



December 2022

Via email

vaidyanathan.balaji@azdeq.gov

airpermits@azdeq.gov

Balaji Vaidyanathan, Manager
Stationary Source Section, Air Quality Division
Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007

**Re: Significant Permit Revision ("SPR") Application
Class I Air Quality Permit No. 90384**

Dear Mr. Vaidyanathan:

Arizona Public Service ("APS") is pleased to provide the following Class I Significant Permit Revision for the Yucca Power Plant. Through this application, APS is seeking approval to install and operate 110 Tier 4 diesel engines rated at 625kw each to assist with supplying power during peak periods. APS is also proposing to limit the engines to a 100-hour, 12-month rolling operating limit, which will apply on a per-engine basis.

Please contact Jeff Cocking at (928) 288-1307 if there are any questions or concerns about this application.

Thank you,

A handwritten signature in black ink, appearing to read "Jarrett Howell", is written over a horizontal line.

Jarrett Howell
Plant Manager
Arizona Public Service
Yucca Power Plant

Attachment A – Standard Permit Application
Attachment B – Air Emissions Calculations
Attachment C – Engine Specification Sheet
Attachment D – Tier 4 Emission Certification

Attachment A – Standard Permit Application

SECTION 2.1
ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
Air Quality Division
1110 West Washington • Phoenix, AZ 85007 • Phone: (602) 771-2338

STANDARD CLASS I PERMIT APPLICATION FORM

(As required by A.R.S. § 49-426, and Chapter 2, Article 3, Arizona Administrative Code)

1. Permit to be issued to (Business license name of organization that is to receive permit):
Arizona Public Service
2. Mailing Address: 400 N. 5th Street ., M.S. 9303
City: Phoenix State: AZ ZIP: 85004
3. Name (or names) of Owners/ Principals: Arizona Public Service Company
Phone: _____ Fax: _____ Email: _____
4. Name of Owner's Agent: Jarrett Howell
Phone: 602-250-1471 Fax: _____ Email: Jarrett.Howell@aps.com
5. Plant/Site Manager/ Contact Person and Title: Jarrett Howell- Plant Manager
Phone: 602-250-1471 Fax: _____ Email: Jarrett.Howell@aps.com
6. Plant Site Name: Yucca Power Plant
7. Plant Site Location Address: 7522 S. Somerton Avenue
City: Yuma County: Yuma Zip Code: 85364
Indian Reservation (if applicable, which one): _____
Latitude/ Longitude, Elevation: _____
Section/ Township/ Range: _____
8. General Nature of Business: Electrical Power Generation
9. Type of Organization:
☒ Corporation ☐ Individual Owner ☐ Partnership ☐ Government Entity (Government Facility Code-----)
☐ Other _____
8. Permit Application Basis: ☐ New Source ☒ Revision ☐ Renewal of Existing Permit
(Check all that apply.)
For renewal or modification, include existing permit number (and exp. date): Permit No. 90384 Exp. 01/27/2027
Date of Commencement of Construction or Modification: 2023
Primary Standard Industrial Classification Code: 4911
9. I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by ADEQ as public record. I also attest that I am in compliance with the applicable requirements of the Permit and will continue to comply with such requirements and any future requirements that become effective during the life of the Permit. I will present a certification of compliance to ADEQ no less than annually and more frequently if specified by ADEQ. I further state that I will assume responsibility for the construction, modification,

or operation of the source in accordance with Arizona Administrative Code, Title 18, Chapter 2 and any permit issued thereof.

Signature of Responsible Official: 

Official Title of Signer: Yucca Plant Manager

Typed or Printed Name of Signer: Jarrett Howell

Date: 12/16/22 Telephone Number: 602-250-1471

1. Process Description

The Yucca Power Plant, located northwest of Yuma, is jointly owned by the Arizona Public Service Company (APS) and the Imperial Irrigation District (IID). APS is the sole operator of the facility. Currently, the Yucca Power Plant consists of eight electrical generating units, one steam boiler, and seven simple-cycle combustion turbines. The plant operates these units to provide electrical power to the electric grid.

Through this application, APS is seeking approval to install and operate 110 Tier 4 diesel engines rated at 625kw to assist with supplying power during peak periods at the Yucca Power Plant. APS is proposing emissions limits at the applicable Tier 4 standards and a 100-hour, 12-month rolling operating limit per engine (110 engines * 100 hours/per engine = 11,000 hours per year). Additional engine specifications are provided throughout this application and in the provided attachments.

2. Product Description

The product of the proposed modification is electricity.

3. Alternate Operating Scenario(s)

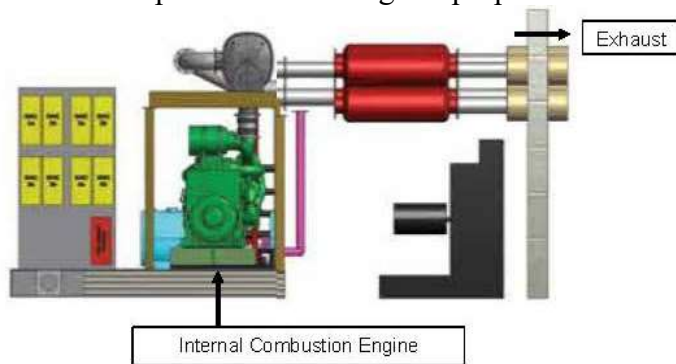
APS is not proposing any alternate operating scenarios for this project.

4. Alternate Operating Scenario product(s)

Not applicable.

