (i.e., decreased emissions), this evaluation will conservatively assume a factor of 1.0.
3. Cold-start emission factor applies to the first 60 seconds of emissions after engine startup.

Abbreviations:

BH - "Back-half" condensable emissions
CO - Carbon monoxide
DEEP - Diesel engine exhaust particulate matter
FH - "Front-half" filterable emissions
HC - Hydrocarbons
lb/hr - Pounds per hour
NO_X - Nitrogen oxides
NTE - Not to exceed
PM - Particulate matter
ppm - Parts per million

Table B-4
Fuel Calculations
CyrusOne
Quincy, Washington

Fuel-Based Generator Parameters

Parameter	Units	Value	
Generator Size	MW	0.75	2.25
No. of Generators	--	1	21
Fuel Usage (per genset)	gph	51	163
Fuel Type	--	ULSD	
Fuel Density	lb/gallon	7.1	
Fuel Heat Content	Btu/gallon	137,000	
Fuel Sulfur Content	ppm weight	15	

Annual Hours of Operation

Scenario	Duration (hour)
Average	38

Generator Inputs Per Period

Generator Input	Units	Per Hour	Per Day	Per Year (average)
Fuel Usage (per period)	Gallon	3,474	83,378	132,016
Heat Input (per period)	MMBtu	476	11,423	18,086

Abbreviations:

Btu - British thermal unit
gph - Gallons per hour
lb - Pounds
MMBtu - Million British thermal units
MW - Megawatts
No. - Number
ppm - Parts per million
ULSD - ultra-low sulfur diesel

Table B-5
Summary of Potential Emission Rates
CyrusOne
Quincy, Washington

Pollutant	Potential Emission Rates[1]			
	Peak Hourly	Proposed Annual	Permitted Annual	Change in Annual
	(lb/hr)	(tpy)	(tpy)	(tpy)
Criteria Pollutants				
NO_X	996	19	36	-17
CO	225	4.1	7.9	-3.8
SO_2	0.74	0.014	0.027	-0.013
$PM_{2.5}/PM_{10}$ (FH + BH)	65	1.2	2.3	-1.1
VOCs	50	0.93	1.8	-0.87
Toxic Air Pollutants				
NO_2	100	1.9	3.6	-1.7
DEEP	17	0.33	0.62	-0.29

Notes:

1. Cold-start emissions are accounted for in the project emissions.

Abbreviations:

BH - Back half
CO - Carbon monoxide
DEEP - Diesel engine exhaust, particulate
FH - Front half
lb/hr - Pounds per hour
NO_2 - Nitrogen dioxide
NO_X - Nitrogen oxides
PM - Particulate matter
$PM_{2.5}$ - PM with an aerodynamic diameter less than 2.5 microns
PM_{10} - PM with an aerodynamic diameter less than 10 microns
SO_2 - Sulfur dioxide
tpy - Tons per year
VOCs - Volatile organic compounds

Table B-6
Modeled Emission Rates
CyrusOne
Quincy, Washington

24-Hour $PM_{2.5}$ and PM_{10} NAAQS: Power Outage Scenario

Operating Condition	Cold-start	Warm	Cold-start	Warm
Daily Hours of Operation	24		24	
Number of events per day	1	1	1	1
Duration of each event (hours)	0.017	23.983	0.017	23.983
Hours at each runtime mode	0.017	23.983	0.017	23.983
Maximum Generators Concurrently Operating	21		1	
Modeled Parameters[1]	**2,250-kW Genset**		**750-kW Genset**	
50% Load Emission Rate per Genset (lb/hr)	2.64		0.41	
50% Load Exhaust Temp. (°F)	703		865	
50% Load Exhaust Flow (cfm)	12,075		3,471	

24-Hour $PM_{2.5}$ and 24-Hour PM_{10} NAAQS: Monthly Maintenance and Testing

Operating Condition	Cold-start	Warm	Cold-start	Warm
Daily Hours of Operation	12		12	
Number of events per hour	2	2	2	2
Duration of each event (hours)	0.017	0.483	0.017	0.483
Hours at each runtime mode	0.033	0.967	0.033	0.967
Maximum Generators Concurrently Operating	1		0 [2]	
Modeled Parameters[3]	**2,250-kW Genset**		**750-kW Genset**	
Worst-Case Emission Rate per Genset (lb/hr)	2.14		--	
Worst-Case Exhaust Temp. (°F)	464		--	
Worst-Case Exhaust Flow (cfm)	4,719		--	

