October 17, 2023

Clark County Department of Environment and Sustainability
Division of Air Quality
4701 W. Russell Road, Suite 200
Las Vegas, NV 89118

RE: Application for a Significant Permit Revision to a Synthetic Minor Source Permit
Source # 18024 – Switch – Las Vegas

To Whom It May Concern,

Switch, Ltd. (Switch®) is in the process of constructing an advanced technology ecosystem communications facility located at South Jones Boulevard and Badura Avenue in Las Vegas, Nevada (the Facility). The Facility is located within the jurisdiction of the Clark County Department of Environment and Sustainability, Division of Air Quality (DAQ) and is permitted under the Synthetic Minor Source Permit for Source 18024, issued by DAQ on May 19, 2020 and most recently revised on February 16, 2022 (the Permit). Enclosed is a Significant Permit Revision (SPR) application which proposes adding an additional data center to the permit. This data center includes 21 emergency generators and 15 cooling towers. In addition, this permit revision includes a revision to the configuration of 9 existing emergency generators and 5 existing cooling towers located at the Facility. The change in equipment configuration at the Facility will not affect the Potential-to-Emit (PTE) for the existing emission units and does not require modification to the units. Switch is submitting this SPR application package in accordance with the requirements stipulated by Clark County Air Quality Regulation (CCAQR) Section 12.1.6(a).

The enclosed application satisfies the SPR requirements stipulated by CCAQR Section 12.1.3.3, and includes the necessary forms, emission calculations, and equipment specifications. Pursuant to CCAQR Section 18.4.1, Switch has included a New Source Review (NSR) fee of $440 with this application package.

Per the DAQ letter, Request for Confidentiality; New Minor Source Permit, Source ID#17992, from Ted Lendis (DAQ) to Brandie Koehler (Switch) on April 26, 2019, this application package also contains the confidentiality determination from DAQ. Switch requests that this confidentiality determination be applied to this application as well. A confidential and public version of this application is being submitted.

If you have any questions or comments about the information presented in this letter or the enclosed SPR application package, please do not hesitate to contact me at (702) 444-4209 or Mr. Sean Keane (Trinity Consultants, Inc.) at SKeane@trinityconsultants.com.

Sincerely,

Brandie Koehler
Vice President of Data Center Operations

Enclosures
cc: Heather Borgen, Switch
Sean Keane, Trinity Consultants, Inc.

For the purposes of this definition, a control technology shall be deemed RACT if it is or meets an EPA control technology guideline limitation for the applicable source category, is a New Source Performance Standard, Maximum Achievable Control Technology standard, or any other federally enforceable limitation or condition relied upon as RACT in a nonattainment or maintenance plan.

RACT may be determined on a case-by-case or source category-specific basis, at the option of the person performing the control technology review, and shall take into account relevant findings and determinations in EPA's RACT/BACT/LAER Clearinghouse. The determination of cost effectiveness may consider the analysis contained in the EPA Office of Air Quality Planning and Standards Cost Control Manual.

Switch conducted a RACT review for diesel-fired emergency engines at a similar site (Source ID: 16304) in October 2022. This site, owned by Switch as well, uses the same type of equipment for the same purpose as discussed in the review. Hence, this analysis is relevant to the proposed new emergency generators in the Project. Switch will adhere to the RACT referenced in this review, which include the following:

1. EPA Tier Certification
2. Use of good combustion practices (GCP)

The diesel-fired emergency engines use GCP as they meet manufacturer specifications and are certified to comply with the applicable emission standards as outlined in 40 CFR Part 60 Subpart IIII for stationary CI internal combustion emergency engine, per the maximum engine power and model year. As discussed in the RACT review, the installation of add-on controls to the existing emergency engines is not feasible per EPA and other agencies' RACT prohibitory rules (e.g., SCAQMD and SJVAPCD) do not require compliance with specific NO_x emission standards for emergency engines. Therefore, the use of GCP and compliance with applicable 40 CFR Part 60 Subpart IIII requirements, such as emission standards, is technically feasible and is selected as meeting RACT for all of the diesel-fired emergency engines. Switch intends to maintain the current emission limits for NOx as contained in the Permit for each of the affected diesel emergency engines. Switch will utilize the existing Permit conditions to monitor compliance with the NOx emission limits contained in the Permit.

4.2.7 CCAQR Section 18: Permit and Technical Service Fees

CCAQR §18 specifies fees that must be paid as part of permit applications and various other compliance activities. Per CCAQR §18.4.1, Switch must pay a $440 NSR Application fee, which is included with this application package. Any additional fees associated with reviewing the application (i.e., fees incurred pursuant to CCAQR §18.4.3) will be invoiced by DAQ following completion of the application review.

4.2.8 CCAQR Section 26: Emission of Visible Air Contaminants

CCAQR §26 prohibits a single source to discharge any air contaminant which exceeds an average of 20 percent opacity for a period of more than 6 consecutive minutes. Switch is subject to requirements of this rule and will operate all equipment in a manner to meet the opacity requirements of CCAQR §26.

4.2.9 CCAQR Section 28: Fuel Burning Equipment

CCAQR §28 prohibits the emission of particulate matter from any fuel burning equipment in excess of the quantity set forth in CCAQR §28.2.1. As demonstrated in Table 3-1 of this application, Switch will operate the engines in compliance with the requirements of CCAQR §28.

4.2.10 CCAQR Section 40: Prohibitions of Nuisance Conditions

CCAQR §40 prohibits the discharge of air contaminants which are injurious to health, offensive to the senses, or otherwise interfere with the reasonable or comfortable enjoyment of life or property. Switch is subject to requirements of this rule and will operate all equipment in a manner to avoid any public nuisance as stipulated under CCAQR §40.

4.2.11 Reasonably Available Control Technology

CCAQR Section 12.1.3.6(c)(2) outlines the RACT control technology demonstration requirements:

> *(2) A modification to an existing minor source that requires a significant permit revision pursuant to Section 12.1.6(a)(7) shall contain the following*
>
> > *(B) A proposed RACT for each affected pollutant, the methodology by which RACT was determined and how compliance with RACT is to be demonstrated, including material usage limits, performance testing, or continuous emissions monitoring, if applicable;*

The proposed project will increase the Facility's PTE for NO_X by an amount greater than the significance levels defined in CCAQR Section 12.1.1(j) (see Table 3-1). Therefore, a RACT analysis is required for NO_X.

CCAQR §0 defines RACT as the following:

> *"Reasonably Available Control Technology (RACT)" means the lowest emissions limitation that a particular source is capable of meeting by the application of control technology that is reasonably available, considering technological and economical feasibility. In determining RACT, the following shall be considered:*
>
> > *(a) Energy and environmental impacts and costs;*
> > *(b) Cost effectiveness;*
> > *(c) Control technology in use by similar sources; and*
> > *(d) Technical feasibility.*

The Facility does not fall under any of the 26 source categories under the definition of a "categorical stationary source" in CCAQR Section 12.2.2(j). CCAQR Section 12.2.2(ff)(1)(A) is therefore not applicable to the Facility. The Facility does not meet the definition of major stationary source under CCAQR Section 12.2.2(ff)(1)(B), because the PTE is less than 250 tpy for any of the regulated NSR pollutants, as shown in Table 3-1 of this application. As the Facility is not considered a major stationary source under the PSD permitting program, CCAQR Section 12.2.2(ff)(1)(C) is not evaluated in this application. CCAQR Section 12.2.2(ff)(1)(D) does not apply because the Project does not constitute a new major stationary source.

Therefore, PSD review and permitting procedures under CCAQR Section 12.2 are not required for the Project.

4.2.3 CCAQR Section 12.3: Permit Requirements for Major sources in Nonattainment Areas

The Facility is located in Clark County, NV, which is partially designated as a "moderate" nonattainment area for ozone (hydrographic area 212). Pursuant to CCAQR Section 12.3.1.1, NA NSR permitting under CCAQR Section 12.3 is triggered if a facility proposes a major modification to an existing major stationary source, or upon construction of a new project which itself exceeds major stationary source thresholds, for each nonattainment pollutant. A "major stationary source" is defined in CCAQR Section 12.3.2(y)(1)(C) as a stationary source with potential to emit 100 tpy VOC or 100 tpy NO_x for areas designated as moderate nonattainment for ozone.

As shown in Table 3-1 of this application, the post-Project PTE of the Facility for VOC and NO_x is less than 100 tpy. Additionally, the increased emissions from the Project itself will not exceed the major stationary source thresholds. Therefore, the NA NSR permitting procedures under CCAQR Section 12.3 do not apply to the Project.

4.2.4 CCAQR Section 12.4: ATC Application and Permit Requirements for Part 70 Sources

CCAQR Section 12.4.1.1(a) states the requirements for Part 70 sources that fall within the preconstruction review applicability criteria. A Part 70 source is defined in CCAQR Section 0 as a source that is defined as a major stationary source under Sections 12.2.2(ff) or 12.3.2(r), or as a major source as defined by 40 CFR 70.2. As discussed above, the Facility is not considered a major stationary source under CCAQR 12.2 or 12.3, and, is not a major source as defined in 40 CFR 70.2 (i.e., does not emit any single HAP in excess of 10 tpy, aggregate HAPs in excess of 25 tpy, or any criteria pollutant in excess of 100 tpy). Therefore, the Facility does not constitute a Part 70 source according to part (a) of the definition. Additionally, the Facility does not meet any of the subsequent requirements in parts (b)-(g) of the definition. As such, the Facility is not a Part 70 source and the requirements of CCAQR 12.4 do not apply.

4.2.5 CCAQR Section 13: National Emission Standards for Hazardous Air Pollutants

CCAQR §13 incorporates the NESHAP codified at 40 CFR Part 61 and Part 63 by reference, which are discussed in Section 4.1.4 of this report.

4.2.6 CCAQR Section 14: New Source Performance Standards

CCAQR §14 incorporates the NSPS codified at 40 CFR Part 60 by reference, which are discussed in Section 4.1.3 of this report.

The proposed project will increase the Facility's PTE for NO_X by an amount greater than the significance levels defined in CCAQR Section 12.1.1(j) (see Table 3-1). Therefore, a RACT analysis is required for NO_X. Please see Section 4.2.11 for a discussion on applicable RACT.

> ***(3) A revision proposing a voluntarily accepted emission limitation shall include enough detail to demonstrate that the voluntarily accepted emission limitation is enforceable as a practical matter, and such detail shall include, at minimum, how the limitation affects each emission unit and each air pollutant from that emission unit.***

Switch is proposing to apply the VAEL of 104 hours per year of operation for each new generator engine in the Project. This is consistent with the VAEL of the existing emergency generators.

> ***(4) A significant revision or a renewal for a source that is not in compliance at the time the application is submitted, shall include a compliance plan to address the non-compliant issue(s). The plan shall include a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any requirements that the source is not in compliance at the time of permit issuance. Any such plan shall be supplemental to, and shall not sanction noncompliance with, the applicable requirements on which it is based.***

This permit application is not a significant revision or a renewal for a source that is not in compliance.

12.1.3.6(d) An application for a minor permit revision for a minor source shall contain the information necessary to demonstrate that the change qualifies as a minor permit revision pursuant to Section 12.1.6(b).

This application is not for a minor permit revision.

4.2.2 CCAQR Section 12.2: Permit Requirements for Major Sources in Attainment Areas (PSD)

The Facility is located in Clark County, NV (hydrographic area 212) which is designated as "attainment" for all criteria pollutants except ozone. Pursuant to CCAQR Section 12.2.1.1, PSD permitting under CCAQR Section 12.2 applies to the construction of new major stationary sources or modifications at existing major stationary sources for attainment pollutants. A "major stationary source" is defined in CCAQR Section 12.2.2(ff)(1) as,

> *(A) Any of the categorical stationary sources of air pollutants which emits, or has the potential to emit 100 tpy or more of any regulated NSR pollutant;*
> *(B) Notwithstanding the stationary source size otherwise specified in paragraph (1)(A) of this definition, any non-categorical stationary source which emits, or has the potential to emit, 250 tpy or more of a regulated NSR pollutant;*
> *(C) Any stationary source specified in paragraphs (1)(A) or (1)(B) of this definition which emits, or has the potential to emit, GHG that are subject to regulation as defined in 40 CFR 52.21(b)(49) as of July 1, 2010; or*
> *(D) Any physical change that would occur at a stationary source not qualifying under paragraphs (1)(A) or (1)(B) of this definition as a major stationary source, if the change would constitute a major stationary source by itself.*

(E) Any limitations on source operation affecting emissions or on any work practice standards affecting emissions.
(F) Other information required by any applicable requirement.
(G) The calculations on which the information in Sections 12.1.3.6(b)(2)(A) through (F) is based.
(H) A justification for any exemption sought from any otherwise applicable requirement.

Please refer to Section 3-1 and Appendix C for information pertaining to the potential emissions from the proposed emergency generators and cooling towers. Refer to Appendix B for manufacturer specifications on the emergency generators and cooling towers.

(3) For a new or modified source, a schedule of construction, if applicable.

Switch plans to commence the installation of the units in 2024. Switch will provide an estimated construction date when the timeline is finalized. Switch requests that DAQ issue the significant permit revision as expeditiously as possible.

(4) A list of emission limitations and other requirements applicable to the source.

Please refer to Appendix C for proposed emission limitations and proposed hours of operation.

(5) A list of emission units or activities claimed as exempt under 12.1.2(b).

This permit modification does not include any exempt emission units.

12.1.3.6(c) In addition to the information required by Section 12.1.3.6(a), the following information is required as applicable where the application proposes the following:

(1) A new minor source that will have a potential to emit that is significant for any regulated air pollutant shall include a demonstration of RACT for the affected pollutant shall be proposed and shall include the methodology by which RACT was determined and how compliance with RACT will be demonstrated.

This is not an application for a new minor source.

(2) A modification to an existing minor source that requires a significant permit revision pursuant to Section 12.1.6(a)(7) shall contain the following:

(A) A description and quantification of the increase in the potential to emit resulting from the modification.

This application contains cooling tower and emergency generator specifications in Appendix B, emission calculations and description of the Project in Appendix C and Section 3.

(B) A proposed RACT for each affected pollutant, the methodology by which RACT was determined and how compliance with RACT is to be demonstrated, including material usage limits, performance testing, or continuous emissions monitoring, if applicable.

Section 12.1.1(d), but less than the major source thresholds listed in 12.2.2(ff) or 12.3.2(r). As shown in Table 3-1 of this application, the Facility constitutes a minor source under Section 12.1.

Section 12.1.6(a) requires a significant permit revision application, pursuant to the permit application requirements in Section 12.1.3, if a change is requested that "increases the source's potential to emit a regulated air pollutant by an amount equal to or exceeding a significant increase." The Project qualifies as a significant permit revision under Section 12.1.6(a)(7) as the addition of the proposed emission units' emissions will result in an increase in the source's PTE more than the significance levels outlined in Section 12.1.1(j), as shown in Table 3-1. Switch is proposing to apply the Voluntarily Accepted Emission Limit (VAEL) of 104 hours per year of operation for each new generator engine in the Project.