5. Flow Diagram

The engines will be standalone sources of electricity and not integrated with other generation sources at the plant for flow diagram purposes. The following diagram outlines the exhaust flow.



6. Material Balance (optional)

APS is not relying on material balance.

7. Potential Emissions and Emission Point

Section 2.2 - Emission Sources														
Regulated Air Pollutant Data					Emission Point Discharge Parameters									
Emission Point		Chemical Composition of Total Stream	Air Pollutant Emission Rate		UTM Coordinates of Emission Points			Stack Sources					Nonpoint	
Number	Name	Pollutant	lb/hr	TPY	Zone	East	North	Height above ground (feet)	Height above structure (feet)	DIA (ft)	VEL (fps)	TEMP (F)	Length	Width
Gen 1-110 (Emissions reflect total for all engines)	PowerBlock Mobile Tier IV engines	PM	4.54	0.23	11	714,647	3,622,530	13' 6 1/8"	TBD	TBD	4866 (SCFM)	903		
		PM10	4.54	0.23										
		PM2.5	4.54	0.23										
		NOx	101.46	5.07										
		CO	530.01	26.50										
		SO2	1.19	0.06										
		VOC	28.77	1.44										
		CO2	113691.60	5684.58										
		N2O	0.91	0.05										
		CH4	69.10	3.45										
		CO2e	115689.47	5784.47										
		Benzene	0.53	0.03										
		Toluene	0.19	0.01										
		Xylenes	0.13	0.01										
		Formaldehyde	0.05	0.00										
		Acetaldehyde	0.02	0.00										
		Acrolein	0.01	0.00										

		Polycyclic aromatic hydrocarbons (PAH)	0.15	0.01										
		Arsenic	0.00	0.00										
		Beryllium	0.00	0.00										
		Cadmium	0.00	0.00										
		Chromium	0.00	0.00										
		Lead	0.01	0.00										
		Manganese	0.00	0.00										
		Mercury	0.00	0.00										
		Nickel	0.00	0.00										
		Selenium	0.01	0.00										

8. Applicable Requirements

The following table summarizes the applicable requirements for this project.

Applicable Requirement	Summary of Requirement	Compliance Method
R18-2-304.E	Permit application processing.	Application submission.
R18-2-310	Excess emissions reporting	Recordkeeping and reporting as required in R18-2-310.01
R18-2-311	Apply applicable test methods	Appropriate procedures and testing methods will be used if testing is requested.
R18-2-312	Performance tests shall be conducted as required by the Director	Performance testing will be conducted as required by the Director.
R18-2-315	Posting of permit at a location where it is clearly visible and accessible	Permit is posted, and revisions will be incorporated.
R18-2-320	Significant permit revision processing procedures	Applicable submission.
R18-2-326	Payment of annual emissions fee	APS will pay fees, including any incurred due to operation of the sources described in this application.
R18-2-327	Submission of annual emissions inventory	APS will submit annual emissions inventory, including emissions due to operation of the sources described in this application.
R18-2-331	Material permit conditions	APS is seeking to establish a material permit condition through this application.
40 CFR 60.4201; 60.4204(b); 1039.105	Smoke shall not exceed 20 percent during acceleration mode; 15 percent during the lugging mode; and 50 percent during the peaks in either the acceleration or lugging modes.	Purchase engines certified to the emission standards and operate engines according to manufacturer's emission-related instructions.

40 CFR 60.4207(b); 60.4211(c); 1090.305	Use diesel with a max sulfur content of 15 ppm and either a minimum cetane index of 40 or a max aromatic content of 35 volume percent	Use conforming fuel and maintain fuel supplier specification records
40 CFR 60.4201, 60.4204(b) and 1039.101	Comply with the following emissions limits: Carbon Monoxide: 3.5 g/kW-hr Nitrogen Oxides: 0.67 g/kW-hr PM: 0.03 g/kW-hr VOC (NMHC): 0.19 g/kW-hr	Purchase engines certified to the emission standards
40 CFR 60.4211(a)	Operate and maintain engines according to manufacturer's emission-related written instruction and meet the requirements of 40 CFR 1068 as applicable.	Operate engines consistent with requirements.
40 CFR 60.4211(g)(2)	Maintain a maintenance plan and records of conducted maintenance, only if the engine is not installed, configured, operated and maintained according to manufacturer's emission-related written instruction	APS intends to operate engines according to manufacturer's emission-related instructions.
40 CFR 60.4211(g)(2)	Conduct an initial performance test if the engine is not installed, configured, operated or maintained according to manufacturer's emission-related written instruction.	APS intends to operate engines according to manufacturer's emission-related instructions.
40 CFR 63.6590	Comply with 40 CFR 60, Subpart IIII.	APS will comply with 40 CFR 60, Subpart IIII.

40 CFR 60.4201, 4204(b), and 1039.105	Smoke shall not exceed: 20 percent during the acceleration mode; 15 percent during the lugging mode; and 50 percent during the peaks in either the acceleration or lugging modes.	Purchase engines certified to the emission standards and operate engines according to manufacturer's emission-related instructions.
--	--	---

APS is also proposing the following permit conditions consistent with AAC R18-2-306.01 to avoid minor and major new source review requirements.

