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: H5 Quincy 18MW Expansion Tier 1
2. Facility Name: H5 Data Centers - Quincy
3. Facility Street Address:
   1711 M Street NE, Quincy, WA 98848
4. Facility Legal Description: _____
5. Company Legal Name (if different from Facility Name):
   H5 Data Centers - Quincy, LLC
6. Company Mailing Address (street, city, state, zip)

   9320 Wilshire Blvd., Suite 300 Beverly Hills, CA 90212

II. Contact Information and Certification

1. Facility Contact Name (who will be onsite): Pat Parkhurst
2. Facility Contact Mailing Address (if different than Company Mailing Address:
   1711 M Street N.E. Quincy, WA 98848

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ERO

MAY 22 2024

3. Facility Contact Phone Number: 509-906-6142
4. Facility Contact E-mail: patrick.parkhurst@h5datacenters.com
5. Billing Contact Name (who should receive billing information):
   Pat Parkhurst
6. Billing Contact Mailing Address (if different Company Mailing Address):

   1711 M Street N.E. Quincy, WA 98848

7. Billing contact Phone Number: 509-906-6142
8. Billing Contact E-mail: Quincy.AP@h5datacenters.com
9. Consultant Name (optional – if 3rd party hired to complete application elements):
   N/A
10. Consultant Organization/Company: N/A
11. Consultant Mailing Address (street, city, state, zip):
12. Consultant Phone Number: N/A
13. Consultant E-mail: N/A
14. Responsible Official Name and Title (who is responsible for project policy or decision making):
    Matthew Wiley, Director of Operations
15. Responsible Official Phone: 303-714-7929
16. Responsible Official E-mail: matthew.wiley@h5datacenters.com
17. Responsible Official Certification and Signature:

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

Signature: _____ Date: 4/2/24

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

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

IV. State Environmental Policy Act (SEPA) Compliance

Check the appropriate box below.

- N/A [ ] SEPA review is complete. Include a copy of the final SEPA checklist and SEPA determination (e.g., DNS, MDNS, and EIS) with your application. ORIGINAL PERMIT MW
- [ ] 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? [x] Yes [ ] No

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

- [x] The names of the criteria air pollutants emitted (i.e., NO_x, SO_2, CO, $PM_{2.5}$, PM_{10}, TSP, VOC, and Pb)
- [ ] 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? [ ] Yes [x] No

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

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

☐ 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

N/A ☐ 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. ORIGINAL PERMIT

Does your project comply with all applicable standards identified? ☐ Yes ☐ No

VIII. Best Available Control Technology

N/A ☐ Provide a complete evaluation of Best Available Control Technology (BACT) for your proposal.

IX. Ambient Air Impacts Analyses NO CHANGE FROM ORIGINAL PERMIT

Please provide the following:

N/A ☐ Ambient air impacts analyses for Criteria Air Pollutants (including fugitive emissions)

N/A ☐ Ambient air impacts analyses for Toxic Air Pollutants (including fugitive emissions) ORIGINAL PERMIT

N/A ☐ Discharge point data for each point included in air impacts analyses (include only if modeling is required)

- N/A ☐ Exhaust height NO GENERATOR ALTERATION FROM ORIGINAL PERMIT
- N/A ☐ Exhaust inside dimensions (ex. diameter or length and width) GENERATOR
- N/A ☐ Exhaust gas velocity or volumetric flow rate GENERATOR ORIGINAL PERMIT
- N/A ☐ Exhaust gas exit temperature GENERATOR
- ☑ The volumetric flow rate
- N/A ☐ Description of the discharges (i.e., vertically or horizontally) and whether there are any obstructions (ex., raincap)
- N/A ☐ Identification of the emission unit(s) discharging from the point ORIGINAL PERMIT
- N/A ☐ The distance from the stack to the nearest property line
- ☑ Emission unit building height, width, and length
- ☑ Height of tallest building on-site or in the vicinity and the nearest distance of that building to the exhaust
- N/A ☐ 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 ☑ 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

H5-Quincy Complex Change to Existing Permit – Narrative Description

This request for complex change is being submitted to amend Approval Order 22AQ-E005. Construction start date of June 2024 and construction completion date of July 2025.