Section 12.1.3.6 lists the required information to be included in the application. The regulatory text from Section 12.1.3.6 is included below in ***bold italics*** text. Switch's response to each regulatory requirement is included in plain text. As demonstrated, Switch has included all required information in this application pursuant to Section 12.1.3.6, thereby complying with the requirements of Section 12.1.

12.1.3.6(a) Identifying information that includes, but is not limited to:

> ***(1) The company name and address (and the source name and address, if different).***
> ***(2) The owner's and Responsible Official's name, email address, telephone number and the name(s) of plant site manager/contact with associated email addresses and telephone numbers.***
> ***(3) A declaration signed by the Responsible Official under penalty of perjury stating that, the statements and information in the application are true, accurate, and complete. Signature of the declaration statement shall subject the Responsible Official to liability for perjury under NRS 199.145.***

Please refer to Appendix A for the permit application forms which contain the requested information.

12.1.3.6(b) Identifying information that includes, but is not limited to:

> ***(1) A description of the source's processes and products using the North American Industrial Classification System (NAICS).***

Please refer to Appendix A for the permit application forms which contain the requested information.

> ***(2) The following emissions-related information:***
>
> > ***(A) The potential to emit of all regulated air pollutants emitted from each emission unit and activity, including fugitive emissions.***
> > ***(B) Identification and description, including but not limited to manufacturer, model, rating and serial number of each emission unit in sufficient detail to establish the applicable requirements.***
> > ***(C) The following information, to the extent it is needed to determine or regulate emissions: fuels, fuel use, raw materials, material usage rates, production rates, and operating schedules.***
> > ***(D) Identification and description of air pollution control equipment and compliance monitoring devices or activities, including design specifications.***

4.1.4 National Emission Standards for Hazardous Air Pollutants

NESHAPs are established in 40 CFR Part 63 to control the emissions of HAPs. The Facility is an area source of HAPs (i.e., the Facility will not emit more than 25 tons of total HAPs or more than 10 tons of any single HAP). The potentially applicable NESHAP subparts are discussed in the following section.

4.1.4.1 NESHAP Subpart A – General Provisions

Any source subject to a NESHAP is also subject to the general provisions of NESHAP Subpart A, unless specifically excluded. NESHAP Subpart A requires initial notification and performance testing, recordkeeping, monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

4.1.4.2 NESHAP Subpart Q

NESHAP Subpart Q, *National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers*, applies to all new and existing industrial process cooling towers located at major sources of HAPs. The applicable definition of major source under NESHAP Subpart Q is as follows:

> ***Major source*** *means any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants.*

Under the definition above, the Facility is not a major source of HAPs because site-wide potential emissions are less than 10 tons per year of each individual HAP and less than 25 tons per year for aggregate HAPs. Therefore, NESHAP Subpart Q does not apply to the Facility.

4.1.4.3 NESHAP Subpart ZZZZ

NESHAP Subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, applies to any new or existing stationary reciprocating internal combustion engine (RICE) operated at a major or area source. The generators proposed to be operated at the Facility will be considered RICE. Per 40 CFR 63.6590(c)(1), a new or reconstructed stationary RICE located at an area source of HAPs does not have any further requirements under NESHAP Subpart ZZZZ if the RICE meets the requirements of NSPS Subpart IIII. As described under Section 4.1.3.1 of this report, Switch will comply with all requirements stipulated under NSPS Subpart IIII. As such, Switch will comply with NESHAP Subpart ZZZZ by meeting the requirements of NSPS Subpart IIII.

4.2 Clark County Air Quality Regulations

In addition to the federal air regulations described previously, DAQ establishes regulations applicable at the emission unit level and at the facility level. The regulations also contain requirements related to the need for construction and/or operating permits. The rules potentially applicable to the Project at the Facility are detailed in the following sections.

4.2.1 CCAQR Section 12.1: Permit Requirements for Minor Sources

Per CCAQR Section 12.1.0, minor source permitting under CCAQR Section 12.1 is applicable to a stationary source with the PTE of a regulated air pollutant equal to or greater than the minor source thresholds listed in

4. REGULATORY REVIEW

This section summarizes the air permitting requirements and the key air quality regulations that apply to the Project. Specifically, applicability of PSD, NNSR, Title V of the 1990 Clean Air Act Amendments, NSPS, NESHAP, and CCAQR are addressed. Applicability to certain general provisions is not detailed in this narrative summary.

4.1 Federally Applicable Regulations

4.1.1 Prevention of Significant Deterioration

US EPA has delegated authority to DAQ to issue PSD permits under CCAQR Section 12.2. PSD applicability and requirements are discussed in Section 4.2.2 of this report.

4.1.2 Major Sources in Nonattainment Areas

DAQ requires new major stationary sources or major modifications to existing major stationary sources in nonattainment (NA) areas to obtain an ATC under CCAQR Section 12.3. NA NSR applicability and requirements are discussed in Section 4.2.3 of this report.

4.1.3 New Source Performance Standards

NSPS apply to certain types of equipment that are newly constructed, modified, or reconstructed after a given applicability date.

4.1.3.1 NSPS Subpart IIII

NSPS Subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*, applies to any owner or operator of a stationary compression ignition (CI) internal combustion engine (ICE) for which construction has commenced after July 11, 2005. The diesel-fired emergency generators proposed to be operated at the Facility are considered CI ICE and construction will commence after July 11, 2005. Therefore, the emergency generators at the Facility are subject to the requirements under NSPS Subpart IIII.

Note that each of the generators meet the definition of an emergency stationary ICE per 40 CFR 60.4219 and will comply with 40 CFR 60.4211. Switch will follow all requirements for emergency ICE as stipulated under NSPS Subpart IIII for the new generators.

4.1.3.2 NSPS Subpart JJJJ

NSPS Subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*, applies to any owner or operator of a spark ignition (SI) ICE emergency engine with a maximum engine power greater than 25 hp, on or after January 1, 2009. SI ICE are fired with gasoline, liquid petroleum gas (LPG), methanol, ethanol, bioethanol, compressed natural gas, hydrogen, and nitromethane but not diesel. Therefore, the engines included in this application are not considered an SI ICE and are not subject to NSPS Subpart JJJJ.

Table 3-1. Emissions Increase (tons per year)

	Pollutant (tpy)							
	PM_{10}	$PM_{2.5}$	NOx	CO	SO_2	VOC	HAP	GHG
PTE – New Emergency Generators	0.31	0.31	41.16	3.30	0.04	2.17	0.04	3,766
PTE – New Cooling Towers	0.97	0.97	--	--	--	--	--	--
Project PTE	1.28	1.28	41.16	3.30	0.04	2.17	0.04	3,766
CCAQR Section 12.1 Significant Levels [1]	7.5	7.5	20	35	40	20	--	--
Project Emissions Exceed CCAQR Section 12.1 Significant Levels	No	No	Yes	No	No	No	No	No
Pre-Project Source-wide PTE, Including Unconstructed Units [2]	1.40	1.40	50.14	3.88	0.25	2.65	0.11	4,148
Post-Project Source-wide PTE [3]	2.68	2.68	91.30	7.18	0.29	4.82	0.15	7,914
Major Source Threshold[4,5]	250	250	100	250	250	100	--	75,000
Post-project PTE Exceeds Major Source Thresholds	No	No	No	No	No	No	No	No
Title V Threshold	100	100	100	100	100	100	--	--
Post-project PTE Exceeds Title V Thresholds	No	No	No	No	No	No	No	No

1. Significant Levels per CCAQR §12.1.1(j)
2. Pre-Project PTE Facility-wide (including unconstructed units) per Table 3-1 of Permit 18024
3. Post-Project Source-wide PTE (tpy) = Pre-Project source-wide PTE, Including Unconstructed Units (tpy) + Project PTE Increase (tpy).
4. Nonattainment New Source Review Major Source Threshold for sources in moderate non-attainment areas for ozone.

3. EMISSIONS INFORMATION

3.1 Emissions Increase

Emissions associated with the 9 engines and 5 cooling towers changing locations are consistent with the existing generators and cooling towers' PTE contained in the Permit.

NO_X, CO, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAP, and GHG emissions associated with the proposed engines at the Facility are calculated using the methodologies described below. An annual operating schedule of 104 hours per year is assumed, pursuant to Condition 3.1.1 of the Permit. Detailed calculations are provided in Appendix C.

NO_X, CO, PM, and VOC emissions are calculated using emission factors (g/kWh) provided by the manufacturer. PM_{10} and $PM_{2.5}$ emissions are conservatively assumed to be equal to PM emissions, as calculated using the manufacturer-provided emission factor. Switch has assumed 95% of these emissions are NOX and 5% are VOC as defined in Table B-22 (NOX and NMHC Fraction Default Values for All Engines except TRUs) of the 2005 Carl Moyer Program Guidelines. SO_2 emissions are based on a fuel sulfur content of 0.0015% for ultra-low sulfur diesel fuel, as defined under 40 CFR 80, Subpart I, Section 80.510(c)(1). The SO_2 emission factor from AP-42 Section 3.4, Table 3.4-1 (10/96) is used in order to account for the fuel sulfur content. Total HAP emissions are calculated using the emission factors (lb/MMBtu) obtained from AP-42, Section 3.4, Table 3.4-3 and Table 3.4-4 (10/96). GHG emissions were calculated using 40 CFR Part 98 Table A-1, C-1, and C-2.

Calculations for each proposed cooling tower at the Facility are based on the annual hours of operation (8,760 hours/year) at the maximum flow rate capacity of each cooling tower (1,250 gpm) and total dissolved solids (TDS) concentration (5,000 ppm). PM, PM_{10}, and $PM_{2.5}$ emissions are quantified per DAQ methodology. Manufacturer specification sheets for the cooling towers are provided in Appendix B.

As seen in Table 3-1 below, the Project will result in an increase to the PTE below the significance levels defined in CCAQR §12.1.1(j) for all pollutants, except NO_X. Post-project Facility-wide emissions are also below the major stationary source thresholds for all pollutants.

2. SOURCE INFORMATION

2.1 Source Description

The Facility is located at South Jones Boulevard and Badura Avenue, Clark County, Las Vegas, Nevada and consists of 1 advanced technology ecosystem communications facility. The source is categorized under SIC code 7375: Information Retrieval Services and NAICS code 517919: All other Telecommunications. The Facility consists of 1-138 horsepower (hp) diesel-fired fire pump engine, 15-1,250 gallons per minute (gpm) cooling towers, as well as 24-3,058 hp diesel-fired emergency generators and associated diesel fuel storage tanks.

2.2 Project Description

Switch is proposing to revise the configuration of the current permitted units at the Facility. Please refer to figures in Appendix D that illustrate the proposed change in location. The changes will affect following units:

- 9 emergency generator and associated engine locations will be revised.
- 5 cooling tower locations will be revised.

The units involved in the configuration change at the Facility will not have any changes to their Potential-to-Emit and are therefore not included in Project emissions calculations.

In addition, Switch is proposing to construct an additional data center at the Facility which will consist of the following emission units:

- 15-3,058 hp diesel-fired emergency generators.
- 6-3,674 hp diesel-fired emergency generators.
- 15-1,250 gpm cooling towers.

Each of the diesel-fired emergency generators will be limited in operation to 104 hours per year, consistent with all other currently permitted emergency generators at the Switch campuses in Las Vegas.

1. EXECUTIVE SUMMARY

Switch, Ltd. (Switch®) is recognized as the independent world-leader in exascale data center ecosystems, edge data center designs, industry-leading telecommunications solutions, and next-generation technology innovation. Switch believes that the future of humanity depends on the intelligent and sustainable growth of the Internet. As more people, businesses, governments and devices come online, the need for reliable data centers powered by renewable energy increases. Powered by 100% renewable energy, Switch's focus on sustainability and efficient technologies make its exascale ecosystems the most sustainable and cost-effective colocation environment in the industry. These initiatives are further supported by CEO and Founder Rob Roy's best-in-class engineering designs, resulting in over 700 issued and pending patent claims. The Switch ecosystem empowers its clients with a myriad of options for innovation, economies of scale, risk mitigation, sustainability and investment protection.

Switch owns and operates an advanced technology ecosystem communications facility located at South Jones Boulevard and Badura Avenue in Las Vegas, Nevada (the Facility). The Facility is located within the jurisdiction of the Clark County Department of Environment and Sustainability, Division of Air Quality (DAQ) and currently operates under the Synthetic Minor Source Permit for Source 18024, issued by DAQ on May 19, 2020 (the Permit) and most recently revised on February 16, 2022.

With this Significant Permit Revision (SPR) application, Switch is proposing to construct an additional data center at the Facility, which will include emergency generators and cooling towers. In addition, Switch is proposing to revise the locations of the emergency generators and cooling towers contained in the Permit. These changes are collectively referred to as the Project. A detailed discussion of the Project is provided in Section 2 of this application. This report and associated appendices include all information required for a complete SPR application pursuant to Clark County Air Quality Regulation (CCAQR) Section 12.1.3.3.

The required DAQ Minor Source Permit Application Form and Emission Unit-specific forms are included in Appendix A of this application. The required certification by a responsible official is included in the DAQ Minor Source Permit Application Form. Pursuant to CCAQR Section 18.4.1, Switch has included a New Source Review (NSR) fee of $440 with this application package.

Appendix B includes the manufacturer specifications for the proposed cooling towers and engines, Appendix C includes detailed emission calculations, and Appendix D includes the proposed equipment location maps.

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APPLICATION FOR A SIGNIFICANT PERMIT REVISION TO A SYNTHETIC MINOR SOURCE PERMIT

Clark County DAQ

Switch, Ltd. / Las Vegas, Nevada
Source 18024

Prepared By:

TRINITY CONSULTANTS
1575 Delucchi Lane, Suite 203
Reno, NV 89502
(775) 242-3200

October 2023

Project 232901.0014

DAQ does not dispute Switch's assertion that the level of security it provides its customers, as it relates to protection of its equipment and infrastructure, directly corresponds to its competitive position. However, Switch's claim that public disclosure of the Subject Information makes it "extremely likely to adversely affect [its] competitive position" is not fully supported in its proposal.

DAQ contends that security concerns relating to unit-specific information, including manufacturer, model, serial, and vintage are debatable when the type, position, and quantity of such units are in plain sight. Moreover, the need for back-up generators and cooling towers to support operations relating to data centers is commonly understood and these units are typically distinguishable from beyond the fenceline, as evident by several comparable properties operated by Switch. Additionally, DAQ believes the presence of such equipment does not enable outside parties to accurately surmise Switch's unique processes and services contained within its building(s).

Switch is at liberty to exclude the layout of its walls, doors, vaults, conduit, power lines, etc. as it sees fit. Such information is not necessary for DAQ to conduct preconstruction review and ultimately issue an air quality permit. Other than a site plan that is relatively non-descript as it relates to Switch's infrastructure layout, DAQ is not aware of other structural information that is detailed in the subject application. Therefore, DAQ accepts Switch's proposal to maintain the redacted site plan in the public version of its application.

Conclusion

Nevada Public Records Act mandates that all information submitted to DAQ is considered public record unless otherwise designated as confidential. A request for DAQ to withhold materials from public inspection on the basis of confidentiality must be demonstrated by an abundance of rationale supporting that non-disclosure is consistent with the intent of both NRS and AQR. Moreover, DAQ must point to specific justification for the claim of confidentiality. Here, Switch has failed to provide DAQ with such justification, and therefore denies, in part, its request to treat emission unit-specific information as confidential.