- The Permittee shall not operate any engine for more than 100 hours, based on a 12-month rolling total.
- The Permittee shall comply with the following emission standards for each of the engines:
 - Carbon Monoxide: 3.5 g/kW-hr
 - Nitrogen Oxides: 0.67 g/kW-hr
 - PM: 0.03 g/kW-hr
 - VOC (NMHC): 0.19 g/kW-hr

APS proposes to demonstrate compliance with these requirements as follows:

- Compliance Requirements
 - Operate and maintain the engines to comply with the emission standards;
 - Operate and maintain the engines according to the manufacturer's emission-related written instructions;
 - Change only those emission-related settings that are permitted by the manufacturer;
 - Meet the requirements of 40 CFR parts 89, 94 and/or 1068, as applicable;
 - Purchase engines certified to the emission standards; and
 - If APS does not install, configure, operate, and maintain the engines according to the manufacturer's emission-related written instructions, or changes emission-related settings in a way that is not permitted by the manufacturer, demonstrate compliance as follows:
 - Keep a maintenance plan and records of conducted maintenance to demonstrate compliance and, to the extent practicable, maintain and operate the engines in a manner consistent with good air pollution control practice for minimizing emissions; and
 - Conduct an initial performance test within 1 year of startup, or within 1 year after the engines are no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after the facility changes emission-related settings in a way that is not permitted by the manufacturer. Subsequent performance testing should be performed every 8,760 hours of engine

operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards.

- Monitoring, Recordkeeping and Reporting Requirements
 - Install and operate non-resettable hour meters on all engines to monitor hours of operation for each engine;
 - Maintain records of the hours of operation for each engine based on the non-resettable hour meter; and
 - At the end of each month, calculate and record monthly hours of operation, and 12-month rolling total hours of operation for each engine.

9. Proposed Exemptions

Not applicable.

10. Maximum Rates

The maximum process rates, related fuel information, and anticipated operating schedule are presented in the tables below.

Table 10.1 Fuel Information

Parameter	Value	Unit
Type of Fuel	Diesel, No. 2	
Max Annual Fuel	3920	Gallons/Year
Max Hourly Fuel	39	Gallons/Hour
Max Hourly kW	625	kw-hr
Max Annual kW	62500	kw-hr
HHV	138412	btu/gal
Sulfur Content	15	ppm

Table 10.2 Operating Schedule

Parameter	Value
Percent of Annual Production by Season	Spring 25%, Summer 30%, Fall 20%, Winter 25%.
Days of the Week Normally in Operation	Varies depending on peak power needs.
Shifts or Hours of the Day Normally in Operation	Varies depending on peak power needs.
Number of Days per Year in Operation	Varies depending on peak power needs. Each engine will be limited to 100 hours per year.

Limitations on source operations have been described in section 8 above. Work practice standards affecting emissions include those applicable under 40 C.F.R. Part 60, Subpart IIII and described in section 8 above.

11. A description of all process and control equipment.

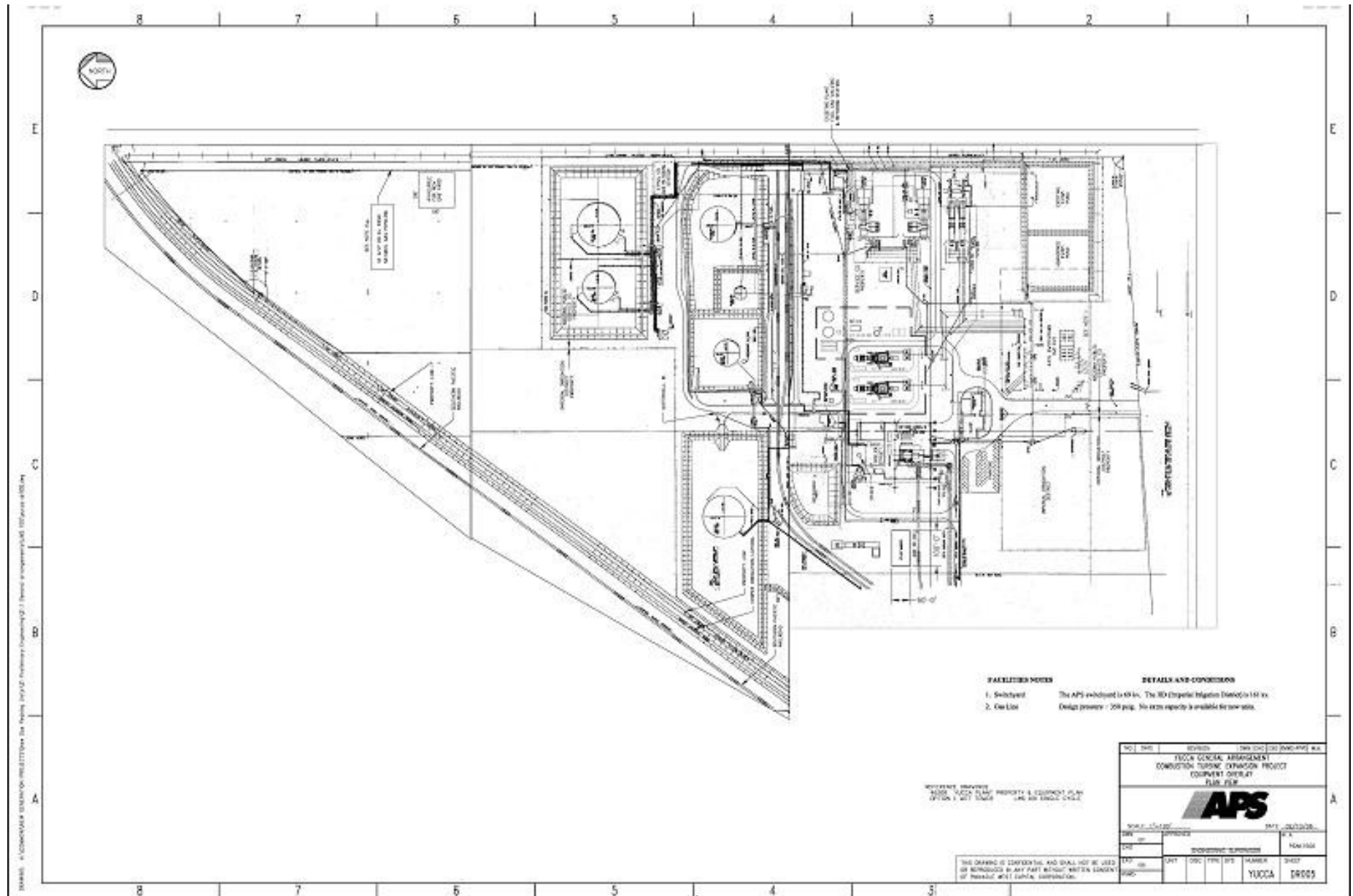
Basic Details	Serial Number	Date of Manufacture	Size/Production Capacity	Type
Name PowerBlock Mobile Tier IV engines Make Volvo Model PowerBlock Mobile 1250 kW Engine Family MVPXL 16.1CDC	TBD	TBD	Standby: 625 kW per engine or 1250 kW per container (2 engines per container) Prime: 560 kW per engine or 1120 kW per container (2 engines per container)	4-Cycle, Diesel, Compression Ignition, Internal Combustion Engine, Tier 4, 6 Cylinders