H5 Data Centers Quincy is, after unforeseeable delays, continuing with an expansion project started in 2022. The expansion will include all components of the original 2022 approval order, with two exceptions. The generators will be changed from twelve additional MTU – 16V400 to seven additional Kohler KD Model 2250. The manufacturer and model change complies with, and is addressed in, the existing approval order. The cooling towers will be changed from eight additional Evapco USS 312-454 to five additional Tower Tech TTXR-121975 Series. The cooling tower height will change to 19 feet – one fourth inch. The Tower Tech cooling towers have the following emission rates, representing a significant improvement over the older Evapco cooling towers:

Fluid Cooler Emissions Summary

Parameter	Value		
Number of Cooling Towers	**5**		
Hours of Operation	8,760	hr/yr	
Feedwater TDS	442	mg/L	
Cycles of Concentration	3	cycles	
Recirculation Rate	**1,991**	gpm	per tower
Drift Rate	0.0004	% of recirc flow	
Liquid Drift Droplet Emissions	**20**	lb/hr	

Pollutant	Emission Factor		Emission Rate: Hourly per Cooling Tower (lbs/hr)	Total Hourly (lbs/hr)	Total Daily (lbs/day)	Total Annual (lb/yr)	Total Annual (tpy)
Criteria Pollutants							
PM	100%	of TDS [a]	0.005	0.03	0.6	231	0.12
PM_{10}	100%	of TDS [a]	0.005	0.03	0.6	231	0.12

$PM_{2.5}$	78%	of TDS	[a]	0.004	0.02	0.5	180	0.09
Toxic Air Pollutants								
Arsenic (As)	**2.9E-03**	**mg/L**	[b]	**3.4E-08**	**1.7E-07**	**4.1E-06**	**1.5E-03**	**7.5E-07**
Beryllium (Be)	*1.0E-04*	*mg/L*	[b]	*1.2E-09*	*6.0E-09*	*1.4E-07*	*5.2E-05*	*2.6E-08*
Cadmium (Cd)	*1.0E-04*	*mg/L*	[b]	*1.2E-09*	*6.0E-09*	*1.4E-07*	*5.2E-05*	*2.6E-08*
Chromium (Cr)	**1.7E-04**	**mg/L**	[b]	**2.0E-09**	**1.0E-08**	**2.4E-07**	**8.9E-05**	**4.5E-08**
Cobalt (Co)	*3.0E-03*	*mg/L*	[b]	*3.6E-08*	*1.8E-07*	*4.3E-06*	*1.6E-03*	*7.9E-07*
Copper (Cu)	**0.327**	**mg/L**	[b]	**3.9E-06**	**2.0E-05**	**4.7E-04**	**0.2**	**8.6E-05**
Lead (Pb)	**1.2E-02**	**mg/L**	[b]	**1.4E-07**	**7.1E-07**	**1.7E-05**	**6.3E-03**	**3.1E-06**
Manganese (Mn)	**1.7E-02**	**mg/L**	[b]	**2.0E-07**	**9.9E-07**	**2.4E-05**	**8.7E-03**	**4.4E-06**
Mercury (Hg)	*2.0E-04*	*mg/L*	[b]	*2.4E-09*	*1.2E-08*	*2.9E-07*	*1.0E-04*	*5.2E-08*
Selenium (Se)	**1.7E-03**	**mg/L**	[b]	**2.1E-08**	**1.0E-07**	**2.5E-06**	**9.1E-04**	**4.5E-07**
Vanadium (V)	**6.1E-02**	**mg/L**	[b]	**7.3E-07**	**3.7E-06**	**8.8E-05**	**0.03**	**1.6E-05**
Total Cyanide	*0.010*	*mg/L*	[b]	*1.2E-07*	*6.0E-07*	*1.4E-05*	*5.2E-03*	*2.6E-06*
Ammonia (as N)	*0.070*	*mg/L*	[b]	*8.4E-07*	*4.2E-06*	*1.0E-04*	*0.04*	*1.8E-05*
Total Phosphorus	**0.070**	**mg/L**	[b]	**8.4E-07**	**4.2E-06**	**1.0E-04**	**0.04**	**1.8E-05**

Per unit engineering data for the Tower Tech TTXR-121975 cooling towers.

TOWER TECH
Sustainable Efficiency

COOLING TOWER DATA REPORT

Quote #	103343-19-7.819
Date	11-08-2023
Project	H5 Quincy

Customer	
Location	
Email	
Phone	

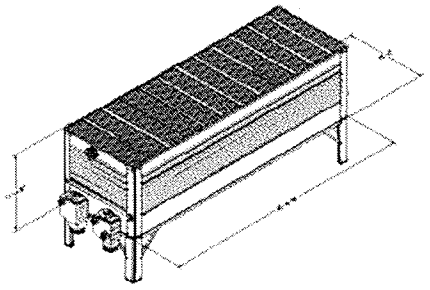
DESIGN CONDITIONS

Flow Rate	1,991.20 GPM (per tower module)	Series	TTXR
Total Flow Rate	9,956.00 GPM (all 5 module(s))	Model	TTXR-121975
Hot Water Temperature	95 deg.F	Number of Units	5
Cold Water Temperature	85 deg.F	Fan hp/per module	90 HP (12 motors @ 7.5 HP each)
Wet Bulb Temperature	75 deg.F	Total Installed HP	90 HP x 5 modules, 450 HP
Tower Pumping Head (psi)	5.12	BHP Per Tower	47.5