In accordance with the Nevada public records law, DAQ will make information that has not been certified as confidential available to the public. Pursuant to AQR 12.6.2, Switch may elect to file a notice of appeal and petition the Clark County Air Pollution Control Hearing Board within twenty (20) calendar days after receipt of this notice of denial. If Switch elects not to appeal this notice of denial, public disclosure of Switch's application may occur upon expiration of the 20-day appeal period, or sooner if requested by Switch in writing.

If you have any questions, I can be reached at (702) 455-5942.

Sincerely,

Theodore A. Lendis, Permitting Manager

cc:
Marci Henson, Director
Jodi Bechtel, Assistant Director
Shibi Paul, Compliance Manager
Jason Patchett, Deputy District Attorney

Protecting the air we share
Air Quality
CLARK COUNTY • DEPARTMENT OF AIR QUALITY
4701 W. Russell Road Suite 200 • Las Vegas, NV 89118-2231
(702) 455-5942 • Fax (702) 383-9994
Marci Henson Director

April 26, 2019

Brandie Koehler
Switch LTD
P.O. Box 400850
Las Vegas, NV 89140

Emailed: BRANDIE@SWITCH.COM

Re: Request for Confidentiality; New Minor Source Permit, Source ID#17992

Dear Ms. Koehler:

The Clark County Department of Air Quality ("DAQ") received your application for an air quality permit on December 21, 2018, on behalf of Switch, LTD ("Switch"), wherein you requested confidential treatment in accordance with Nevada Revised Statutes ("NRS") 445B.570(6)(c) and Clark County Air Quality Regulation ("AQR") 12.6. In said application you propose that information pertaining to the equipment specifications, physical layout of the facility, and physical design of infrastructure ("Subject Information") be designated as confidential.

Pursuant to NRS 445B.570(1) and AQR 12.6, any information obtained by the Control Officer in the course of performing his/her duties is public information unless otherwise designated as confidential. AQR 12.6.1(b) requires "[a] justification for the claim of confidentiality with specific reference to the criterion in NRS 445B.570(6) on which the claim is based and the facts supporting the position that the criterion has been met." NRS 445B.570(6) lists three criteria that define "confidential information," and they are as follows:

(a) Relate to dollar amounts of production or sales;
(b) Relate to processes or production unique to the owner or operator; or
(c) If disclosed, would tend to affect adversely the competitive position of the owner or operator.

Relates to Likelihood to Adversely Affect Competitive Position

Switch put forth the following assertion supporting its claim that the Subject Information should be designated as confidential under NRS 445B.570(6)(c):

> *"Switch's reputation is inextricably tied to its ability to provide physical security.... The likelihood [of a] security assault increases if information about Switch's processes, materials, technologies, locations and services are made publically available. Therefore, as a general matter, the mission critical function of Switch's business makes public disclosure of certain items extremely likely to adversely affect our competitive position as provided in NRS 445B.570(6)(c)."*

Minor Source Permit Application
Clark County Department of Environment & Sustainability—Division of Air Quality

For DAQ Use Only

Invoice Number: 06387ce

Submit Application and Payment to:
Division of Air Quality
4701 W. Russell Road, Suite 200
Las Vegas NV 89118

RECEIVED CC DAQ
2023 OCT 18 PM3:42

Section A: Application Type (select one):

- ☐ New Permit
- ☐ Permit renewal*
- ☐ Renewal with revision*
- ■ Significant Permit Revision*
- ☐ Minor Permit Revision*
- ☐ Permit exemption re-evaluation*

*Include the Source ID number in the Source Identification section below.

Application Description: Please describe what is being proposed in this application. Include details that describe revisions to your permit (e.g., adding, removing, or changing equipment; changing permit conditions; changing operational throughputs; requesting a voluntary emission limit; etc.). If this application is for a new stationary source, write "New source" in the space provided below. If this application is for a renewal permit with no revisions, write "Renewal – no changes" in the space provided below.

Switch is proposing a significant revision to add an additional data center, including generators and cooling towers, to the Permit. In addition, Switch is proposing to change the configuration of the currently permitted data center, involving a change in location to several cooling towers and emergency generators already included in the Permit. These changes to the units included in the Permit will not result in any changes to the permitted PTE.

Complete the fields in Sections B–D even if there is no change from the previous application.

Section B: Source Identification

EXISTING PERMIT HOLDERS ONLY: Has any of this information changed since the previous application? ☐ YES ■ NO

Source Name: Switch, Ltd.	Source ID No.: 18024
Permit Expiration Date (existing permits only): May 18, 2025	Portable Source: ☐ Yes ■ No

Physical Location Information
(For portable sources, provide physical address of main office)

Number:	Direction:	Street Name:	Street Type:	Suite:	P.O. Box:
		South Jones Boulevard and Badura Avenue			
City: Las Vegas			State: NV	Zip: 89118	

Phone Numbers

Office: (702) 444-4105	Fax:

North American Industry Classification System (NAICS) Designation

Primary NAICS: 517919	Additional NAICS (optional):

Source Description: Please describe the nature of your business, including processes and products.

NAICS Code 517919 - All other telecommunications

APPENDIX A. DAQ APPLICATION FORMS

Section C: Company Information (AS LISTED ON THE SECRETARY OF STATE'S BUSINESS CERTIFICATE/FILING)

EXISTING PERMIT HOLDERS ONLY: Has any of this information changed since the previous application? ☐ YES ☒ NO
If company ownership and/or name has changed, separately submit a Transfer of Ownership / Change of Name form + fee (SS-PER-020-01).

Company Name:

Number:	Direction:	Street Name:	Street Type:	Suite:	P.O. Box:
					400850

City: Las Vegas | State: NV | Zip: 89140

Proof of Company Name: Have you selected "New Permit" for the action type above? ☐ YES ☐ NO

If YES, attach a printout of your company's business listing on the Nevada Secretary of State website or some other formal documentation that includes your company's full legal name.

Phone Numbers

Office: (702) 444-4105 | Fax: 702-444-0326

Section D: Responsible Official (RO) Information

EXISTING PERMIT HOLDERS ONLY: Has any of this information changed since the previous application? ☐ YES ☐ NO
If the RO has changed, separately submit a Declaration of Responsible Official form (RO-PER-003).

Name: Brandie Koehler | Title: VP of Data Center Operations

Number:	Direction:	Street Name:	Street Type:	Suite:	P.O. Box:
					400850

City: Las Vegas | State: NV | Zip: 89140

Email: brandie@switch.com | Primary Communication Method: ☒ Email ☐ U.S. Postal

Office: (702) 444-4209 | Extension: | Cell: 702-449-5570 | Fax:

Responsible Officials. The RO for a minor source in Clark County is the person who is authorized by the owner of the source to sign all documents and to make decisions that:

- Govern the operation of the regulated facility;
- Initiate and direct measures to assure compliance with air quality laws and regulations; and
- Ensure actions are taken to gather complete and accurate information for permit application requirements.

Section E: Plant Manager/Environmental Representative Information (Optional)

Name: | Title:

Number:	Direction:	Street Name:	Street Type:	Suite:	P.O. Box:

City: | State: | Zip:

Email:

Office: | Extension: | Cell: | Fax:

Section F: Environmental Consultant Information (Optional)

Name: Sean Keane | Title: Senior Consultant

Email: skeane@trinityconsultants.com | Office: 847-445-0557 | Extension:

By identifying a consultant, the RO assents that such consultant has the authority to communicate directly with DAQ for the limited purpose of providing supplemental information and comments in support of the information already provided by the RO in the application. The RO acknowledges that any change to, or withdrawal of, the application must be done by the RO.

Section G: Billing Contact (Accounts Payable) Information (Optional)

Name: | Title:

Email: | Office: | Extension:

Section H: Application Supplemental Documents

Required for all permit applications unless the information was submitted previously and no changes are being proposed in this application, with the following exceptions:

- Gasoline dispensing operations must always submit their GDO worksheets, even if no changes were made.
- Sources using VOC-containing material (paints, solvents, thinners, etc.) must always submit Safety Data Sheets (SDSs) for all proposed materials with new and renewal applications, even if there were no changes; attach SDSs for new/existing materials to revision applications that propose changes to the weighted average VOC content; and attach Environmental Data Sheets (EDSs) as applicable.

1. Supplemental Documents

Site Map. A map that depicts the physical location of the stationary source, which must identify the main entrance, property boundaries, and all buildings and structures on the site as they relate to the source emission units (EUs). The map should include any legal descriptions associated with the source property (Clark County Assessor parcel number(s) or Township, Range, and Section(s)).

Flow Diagram. A detailed flow diagram of each process that depicts all associated EUs. Each process must be labeled, and each EU must have a unique identification number that matches with a unit in the Emission Units List. EUs in existing permits should retain their EU numbers from that permit. A flow diagram is not needed for sources that do not move materials/products from one emission unit to the next (e.g., commercial buildings or gasoline stations). Standalone emission units do not have to be included in a flow diagram (e.g., emergency backup generators and nonindustrial boilers).

Emission Units, Insignificant Equipment/Activities, and Exemption List. A list of equipment or activities that emit one or more regulated air pollutants to the atmosphere. A complete list containing the following areas of information must be included in the application for all new EUs and other emitting equipment and activities.

- **Descriptions and Specifications**. Descriptive information about the types of EUs and insignificant equipment/activities. Include the manufacturer name, model & serial numbers, and Source Classification Codes (SCC) for all EUs.
- **Power/Capacity Ratings**. The design power or capacity output of all emitting equipment. Manufacturer's documentation must be included to support these specifications.
- **Dates of Manufacture/Installation/Operation**. The date an EU is fully constructed/assembled and made available for use; the date an EU is put into place and ready to operate; the date an EU commences normal operation. Dates can be actual or projected.
- **Emission Unit Number**. A unique identification number corresponding to each EU presented in the flow diagram (as applicable). The number is fictitious for a new EU (e.g., "New 01"), and as listed in the permit for an existing EU.
- **Exemptions**. EUs or activities claimed as exempt in accordance with Section 12.1.2(b) of the Air Quality Regulations (AQRs).

NOTE: The most recent worksheets are required for applications proposing new EUs. Available at Stationary Source Permitting Forms.

Air Pollution Control. Pollution control devices or measures that reduce the amount of regulated air pollutants emitted to the atmosphere. The following information must be included in an application for all new or modified EUs (as applicable).

- **Air Pollution Control Equipment List.** Identification and description of each control device that shall include design specifications (including capture and control efficiencies), manufacturer, model & serial number, and associated EUs and processes.
- **Air Pollution Control Measure List.** Description of each control measure that shall include how/where it is applied, how much control is applied, control efficiency, and associated EUs and processes.
- **RACT Demonstration Proposal**. Applications for a new minor source with a potential to emit (PTE) that is significant for any regulated air pollutant under AQR 12.1.1(j), OR for a modifying source with a PTE increase that is significant for any regulated air pollutant, shall propose a demonstration of Reasonably Available Control Technology (RACT) for the affected pollutant(s). The proposal shall describe the

methodology by which RACT was determined and how RACT compliance will be demonstrated, including material usage limits, performance testing, or emissions monitoring, if applicable.

NOTE: The most recent worksheet is required for applications proposing new air pollution control equipment.

Source Emissions. Estimates of each regulated air pollutant that will be emitted to the atmosphere. The following types of emissions must be included in **ALL** applications for **ALL** new or modified EUs and insignificant activities, as noted.

- **Emission Factor(s)**. The short-term rate at which regulated air pollutants can be emitted from an EU or insignificant activity, generally presented as an hourly rate (lb/hr) or a rate based on throughput of materials (lb/ton). The amount of pollutant contained within a product can also serve as an emission factor, typically presented as weight of pollutant per volume of product (lb/gal).

- **Status Determination Emissions (SDE).** The amount of regulated air pollutants that can theoretically be emitted by EUs and insignificant activities when there are no operational restrictions and no emission control devices/measures, unless these limiting factors are inherent to the operation based on operational necessity and/or regulatory requirements. Typically based on the maximum rated capacity of the equipment and an assumed 8,760 hours of operation per year (emergency generators and fire pumps are based on 500 hours per year), regardless of whether the equipment is expected to operate less. The emissions of each EU and insignificant activity should be submitted individually and as a source-wide total. The SDE and PTE together establish the source's status: true minor, synthetic minor, or major.

- **Potential to Emit.** Also referred to as "allowable emissions": the amount of regulated air pollutants EUs can emit after operational limitations and emission control devices/measures are applied. Does not include anything deemed to be insignificant or exempt from permitting. The emissions of each EU should be submitted individually and as a source-wide total. The PTE is listed in the permit, and serves as an emission limitation that must be met on either an annual or rolling 12-month basis.

- **Emissions Increase.** The difference in PTE before and after any proposed changes. For new sources, the emissions increase is the entire PTE. For modifying sources applying for a permit revision, the emissions increase is the difference between the proposed PTE and the current PTE (what is in the most recent permit). Emissions increases that meet or exceed any of the significant thresholds listed in AQR 12.1.1(j) trigger additional application requirements.

Operational Information. A list of production rates, fuel types (with consumption rates), raw materials (with throughput rates), and operating schedules, if not included in the required emission unit worksheets. Provide enough information to calculate hourly and annual emissions. List any inherent limitations on operations (not to include self-imposed limits) or work practice standards affecting emissions.

Safety Data Sheet (SDS). A detailed document prepared by the manufacturer or importer of a hazardous chemical that describes its physical and chemical properties. EDSs with similar information, including VOC and hazardous air pollutant content, may substitute for SDSs as applicable.

Compliance Monitoring Devices. Identification and description of each air pollution compliance monitoring device or activity, including design specifications, manufacturers, model & serial numbers, and all associated EUs and processes.

Stack Information List (if applicable). Emissions (exhaust) stack location, height above grade, diameter (inside or effective), exhaust gases, flow rate (in actual cubic feet per minute), and temperature (in degrees Fahrenheit).

Federal Performance Standards List. A list of the federal performance standards, emission limits, and requirements that apply to the source (i.e., NSPS, NESHAP, and MACT). If the source has an EPA- or DAQ-approved exemption for one or more performance standards, attach the exemption approval(s) to the application.

Applicable Requirement (AR) Supplement (if applicable). Requirements of federal, state, or local jurisdictions that are not included in AQR 12.1. These may be specified in a court order, Hearing Officer or Hearing Board order, consent decree, compliance plan, etc.

2. Other Supplemental Documents (attach as applicable)

Construction Schedule. A schedule outlining the timeline for constructing a new or modified source. Dates can be approximate. Not applicable to sources that have already been constructed or do not require construction.

Minor Permit Revision Specification. The information needed to demonstrate that the proposed permit revision complies with the minor revision criteria outlined in AQR 12.1.6(b). Not applicable to new sources or sources proposing a different type of permit revision.

Compliance Plan. A plan addressing a source's issues of noncompliance required when submitting an application for a significant revision or a permit renewal. Attach a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any requirement that the source is not meeting at the time of permit issuance.