Control equipment is detailed in response to question 14.

12. Stack Information

ID	Description	Building Dimensions	Exhaust Temp. (F)	Exhaust Velocity	Height	Inside Dimensions
Gen Stack 1-110	Generator Stack 1-110	Height 13' 6 1/8" Width 8'-2 3/16" Length 41'- 1/4"	903	4866 SCFM	TBD	TBD

13. Site diagram



14. Air Pollution Control Information

Engines have been certified to meet Tier 4 standards per 40 CFR 60.4201, 60.4204(b) and 1039.101. To meet the Tier 4 NO_x emission limit, the engines are equipped with selective catalytic reduction (SCR) control technology. Exhaust fumes are directed to the SCR system where diesel exhaust fluid is sprayed onto a special catalyst. This initiates a chemical reaction that breaks down nitrogen oxides into nitrogen, water and CO₂. The following table summarizes the diesel exhaust fluid consumption rates for the proposed engines.

Diesel Exhaust Fluid (DEF) Consumption (gal/hr.) (per Engine)		
Percent Load	Standby	Prime
25%	0.73	0.69
50%	1.34	1.28
75%	2.09	2
100%	2.51	2.37

The engine is otherwise designed to meet emission standards for other Tier 4 pollutants. APS will operate the engines consistent with the manufacturer's emission-related work instructions.

Applicable compliance methods have been provided in response to question 8 above.

15. Equipment manufacturer's bulletins or shop drawings

The facility is not providing equipment manufacturer's bulletins or shop drawings to supply the required information. Attachments C and D provide some of the information provided throughout this application.

16. Compliance Plan

The facility will maintain the proposed equipment in compliance with all applicable requirements under state and federal law. The source will meet all requirements that become applicable as a result of this change in a timely fashion and consistent with regulatory deadlines.

APS proposes to comply with the proposed Tier 4 emissions limits by implementing the compliance, monitoring and recordkeeping requirements detailed in response to question 8. The source will comply with proposed hourly limitations by purchasing engines with a non-resettable hour meter and tracking hours of operation on a 12-month rolling basis.

17. Compliance Certification:

APS certifies that it will comply with the applicable requirements and voluntarily accepted limits detailed in response to question 8. The responses to question 8 detail the applicable requirements and the methods used to determine compliance. APS proposes to certify compliance with these requirements according to the existing compliance certification schedule in Permit No. 90384. The source is not subject to enhanced monitoring requirements. A certification of truth, accuracy,

and completeness is provided in Attachment A.

18. Acid Rain Program Compliance Plan

APS is not seeking any change to the existing Acid Rain Program Compliance Plan for Yucca. The proposed units are not subject to the Acid Rain Program because they do not serve a generator of 25 MW or greater.

19. Major New Source Review and Major Modification Analysis

This project is not proposing a new major source or major modification to an existing major source. A minor and major NSR analysis is included in Attachment B and summarized below.

Based on this review, project emissions are below minor NSR and major NSR thresholds.

Pollutant	Project Emissions (TPY)	Minor NSR Threshold (TPY)	Below Minor NSR?	SER Thresholds	Below SER?
PM10	0.23	7.5	Yes	15	Yes
PM2.5	0.23	5	Yes	10	Yes
NOX	5.07	20	Yes	40	Yes
CO	26.50	50	Yes	100	Yes
SO2	0.06	20	Yes	40	Yes
VOC	1.46	20	Yes	40	Yes
Lead	0.0003	0.3	Yes	1	Yes

20. Calculations on which all information requested in this application is based.

See Attachment B.

Attachment B – Air Emissions Calculations

PowerBlock Mobile Tier IV engines

Gen 1-110

Arizona Public Service

Yucca Power Plant

Minor and Major NSR Evaluation

Pollutant	Project Emissions (TPY)	Minor NSR Threshold (TPY)	Below Minor NSR?	SER Thresholds	Below SER?
PM ₁₀	0.23	7.5	Yes	15	Yes
PM _{2.5}	0.23	5	Yes	10	Yes
NO _x	5.07	20	Yes	40	Yes
CO	26.50	50	Yes	100	Yes
SO ₂	0.06	20	Yes	40	Yes
VOC	1.44	20	Yes	40	Yes
Lead	0.0003	0.3	Yes	1	Yes

Notes:

1. Minor NSR thresholds derived from permitting exemption thresholds in AAC R18-2-101.
2. Significant Emission Rate (SER) thresholds derived from 40 CFR 52.21.