ENGINEERING DATA PER UNIT

Unit Width	12'-00"	Total Unit Airflow	119,101.8 CFM
Unit Length	36'-06"	Estimated Shipping Weight	22912 pounds
Unit Height	11'-1/4"	Estimated Operating Weight	37623 pounds
Unit Height (Incl. substructure)	19' 1/4"	Energy Rating	248.279
Hot Water Inlet Size	12"	Drive System	Baldor
Number of Inlet Connections	1	Gear Box	N/A
Cold Water Return Size	12" (2 outlets)	Drive Shaft	N/A
Number of Return Connections	2	Belt Drive	N/A
Max Continuous Water Temp	130 deg F	Fill Media	CF1900 10 mil PVC (5') Standard

Thermal performance at design conditions at Total Fan Power is certified by Cooling Technology Institute(CTI).



Thank you for your consideration in this matter,

Patrick L. Parkhurst

Facility Manager

H5 Data Centers – Quincy, LLC

TOWER TECH

Outperform™

SECTION 15640

COOLING TOWERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cooling Towers:
   1. Type: Open-circuit, forced-draft counterflow cooling towers.
   2. Type: Induced-draft, crossflow/counterflow cooling tower.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications.

B. Section 15700 - HVAC Equipment.

C. Section 15120 - Plumbing Piping Specialties.

D. Section 15180 - Heating and Cooling Piping.

E. Division 16 - Electrical.

1.3 REFERENCES

A. ASTM International (ASTM): ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Cooling Technology Institute (CTI): CTI STD-201 - Certification Standard for Commercial Water-cooling Towers' Thermal Performance.

C. National Electrical Manufacturers Association (NEMA).

D. United Laboratories (UL).

E. National Electric Code (NEC).

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Submit manufacturer's product data for each model indicated, including, provide rated capacities at design conditions, physical dimensions, required clearances, weights, sizes, locations of field connections, electrical requirements, and accessories.
   1. Component sizes and rough-in requirements.

2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Installation methods.
5. Operation and maintenance data.
6. Lift rigging recommendations.

C. Reports: Startup service reports.

D. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, materials, and fabrication of doors, frames, sidelites, operator, motion/presence sensor control device, anchors, hardware, finish, options, and accessories.
1. Wiring Diagrams: Showing internal tower wiring and required field connections by others.

E. Job Specific Submittals: kW/Ton design conditions and part load conditions.
1. Standard Display:
   a. Tower Performance Analysis: Showing hot water flow in gallons per minute.
   b. Tower Inlet and Outlet Temperatures: In degrees Fahrenheit.
   c. Wet Bulb Temperatures: In degrees Fahrenheit.
   d. Required Motor Power in: HP.
2. Drawings showing plan and elevation views with critical dimensions, tower weight (dry and operating), design operating conditions, and motor data.
3. Dimensioned fabrication drawings of tower support structure accompanied by manufacturers engineering load calculations confirming design.
4. Wiring diagrams showing internal tower wiring and required field connections by others.
5. Drawing of tower "lift rigging" recommendations showing proper sizing of spreader bar, locations of pre-installed lifting brackets, and final leveling instructions.
6. Wiring diagrams and installation drawings shall also be provided for optional equipment (motor control panel, variable-speed drive, basin heaters, ultrasonic level control) when applicable.
7. Copy of manufacturers' written warranty regarding materials and labor, along with the conditions under which warranty is subject.

1.5 QUALITY ASSURANCE

A. Electrical components, devices and accessories: UL-listed components and labeled per UL and NEC requirements.

B. Cooling Technology Institute (CTI) Certification: Cooling tower thermal performance at design conditions according to CTI STD-201 - Certification Standard for Commercial Water-cooling Towers' Thermal Performance.

C. ASHRAE: 90.1 Compliant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards. Store materials within absolute limits for temperature and humidity recommended by manufacturer. Protect from damage.
1. Upon arrival of cooling tower modules (prior to any lifting operation), the tower modules shall be inspected on the flatbed trailer by owner's representative for general acceptance. Any items of concern related to damage or lifting

operations shall be documented and reported (in writing) to the manufacturer's representative or the manufacturer. The owner's representative or his crane operator shall inspect corner lifting brackets and their attachment bolting to the tower.