Request for a Voluntarily Accepted Emission Limitation (VAEL). An emission limitation or other standard that a source voluntarily proposes and accepts in its permit to avoid being subject to an otherwise applicable requirement. If requesting a VAEL pursuant to AQR 12.1.7, include enough detail to demonstrate that the proposed limitation is enforceable as a practical matter, including, at a minimum, how the limitation affects each EU and each air pollutant emitted by that EU.

> **NOTE**: Subsequent permit revisions affecting a pre-established VAEL are classified as significant permit revisions. An initial VAEL intended to avoid (1) New Source Review under AQRs 12.2 or 12.3, (2) having to obtain a Part 70 Operating Permit, or (3) becoming a major source of hazardous air pollutants is subject to the public participation procedures set forth in AQR 12.1.5.3.

Applicable Requirement (AR) Exemptions List. A list of requested exemptions from otherwise applicable requirements. Include detailed justification to support each request for an exemption.

Section I: Application Advisories

Small Business Assistance. A DAQ program that offers free assistance on permitting and compliance matters to small businesses (100 employees or fewer). Please ask for an SBA representative at our front counter or call (702) 455-5942 to schedule an appointment.

Fees and Payments.

Air Quality Program Fees: AQR 18, "Permit and Technical Service Fees," describes all fees related to this application and the resulting permit. AIR QUALITY REGULATION 18

Application Filing Fee: The application fee invoice must be paid in full before the application will be processed.

Permit Issuance: All outstanding invoices for the source and associated with the parent company of the source must be paid in full; otherwise, DAQ cannot issue the source any permits. This includes the invoice for the permit fees resulting from this application.

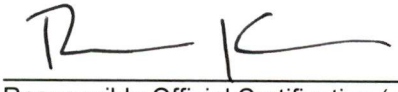
Payment: Invoices must be paid by check, money order, or credit card. Make checks and money orders payable to **Division of Air Quality** or **DAQ**. Credit-card payments must be made in person at the DAQ main office.

Section J: Authority Granted

I authorize DAQ to transmit all communications, permits, and billing invoices by the primary communication method selected in Section D of this application. I acknowledge that if I select "Email," DAQ will transmit all listed items electronically. I further acknowledge that if I select "U.S. Postal Service," I may incur applicable postage fees.

Section K: Declaration

As the Responsible Official, I declare, under penalty of perjury under the laws of the state of Nevada, that the statements and information in this application and the attached supplemental documents and worksheets are true and correct. My signature acknowledges that I am subject to liability for perjury under NRS Chapter 199.145.



Responsible Official Certification (original "wet" signature) Date

Brandie Koehler

Printed Name of Responsible Official

If this application is being submitted for an existing permit holder, it must be signed by an RO on file for this source.

DES
DEPARTMENT OF ENVIRONMENT AND SUSTAINABILITY

4701 W. Russell Rd Suite 200
Las Vegas, NV 89118-2231
Phone (702) 455-5942
Fax (702) 383-9994

DAQ Use Only

Form SS-PER-007-03: Internal Combustion Engine Worksheet

(Must be submitted with the Minor Source Permit Application or the Authority to Construct—Major Source Application forms)

Please see instructions on page 2 before filling out the form.

☐ Supplemental Information

IDENTIFICATION

1. Source Name: Switch, Ltd.	2. Source ID No.: 18024

3. Brief Project Description:

Significant permit revision to a synthetic minor source to add 21 emergency generators and 15 cooling towers. This form is for 15 of the 21 emergency generators proposed.

ENGINE SPECIFICATIONS

4. Engine Manufacturer: MTU	
5. Engine Power Rating: 3,058 (hp) @ 1,800 RPM	
6. Engine Model Number: 16V400024S	7. Engine Serial Number: TBD
8. Date of Engine Manufacture: TBD	
9. Date Engine Ordered: TBD	10. Date of Installation: TBD
11. No. Cylinders: 16	12. Displacement (check one): 76.3 ■ liters OR ☐ in^3
13. Check ALL configurations below that apply to this engine: ☐ Continuous-duty ■ Emergency	
☐ Spark Ignition OR ■ Compression Ignition	☐ Two Cycle OR ■ Four Cycle ☐ Lean Burn OR ☐ Rich Burn
14. Fuel type: ☐ Natural gas ■ Diesel ☐ Propane/LPG ☐ Dual-Fuel ☐ Other (specify):	
15. Maximum hours of operation per year: 104	

EQUIPMENT SPECIFICATIONS

16. Check ONE option below that best describes the equipment receiving power from the engine:

■ Electric Generator ☐ Fire Pump ☐ Air Compressor ☐ Other (specify):

17. Equipment Manufacturer: MTU	
18. Equipment Output Rating: 2,250 kW (If not kW, specify unit):	
19. Equipment Model Number: TBD	20. Equipment Serial Number:

ENGINE EMISSIONS DATA

21. List the emission data for this unit for particulate matter under 10 microns (PM_{10}), particulate matter under 2.5 microns ($PM_{2.5}$), nitrogen oxides (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), and volatile organic compounds (VOCs). Greenhouse gas (GHG) emissions (calculated in CO_2e) are only required for sources subject to major source New Source Review and/or Title V.

Pollutant	Emissions rate	Units (check one)
$PM_{10}/PM_{2.5}$	0.04	☐ g/bhp-hr OR ■ g/kW-hr
NOx	5.11	☐ g/bhp-hr OR ■ g/kW-hr
SO_2	1.21E-05 [lb/hp-hr]	☐ g/bhp-hr OR ☐ g/kW-hr
CO	0.45	☐ g/bhp-hr OR ■ g/kW-hr
VOC	0.27	☐ g/bhp-hr OR ■ g/kW-hr
GHG	74.0 [kg/MMBtu]	☐ g/bhp-hr OR ☐ g/kW-hr

22. Check ALL sources of emissions data referenced above and note for which pollutant(s):

☒ Manufacturer's Guarantee* Pollutant(s): PM10/PM2.5, NOx, CO, VOC

☐ Source Test Pollutant(s):

☒ AP-42 (if no other data available) Pollutant(s): SO2 per AP-42, GHG per 40 CFR 98

23. Specify the air pollution control methods used with the engine:

N/A

24. **40 CFR Part 60, Subpart IIII:** Is the engine subject to this regulation and/or applicable to the paragraph in this section? ☒ Yes ☐ No

The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE) and other persons as specified in paragraphs (a)(1) through (4) of this section. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. (1) Manufacturers of stationary CI ICE with a displacement of less than 30 liters per cylinder where the model year is: (i) 2007 or later, for engines that are not fire pump engines; (ii) The model year listed in Table 3 to this subpart or later model year, for fire pump engines; (2) Owners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are: (i) Manufactured after April 1, 2006, and are not fire pump engines, or (ii) Manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006; (3) Owners and operators of any stationary CI ICE that are modified or reconstructed after July 11, 2005 and any person that modifies or reconstructs any stationary CI ICE after July 11, 2005; (4) The provisions of § 60.4208 of this subpart are applicable to all owners and operators of stationary CI ICE that commence construction after July 11, 2005.

25. **40 CFR Part 60, Subpart JJJJ:** Is the engine subject to this regulation and/or applicable to the paragraph in this section? ☐ Yes ☒ No

The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (6) of this section. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. (1) Manufacturers of stationary SI ICE with a maximum engine power less than or equal to 19 kilowatt (KW) (25 horsepower (HP)) that are manufactured on or after July 1, 2008; (2) Manufacturers of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) that are gasoline fueled or that are rich burn engines fueled by liquefied petroleum gas (LPG), where the date of manufacture is: (i) On or after July 1, 2008; or (ii) On or after January 1, 2009, for emergency engines; (3) Manufacturers of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) that are not gasoline fueled and are not rich burn engines fueled by LPG, where the manufacturer participates in the voluntary manufacturer certification program described in this subpart and where the date of manufacture is: (i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP),(ii) On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP, (iii) On or after July 1, 2008, for engines with a maximum engine power less than 500 HP, or (iv) On or after January 1, 2009, for emergency engines; (4) Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured: (i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP),(ii) on or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP, (iii) on or after July 1, 2008, for engines with a maximum engine power less than 500 HP, or (iv) on or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP); (5) Owners and operators of stationary SI ICE that are modified or reconstructed after June 12, 2006, and any person that modifies or reconstructs any stationary SI ICE after June 12, 2006; (6) The provisions of § 60.4236 of this subpart are applicable to all owners and operators of stationary SI ICE that commence construction after June 12, 2006.

26. **40 CFR Part 63, Subpart ZZZZ:** Is the engine subject to this regulation and/or applicable to the paragraph in this section? ☒ Yes ☐ No

You are subject to this subpart if you own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand; (a) A stationary RICE is any internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. Stationary RICE differ from mobile RICE in that a stationary RICE is not a non-road engine as defined at 40 CFR 1068.30, and is not used to propel a motor vehicle or a vehicle used solely for competition; (b) A major source of HAP emissions is a plant site that emits or has the potential to emit any single HAP at a rate of 10 tons (9.07 megagrams) or more per year or any combination of HAP at a rate of 25 tons (22.68 megagrams) or more per year, except that for oil and gas production facilities, a major source of HAP emissions is determined for each surface site; (c) An area source of HAP emissions is a source that is not a major source; (d) If you are an owner or operator of an area source subject to this subpart, your status as an entity subject to a standard or other requirements under this subpart does not subject you to the obligation to obtain a permit under 40 CFR part 70 or 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart as applicable; (e) If you are an owner or operator of a stationary RICE used for national security purposes, you may be eligible to request an exemption from the requirements of this subpart as described in 40 CFR part 1068, subpart C; (f) The emergency stationary RICE listed in paragraphs (f)(1) through (3) of this section are not subject to this subpart. The stationary RICE must meet the definition of an emergency stationary RICE in § 63.6675, which includes operating according to the provisions specified in § 63.6640(f); (1) Existing residential emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in § 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in § 63.6640(f)(4)(ii); (2) Existing commercial emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in § 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in § 63.6640(f)(4)(ii); (3) Existing institutional emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in § 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in § 63.6640(f)(4)(ii).

DES
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DAQ Use Only

Form SS-PER-007-03: Internal Combustion Engine Worksheet

(Must be submitted with the Minor Source Permit Application or the Authority to Construct—Major Source Application forms)

Please see instructions on page 2 before filling out the form.

☐ Supplemental Information

IDENTIFICATION

1. Source Name: Switch Ltd.	2. Source ID No.: 18024

3. Brief Project Description:

Significant permit revision to a synthetic minor source to add 21 emergency generators and 15 cooling towers. This form is for 6 of the 21 emergency generators proposed.

ENGINE SPECIFICATIONS

4. Engine Manufacturer: MTU	
5. Engine Power Rating: 3,674 (hp) @ 1,800 RPM	
6. Engine Model Number: 20V4000G24S	7. Engine Serial Number: TBD
8. Date of Engine Manufacture: TBD	
9. Date Engine Ordered: TBD	10. Date of Installation: TBD
11. No. Cylinders: 20	12. Displacement (check one): 95.4 ■ liters OR ☐ in^3
13. Check ALL configurations below that apply to this engine: ☐ Continuous-duty ■ Emergency	
☐ Spark Ignition OR ■ Compression Ignition	☐ Two Cycle OR ■ Four Cycle ☐ Lean Burn OR ☐ Rich Burn
14. Fuel type: ☐ Natural gas ■ Diesel ☐ Propane/LPG ☐ Dual-Fuel ☐ Other (specify):	
15. Maximum hours of operation per year: 104	

EQUIPMENT SPECIFICATIONS

16. Check ONE option below that best describes the equipment receiving power from the engine:

■ Electric Generator ☐ Fire Pump ☐ Air Compressor ☐ Other (specify):

17. Equipment Manufacturer: MTU	
18. Equipment Output Rating: 2,800 kW (If not kW, specify unit):	
19. Equipment Model Number: TBD	20. Equipment Serial Number: TBD

ENGINE EMISSIONS DATA

21. List the emission data for this unit for particulate matter under 10 microns (PM_{10}), particulate matter under 2.5 microns ($PM_{2.5}$), nitrogen oxides (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), and volatile organic compounds (VOCs). Greenhouse gas (GHG) emissions (calculated in CO_2e) are only required for sources subject to major source New Source Review and/or Title V.

Pollutant	Emissions rate	Units (check one)
$PM_{10}/PM_{2.5}$	0.04	☐ g/bhp-hr OR ■ g/kW-hr
NOx	5.65	☐ g/bhp-hr OR ■ g/kW-hr
SO_2	1.21E-05 [lb/hp-hr]	☐ g/bhp-hr OR ☐ g/kW-hr
CO	0.37	☐ g/bhp-hr OR ■ g/kW-hr
VOC	0.30	☐ g/bhp-hr OR ■ g/kW-hr
GHG	74.0 [kg/MMBtu]	☐ g/bhp-hr OR ☐ g/kW-hr

22. Check ALL sources of emissions data referenced above and note for which pollutant(s):

☒ Manufacturer's Guarantee* Pollutant(s): PM10/PM2.5, NOx, CO, VOC

☐ Source Test Pollutant(s):

☒ AP-42 (if no other data available) Pollutant(s): SO2 per AP-42, GHG per 40 CFR 98

23. Specify the air pollution control methods used with the engine:

N/A

24. **40 CFR Part 60, Subpart IIII:** Is the engine subject to this regulation and/or applicable to the paragraph in this section? ☒ Yes ☐ No

The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE) and other persons as specified in paragraphs (a)(1) through (4) of this section. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. (1) Manufacturers of stationary CI ICE with a displacement of less than 30 liters per cylinder where the model year is: (i) 2007 or later, for engines that are not fire pump engines; (ii) The model year listed in Table 3 to this subpart or later model year, for fire pump engines; (2) Owners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are: (i) Manufactured after April 1, 2006, and are not fire pump engines, or (ii) Manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006; (3) Owners and operators of any stationary CI ICE that are modified or reconstructed after July 11, 2005 and any person that modifies or reconstructs any stationary CI ICE after July 11, 2005; (4) The provisions of § 60.4208 of this subpart are applicable to all owners and operators of stationary CI ICE that commence construction after July 11, 2005.

25. **40 CFR Part 60, Subpart JJJJ:** Is the engine subject to this regulation and/or applicable to the paragraph in this section? ☐ Yes ☒ No

The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (6) of this section. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. (1) Manufacturers of stationary SI ICE with a maximum engine power less than or equal to 19 kilowatt (KW) (25 horsepower (HP)) that are manufactured on or after July 1, 2008; (2) Manufacturers of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) that are gasoline fueled or that are rich burn engines fueled by liquefied petroleum gas (LPG), where the date of manufacture is: (i) On or after July 1, 2008; or (ii) On or after January 1, 2009, for emergency engines; (3) Manufacturers of stationary SI ICE with a maximum engine power greater than 19 KW (25 HP) that are not gasoline fueled and are not rich burn engines fueled by LPG, where the manufacturer participates in the voluntary manufacturer certification program described in this subpart and where the date of manufacture is: (i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP),(ii) On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP, (iii) On or after July 1, 2008, for engines with a maximum engine power less than 500 HP, or (iv) On or after January 1, 2009, for emergency engines; (4) Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured: (i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP),(ii) on or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP, (iii) on or after July 1, 2008, for engines with a maximum engine power less than 500 HP, or (iv) on or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP); (5) Owners and operators of stationary SI ICE that are modified or reconstructed after June 12, 2006, and any person that modifies or reconstructs any stationary SI ICE after June 12, 2006; (6) The provisions of § 60.4236 of this subpart are applicable to all owners and operators of stationary SI ICE that commence construction after June 12, 2006.