Tier 4 Engines

Gen 1-110

Arizona Public Service

Yucca Power Plant

Inputs

Description	Value	Units	Notes
Number of Engines	110		
Kilowatt Per Engine	625	kw	
Horsepower Per Engine	891	hp	
Fuel Consumption Rate per Engine	39	gal/hr	
Maximum Operating Hours	100	hrs/yr	1
Horsepower Per Engine	891	hp	
Grams/lb	454	gr/lb	
Sulfur Content in Diesel Fuel	15	ppm	2

Total Emissions Summary (110 Engines)

Pollutant	Hourly Rate (lb/hr)	PTE (TPY)
PM	4.54	0.23
PM ₁₀	4.54	0.23
PM _{2.5}	4.54	0.23
NO _x	101.46	5.07
CO	530.01	26.50
SO ₂	1.19	0.06
VOC	28.77	1.44
CO ₂	113691.60	5684.58
N ₂ O	0.91	0.05
CH ₄	69.10	3.45
CO ₂ e	115689.47	5784.47
Benzene	5.3E-01	2.7E-02
Toluene	1.9E-01	9.6E-03
Xylenes	1.3E-01	6.6E-03
Formaldehyde	5.4E-02	2.7E-03
Acetaldehyde	1.7E-02	8.6E-04
Acrolein	5.4E-03	2.7E-04
Polycyclic aromatic hydrocarbons (PAH)	1.5E-01	7.3E-03
Arsenic	2.7E-03	1.4E-04
Beryllium	2.1E-03	1.0E-04
Cadmium	2.1E-03	1.0E-04
Chromium	2.1E-03	1.0E-04
Lead	6.2E-03	3.1E-04
Manganese	4.1E-03	2.1E-04
Mercury	2.1E-03	1.0E-04
Nickel	2.1E-03	1.0E-04
Selenium	1.0E-02	5.1E-04
Total HAP	9.8E-03	4.9E-04

Emissions Calculations Per Engine $\text{g/kw-hr} * 1\text{lb}/454\text{g} = \text{lb/hr}$

Pollutant	Emission Factor (lb/hp-hr)	Emission Limit (g/kw-hr)	Potential Emissions		Notes
			(lb/hr)	(tpy)	
PM		0.03	0.04	0.00	3, 7, 9
PM ₁₀		0.03	0.04	0.00	3, 7, 9
PM _{2.5}		0.03	0.04	0.00	3, 9
NO _x		0.67	0.92	0.05	3, 9
CO		3.5	4.82	0.2409	3, 9
SO ₂	1.21E-05		0.011	5.4E-04	3, 9
VOC		0.19000	0.26	0.01	3, 9
Pb	6.30E-08		0.00	0.00	

CO ₂	1.16		1,033.56	51.68	3, 9
N ₂ O	9.259E-06		0.01	4.1E-04	6, 9
CH ₄	7.05E-04		0.63	3.1E-02	3, 9
CO ₂ e	-		1,051.72	52.59	3, 4, 9
Benzene	5.43E-06		4.8E-03	2.4E-04	5, 9
Toluene	1.97E-06		1.8E-03	8.8E-05	5, 9
Xylenes	1.35E-06		1.2E-03	6.0E-05	5, 9
Formaldehyde	5.52E-07		4.9E-04	2.5E-05	5, 9
Acetaldehyde	1.76E-07		1.6E-04	7.9E-06	5, 9
Acrolein	5.52E-08		4.9E-05	2.5E-06	5, 9
Polycyclic aromatic hydrocarbons (PAH)	1.48E-06		1.3E-03	6.6E-05	7, 9
Arsenic	2.80E-08		2.5E-05	1.2E-06	8, 9
Beryllium	2.10E-08		1.9E-05	9.4E-07	8, 9
Cadmium	2.10E-08		1.9E-05	9.4E-07	8, 9
Chromium	2.10E-08		1.9E-05	9.4E-07	8, 9
Lead	6.30E-08		5.6E-05	2.8E-06	8, 9
Manganese	4.20E-08		3.7E-05	1.9E-06	8, 9
Mercury	2.10E-08		1.9E-05	9.4E-07	8, 9
Nickel	2.10E-08		1.9E-05	9.4E-07	8, 9
Selenium	1.05E-07		9.4E-05	4.7E-06	8, 9
Total HAP	-		9.8E-03	4.9E-04	

Notes:

1. APS proposes to accept a 100-hour limit per engine.
2. Per 40 CFR 60.4207(b), 15 ppm is the maximum sulfur content for nonroad diesel fuel, as specified in 40 CFR 80.510(b)(1)(i).
3. Lb/hp-hr emissions factors based on AP-42 Section 3.4 *Large Stationary Diesel and All Stationary Dual-fuel Engines* Table 3.4.-1 for diesel fuel. G/kw-hr based on applicable Tier 4 standards.
4. Global Warming Potentials from 40 CFR 98 Subpart A Table A-1.
5. Emission factors from AP-42 Section 3.4 *Large Stationary Diesel and All Stationary Dual-fuel Engines* Table 3.4-3. Convert from MMBtu to hp-hr (* 7000 Btu/hp-hr / 1,000,000 Btu/MMBtu).
6. Emission factor from 40 CFR 98 Table C-2 to Subpart C for petroleum fuel. Convert from kg to lb, and convert from MMBtu to hp-hr (* 7000 Btu/hp-hr / 1,000,000 Btu/MMBtu).
7. Emission factors from AP-42 Section 3.4 *Large Stationary Diesel and All Stationary Dual-fuel Engines* Table 3.4-4. Factors converted from MMBtu to hp-hr (* 7000 Btu/hp-hr / 1,000,000 Btu/MMBtu).
8. Emission factors from APS-Marine Corps Air Station Yuma permit application on file with ADEQ. Factors converted from lb/MMBtu to lb/hp-hr (* 7000 Btu/hp-hr / 1,000,000 Btu/MMBtu).
9. The following equations are applied:

$$kw * g/kw-hr * 1 \text{ lb}/454g = \text{lb/hr}$$

$$\text{lb/hr} * 100 \text{ hours} * 1 \text{ ton}/2,000 \text{ lb} = \text{TPY}$$

$$\text{hp} * \text{lb}/\text{hp-hr} = \text{lb/hr}$$

$$\text{lb/hr} * 100 \text{ hours} * 1 \text{ ton}/2,000 \text{ lb} = \text{TPY}$$

Attachment C – Engine Specification Sheet

1250 kW Standby | 1120 kW Prime Power



Leading the way with proven power designs

PowerSecure has taken its robust design on the road by introducing the PowerBlock Mobile (PBM). Utilizing Tier-IV Final EPA-Certified engines, the PBM is ready to provide backup power for any system applications. The PBM is designed to tie multiple PBM units together to kW/kVAR load share, for additional capacity. Combined with on-board, 100% load 18-hour fuel and DEF tanks, load demands can be met with extended run times between fueling.

Servicing of the PBM is backed by PowerSecure's network of Factory Certified and Electrical Generating Systems Association (EGSA) Certified Service Technicians. PowerSecure's experienced nationwide network can manage all routine maintenance and troubleshooting needs 24/7/365.

PowerSecure's PBM Series generators: safely powering your world.

Application and Engineering Data

Engine Specifications

General (per Engine)

Make	Volvo
Cylinder #	6
Type	4-Cycle
Displacement – L(in ³)	16.12 (983.9)
Bore – mm (in)	144 (5.67)
Stroke – mm (in)	165 (6.50)
Compression Ratio	16.8:1
Intake Air Method	Turbocharged/ Aftercooled
Number of Main Bearings	7
Cylinder Head	Cast Iron 4
Ignition	Electronic
Piston Type	Steel
Crankshaft Type	Drop Forged Steel
Lifter Type	Solid Overhead Cam Roller
Intake Valve Material	Nimonic
Exhaust Valve Material	Nimonic
Hardened Valve Seats	Proprietary Alloy
Crankcase Ventilation	Closed

Engine Governing (per Engine)

Governor	Electronic
Frequency Regulation	± 0.25%

Engine Electrical System (per Engine)

System Voltage (DC)	24
Battery Charger Alternator (Volts/Amps)	28/80
Battery Size	2, 4D

Cooling System (per Engine)

Cooling System Type	Unit Mounted Radiator
Fan Type	Pusher
Fan Speed - RPM	1,080
Fan Diameter – mm (in)	965 (37.99)

Fuel System (per Engine)

Fuel Type	ULSD #2
System Supply Flow, Max— 1800 RPM L(Gal/HR)	210.0 (55.5)
Fuel Filtering (Microns)	Primary-10, Secondary-5
Fuel Injectors	Electromechanical

Lubrication System (per Engine)

Oil Pump Type	Full Pressure
Oil Filter Type	Spin on
Crankcase Capacity with Filter— L (Gal)	48 (12.7)

DEF System (per Engine)

Required Brand	AdBlue®
Solution	32.5% per ISO22241
Total Capacity	100 Gallons (90 Usable)

Alternator Specifications (per Engine)

Standard Model	573RSL4033	Standard Excitation	Permanent Magnet
Poles	4	Bearings	Single Sealed Cartridge
Field Type	Rotating	Coupling	Direct via Flexible Disc
Insulation Class – Rotor	H	Prototype Short Circuit Test	Yes
Insulation Class – Stator	H	Voltage Regulator Type	Fully Digital
Total Harmonic Distortion	<5% (3-Phase)	Number of Sensed Phases	All
Telephone Interference Factor (TIF)	<50	Regulation Accuracy (Steady State)	± 0.25%

Cooling (per Engine)

		Standby/Prime
Air Flow (Fan Air Flow Over Radiator)	scfm (m ³ /min)	28,817 (816)
Coolant Flow	Gal/s (L/s)	1.59 (6)
Coolant System Capacity	gal (L)	43.85 (166)
Maximum Operating Ambient Temperature	°F (°C)	122 (50)
Maximum Operating Ambient Temperature (Prior to Deration)		Contact PowerSecure
Maximum Radiator Backpressure	in H ₂ O (kPA)	0.5 (0.125)

Combustion Air Requirements (per Engine)

	Standby	Prime
Flow at Rated Power – scfm (m ³ /min)	1,805 (51.1)	1699 (48.1)

Engine (per Engine)