Table B-6
Modeled Emission Rates
CyrusOne
Quincy, Washington

24-Hour $PM_{2.5}$ and 24-Hour PM_{10} NAAQS: Annual Maintenance and Testing

Operating Condition	Cold-start	Warm	Cold-start	Warm
Daily Hours of Operation	12		12	
Number of events per day	2	2	2	2
Duration of each event (hours)	0.017	5.983	0.017	5.983
Hours at each runtime mode	0.033	11.967	0.033	11.967
Maximum Generators Concurrently Operating	1		0 [2]	
Modeled Parameters[3]	**2,250-kW Genset**		**750-kW Genset**	
Worst-Case Emission Rate per Genset (lb/hr)	1.94		--	
Worst-Case Exhaust Temp. (°F)	464		--	
Worst-Case Exhaust Flow (cfm)	4,719		--	

24-Hour $PM_{2.5}$ and 24-Hour PM_{10} NAAQS: 1 in 5 Year Stack Testing

Operating Condition	Cold-start	Warm	Cold-start	Warm
Daily Hours of Operation	8		8	
Number of events per day	1	1	1	1
Duration of each event (hours)	0.017	7.983	0.017	7.983
Hours at each runtime mode	0.017	7.983	0.017	7.983
Maximum Generators Concurrently Operating	1		0 [2]	
Modeled Parameters[3]	**2,250-kW Genset**		**750-kW Genset**	
Worst-Case Emission Rate per Genset (lb/hr)	1.29		--	
Worst-Case Exhaust Temp. (°F)	464		--	
Worst-Case Exhaust Flow (cfm)	4,719		--	

Notes:

1. Power outage operation is assumed to run at 50% load.
2. Maintenance and testing of the 750-kW generators could occur in the same day as testing of the 2,250-kW generators; therefore, it was conservatively assumed that a representative AERMOD run of a 2,250-kW generator is a conservative estimate for worst-case scheduled operations on the 750-kW generators.
3. All operations are assumed to run at worst-case load that would contribute to the highest impact as shown in Table B-1.

Abbreviations:

cfm - Cubic feet per minute
°F - degrees Fahrenheit
hr - Hour
lb/hr - Pounds per hour
NAAQS - National Ambient Air Quality Standards
PM - Particulate Matter
$PM_{2.5}$ - PM with an aerodynamic diameter less than 2.5 microns
PM_{10} - PM with an aerodynamic diameter less than 10 microns
Temp. - Temperature

Table B-7
Summary of Ranked Generator Runtime Scenarios
CyrusOne
Quincy, Washington

Ranked Day	Runtime Regime	Assumed Duration (hours per day)	Assumed Days of Operation (days per year)	Maximum Generators Concurrently Operating	Max. Daily Facility-wide $PM_{2.5}$ and PM_{10} Emissions[1] (lbs/day)
1-2	Power outage - all generators at or near maximum load (≥50% load)	24	2	22	1,472
3-35	Monthly Maintenance and Testing (scheduled operations)[2]	12	33	1	38
36-57	Annual Maintenance and Testing (scheduled operations)[2]	12	22	1	35
58-61	Stack Testing (scheduled operations)[2]	8	4	1	23

Notes:

1. Unless otherwise stated, for the purposes of emissions ranking, emission rates are conservatively based on the maximum emission rate at full-variable load (≤100% Load).
2. This model assumed project operations will occur between daylight hours only (assumed 7 a.m. to 7 p.m.).

Table B-8
Summary of Monte Carlo Results
CyrusOne
Quincy, Washington

Generator Runtime Activity[1]	AERMOD Filename Script Input Filename (Source Group)	Simulation Days of Operation
Power outage - All generators, at or near maximum load (≥ 50% load)	PM25.50PCT.PO.ADI PM25.50PCT.PO.PST (PO)	2
Monthly Maintenance and Testing (variable load)	PM25.240E.10RPCT.MT1.ADI PM25.240E.10RPCT.MT1.PST (MT1)	33
Annual Maintenance and Testing (variable load)	PM25.240E.10RPCT.AM.ADI PM25.240E.10RPCT.AM.PST (AM)	22
Stack Testing (variable load)	PM25.240E.10RPCT.1IN5YR.ADI PM25.240E.10RPCT.1IN5YR.PST (1IN5YR)	4