26. **40 CFR Part 63, Subpart ZZZZ:** Is the engine subject to this regulation and/or applicable to the paragraph in this section? ☒ Yes ☐ No

You are subject to this subpart if you own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand; (a) A stationary RICE is any internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. Stationary RICE differ from mobile RICE in that a stationary RICE is not a non-road engine as defined at 40 CFR 1068.30, and is not used to propel a motor vehicle or a vehicle used solely for competition; (b) A major source of HAP emissions is a plant site that emits or has the potential to emit any single HAP at a rate of 10 tons (9.07 megagrams) or more per year or any combination of HAP at a rate of 25 tons (22.68 megagrams) or more per year, except that for oil and gas production facilities, a major source of HAP emissions is determined for each surface site; (c) An area source of HAP emissions is a source that is not a major source; (d) If you are an owner or operator of an area source subject to this subpart, your status as an entity subject to a standard or other requirements under this subpart does not subject you to the obligation to obtain a permit under 40 CFR part 70 or 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart as applicable; (e) If you are an owner or operator of a stationary RICE used for national security purposes, you may be eligible to request an exemption from the requirements of this subpart as described in 40 CFR part 1068, subpart C; (f) The emergency stationary RICE listed in paragraphs (f)(1) through (3) of this section are not subject to this subpart. The stationary RICE must meet the definition of an emergency stationary RICE in § 63.6675, which includes operating according to the provisions specified in § 63.6640(f); (1) Existing residential emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in § 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in § 63.6640(f)(4)(ii); (2) Existing commercial emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in § 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in § 63.6640(f)(4)(ii); (3) Existing institutional emergency stationary RICE located at an area source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in § 63.6640(f)(2)(ii) and (iii) and that do not operate for the purpose specified in § 63.6640(f)(4)(ii).

DES
DEPARTMENT OF ENVIRONMENT AND SUSTAINABILITY

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Phone (702) 455-5942
Fax (702) 383-9994

For DAQ Use Only

Form SS-PER-013-02: Cooling Tower Worksheet

Please see instructions on page 2 before filling out the form.

☐ Supplemental Information

IDENTIFICATION	
1. Source Name: Switch, Ltd.	2. Source ID No.: 18024
3. Brief description of project: Significant permit revision to a synthetic minor source to add 21 emergency generators and 15 cooling towers. This form is for the 15 cooling towers proposed.	

SPECIFICATIONS
4. Manufacturer: Evapco
5. Model No.: ESWA 216-460
6. Serial No.: TBD
7. Date of manufacture: TBD
8. No. of cells: 1 Can cells operate independently to support mutually exclusive areas? ☐ Yes ■ No
9. Recirculation rate per cell (gal/min): 1,250
10. Total recirculation rate (gal/min): 1,250
11. Proposed maximum TDS concentration in the recirculating water (circle **ppm** or **mg/l**): 5,000 ppm
12. How will the TDS be measured? Conductivity meter
13. Maximum hours of operation per year: 8,760
14. Does the cooling tower have drift eliminators? ▣ Yes ☐ No
If "Yes," what is the rated drift loss in percentage? (Attach a copy of the manufacturer's information): 0.001
15. List any water treatment chemicals being used. In particular, note if chromium will be/is being used: Chromium is NOT used as a water treatment chemical

Attach manufacturer's specification sheet(s) for the cooling tower.

All information above this line is required for this form to be considered complete. Duplicate sheet as needed.

The information in this section guides you to other forms that may have to accompany this worksheet.

- Use the Engine form (SS-PER-007-03) if not operating on grid power and/or if there is an engine on-site.

APPENDIX B. MANUFACTURER SPECIFICATIONS

Diesel Generator Set

mtu 16V4000 DS2250 50 °C

2,045 kWe/60 Hz/Data Center Continuous Power/380 - 13,800V
Reference: *mtu* 16V4000 DS2250 (2,250 kWe) 50 °C for Standby Rating Technical Data

System ratings

Voltage (L-L)	380V † ‡	416V † ‡	440V † ‡	480V † ‡	600V ‡	4,160V	12,470V
Phase	3	3	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60	60	60
kW	2,045	2,045	2,045	2,045	2,045	2,045	2,045
kVA	2,556	2,556	2,556	2,556	2,556	2,556	2,556
Amps	3,884	3,548	3,354	3,075	2,460	355	118
skVA@30% voltage dip	6,899	5,573	4,047	4,816	6,271	5,852	4,266
Generator model*	841-M70	841-L75	641-VL95	641-VL95	841-S60	841-S60	4P6.6-2800
Temp rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	~~130 °C/40 °C~~
Connection	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE

105°C/40°C for this application.
Reference alternator data sheet.

Voltage (L-L)	13,200V	13,800V
Phase	3	3
PF	0.8	0.8
Hz	60	60
kW	2,045	2,045
kVA	2,556	2,556
Amps	112	107
skVA@30% voltage dip	4,017	4,390
Generator model*	4P6.6-2800	4P6.6-2800
Temp rise	130 °C/40 °C	130 °C/40 °C
Connection	6 LEAD WYE	6 LEAD WYE

* Consult the factory for alternate configuration. Generator model may end with -M or -R, depending on selection.
† UL 2200 offered
‡ CSA offered

A Rolls-Royce solution

Certifications and standards

- Emissions
  - EPA Tier 2 certified
  - South Coast Air Quality Management District (SCAQMD)
- Generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004
- Seismic certification – optional
  - 2021 IBC certification
  - HCAI pre-approval
- UL 2200 - optional (refer to *System ratings* for availability)
- CSA - optional (refer to *System ratings* for availability)
  - CSA C22.2 No. 100
  - CSA C22.2 No. 14
- Performance Assurance Certification (PAC)
  - Generator set tested to ISO 8528-5 for transient response
  - Verified product design, quality, and performance integrity
  - All engine systems are prototype and factory tested
- Power rating
  - Data Center Continuous Power (DCCP) rating is optimized for data center applications
  - Uptime Institute compliant for Tier III and IV data centers
  - No runtime limitation
  - 100% load factor
  - 10% overload available
  - Accepts rated load in one step per NFPA 110

Standard features *

- Single source supplier
- Global product support
- Two (2) Year/3,000 Hour Basic Limited Warranty
- 16V4000 diesel engine
  - 76.3 liter displacement
  - Common rail fuel injection
  - 4-cycle
- Complete range of accessories
- Cooling system
  - Integral set-mounted
  - Engine-driven fan
- Generator
  - Brushless, rotating field generator
  - 2/3 pitch windings
  - Permanent Magnet Generator (PMG) supply to regulator
  - 300% short circuit capability
- Digital control panel(s)
  - UL recognized, CSA certified, NFPA 110
  - Complete system metering
  - LCD display

Standard equipment *

Engine

- Air cleaners
- Oil pump
- Oil drain extension and shut-off valve
- Centrifugal oil filtration
- Closed crankcase ventilation
- Jacket water pump
- Inter cooler water pump
- Thermostats
- Blower fan and fan drive
- Radiator - unit mounted
- Electric starting motor - 24V
- Governor - electronic Isochronous
- Base - structural steel
- SAE flywheel and bell housing
- Charging alternator - 24V
- Battery box and cables
- Flexible fuel connectors
- Flexible exhaust connection
- EPA certified engine

Generator

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting
- Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
- Self-ventilated and drip-proof
- Superior voltage waveform
- Digital, solid state, volts-per-hertz regulator
- Brushless alternator with brushless pilot exciter
- 4 pole, rotating field
- 1 bearing, sealed
- Flexible coupling
- Full amortisseur windings
- 125% rotor balancing
- 3-phase voltage sensing
- ± 0.25% voltage regulation no load to full load
- 100% of rated load - one step
- 5% maximum total harmonic distortion

Digital control panel(s)

- Digital metering
- Engine parameters
- Generator protection functions
- Engine protection
- CANBus ECU communications
- Windows®-based software
- Multilingual capability
- Communications to remote annunciator
- Programmable input and output contacts
- UL recognized, CSA certified, CE approved
- Event recording
- IP 54 front panel rating with integrated gasket
- NFPA 110 compatible

* Represents standard product only. Consult factory/*mtu* Distributor for additional configurations.

Application data

Engine

Manufacturer	***mtu***
Model	16V4000G24S
Type	4-cycle
Arrangement	16-V
Displacement: L (in³)	76.3 (4,656)
Bore: cm (in)	17 (6.69)
Stroke: cm (in)	21 (8.27)
Compression ratio	16.5:1
Rated rpm	1,800
Engine governor	electronic isochronous (ADEC)
Maximum power: kWm (bhp)	2,280 (3,058)
Steady state frequency band	± 0.25%
Air cleaner	dry

Liquid capacity

Total oil system: L (gal)	300 (79.3)
Engine jacket water capacity: L (gal)	175 (46.2)
After cooler water capacity: L (gal)	50 (13.2)
System coolant capacity: L (gal)	719 (190)

Electrical

Electric volts DC	24
Cold cranking amps under -17.8 °C (0 °F)	2,800
Batteries: group size	8D
Batteries: quantity	4

Fuel system

Fuel supply connection size	-16 JIC 37° female 1" NPT adapter provided
Fuel return connection size	-16 JIC 37° female 1" NPT adapterprovided
Maximum fuel lift: m (ft)	1 (3)
Recommended fuel	diesel #2
Total fuel flow: L/hr (gal/hr)	1,200 (317)

Fuel consumption

At 100% of power rating: L/hr (gal/hr)	558 (147)
At 75% of power rating: L/hr (gal/hr)	426 (113)
At 50% of power rating: L/hr (gal/hr)	299 (79)

Cooling - radiator system

Ambient capacity of radiator: °C (°F)	50 (122)
Maximum restriction of cooling air: intake and discharge side of radiator: kPa (in. H_2O)	0.12 (0.5)
Water pump capacity: L/min (gpm)	1,350 (357)
After cooler pump capacity: L/min (gpm)	583 (154)
Heat rejection to coolant: kW (BTUM)	840 (47,770)
Heat rejection to after cooler: kW (BTUM)	610 (34,690)
Heat radiated to ambient: kW (BTUM)	202.1 (11,493)
Fan power: kW (hp)	101.4 (136)

Air requirements

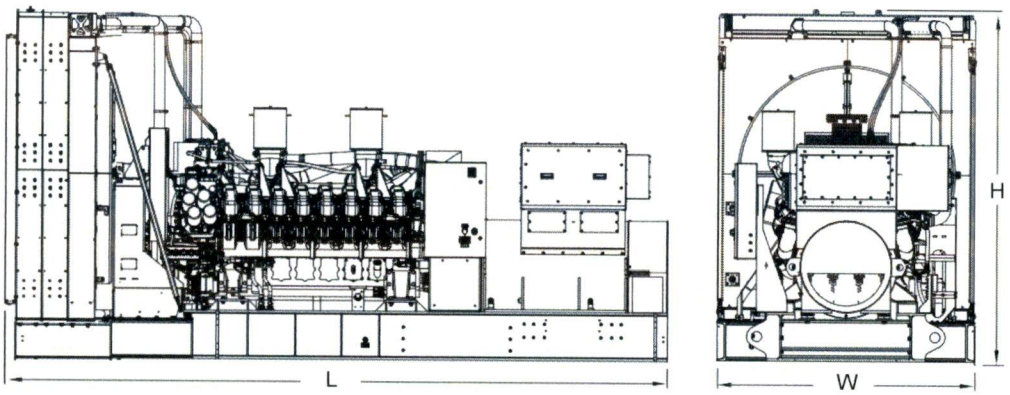
Aspirating: *m³/min (SCFM)	180 (6,357)
Air flow required for radiator cooled unit: *m³/min (SCFM)	3,168 (111,890)
Remote cooled applications; air flow required for dissipation of radiated generator set heat for a maximum of 25 °F rise: *m³/min (SCFM)	739 (26,241)

* Air density = 1.184 kg/m3 (0.0739 lbm/ft³)

Exhaust system

Gas temperature (stack): °C (°F)	480 (896)
Gas volume at stack temperature: m³/min (CFM)	456 (16,103)
Maximum allowable back pressure at outlet of engine, before piping: kPa (in. H_2O)	8.5 (34.1)

Weights and dimensions



Drawing above for illustration purposes only, based on standard open power 480 volt generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight
Open Power Unit (OPU)	6,474 x 2,539 x 3,434 mm (254.9 x 99.9 x 135.2 in)	21,554 kg (47,523 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific generator set.

Sound data

Unit type	DCCP full load
Level 0 (OPU): dB(A)	98.6

Sound data is provided at 7 m (23 ft). Generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

Emissions data

NO_x + NMHC	CO	PM
5.38	0.45	0.04

— All units are in g/hp-hr and shown at 100% load (not comparable to EPA weighted cycle values). Emission levels of the engine may vary with ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data was obtained in compliance with US EPA regulations. The weighted cycle value (not shown) from each engine is guaranteed to be within the US EPA standards.

Rating definitions and conditions

— Data Center Continuous Power (DCCP) ratings apply to data center installations where a utility power is available and comply with Uptime Institute Tier III and IV requirements. At constant or varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, and AS 2789. Average load factor: ≤ 100%.
— Nominal ratings at standard conditions: 25 °C and 300 meters (77 °F and 1,000 feet).
— Deration Factor:
•Consult your local ***mtu*** Distributor for altitude derations.
•Consult your local ***mtu*** Distributor for temperature derations.