B. Cooling tower module shall arrive as single, fully assembled and wired component, on a flatbed trailer. The substructure legs, sump, and sump hardware shall be shipped on a separate pallet on the same trailer. When supplied, motor control panel and/or basin heater control panel shall also ship on separate pallet on same trailer.
   1. Store products in manufacturer's labeled packaging until ready for installation.

C. Should tower need to be temporarily placed on the ground prior to its final positioning, the tower shall be stored on sound and level surface in accordance with manufacturer's recommendations.
   1. Prior to lifting tower, excess water should be removed from basin.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Warranty: Provide cooling tower manufacturer's standard material and labor warranty, in accordance with conditions specified within written warranty. Towers not covered by a warranty of this scope will not be accepted.
   1. External Shell: Fifteen years from date of shipment from factory. Excludes normal wear and tear and cosmetic and superficial damage.
   2. Internal Components and Fans: Five years from date of shipment from factory.
   3. Fill Media and Drift Eliminators: Five years from date of shipment from factory.
   4. Cold Water Basin and Tower Casing: Fifteen years from date of shipment from factory.
   5. Motors, Sump, Water Collection Devices, Fans: Five years from date of shipment from factory.
   6. Labor: One year from date of shipment from factory.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Tower Tech,

B. Acceptable Manufacturer's with Pre-Approval required: _____, _____

2.2 COOLING TOWERS - GENERAL

A. Basis of Design Cooling Towers: TTXR Series as manufactured by Tower Tech.

B. General Requirements: Furnish and install as shown on the plans a >factory-assembled, forced draft, counter-flow, modular cooling tower.
   Design Loading: Tower shell and substructure (support legs) shall be designed to withstand a sustained wind load of 200 MPH (91.6 psf).
   1. Seismic: force factor of Cs = SDC E, (Ss = 3, S1 = 2, soil class D)

C. System Requirements: Cooling tower modules must be capable of operating

independently or in combination with future modules.

1. Minimum Cells or Modules: As indicated on Drawings.

2. The basis of design cooling tower's principal construction shall be of pultruded Fiberglass Reinforced Polyester (FRP) and must have a flame spread rating less than 25 (ÅSTM E 84) or a flammability coefficient of 94-V0.
3. Cooling towers constructed of metal shall have basin, panels, and structural elements manufactured from 316 stainless steel.

2.3 MATERIALS

A. Thermal Performance:
   1. Peak Load Conditions:
      a. Tower shall be capable of cooling _____ gallons per minute of circulating water from ___ degrees F HWT, to ___ degrees F CWT, at ___ degrees F air entering wet bulb temperature, operating with a total fan motor power of ___ BHP maximum.
   2. The manufacturer shall guarantee the towers are certified as to thermal performance by Cooling Technology Institute (CTI) as set forth in the current version of CTI Certification Standard STD-201.

B. Compliance: Cooling tower must be CTI Certified as set forth in the current version of CTI Certification Standard STD-201. Towers claiming to be CTI "listed" or "designed" to CTI specifications shall not be acceptable.

2.4 CONSTRUCTION

A. Cold Water Basin and Tower:
   1. The cold water basin and the tower casing shall be constructed of pultruded Fiberglass Reinforced Polyester (FRP) with UV inhibitors.
   2. FRP
      a. Minimum Thickness: 1/4 inch (6.35 mm).
      b. Minimum Density: 0.7 oz./cu. in. (1.21 grams/cm3).
   3. Specially placed reinforcement and an ultraviolet veil layer will ensure the structural strength and longevity.
   4. Metal Tower: Basin shall be constructed of stainless steel.
      a. Stainless Steel Alloy: 316.
   5. Perimeter Basin: External shell.
   6. Tower shell or casing shall have an integral perimeter basin. Its elevated basin shall reduce operational pump head requirements.
   7. High Velocity Water Flow: 5-7 feet per second during operation shall minimize accumulation of sediment.
   8. Perimeter Basin: Equipped with one inspection port, at each corner support member, on the front and rear surfaces.
   9. Towers constructed of metal shall have stainless steel casing and structure.
      a. Stainless Steel Alloy: 316.
   10. Basin Heaters: Two 6kW stainless steel basin heater elements.
   11. Heater shall have corrosion and liquid proof enclosure.
   12. The basin heater package shall include a combination controller and probe (temperature and level sensor) preset at 45 degrees F (7.2 degrees C). This sensor probe is stainless steel with a 1/2-inch NPT mounting fitting.
   13. The control panel contains the electronic temperature/flow liquid level control, control voltage transformer, and magnetic contactor used to energize and de-energize heater.
   14. Heater must be interlocked with pump control to deactivate heaters when cooling tower pumps are operating.