24-Hour $PM_{2.5}$ NAAQS

UTM Zone 11, NAD 83	(m East)	(m North)
Monte Carlo Predicted: $PM_{2.5}$ Max. Impact Location	282,991	5,236,150
	98th-percentile Impact (µg/m³)	
Project Concentration	8.3	
Regional Background Concentration	20	
Cumulative Concentration	29	
Regulatory Limit (based on 98th-percentile)	35	

24-Hour PM_{10} NAAQS

UTM Zone 11, NAD 83	(m East)	(m North)
Monte Carlo Predicted: PM_{10} Max. Impact Location	282,991	5,236,162
	99.7th-percentile Impact (µg/m³)	
Project Concentration	78	
Regional Background Concentration	61	
Cumulative Concentration	139	
Regulatory Limit (based on 99.7th-percentile)	150	

Notes:
1. Runtime activities further described in Table B-7.

Abbreviations:
m - Meters
NAD - North American Datum
$PM_{2.5}$ - Particulate matter with aerodynamic diameter less than or equal to 10 microns.
PM_{10} - Particulate matter with aerodynamic diameter less than or equal to 10 microns.
UTM - Universal transverse mercator coordinate system zone
µg/m³ - micrograms per cubic meter
NAD - North American Datum

ATTACHMENT C: AIR DISPERSION MODELING FILES

Electronic access to the air dispersion files will be submitted to the Department of Ecology.

RAMBOLL

ENVIRONMENT
& HEALTH

Department of Ecology
4601 N. Monroe St.
Spokane, WA 99205-1295

Delivered via email to jenny.filipy@ecy.wa.gov, befr461@ ecy.wa.gov, and sxia461@ecy.wa.gov

UPDATE TO NOTICE OF CONSTRUCTION APPLICATION FOR REDUCED GENERATORS TECHNICAL AMENDMENT
CYRUSONE
QUINCY, WASHINGTON

September 16, 2025

Jenny,

CyrusOne operates the Quincy data center under Approval Order (AO) No. 24AQ-E036, issued by Ecology on August 12, 2024. The facility submitted a permit amendment request to Ecology on August 6, 2025 to align generator counts and streamline approval conditions.

Ecology requested that Ramboll update the air dispersion modeling using the most recent NLCD dataset in AERSURFACE, rerun AERMET with the revised surface parameters, and update the AERMOD dispersion modeling accordingly. Additionally, Ecology recommended using 2024 monitoring data for background concentrations. Ramboll updated the modeling analyses for the CyrusOne Quincy data center consistent with Ecology's request. The new results are presented below.

Ramboll
901 5th Ave
Suite 3900
Seattle, WA 98164
USA

https://ramboll.com

Load Screening

A load screening analysis was completed to assess the updated short-term $PM_{2.5}$ and PM_{10} NAAQS analyses. This screening analysis was used to identify the worst-case operating load for each modeled scenario. Updated load screening results are presented in Table B-1, attached. The worst-case load for full variable load scenarios (monthly maintenance, annual maintenance, and stack testing) is still 10% load for both the 2.25-MW generator and the 750-kW generator. The worst-case load is still 50% load for the power outage scenario for both generators.

Generator Screening

A secondary screening analysis was completed to identify which generator is the most conservative to model in the single engine scheduled maintenance and testing and stack testing operating scenarios given the emission rates and stack parameters at the worst-case load. The worst-case generator is still generator ID 240E (permit ID 2) on the west side of the building.

NAAQS

As shown in Table 1 below, the updated modeling demonstrates that the reduced generator facility configuration continues to comply with the NAAQS. The regional background for $PM_{2.5}$ 24-hour has been updated to the three-year average of the 98th

percentile from the Quincy monitor and the regional background for PM_{10} 24-hour has been updated to the 2024 high-second-high value from the Yakima monitor. Dispersion modeling input and output files will be provided via an electronic download link emailed concurrently with this response. Additional details of the Monte Carlo parameters and results are provided in Table B-8, attached.