Diesel Generator Set

mtu 20V4000 DS2800 48 °C

2,500 kWe/60 Hz/Data Center Continuous Power/380 - 13,800V
Reference: *mtu* 20V4000 DS2800 (2,800 kWe) 48 °C for Standby Rating Technical Data

System ratings

Voltage (L-L)	380V † ‡	416V † ‡	440V † ‡	480V † ‡	600V ‡	4,160V	12,470V
Phase	3	3	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60	60	60
kW	2,500	2,500	2,500	2,500	2,500	2,500	2,500
kVA	3,125	3,125	3,125	3,125	3,125	3,125	3,125
Amps	4,748	4,337	4,101	3,759	3,007	434	145
skVA@30% voltage dip	6,454	5,303	8,729	7,420	8,607	8,777	4,791
Generator model*	841-L75	941-VL60	841-VL85	841-L75	841-L75	841-L75	4P9.6-2100
Temp rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C
Connection	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE

Voltage (L-L)	13,200V	13,800V
Phase	3	3
PF	0.8	0.8
Hz	60	60
kW	2,500	2,500
kVA	3,125	3,125
Amps	137	131
skVA@30% voltage dip	5,369	5,868
Generator model*	4P9.6-2100	4P9.6-2100
Temp rise	130 °C/40 °C	130 °C/40 °C
Connection	6 LEAD WYE	6 LEAD WYE

* Consult the factory for alternate configuration. Generator model may end with -M or -R, depending on selection.
† UL 2200 offered
‡ CSA offered

A Rolls-Royce solution

Certifications and standards

- Emissions
  - EPA Tier 2 certified
  - South Coast Air Quality Management District (SCAQMD)
- Generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004
- Seismic certification – optional
  - 2021 IBC certification
  - HCAI pre-approval
- UL 2200 - optional (refer to *System ratings* for availability)
- CSA - optional (refer to *System ratings* for availability)
  - CSA C22.2 No. 100
  - CSA C22.2 No. 14
- Performance Assurance Certification (PAC)
  - Generator set tested to ISO 8528-5 for transient response
  - Verified product design, quality, and performance integrity
  - All engine systems are prototype and factory tested
- Power rating
  - Data Center Continuous Power (DCCP) rating is optimized for data center applications
  - Uptime Institute compliant for Tier III and IV data centers
  - No runtime limitation
  - 100% load factor
  - 10% overload available
  - Accepts rated load in one step per NFPA 110

Standard features*

- Single source supplier
- Global product support
- Two (2) Year/3,000 Hour Basic Limited Warranty
- 20V4000 diesel engine
  - 95.4 liter displacement
  - Common rail fuel injection
  - 4-cycle
- Complete range of accessories
- Cooling system
  - Integral set-mounted
  - Engine-driven fan
- Generator
  - Brushless, rotating field generator
  - 2/3 pitch windings
  - Permanent Magnet Generator (PMG) supply to regulator
  - 300% short circuit capability
- Digital control panel(s)
  - UL recognized, CSA certified, NFPA 110
  - Complete system metering
  - LCD display

Standard equipment*

Engine

- Air cleaners
- Oil pump
- Oil drain extension and shut-off valve
- Centrifugal oil filtration
- Closed crankcase ventilation
- Jacket water pump
- Inter cooler water pump
- Thermostats
- Blower fan and fan drive
- Radiator - unit mounted
- Electric starting motor - 24V
- Governor - electronic Isochronous
- Base - structural steel
- SAE flywheel and bell housing
- Charging alternator - 24V
- Battery box and cables
- Bulkhead fuel connectors
- Flexible exhaust connection
- EPA certified engine

Generator

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting
- Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
- Self-ventilated and drip-proof
- Superior voltage waveform
- Digital, solid state, volts-per-hertz regulator
- Brushless alternator with brushless pilot exciter
- 4 pole, rotating field
- 2-bearing, sealed
- Flexible coupling
- Full amortisseur windings
- 125% rotor balancing
- 3-phase voltage sensing
- ± 0.25% voltage regulation no load to full load
- 100% of rated load - one step
- 5% maximum total harmonic distortion

Digital control panel(s)

- Digital metering
- Engine parameters
- Generator protection functions
- Engine protection
- CANBus ECU communications
- Windows®-based software
- Multilingual capability
- Communications to remote annunciator
- Programmable input and output contacts
- UL recognized, CSA certified, CE approved
- Event recording
- IP 54 front panel rating with integrated gasket
- NFPA 110 compatible

* Represents standard product only. Consult the factory/***mtu*** Distributor for additional configurations.

Application data

Engine

Manufacturer	***mtu***
Model	20V4000G24S
Type	4-cycle
Arrangement	20-V
Displacement: L (in³)	95.4 (5,822)
Bore: cm (in)	17 (6.69)
Stroke: cm (in)	21 (8.27)
Compression ratio	16.4:1
Rated rpm	1,800
Engine governor	electronic isochronous (ADEC)
Maximum power: kWm (bhp)	2,740 (3,674)
Steady state frequency band	± 0.25%
Air cleaner	dry

Liquid capacity

Total oil system: L (gal)	390 (103)
Engine jacket water capacity: L (gal)	205 (54.2)
After cooler water capacity: L (gal)	50 (13.2)
System coolant capacity: L (gal)	860 (227)

Electrical

Electric volts DC	24
Cold cranking amps under -17.8 °C (0 °F)	4,200
Batteries: group size	8D
Batteries: quantity	6

Fuel system

Fuel supply connection size	-16 JIC 37° female 1" NPT adapter provided
Fuel return connection size	-16 JIC 37° female 1" NPT adapter provided
Maximum fuel lift - cranking: m (ft)	1 (3.3)*
Maximum fuel lift - running: m (ft)	3.1 (10)
Recommended fuel	diesel #2
Total fuel flow: L/hr (gal/hr)	1,620 (428)

* Fuel lift pump for cranking increases lift to: m (ft) 3.1 (10)

Fuel consumption

At 100% of power rating: L/hr (gal/hr)	647 (171)
At 75% of power rating: L/hr (gal/hr)	511 (135)
At 50% of power rating: L/hr (gal/hr)	367 (97)

Cooling - radiator system

Ambient capacity of radiator: °C (°F)	48 (110)
Maximum restriction of cooling air: intake and discharge side of radiator: kPa (in. H_2O)	0.12 (0.5)
Water pump capacity: L/min (gpm)	1,567 (414)
After cooler pump capacity: L/min (gpm)	567 (150)
Heat rejection to coolant: kW (BTUM)	970 (55,162)
Heat rejection to after cooler: kW (BTUM)	670 (38,102)
Heat radiated to ambient: kW (BTUM)	233 (13,244)
Fan power: kW (hp)	60.6 (81.3)

Air requirements

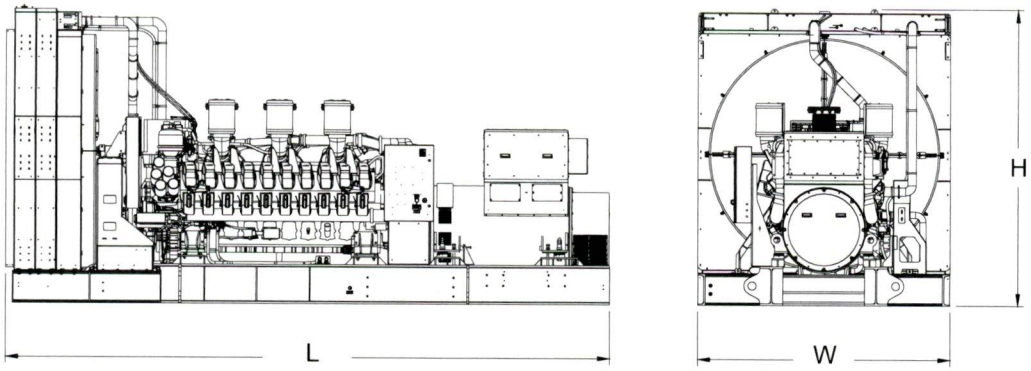
Aspirating: *m³/min (SCFM)	240 (8,476)
Air flow required for radiator cooled unit: *m³/min (SCFM)	3,082 (108,843)
Remote cooled applications; air flow required for dissipation of radiated generator set heat for a maximum of 25 °F rise: *m³/min (SCFM)	845 (29,843)

* Air density = 1.184 kg/m³ (0.0739 lbm/ft³)

Exhaust system

Gas temperature (stack): °C (°F)	465 (869)
Gas volume at stack temperature: m³/min (CFM)	576 (20,341)
Maximum allowable back pressure at outlet of engine, before piping: kPa (in. H_2O)	8.5 (34.1)

Weights and dimensions



Drawing above for illustration purposes only, based on standard open power 480 volt generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight
Open Power Unit (OPU)	7,335 x 3,072 x 3,590 mm (288.8 x 120.9 x 141.3 in)	23,341 kg (53,673 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific generator set.

Sound data

Unit type	DCCP full load
Level 0 (OPU): dB(A)	97.5

Sound data is provided at 7 m (23 ft). Generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

Emissions data

NO_x + NMHC	CO	PM
5.95	0.37	0.04

- All units are in g/hp-hr and shown at 100% load (not comparable to EPA weighted cycle values). Emission levels of the engine may vary with ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data was obtained in compliance with US EPA regulations. The weighted cycle value (not shown) from each engine is guaranteed to be within the US EPA standards.

Rating definitions and conditions

- Data Center Continuous Power (DCCP) ratings apply to data center installations where a utility power is available and comply with Uptime Institute Tier III and IV requirements. At constant or varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, and AS 2789. Average load factor: ≤ 100%.
- Nominal ratings at standard conditions: 25 °C and 300 meters (77 °F and 1,000 feet).
- Deration Factor:
  - Consult your local ***mtu*** Distributor for altitude derations.
  - Consult your local ***mtu*** Distributor for temperature derations.

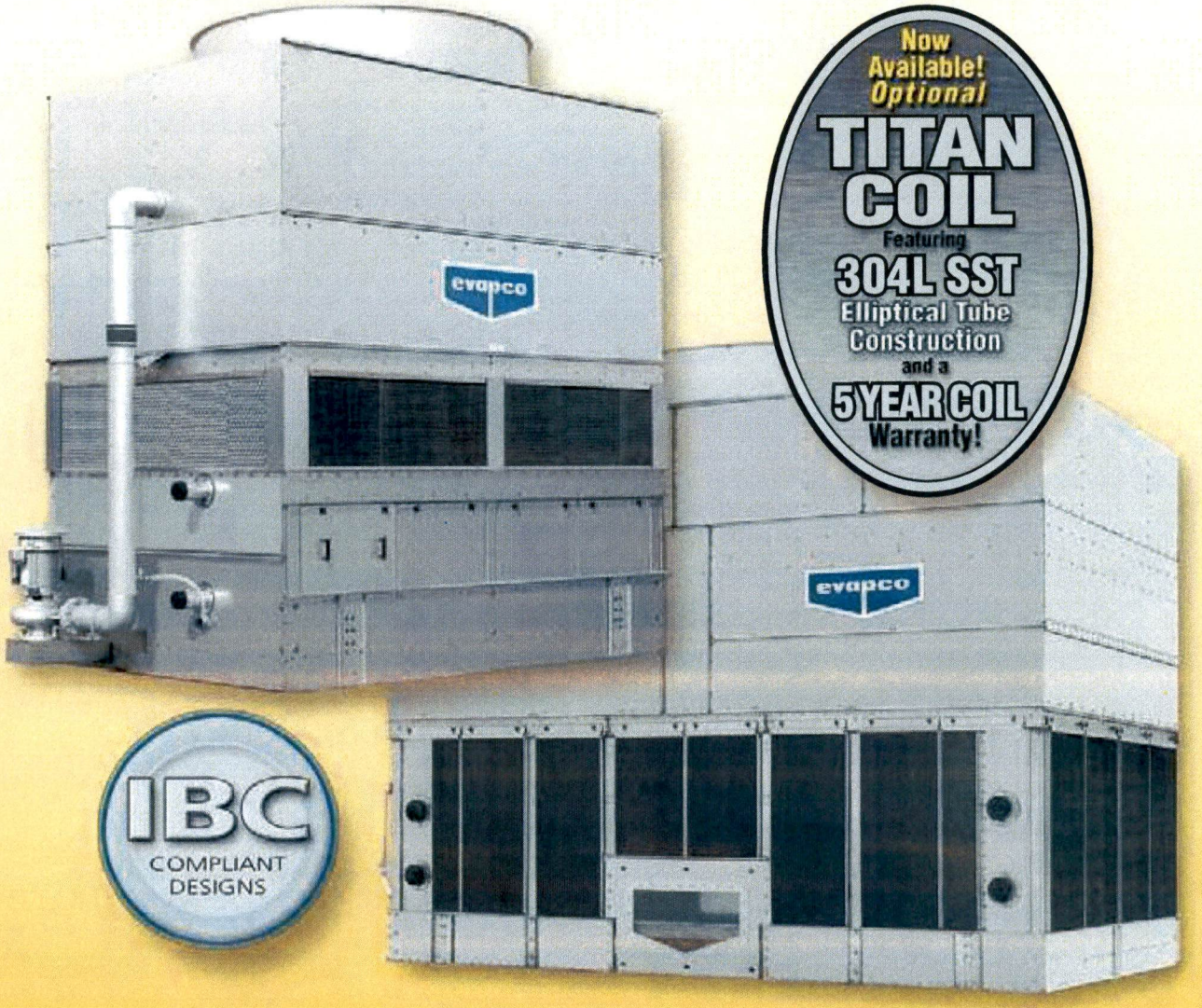
Bulletin 241C

evapco®

CTI† CERTIFIED

ESWA™

CLOSED CIRCUIT COOLER



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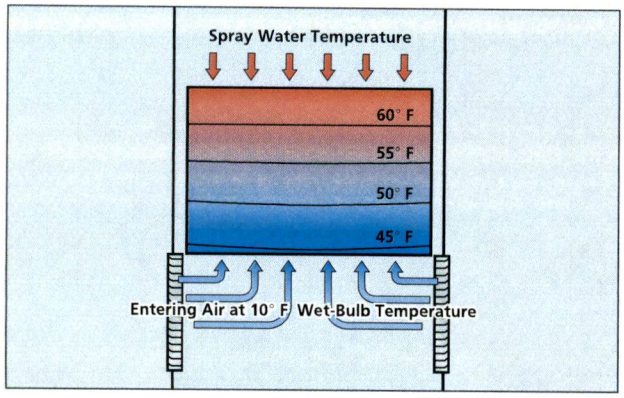
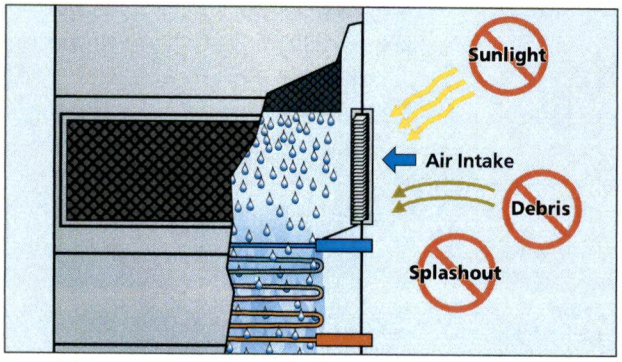
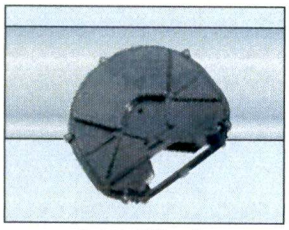
Sensi-COIL™ TECHNOLOGY

† Mark owned by the Cooling Technology Institute

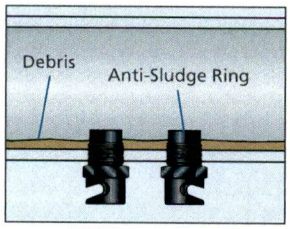
ESWA Design Benefits



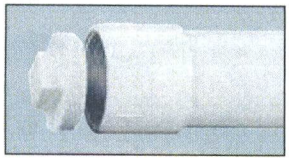




EvapJet™ Nozzle



ABS Water Diffusers



Counterflow... Optimum Design for Freezing Climates

The counterflow design of the ESWA Closed Circuit Cooler is well suited for winter operation. The fill section is totally encased and protected from freezing winds thus inhibiting ice formation on the fill section. The even temperature gradient of the counterflow design further improves winter operability by eliminating cold spots.