15. Control panel door includes standard lockout disconnect.
16. Panel and probes shipped loose for field install.
17. A separate 3-Phase power source must be supplied to the control unit.
18. Interlock with pump control and flow/pressure switch to be completed in the field by others (temperature controls contractor or electrician).
19. Compliance: Control panel is NEMA-4X, UL rated.
20. Towers with conventional basin designs shall provide a "Sweeper" piping system to prevent sediment buildup and/or stagnant water areas that permit algae and other biological growth. Sweeper piping system shall include necessary "Eductor" nozzles, piping, pump, sediment separator, and electronic controllers for a completely automatic system.

B. Sump: Mechanical component.
1. Tower shall be equipped with a terminally mounted (end wall) outlet sump with a bottom outlet providing a flanged 150 lb bolt pattern discharge connection for simplified piping. Sump casing shall be manufactured of rotationally molded Polypropylene (PP). Towers having depressed center-type sumps shall use 316 stainless steel for sump construction.
2. Standard equipment shall include a manufacturer supplied and mounted brass float valve with brass or stainless steel components.
3. Connection Size: 2 inch NPT.
4. Also included are a flanged overflow/equalization connection, and a corrosion-free, easily removable debris screen. Contractor to be responsible for modifications and additions for towers that utilize alternative equalization and overflow designs.
5. Maximum Rated Operating Pressure for Float Valve: 25 psi (1.72 Bar).
6. Install pressure reducing valve if site water pressure is above 25 psi (1.72 Bar).
7. Towers with conventional basin designs shall provide a solid stainless steel, heavy gauge basin with depressed center section, and an adequate drain (removable standpipe) for flushing.
   a. Stainless Steel Alloy: 316.

C. Fill and Drift Eliminators: Internal component.
1. Fill shall be Polyvinyl Chloride (PVC) of cross-fluted design, 10-mil after forming, impervious to decay, fungus and biological attack, with a flame spread index of 5 according to ÅSTM E 84 and a maximum operating temperature of 130 degrees F (54.4 degrees C). Fill sheets shall be self-spacing, supported on maximum spans of 12 inches (305 mm). Each fill sheet shall have a microstructure to improve heat transfer. Fill sheets shall be bonded together to form a cross-corrugated pattern by application of glue to dedicated glue joints or by engineered mechanical attachment. Where glued, random application of glue shall not be acceptable.
2. The flute opening of the fill pack shall not be less than around 3/4 inch (19 mm). Fill packs or blocks shall be placed in the tower so as to provide the tightest fit possible without damage to the fill.
3. Drift eliminators shall be minimum three-pass Polyvinyl Chloride (PVC) material of cellular design impervious to decay, fungus and biological attack, with a flame spread index of 5 according to ÅSTM E 84 and a maximum operating temperature of 130 degrees F (54.4 degrees C). Drift losses shall not exceed 0.0004 percent of the design circulating flow rate at full fan speed. Manufacturer must include in proposal the stated drift rate of proposed cooling tower.

D. Water Distribution Systems: Internal component.
1. Water shall enter the tower through a single inlet comprised of an enclosed,

low pressure, non-corrosive Polyvinyl Chloride (PVC) Schedule 40 piping system.. Water shall be evenly sprayed over the fill media by evenly spaced and sized High Density Polyethylene (HDPE) spray nozzles.

2. The nozzles must operate at a pressure from a minimum of .5 psi (3.45 kPa) to a maximum of 1.5 psi (10.3 kPa).
3. Towers that utilize a hot water gravity basin design shall be constructed of 316 stainless steel, and the hot water basin covers shall be constructed of stainless steel or corrosion resistant material of equal quality.
   a. Stainless Steel Alloy: 316.
4. Hardware used for securing panels to basin shall be stainless steel.
   a. Stainless Steel Alloy: 304
5. Towers operating with nozzles less than 2" in diameter shall include a ladder equipped with safety cage and a fan deck handrail system to provide access to the gravity distribution basin or nozzles for routine maintenance. The water distribution system shall provide full fill media coverage through the entire operating flow range of the circulating water system.