Table 1. Modeled Cumulative Impacts Compared to Air Quality Standards and Previous Values

Pollutant and Averaging Period	NAAQS (µg/m³)	Concentration (µg/m³)			
		2025 Modeled Project	Regional Background[1]	2025 Cumulative	Prior Cumulative
PM_{10} 24-hour	150	77	60	137	139
$PM_{2.5}$ 24-hour	35	8.3	18	26	32

1. The regional background for 24-hour PM_{10} is the 2024 Yakima, WA monitor high-second-high value. The regional background for 24-hour $PM_{2.5}$ is from the Quincy, WA monitor average of 2022 to 2024 24-hour values.

* * *

If you have any questions regarding this submittal, please feel free to contact Eri Ottersburg at eottersburg@ramboll.com or 206-336-1677.

Sincerely,

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Mike Lake, CyrusOne
Marcus Westra, CyrusOne
Steven Stump, CyrusOne

ATTACHMENT B: LOAD SCREENING AND MONTE CARLO RESULTS

Table B-1
Load Screening Results and Comparison
CyrusOne
Quincy, Washington

2.25-MW Load Screening Model Results for Reduced Generator Count Project

Load	Dispersion Factor	Model Results[1]
	24-hour	$PM_{10}/PM_{2.5}$ 24-hour
	(µg/m³ per lb/hr)	(µg/m³)
10%[2]	10	19
25%	6.2	18
50%	5.4	14
75%	5.0	13
100%	4.6	9.6

750-kW Load Screening Model Results for Reduced Generator Count Project

Load	Dispersion Factor	Model Results[1]
	24-hour	$PM_{10}/PM_{2.5}$ 24-hour
	(µg/m³ per lb/hr)	(µg/m³)
10%[2]	20	24
25%	15	10
50%	11	4.6
75%	10	4.2
100%	9.2	4.0

Notes:

1. Highlighted cells indicate which operating load correlates to the highest modeled impact for each pollutant and averaging period.
2. The 10% load screening uses adjusted velocity and effective stack diameter to account for impacts of rain caps on the stacks. Ecology had provided a list exhaust flow adjustment factors over various degrees of damper openings, which Ramboll had used to derive the equivalent velocity and effective stack diameter.

Abbreviations:

PM - Particulate matter
$PM_{2.5}$ - PM with an aerodynamic diameter less than 2.5 microns
PM_{10} - PM with an aerodynamic diameter less than 10 microns

Table B-8
Summary of Monte Carlo Results
CyrusOne
Quincy, Washington

Generator Runtime Activity[1]	AERMOD Filename Script Input Filename (Source Group)	Simulation Days of Operation
Power outage - All generators, at or near maximum load (≥50% load)	PM25.50PCT.PO.ADI PM25.50PCT.PO.PST (PO)	2
Monthly Maintenance and Testing - Single generator, variable load (≤100%)	PM25.240E.10RPCT.MT1.ADI PM25.240E.10RPCT.MT1.PST (MT1)	33
Annual Maintenance and Testing - Single generator, variable load (≤100%)	PM25.240E.10RPCT.AM.ADI PM25.240E.10RPCT.AM.PST (AM)	22
Stack Testing - Single generator, variable load (≤100%)	PM25.240E.10RPCT.1IN5YR.ADI PM25.240E.10RPCT.1IN5YR.PST (1IN5YR)	4

24-Hour $PM_{2.5}$ NAAQS

UTM Zone 11, NAD 83 Monte Carlo Predicted: $PM_{2.5}$ Max. Impact Location	(m East)	(m North)
	282,991.05	5,236,149.90
	98th-percentile Impact (µg/m³)	
Project Concentration	8.3	
Regional Background Concentration	18	
Cumulative Concentration	26	
Regulatory Limit (based on 98th-percentile)	35	

24-Hour PM_{10} NAAQS

UTM Zone 11, NAD 83 Monte Carlo Predicted: PM_{10} Max. Impact Location	(m East)	(m North)
	282,991.48	5,236,162.24
	99.7th-percentile Impact (µg/m³)	
Project Concentration	77	
Regional Background Concentration	60	
Cumulative Concentration	137	
Regulatory Limit (based on 99.7th-percentile)	150	

Notes:
1. Runtime activities further described in Table B-7.

Abbreviations:

m - Meters
NAD - North American Datum
$PM_{2.5}$ - Particulate matter with aerodynamic diameter less than or equal to 10 microns.
PM_{10} - Particulate matter with aerodynamic diameter less than or equal to 10 microns.
UTM - Universal transverse mercator coordinate system zone
$\mu g/m^3$ - micrograms per cubic meter
NAD - North American Datum