Evapco's counterflow design solves the problem of fill collapse due to ice formation.

Water Sight Tight Air Inlet Louver*

Evapco's innovative air inlet louvers are both water and sight tight to ensure that the water stays in and the sunlight stays out of the cold water basin. Using extensive computational fluid dynamics modeling, Evapco engineers developed a louver to improve "splash resistance" while maximizing airflow. The resulting design maximizes thermal performance while minimizing water loss. This sight tight design also inhibits algae growth more effectively than previous designs.

Evapco's louver design solves the problem of the circulating water and heat transfer surfaces being directly exposed to external contaminants and the harsh surroundings.

Water Distribution System

The water distribution system is enclosed and completely protected by the casing panels and drift eliminators. The eliminators also function as effective debris screens which block sunlight and prevent debris from entering the spray system.

The water distribution system is made with non-corrosive materials including schedule 40 PVC pipe and durable ABS plastic water diffusers or the EvapJet™ distribution system (14' wide models).

The spray branch piping is easily removed and designed with threaded end-caps for easy cleaning. The water diffusers have wide openings with anti-sludge rings to prevent clogging from sediment and debris.

Evapco's design avoids the problems of biological growth and clogging that can occur due to a water distribution system that is open with direct exposure to the surroundings.

Efficient Drift Eliminators**

The New ESWA is provided with an efficient drift eliminator system that effectively reduces entrained water droplets from the air discharge to less than 0.001% of the spray water flow rate.

The eliminators are constructed of non-corrosive PVC with a multi-pass design for maximum drift reduction. They are assembled in modular sections for easy removal and access to the water distribution system.

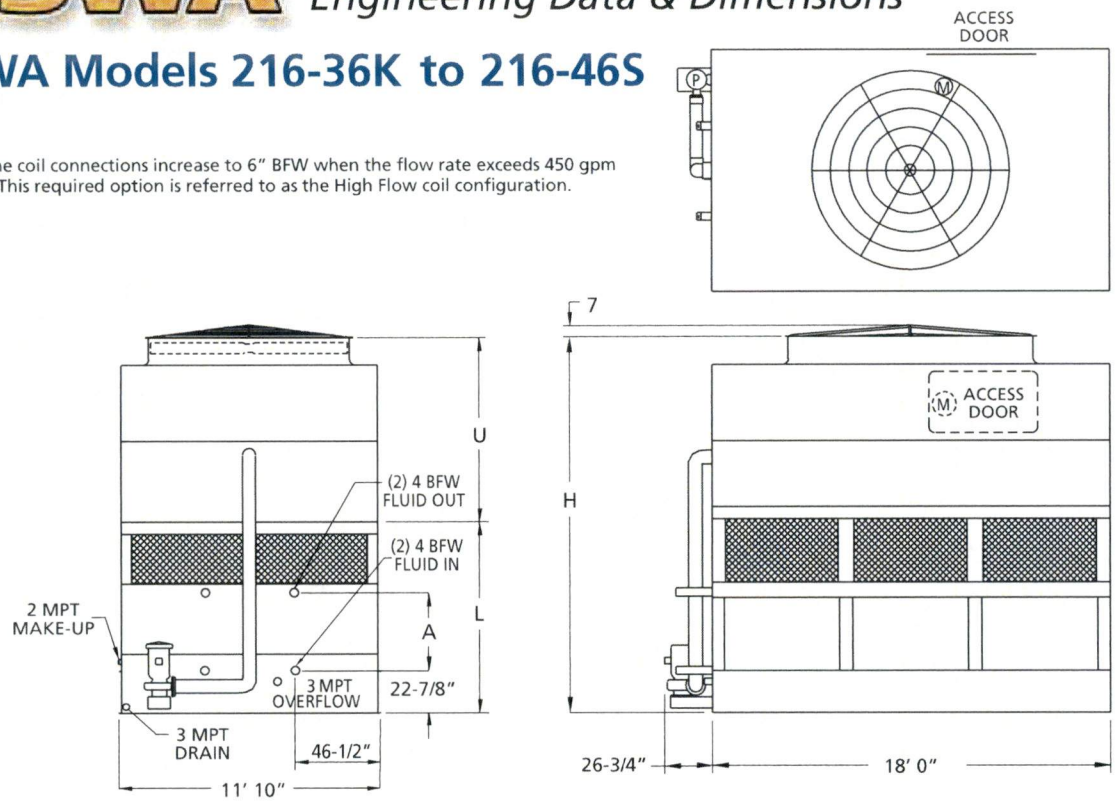
In addition to reducing drift the eliminators also function as effective debris screens which protect the spray system from sunlight and debris.

*Patent Pending
**U.S. Patent #6,315,804

ESWA *Engineering Data & Dimensions*

ESWA Models 216-36K to 216-46S

Note: The coil connections increase to 6" BFW when the flow rate exceeds 450 gpm per coil. This required option is referred to as the High Flow coil configuration.



Model Number[1]	Weights (lbs.)			Fans		Spray Pump		Coil Volume (gallons)	Remote Sump[4]			Dimensions[5]			
	Shipping	Heaviest Section[2]	Operating	HP	CFM	HP	GPM		Gallons Required[3]	Conn. Size	Operating Weight (lbs.)	Lower L	Upper U	Coil A	Height H
ESWA 216-36K	28,030	20,200	42,450	20	116,000	15	1,250	668	720	12"	36,330	9' 31/2"	9' 4"	42"	18' 7-1/2"
ESWA 216-36L	28,060	20,200	42,480	25	125,000	15	1,250	668	720	12"	36,360	9' 3-1/2"	9' 4"	42"	18' 7-1/2"
ESWA 216-36M	28,110	20,200	42,530	30	132,300	15	1,250	668	720	12"	36,410	9' 3-1/2"	9' 4"	42"	18' 7-1/2"
ESWA 216-36N	28,270	20,200	42,690	40	144,800	15	1,250	668	720	12"	36,570	9' 3-1/2"	9' 4"	42"	18' 7-1/2"
ESWA 216-43K	21,470	12,910	33,180	20	113,800	15	1,250	344	720	12"	27,060	7' 5"	10' 4"	19-1/2"	17' 9"
ESWA 216-43L	21,500	12,910	33,210	25	122,500	15	1,250	344	720	12"	27,090	7' 5"	10' 4"	19-1/2"	17' 9"
ESWA 216-43M	21,550	12,910	33,260	30	130,100	15	1,250	344	720	12"	27,140	7' 5"	10' 4"	19-1/2"	17' 9"
ESWA 216-44K	23,940	15,380	36,560	20	113,800	15	1,250	452	720	12"	30,440	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-44L	23,970	15,380	36,590	25	122,500	15	1,250	452	720	12"	30,470	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-44M	24,020	15,380	36,640	30	130,100	15	1,250	452	720	12"	30,520	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-44N	24,180	15,380	36,800	40	143,000	15	1,250	452	720	12"	30,680	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-44O	24,190	15,380	36,810	50	152,500	15	1,250	452	720	12"	30,690	8' 1/2"	10' 4"	27"	18' 4-1/2"
ESWA 216-45K	26,300	17,740	39,820	20	113,800	15	1,250	560	720	12"	33,700	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-45L	26,330	17,740	39,850	25	122,500	15	1,250	560	720	12"	33,730	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-45M	26,380	17,740	39,900	30	130,100	15	1,250	560	720	12"	33,780	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-45N	26,540	17,740	40,060	40	143,000	15	1,250	560	720	12"	33,940	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-45O	26,550	17,740	40,070	50	152,500	15	1,250	560	720	12"	33,950	8' 8"	10' 4"	34-1/2"	19' 0"
ESWA 216-46K	28,760	20,200	43,180	20	113,800	15	1,250	668	720	12"	37,060	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46L	28,790	20,200	43,210	25	122,500	15	1,250	668	720	12"	37,090	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46M	28,840	20,200	43,260	30	130,100	15	1,250	668	720	12"	37,140	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46N	29,000	20,200	43,420	40	143,000	15	1,250	668	720	12"	37,300	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46O	29,010	20,200	43,430	50	152,500	15	1,250	668	720	12"	37,310	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46P	29,210	20,200	43,630	60	161,500	15	1,250	668	720	12"	37,510	9' 3-1/2"	10' 4"	42"	19' 7-1/2"
ESWA 216-46S	29,210	20,200	43,630	60	161,500	15	1,250	668	720	12"	37,510	9' 3-1/2"	10' 4"	42"	19' 7-1/2"

1 Model numbers will end in "-Z" for units with Series Flow piping configuration. Series Flow will require crossover piping. Model numbers will include "C" for units with stainless steel coil(s), "R" for units with low sound fan(s) and "S" for units with an option that negates CTI Certification.

2 Heaviest section is the lower section.

3 Gallons shown includes water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation (12" would normally be sufficient).

4 When a remote sump arrangement is selected, the spray pump, suction strainer and associated piping are omitted; the unit is provided with an oversized outlet to facilitate drainage to the remote sump.

5 Unit dimensions may vary slightly from catalog. See factory certified prints for exact dimensions. Coil connections are 4 inch bevel for weld (BFW). Other connection types such as grooved for mechanical coupling or flanged are also available as options.

APPENDIX C. EMISSION CALCULATIONS

Table 1. Project PTE Increase Calculation (tons/year)

	PM_{10}	$PM_{2.5}$	NO_X	CO	SO_2	VOC	HAP	GHG
Generators (21 new)	0.31	0.31	41.16	3.30	0.04	2.17	0.04	3,766
Cooling Towers (15 new)	0.97	0.97	0.00	0.00	0.00	0.00	0.00	0
Project PTE[1]	1.28	1.28	41.16	3.30	0.04	2.17	0.04	3,766
Section 12.1 Significant Thresholds[2]	7.5	7.5	20	35	40	20	-	-
Does Project PTE Exceed Significant Thresholds?	No	No	Yes	No	No	No	No	No

1. Project PTE (tons/year) = New generators PTE (tons/year) + new cooling towers PTE (tons/year)
2. "Significant" as defined in 12.1.1(j).

Table 2. Facility-Wide PTE, including unconstructed units (referenced Permit for values)

	PM_{10}	$PM_{2.5}$	NO_X	CO	SO_2	VOC	HAP	GHG[2]
Pre-project Facility-Wide PTE	1.40	1.40	50.14	3.88	0.25	2.65	0.11	4,148
Post-project Facility-Wide PTE	2.68	2.68	91.30	7.18	0.29	4.82	0.15	7,914
PSD/NANSR thresholds	250	250	100	250	250	100	-	75,000
Does Post-Project PTE Exceed PSD/NANSR Thresholds?	No	No	No	No	No	No	No	No
Title V Thresholds	100	100	100	100	100	100	25	-
Does Post-Project PTE Exceed Title V Thresholds?	No	No	No	No	No	No	No	No

1. The Facility's post-Project PTE does not exceed the NANSR major source threshold for sources in moderate non-attainment areas, and will remain below the applicable thresholds for a major stationary source as defined as defined in CCAQR Section 12.2 and 12.3 for a non-categorical stationary source in an area in moderate non-attainment for ozone.
2. Pre-project GHG emissions are based on the total MMBtu/hr of the current permitted engines.

Table 3. Key Parameters/Constants for Proposed Emergency Generator Emission Calculations - 16V4000

Parameter	Value	Unit
Engine Power(@1800 rpm)[1]	3,058	hp
Engine Power(@1800 rpm)[1]	2,280	kW
Annual Hours [2]	104	hrs/yr
Maximum Fuel Consumption Rate (gal/hr) [1]	147	gal/hr
Heating Value of Diesel (Btu/gal) [3]	137,000	btu/gal
Maximum Heat Input (MMBtu/hr) [4]	20.14	MMBtu/hr
Number of New Engines	15	Engine

1. Based on manufacturer specifications.
2. Emission calculations for the emergency generator based on 104 hours of operation per the current permit.
3. Heating value of diesel provided in AP-42, Appendix A (09/85).
4. Maximum Heat Input (MMBtu/hr) = Maximum Fuel Consumption Rate (gal/hr) * Heating Value of Diesel (Btu/gal) / 10^6 (Btu/MMBtu).

Table 4. Emission Factors

Pollutant	Value	Unit
VOC[1]	0.27	g/hp-hr
NO_X[1]	5.11	g/hp-hr
CO[1]	0.45	g/hp-hr
PM[1]	0,04	g/hp-hr
PM_{10}[2]	0.04	g/hp-hr
$PM_{2.5}$[2]	0.04	g/hp-hr
SO_X[3]	1.21E-05	lb/hp-hr

1. NO_X, CO, PM, and VOC emission factors per manufacturer specifications. Switch has assumed 95% of these emissions are NO_X and 5% are VOC as defined in Table B-22 (NOX and NMHC Fraction Default Values for All Engines except TRUs) of the 2005 Carl Mover Program Guidelines.
2. It is conservatively assumed that emission factors for PM_{10} and $PM_{2.5}$ are equivalent to the emission factor for PM.
3. The emission factor for SO_2 is based on values listed in AP-42 Ch. 3.4, Table 3.4-1. Based on ultra low sulfur diesel with a

Table 5. HAP Emissions per Engine

Pollutant	Emission Factor (lb/MMBtu)[1]	Hourly PTE (lb/hr)[2]	Annual PTE (lb/yr)[3]	Annual PTE (tpy)
Benzene	7.76E-04	1.56E-02	1.63	8.13E-04
Toluene	2.81E-04	5.66E-03	0.59	2.94E-04
Xylenes	1.93E-04	3.89E-03	0.40	2.02E-04
Formaldehyde	7.89E-05	1.59E-03	0.17	8.26E-05
Acetaldehyde	2.52E-05	5.08E-04	0.05	2.64E-05
Acrolein	7.88E-06	1.59E-04	0.02	8.25E-06
Naphthalene	1.30E-04	2.62E-03	0.27	1.36E-04
Acenaphthylene	9.23E-06	1.86E-04	0.02	9.67E-06
Acenaphthene	4.68E-06	9.43E-05	0.01	4.90E-06
Fluorene	1.28E-05	2.58E-04	0.03	1.34E-05
Phenanthrene	4.08E-05	8.22E-04	0.09	4.27E-05
Anthracene	1.23E-06	2.48E-05	2.58E-03	1.29E-06
Fluoranthene	4.03E-06	8.12E-05	8.44E-03	4.22E-06
Pyrene	3.71E-06	7.47E-05	7.77E-03	3.89E-06
Benzo(a)anthracene	6.22E-07	1.25E-05	1.30E-03	6.51E-07
Chrysene	1.53E-06	3.08E-05	3.20E-03	1.60E-06
Benzo(b)fluoranthene	1.11E-06	2.24E-05	2.32E-03	1.16E-06
Benzo(k)fluoranthene	2.18E-07	4.39E-06	4.57E-04	2.28E-07
Benzo(a)pyrene	2.57E-07	5.18E-06	5.38E-04	2.69E-07
Indeno(1,2,3-cd)pyrene	4.14E-07	8.34E-06	8.67E-04	4.34E-07
Dibenz(a,h)anthracene	3.46E-07	6.97E-06	7.25E-04	3.62E-07
Benzo(g,h,l)perylene	5.56E-07	1.12E-05	1.16E-03	5.82E-07
Total HAPs:		0.03	3.30	1.65E-03