E. Water Collection Systems: Internal component.
1. The tower shall utilize a water collection system positioned beneath the fill media and above the air inlet.
2. The water collection system shall collect cold water as it falls from the fill media and channel the water into the tower's elevated perimeter basin permitting the mechanical equipment to be mounted in the dry entering air stream beneath the tower.
3. The water collectors shall be made of extruded flame retardant acrylonitrile butadiene styrene copolymer (ABS) material and shall contain an integral barometric damper system that causes the dampers to open and close mechanically with airflow.
4. Each fan's damper system will prevent entry of airborne debris into the tower when the fan below the damper is OFF.
5. For towers utilizing an open sediment-type basin design, air inlet louvers shall be installed and the following type of louvers installed.
   a. Louvers Materials: FRP. Or 316 Stainless Steel

F. Motors: Mechanical component.
1. Motors: A minimum of four equally sized motors shall be provided. Tower modules offering a single motor for the design conditions shall be unacceptable.
2. Power: As indicated on Drawings.
   a. Service Factor: At least 1.15.
3. Must be Suitable For: Voltage as indicated on Drawings.
4. Frequency: As indicated on Drawings.
5. At Service Temperature: As indicated on Drawings.
6. Motors: Inverter ready, RPM as indicated on Drawings.
7. Wiring: As indicated on Drawings.
8. Towers having motors located in the exit air stream are not acceptable. Towers having motors with greater than 7.5 HP (5.6 kW) per motor shall provide a davit system designed to remove motors from top of tower to base of tower.
9. Towers operating with top mounted motors shall include a ladder equipped with safety cage, a fan deck handrail system to provide access to the mechanical system for routine inspection and maintenance. The motors, fans, and drive trains shall be mounted to stainless steel sub-structure using .
   a. Stainless Steel Alloy: 316.
10. Stainless Steel Bolts:
   a. Stainless Steel Alloy: 304.

G. Fans: Mechanical component.
   1. The tower system shall have a minimum of four (4) fans to handle the design conditions.
   2. Fans shall be of an axial, airfoil design positioned within an aerodynamically streamlined fiberglass shroud and installed with a minimum tip clearance for maximum efficiency. Fan blades shall be manufactured of Fiberglass-Reinforced Polypropylene or cast aluminum, and be pitch-adjustable. Fan hubs shall be manufactured of high strength, low weight aluminum alloy to minimize stress and wear on motor bearings.
   3. Towers utilizing gear reducers or belt-driven units positioned in the moist exiting air stream must provide one replacement spare of each mechanical component.
   4. Towers utilizing gear reducers shall provide a davit system designed to remove gear reducers from top of tower to base of tower. Gear reducer units shall be equipped with remote oil fill and drain lines.
   5. Towers utilizing gear reducers shall have a vibration switch for each fan drive. Vibration switches shall be NEMA 250 Type 4X with a field adjustable acceleration sensitivity setpoint in a range of 0-1g and frequency range of 0-3000 cycles per minute. Vibration switch to have manual and remote reset capability.

H. Personnel Access Components:
   1. Doors, external ladders, platforms, and handrails: Towers having fans located on the top shall be equipped with fixed ladders with ladder extensions to access top of cooling tower from adjacent grade without the need for portable ladders.
      a. Ladder Materials: FRP or 316 alloy.
   2. Handrails, knee rails, toe boards around the top of tower shall be supplied.
      a. Handrail Materials: FRP or 316 alloy.
   3. Towers having access doors to internal components shall provide internal platform spanning the collection basin from one end of the tower to the other and positioned to form a path between access doors. Platform shall be elevated so that parts remain above the high water level of the collection basin.
      a. Internal Platform Materials: FRP or 316 alloy.

2.5 MOTOR CONTROL PANELS

A. Panel Type: Basic MPP Panel
   1. Furnish a NEMA-4 (outdoor location) rated motor protection panel or disconnect as applicable to proposed cooling tower.

PART 3 EXECUTION

3.1 PREPARATION

A. Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

B. Prepare substrates using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Verify substrate and framing is acceptable for product installation.

C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 INSTALLATION

A. Install cooling towers in accordance with manufacturer's instructions.
   1. Install in accordance with project engineering drawings and manufacturer's installation, operation, and maintenance manuals.
   2. Provide required supports, attachments devices, and accessories needed to insure quiet operation.
   3. Provide representative of manufacturer for installation supervision and start up.
   4. Owner training shall be provided by manufacturer's representative.

3.3 DEMONSTRATION AND TRAINING

A. Train Owner's maintenance personnel to operate and maintain cooling towers and controls including:
   1. Starting and stopping of fan motors.
   2. Sequence of operation.
   3. Troubleshooting and servicing.
   4. Routine maintenance.
   5. Schedule training with owner, through Engineer or Construction Manager.