		Standby	Prime			Standby	Prime
Rated Engine Speed	RPM	1,800	1,800	Exhaust Flow (Rated Output)	scfm (m ³ /min)	4866 (137.8)	4471 (126.6)
Horsepower at Rated kW**	hp	891	809	Max. Allowable Backpressure (Post Turbocharger)	psi (kPA)	2.9 (20)	2.7 (19)
Piston Speed	ft/sec (m/sec)	32.6 (9.9)	32.6 (9.9)	Exhaust Temp (Post Turbocharger)	°F (°C)	903	851
Effective Mean Pressure	psi (kPA)	411 (2,800)	375 (2,555)				

Control System

Controller

- Engine Protective Functions
- Alternator Protective Functions
- Digital Engine Governor Control
- Digital Voltage Regulator
- Multiple Programmable Inputs and Outputs
- Remote Display Capability
- Remote Communication via PowerSecure PowerControl
- Alarm and Event Logging with Real Time Stamping
- Expandable Analog and Digital Inputs and Outputs
- Built-In Programmable Logic eliminates the need for external controllers under most conditions
- CAN-Based Communications between Generators
- Programmable I/O Channel Properties
- Built-In Diagnostics

Alarms and Warnings

- Low Oil Pressure
- Low Coolant Level
- High/Low Coolant Temperature
- Sensor Failure
- Oil Temperature
- Over/Under Speed
- Over/Under Voltage
- Over/Under Frequency
- Over Current
- Overload
- High/Low Battery Voltage
- High/Low Fuel
- Reverse Power
- Low Coolant Temperature
- Battery Charge Fail

Paralleling Controls

- Paralleling Control (Synchronizing)
- Loss of Communication Between Gensets
- kW/kVAR Sharing

Digital Display

- Easily Identifiable Icons
- Multi-Lingual
- On-Screen Editable Parameters
- Key Function Monitoring
- Three-Phase Voltage, Amperage, kW, KVA and KVAR
- Selectable Line-to-Line or Line-to-Neutral Measurements
- Frequency
- Engine Speed
- Engine Coolant Temperature
- Engine Oil Pressure
- Fuel Level
- Battery Voltage
- Engine Hour Meter
- Warning and Alarm Indication
- Diagnostics
- Maintenance Events/Information



Standard Features

Alternator System

- UL2200
- Class H Insulation Material
- 2/3 Pitch
- Permanent Magnet Excitation
- Sealed Bearings
- Amortisseur Winding
- Low Temperature Rise
- Motorized Main Line Circuit Breaker
- Digital Voltage Regulator

Cooling System

- Closed Coolant Recovery System
- Factory-Installed Radiator
- 40/60 VCS Antifreeze
- Block Heater

Electrical System

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Solenoid Activated Starter Motor
- Sealed Batteries
- Battery Disconnect
- Battery Charger
- DC Lights with Timer Switch
- Shore power Connections
- Exterior Toggle On/Off Switch
- External E-Stop

Enclosure

- 40' ISO Container
- 40' Air ride Chassis
- Padlock-style Door Handles
- Internal Release
- Aluminum Fixed Intake Louvers
- Aluminum Backdraft Damper
- Access Ladder
- Cable Storage Boxes

Engine System

- Oil Drain Extension
- Air Cleaner
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Critical Silencer/SCR
- 18-Hour, 100% load DEF Tank

Fuel System

- 18-Hour, 100% load Tank
- Primary and Secondary Fuel Filters
- Primary and Secondary Cam-Lok Fill neck with Spill Bucket
- Check Valve on primary Cam-Lok
- Overfill Prevention Valve
- Fuel Supply and Return Lines
- Fuel Removal Port with integral Cam-Lok fitting
- Local Fuel Fill Indicator Panel (displays gallons required to fill)
- Racor Fuel Filtration with electronic priming pump

Generator Set

- Genset Vibration Isolators
- Separation of Circuits – High/Low Voltage
- Wrapped Exhaust Piping
- Standard Factory Testing
- Standard Warranty

Operating Data

Power Ratings

	Standby	Amps	Prime	Amps
Three-Phase 480/277 VAC @0.8 PF (kW/kVA)	1250/1562.5	1879.5	1120/1400	1684

Diesel Exhaust Fluid (DEF) Consumption (gal/hr.) (per Engine)

Percent Load	Standby	Prime
25%	0.73	0.69
50%	1.34	1.28
75%	2.09	2.00
100%	2.51	2.37

Fuel Consumption Rates (gal/hr. (L/hr.)) (per Engine)

Percent Load	Standby	Prime
25%	11.1 (42.0)	10.8 (40.8)
50%	20.0 (75.7)	19.20 (72.6)
75%	29.1 (110.2)	27.7 (104.9)
100%	39.2 (148.4)	37.0 (140.1)

Ratings Definitions:

Emergency Standby Power:

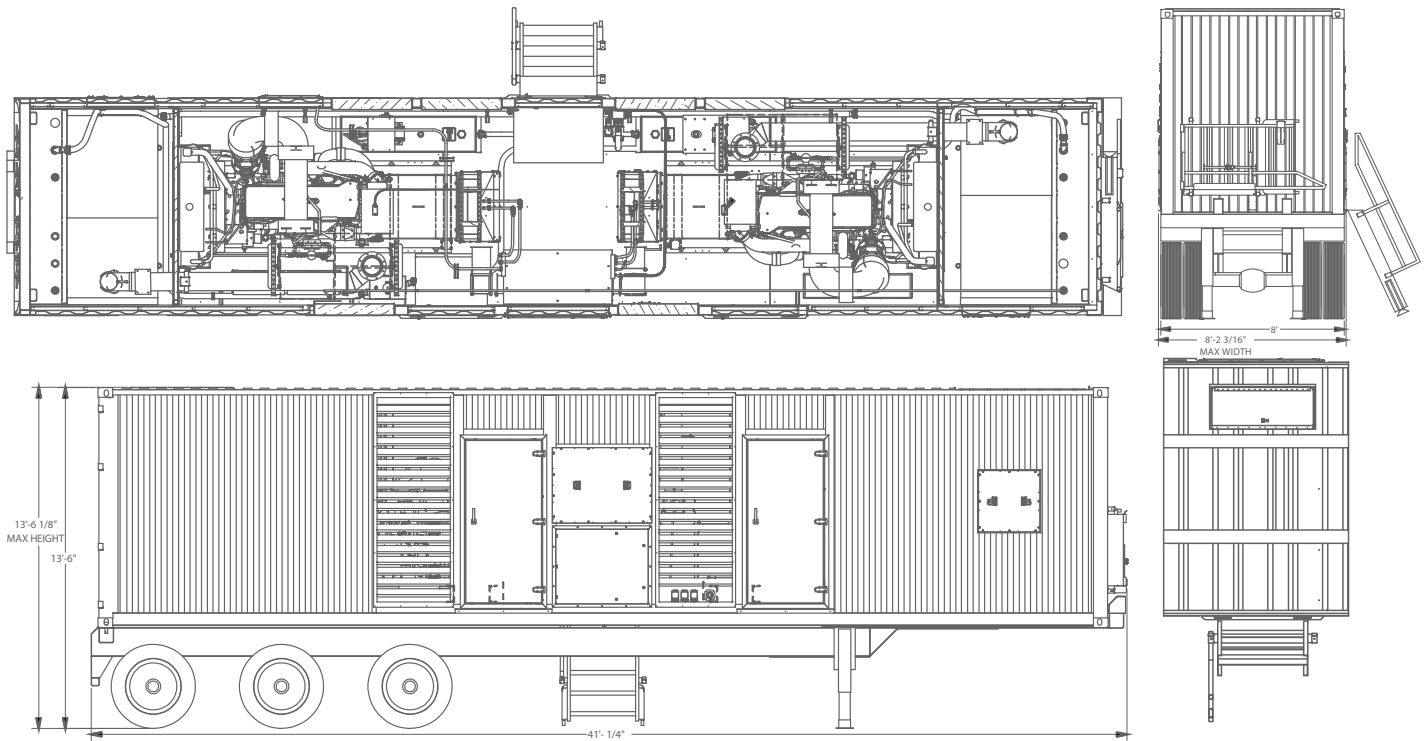
Maximum power available from the generator set to energize a variable electrical load profile, where it has been determined that the total annual run time does not exceed 200 hours of operation with an average load factor over a 24-hour period shall not exceed 70 percent of standby rating unless otherwise approved by manufacturer.

Prime Power:

Maximum power which a generator set can provide a variable electric load sequence for an unlimited numbers per year. In addition, the maximum average load factor over a 24-hour period shall not exceed 70 percent of Prime Power Rating unless approved by manufacturer.

Dimensions and Weights*

Dry Weight 51,700 pounds



* All measurements are approximate and for estimation purposes only.

Specification characteristics may change without notice. Please contact PowerSecure for detailed installation drawings.

Codes and Standards

- UL 2200 Listed Genset
- UL 891
- ISO 8528
- NEC 70
- DOT-Compliant Chassis

Not all codes and standards apply to all configurations. Contact PowerSecure for details.

Attachment D – Tier 4 Emission Certification

 CALIFORNIA AIR RESOURCES BOARD	AB VOLVO PENTA	EXECUTIVE ORDER U-R-014-0187 New Off-Road Compression-Ignition Engines
--	-----------------------	---

Pursuant to the authority vested in California Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-19-095;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engines and emission control systems produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2021	MVPXL16.1CDC	16.1	Diesel	8000
SPECIAL FEATURES & EMISSION CONTROL SYSTEMS			TYPICAL EQUIPMENT APPLICATION	
Electronic Direct Injection, Electronic Control Module, Charge Air Cooler, Turbocharger, Selective Catalytic Reduction – Urea, Ammonia Oxidation Catalyst			Generator Set	

The engine models and codes are attached.

The following are the exhaust certification standards (STD) and certification levels (CERT) for non-methane hydrocarbon (NMHC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kw-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kw-hr)					OPACITY (%)		
			NMHC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
560kW < GEN ≤ 900 kW	Tier 4 Final	STD	0.19	0.67	N/A	3.5	0.03	N/A	N/A	N/A
		CERT	0.003	0.33	--	0.1	0.02	--	--	--

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed on this 26th day of December 2020.



Allen Lyons, Chief
Emissions Certification and Compliance Division

Attachment 1 of 1: Engine Models										EO #: U-R-014-0187		Family: MVPXL16.1CDC		Attachment Revised: 12/2/2020				
Model	Code	Trim	Config	Displacement	Displacement - Units	Peak Power	Peak Power - Units	Peak Power - Speed (rpm)	Peak Power - Fueling	Peak Power - Fuel Units	Peak Torque - Units	Peak Torque - Speed (rpm)	Peak Torque - Fuel	Peak Torque - Fuel Units	OBD	GHG	Special	Notes
TWD1673 GE	I	N/A	I6	16.1	Liters	919	horsepower	1800	305	lb/hr	3634	1800	305	lb/hr	N/A	N/A	None	None
TWD1672 GE	II	N/A	I6	16.1	Liters	825	horsepower	1800	270	lb/hr	3264	1800	270	lb/hr	N/A	N/A	None	None