1. HAP Emission Factors per AP-42 Chapter 3.4, Table 3.4-3 and Table 3.4-4 (10/96).
2. Hourly PTE (lbs/hr) = Emission Factor (lb/hr-hr) * Engine Power (bhp)
3. Annual PTE (lbs/yr) = Emission Factor (lb/hr-hr) * Engine Power (bhp) * Annual Hours (hrs/yr)

Table 6. Potential Emissions per Engine

Pollutant	Hourly PTE (lb/hr)[1]	Annual PTE (per engine)		Annual PTE (15 engines)	
		(lb/yr) [2]	(tpy)	(lb/yr)	(tpy)
VOC	1.81	188.58	0.09	2,828.67	1.41
NO_X	34.45	3,582.98	1.79	53,744.68	26.87
CO	3.03	315.46	0.16	4,731.97	2.37
PM	0.27	28.04	0.01	420.62	0.21
PM_{10}	0.27	28.04	0.01	420.62	0.21
$PM_{2.5}$	0.27	28.04	0.01	420.62	0.21
SO_X[3,4]	0.04	3.86	1.93E-03	57.88	0.03
HAP	0.03	3.30	1.65E-03	49.43	0.02

1. Hourly PTE (lb/hr) = Emission Factor (g/hp-hr) * Engine Power (bhp) / 453.592 (grams/lb)
2. Annual PTE (lb/year) = Emission Factor (g/hp-hr) * Engine Power (bhp) * Annual Hours (hr/year) / 453.592 (grams/lb)
3. Hourly PTE (lb SOx/hr) = Emission Factor (lb/hp-hr) * Engine Power (bhp)
4. Annual PTE (lb SOx/year) = Emission Factor (lb/hp-hr) * Engine Power (bhp) * Annual Hours (hr/year)

Table 7. Greenhouse Gas Potential to Emit

Pollutant	Global Warming Potential[1]	Emission Factor (kg/MMBtu)[2]	CO_2e emissions (per engine)		CO_2e emissions (15 Engines)	
			(lb/yr)[3]	(tpy)	(lb/yr)	(tpy)
CO_2	1.0	74.0	341,509	170.75	5,122,638	2,561.32
CH_4	25.0	3.00E-03	346	1.73E-01	5,195	2.60
N_2O	298.0	6.00E-04	826	4.13E-01	12,384	6.19
				Total CO_2e Emissions (tpy):		2,570.11

1. Global Warming Potentials are obtained from Subpart A of 40 CFR 98, Table A–1 "Global Warming Potentials."
2. Emission factor for carbon dioxide is obtained from 40 CFR 98, Table C–1 to Subpart C for Distillate Fuel Oil No. 2. Emission factors for methane and nitrous oxide are obtained from 40 CFR 98, Table C–2 to Subpart C.
3. CO_2e Potential Emissions (lb/year) = GWP * Emission Factor (kg/MMBtu) * 1000 (g/kg) * 7,000 (Btu/hp-hr) / 1,000,000 (Btu/MMBtu) * Annual Hours (hr/year) * Engine Power (bhp) / 453.592 (grams/lb)

Table 8. Key Parameters/Constants for Proposed Engine Emission Calculations - 20V4000

Parameter	Value	Unit
Engine Power(@1800 rpm) [1]	3,674	bhp
Engine Power(@1800 rpm)[1]	2,740	kW
Annual Hours [2]	104	hrs/yr
Maximum Fuel Consumption Rate (gal/hr) [1]	171	gal/hr
Heating Value of Diesel (Btu/gal) [3]	137,000	btu/gal
Maximum Heat Input (MMBtu/hr) [4]	23.43	MMBtu/hr
Number of New Engines	6	Engines

1. Based on manufacturer specifications.

2. Annual hours of operation are equal to other permitted emergency generators, per permit 18024, Condition 3.1-1

3. Heating value of diesel provided in AP-42, Appendix A (09/85).

4. Maximum Heat Input (MMBtu/hr) = Maximum Fuel Consumption Rate (gal/hr) * Heating Value of Diesel (Btu/gal) / 10^6 (Btu/MMBtu).

Table 9. Emission Factors

Pollutant	Value	Unit
VOC[1]	0.30	g/hp-hr
NO_X[1]	5.65	g/hp-hr
CO[1]	0.37	g/hp-hr
PM[1]	0.04	g/hp-hr
PM_{10}[2]	0.04	g/hp-hr
$PM_{2.5}$[2]	0.04	g/hp-hr
SO_X[3]	1.21E-05	lb/hp-hr

1. NO_X, CO, PM, and VOC emission factors per manufacturer specifications. Switch has assumed 95% of these emissions are NO_X and 5% are VOC as defined in Table B-22 (NOX and NMHC Fraction Default Values for All Engines except TRUs) of the 2005 Carl Moyer Program Guidelines.

2. It is conservatively assumed that emission factors for PM_{10} and $PM_{2.5}$ are equivalent to the emission factor for PM.

3. The emission factor for SO_2 is based on values listed in AP-42 Ch. 3.4, Table 3.4-1. Based on ultra low sulfur diesel with a sulfur content of 0.0015%.

Table 10. HAP Emissions per Engine

Pollutant	Emission Factor (lb/MMBtu)[1]	Hourly PTE (lb/hr)[2]	Annual PTE	
			(lb/yr)[3]	(tpy)
Benzene	7.76E-04	1.82E-02	1.89E+00	9.45E-04
Toluene	2.81E-04	6.58E-03	6.85E-01	3.42E-04
Xylenes	1.93E-04	4.52E-03	4.70E-01	2.35E-04
Formaldehyde	7.89E-05	1.85E-03	1.92E-01	9.61E-05
Acetaldehyde	2.52E-05	5.90E-04	6.14E-02	3.07E-05
Acrolein	7.88E-06	1.85E-04	1.92E-02	9.60E-06
Naphthalene	1.30E-04	3.05E-03	3.17E-01	1.58E-04
Acenaphthylene	9.23E-06	2.16E-04	2.25E-02	1.12E-05
Acenaphthene	4.68E-06	1.10E-04	1.14E-02	5.70E-06
Fluorene	1.28E-05	3.00E-04	3.12E-02	1.56E-05
Phenanthrene	4.08E-05	9.56E-04	9.94E-02	4.97E-05
Anthracene	1.23E-06	2.88E-05	3.00E-03	1.50E-06
Fluoranthene	4.03E-06	9.44E-05	9.82E-03	4.91E-06
Pyrene	3.71E-06	8.69E-05	9.04E-03	4.52E-06
Benzo(a)anthracene	6.22E-07	1.46E-05	1.52E-03	7.58E-07
Chrysene	1.53E-06	3.58E-05	3.73E-03	1.86E-06
Benzo(b)fluoranthene	1.11E-06	2.60E-05	2.70E-03	1.35E-06
Benzo(k)fluoranthene	2.18E-07	5.11E-06	5.31E-04	2.66E-07
Benzo(a)pyrene	2.57E-07	6.02E-06	6.26E-04	3.13E-07
Indeno(1,2,3-cd)pyrene	4.14E-07	9.70E-06	1.01E-03	5.04E-07
Dibenz(a,h)anthracene	3.46E-07	8.11E-06	8.43E-04	4.21E-07
Benzo(g,h,I)perylene	5.56E-07	1.30E-05	1.35E-03	6.77E-07
Total HAPs:		0.04	3.83	1.92E-03

1. HAP Emission Factors per AP-42 Chapter 3.4, Table 3.4-3 and Table 3.4-4 (10/96).
2. Hourly PTE (lbs/hr) = Emission Factor (lb/hr-hr) * Engine Power (bhp)
3. Annual PTE (lbs/yr) = Emission Factor (lb/hr-hr) * Engine Power (bhp) * Annual Hours (hrs/yr)

Table 11. Potential Emissions

Pollutant	Hourly PTE (lb/hr)[1]	Annual PTE (per engine)		Annual PTE (6 engines)	
		(lb/yr) [2]	(tpy)	(lb/yr)	(tpy)
VOC	2.41	250.63	0.13	1,503.8	0.75
NO_X	45.79	4,762.06	2.38	28,572.3	14.29
CO	3.00	311.71	0.16	1,870.3	0.94
PM	0.32	33.70	0.02	202.2	0.10
PM_{10}	0.32	33.70	0.02	202.2	0.10
$PM_{2.5}$	0.32	33.70	0.02	202.2	0.10
SO_X [3,4]	0.04	4.64	2.32E-03	27.8	1.39E-02
HAP	0.04	3.83	1.92E-03	23.0	1.15E-02

1. Hourly PTE (lb/hr) = Emission Factor (g/hp-hr) * Engine Power (bhp) / 453.592 (grams/lb)

2. Annual PTE (lb/year) = Emission Factor (g/hp-hr) * Engine Power (bhp) * Annual Hours (hr/year) / 453.592 (grams/lb)

3. Hourly PTE (lb SOx/hr) = Emission Factor (lb/hp-hr) * Engine Power (bhp)

4. Annual PTE (lb SOx/year) = Emission Factor (lb/hp-hr) * Engine Power (bhp) * Annual Hours (hr/year)

Table 12. Greenhouse Gas Potential to Emit

Pollutant	Global Warming Potential[1]	Emission Factor (kg/MMBtu)[2]	CO_2e emissions (per engine)		CO_2e emissions (6 Engines)	
			(lb/yr)[3]	(tpy)	(lb/yr)	(tpy)
CO_2	1.0	74.0	397,266	198.63	2,383,595	1,191.80
CH_4	25.0	3.00E-03	403	2.01E-01	2,417	1.21
N_2O	298.0	6.00E-04	960	4.80E-01	5,762	2.88
				Total CO_2e Emissions (tpy):		1,195.89

1. Global Warming Potentials are obtained from Subpart A of 40 CFR 98, Table A–1 "Global Warming Potentials."

2. Emission factor for carbon dioxide is obtained from 40 CFR 98, Table C–1 to Subpart C for Distillate Fuel Oil No. 2. Emission factors for methane and nitrous oxide are obtained from 40 CFR 98, Table C–2 to Subpart C.

3. CO_2e Potential Emissions (lb/year) = GWP * Emission Factor (kg/MMBtu) * 1000 (g/kg) * 7,000 (Btu/hp-hr) / 1,000,000 (Btu/MMBtu) * Annual Hours (hr/year) * Engine Power (bhp) / 453.592 (grams/lb)

Table 13. Cooling Tower Parameters

Parameter[1]	New Units
Manufacturer	Evapco
Model Number	ESWA 216-460
Number of new cooling towers	15
Proposed Maximum TDS (ppm)	5,000
Drift Rate (%)	0.001
Water Flow Rate (GPM)	1,250
Operation Hours (hr/yr)	8,760

1. Cooling tower parameters can be found in the ESWA specification sheet.

Table 14. Emission Factor Calculations

Rating				TDS	Drift Rate	Emission Factors [1] (lb/hr)		
Value	Unit	Value	Unit	(ppmw)	(%)	PM	PM_{10}	$PM_{2.5}$
1,250	gpm	75	10^3 gal/hr	5,000	0.001	0.03	0.01	0.01

[1] PM Emissions (lb/hr) = Cooling Water Flow Rate (Mgal/hr) x 1,000 (gal/Mgal) x Drift Loss (%) / 100 x 8.34 (lb/gal) x TDS Content (ppmw) / 1,000,000 (parts/million)
PM_{10} emissions = $PM_{2.5}$ = 47% * PM emissions, per DAQ methodology

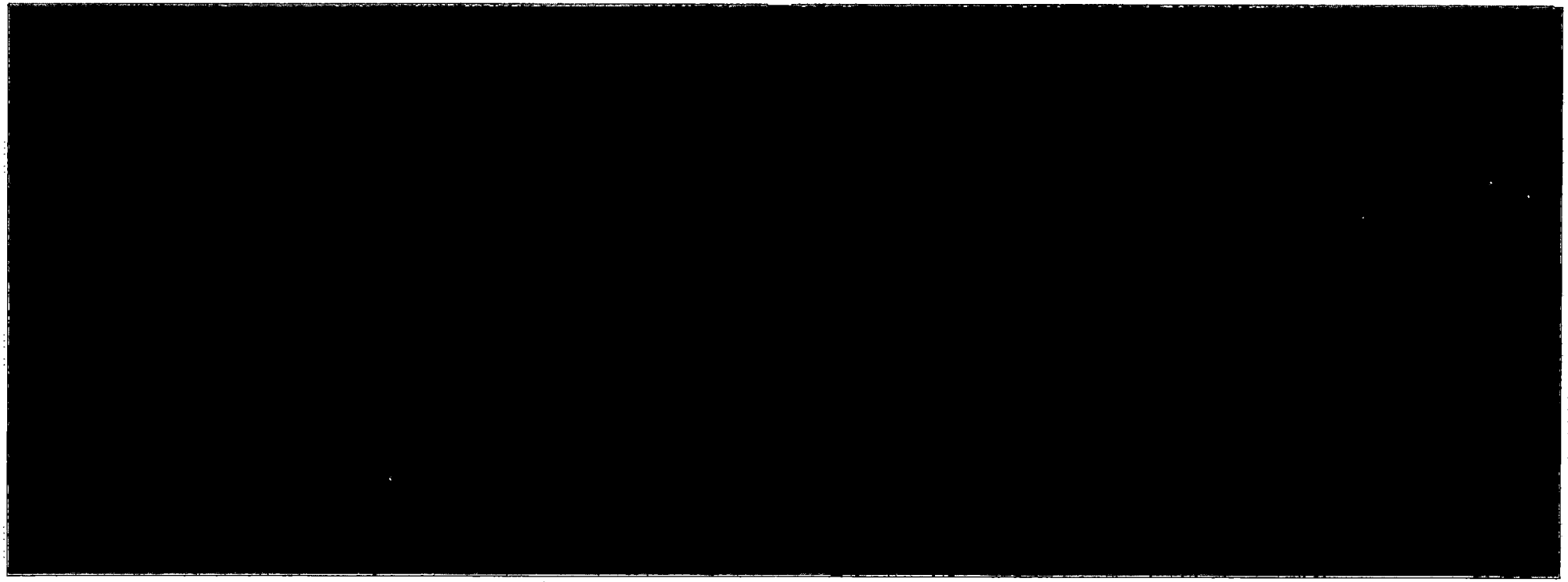
Table 15. Potential Emissions

Pollutant	Hourly PTE (lb/hr)[1]	Annual PTE (per cooling tower)[1]		Annual PTE (15 cooling towers)	
		(lb/yr)	(tpy)	(lb/yr)	(tpy)
PM	0.03	2.740E+02	0.14	4,109.5	2.05
PM_{10}	0.01	128.765	0.06	1,931.5	0.97
$PM_{2.5}$	0.01	128.77	0.06	1,931.5	0.97

[1] Assumes continuous operation of 8,760 hours per year

APPENDIX D. PROPOSED EQUIPMENT LOCATION MAP

Switch Facility Site Map: Proposed Change in Emission Unit Locations



Switch Facility Proposed Site Map: New Emission Unit Locations