3.4 CLEANING AND PROTECTION

A. Clean products in accordance with manufacturer's instructions.

B. Protect installed products from damage by subsequent construction activities.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

New 2024 proposed Fluid Cooler Emissions Summary

Parameter	Value	Units
Number of Cooling Towers	5	
Hours of Operation	8,760	hr/yr
Feedwater TDS	442	mg/L
Cycles of Concentration	3	cycles
Recirculation Rate	1,991	gpm
Drift Rate	0.0004	% of recirc flow
Liquid Drift Droplet Emissions	20	lb/hr

Pollutant	Emission Factor			Hourly per Cooling Tower (lbs/hr)	Total Hourly (lbs/hr)	Total Daily (lbs/day)	Annual Emissions (lb/yr)	(tpy)
Criteria Pollutants								
PM	100%	of TDS	[a]	0.005	0.03	0.6	231	0.12
PM_{10}	100%	of TDS	[a]	0.005	0.03	0.6	231	0.12
$PM_{2.5}$	78%	of TDS	[a]	0.004	0.02	0.5	180	0.09
Toxic Air Pollutants								
Arsenic (As)	**2.9E-03**	**mg/L**	[b]	**3.4E-08**	**1.7E-07**	**4.1E-06**	**1.5E-03**	**7.5E-07**
Beryllium (Be)	*1.0E-04*	*mg/L*	[b]	*1.2E-09*	*6.0E-09*	*1.4E-07*	*5.2E-05*	*2.6E-08*
Cadmium (Cd)	*1.0E-04*	*mg/L*	[b]	*1.2E-09*	*6.0E-09*	*1.4E-07*	*5.2E-05*	*2.6E-08*
Chromium (Cr)	**1.7E-04**	**mg/L**	[b]	**2.0E-09**	**1.0E-08**	**2.4E-07**	**8.9E-05**	**4.5E-08**
Cobalt (Co)	*3.0E-03*	*mg/L*	[b]	*3.6E-08*	*1.8E-07*	*4.3E-06*	*1.6E-03*	*7.9E-07*
Copper (Cu)	**0.327**	**mg/L**	[b]	**3.9E-06**	**2.0E-05**	**4.7E-04**	**0.2**	**8.6E-05**
Lead (Pb)	**1.2E-02**	**mg/L**	[b]	**1.4E-07**	**7.1E-07**	**1.7E-05**	**6.3E-03**	**3.1E-06**
Manganese (Mn)	**1.7E-02**	**mg/L**	[b]	**2.0E-07**	**9.9E-07**	**2.4E-05**	**8.7E-03**	**4.4E-06**
Mercury (Hg)	*2.0E-04*	*mg/L*	[b]	*2.4E-09*	*1.2E-08*	*2.9E-07*	*1.0E-04*	*5.2E-08*
Selenium (Se)	**1.7E-03**	**mg/L**	[b]	**2.1E-08**	**1.0E-07**	**2.5E-06**	**9.1E-04**	**4.5E-07**
Vanadium (V)	**6.1E-02**	**mg/L**	[b]	**7.3E-07**	**3.7E-06**	**8.8E-05**	**0.03**	**1.6E-05**
Total Cyanide	*0.010*	*mg/L*	[b]	*1.2E-07*	*6.0E-07*	*1.4E-05*	*5.2E-03*	*2.6E-06*
Ammonia (as N)	*0.070*	*mg/L*	[b]	*8.4E-07*	*4.2E-06*	*1.0E-04*	*0.04*	*1.8E-05*
Total Phosphorus	**0.070**	**mg/L**	[b]	**8.4E-07**	**4.2E-06**	**1.0E-04**	**0.04**	**1.8E-05**

Notes:

[a] Methodology for calculating the evaporated solid particle size distribution based on the droplet size distribution is taken from "Calculating Realistic PM $_{10}$ Emissions from Cooling Towers," Reisman and Frisbie, Environmental Progress, July 2002.

[b] Italic text indicates reporting limits were used because the analyte was not detected. Bold text indicates the analyte was detected and the maximum value is used (Cascade Analytical 2020).

453592	mg/lb
2.2	lb/L water
997902.4	lb pollutant/lb liquid drift droplet

Old 2022 proposed expansion Fluid Cooler Emissions Summary

Parameter	Value	
Number of Cooling Towers	8	
Hours of Operation	8,760	hr/yr
Feedwater TDS	442	mg/L
Cycles of Concentration	3	cycles
Recirculation Rate	7,352	gpm
Drift Rate	0.0005	% of recirc flow
Liquid Drift Droplet Emissions	147	lb/hr

Pollutant	Emission Factor			Emission Rate				
				Hourly per Cooling Tower (lbs/hr)	Total Hourly (lbs/hr)	Total Daily (lbs/day)	Total Annual (lb/yr)	Total Annual (tpy)
Criteria Pollutants								
PM	100%	of TDS	[a]	0.024	0.20	4.7	1,709	0.85
PM10	100%	of TDS	[a]	0.024	0.20	4.7	1,709	0.85
PM2.5	78%	of TDS	[a]	0.019	0.15	3.6	1,330	0.66
Toxic Air Pollutants								
Arsenic (As)	**2.9E-03**	**mg/L**	[b]	**1.6E-07**	**1.3E-06**	**3.0E-05**	**1.1E-02**	**5.6E-06**
Beryllium (Be)	*1.0E-04*	*mg/L*	[b]	*5.5E-09*	*4.4E-08*	*1.1E-06*	*3.9E-04*	*1.9E-07*
Cadmium (Cd)	*1.0E-04*	*mg/L*	[b]	*5.5E-09*	*4.4E-08*	*1.1E-06*	*3.9E-04*	*1.9E-07*
Chromium (Cr)	**1.7E-04**	**mg/L**	[b]	**9.4E-09**	**7.5E-08**	**1.8E-06**	**6.6E-04**	**3.3E-07**
Cobalt (Co)	*3.0E-03*	*mg/L*	[b]	*1.7E-07*	*1.3E-06*	*3.2E-05*	*1.2E-02*	*5.8E-06*
Copper (Cu)	**0.327**	**mg/L**	[b]	**1.8E-05**	**1.4E-04**	**3.5E-03**	**1.3**	**6.3E-04**
Lead (Pb)	**1.2E-02**	**mg/L**	[b]	**6.6E-07**	**5.3E-06**	**1.3E-04**	**4.6E-02**	**2.3E-05**
Manganese (Mn)	**1.7E-02**	**mg/L**	[b]	**9.2E-07**	**7.3E-06**	**1.8E-04**	**6.4E-02**	**3.2E-05**
Mercury (Hg)	*2.0E-04*	*mg/L*	[b]	*1.1E-08*	*8.8E-08*	*2.1E-06*	*7.8E-04*	*3.9E-07*
Selenium (Se)	**1.7E-03**	**mg/L**	[b]	**9.6E-08**	**7.7E-07**	**1.8E-05**	**6.7E-03**	**3.4E-06**
Vanadium (V)	**6.1E-02**	**mg/L**	[b]	**3.4E-06**	**2.7E-05**	**6.5E-04**	**0.24**	**1.2E-04**
Total Cyanide	*0.010*	*mg/L*	[b]	*5.5E-07*	*4.4E-06*	*1.1E-04*	*3.9E-02*	*1.9E-05*
Ammonia (as N)	*0.070*	*mg/L*	[b]	*3.9E-06*	*3.1E-05*	*7.4E-04*	*0.27*	*1.4E-04*
Total Phosphorus	**0.070**	**mg/L**	[b]	**3.9E-06**	**3.1E-05**	**7.4E-04**	**0.27**	**1.4E-04**

	2022 Proposal (tpy)	2024 Proposal (tpy)	Emission Redcution (tpy)
Criteria Pollutants			
PM	0.85	0.12	-0.74
PM_{10}	0.85	0.12	-0.74
$PM_{2.5}$	0.66	0.09	-0.57
Toxic Air Pollutants			
Arsenic (As)	5.55E-06	**7.5E-07**	-4.80E-06
Beryllium (Be)	1.94E-07	*2.6E-08*	-1.68E-07
Cadmium (Cd)	1.94E-07	*2.6E-08*	-1.68E-07
Chromium (Cr)	3.29E-07	**4.5E-08**	-2.85E-07
Cobalt (Co)	5.81E-06	*7.9E-07*	-5.03E-06
Copper (Cu)	6.34E-04	**8.6E-05**	-5.48E-04
Lead (Pb)	2.31E-05	**3.1E-06**	-2.00E-05
Manganese (Mn)	3.22E-05	**4.4E-06**	-2.78E-05
Mercury (Hg)	3.88E-07	*5.2E-08*	-3.35E-07
Selenium (Se)	3.35E-06	**4.5E-07**	-2.90E-06
Vanadium (V)	1.18E-04	**1.6E-05**	-1.02E-04
Total Cyanide	1.94E-05	*2.6E-06*	-1.68E-05
Ammonia (as N)	1.36E-04	*1.8E-05*	-1.17E-04
Total Phosphorus	1.36E-04	**1.8E-05**	-1.17E-04