SMAQMD BACT CLEARINGHOUSE

ACTIVE

CATEGORY Type: **MISCELLANEOUS**

BACT Category: Minor Source BACT

BACT Determination Number: 358	**BACT Determination Date:** 2/15/2024

Equipment Information

Permit Number: 27780
Equipment Description: FUEL CELL
Unit Size/Rating/Capacity: ALL
Equipment Location: SACRAMENTO REG. COUNTY SANITATION DISTRICT
8521 LAGUNA STATION RD ELK GROVE, CA

BACT Determination Information

District Contact: Felix Trujillo, Jr. Phone No.: (279) 207-1154 email: ftrujillo@airquality.org

ROCs	**Standard:**	0.02 lb/MW-hr
	Technology Description:	
	Basis:	Achieved in Practice
NOx	**Standard:**	0.07 lb/MW-hr
	Technology Description:	
	Basis:	Achieved in Practice
SOx	**Standard:**	
	Technology Description:	
	Basis:	
PM10	**Standard:**	
	Technology Description:	
	Basis:	
PM2.5	**Standard:**	
	Technology Description:	
	Basis:	
CO	**Standard:**	0.10 lb/MW-hr
	Technology Description:	
	Basis:	Achieved in Practice
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: This BACT applies to waste gas and/or natural gas fueled fuel cells.
DG Units that produce combined heat and power may take a credit to meet the emission standard above. Credit shall be at the rate of one MW-hr for each 3.4 million Btu's of heat recovered. To take the credit, the following must apply: (1) DG Units are sold with combined heat and power technology integrated into a standardized package by the manufacturer; and (2) DG Units achieve a minimum energy efficiency of 60 percent.

Printed: 2/15/2024

777 12th Street, Ste. 300

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.:	358
DATE:	2/15/2024
ENGINEER:	Felix Trujillo, Jr.

Category/General Equip Description:	Fuel Cell
Equipment Specific Description:	Waste Gas and/or Natural Gas
Equipment Size/Rating:	Minor Source BACT
Previous BACT Det. No.:	None

This BACT determination is a result of the fuel cell proposed under A/C 27780. This BACT determination will apply to fuel cells that are fueled by waste gas and/or natural gas. The fuel cells will primarily be fueled with waste gas and will use natural gas as supplemental fuel, as needed to meet the fuel demand. The waste gas from this project is derived from digester gas from the decomposition of sewage. Waste gas can also be derived from landfill gas, which could potentially require the use of natural gas as a supplemental fuel, as well. Therefore, this BACT can apply to fuel cells fueled only on waste gas (digester gas or landfill gas) or natural gas or both.

Fuels cells generate electricity through an electrochemical reaction, not through combustion. In a fuel cell, hydrogen and oxygen are combined to generate electricity, heat and water. A fuel cell is composed of an anode, cathode and an electrolyte membrane. A typical fuel cell works by passing hydrogen through the anode of a fuel cell and oxygen through the cathode. At the anode site, a catalyst splits the hydrogen molecules into electrons and protons. The protons pass through the porous electrolyte membrane, while the electrons are forced through a circuit, generating an electric current and excess heat. At the cathode, the protons, electrons, and oxygen combine to produce water molecules.

In general, the emissions from fuel cells are so low that they would not trigger the 2.0 lb/day permitting requirements of the SMAQMD, especially for particulate matter (PM) and SOx. The only standards listed were for NOx, VOC and CO. Therefore, this BACT will apply more to NOx, VOC and CO emissions.

BACT ANALYSIS

A. ACHIEVED IN PRACTICE (Rule 202, §205.1a)

The following control technologies are currently employed as BACT for waste gas and/or natural gas fuelled fuel cells by the following air pollution control districts:

US EPA

BACT
Source: EPA RACT/BACT/LAER Clearinghouse

None

RULE REQUIREMENTS:

None

California Air Resource Board (CARB)

BACT
Source: ARB BACT Clearinghouse

None

RULE REQUIREMENTS:

Title 17, California Code of Regulations, Sections 94200-94214 – Distributed Generation (DG) Certification Regulation

The Distributed Generation Certification Regulation requires manufacturers of electrical generation technologies, that are exempt from air district permit requirements, to certify their technologies to specific criteria pollutant emission standards before selling their products in California. Therefore, distributed generation equipment will either require a district permit or certification under the DG regulation. Distributed generation refers to electrical generation sources that are located near the place of electricity consumption. Sections 94203(b) and (c) set emissions standards for fossil fuels and waste gas, respectively. The emission standards for both fuels are the same and are the following:

Pollutant	Emission Standard (lb/MW-hr)
NOx	0.07
CO	0.10
VOC	0.02

DG Units that produce combined heat and power may take a credit to meet the emission standard above. Credit shall be at the rate of one MWhr for each 3.4 million Btu's of heat recovered. To take the credit, the following must apply:

1) DG Units are sold with combined heat and power technology integrated into a standardized package by the manufacturer of the electrical energy technology; and

2) DG Units achieve a minimum energy efficiency of 60 percent.

The proposed project will use digester gas as the primary fuel and natural gas as the supplemental fuel. In order to allow flexibility of this BACT and allow the use of landfill gas for potential future projects, this BACT will apply to waste gas and/or natural gas. Although, fossil fuels are listed as an option on this regulation, the only fossil fuel that will be addressed under this BACT is the use of natural gas, as this is the fossil fuel that is proposed under the associated project. Also, natural gas is the only fossil fuel used in the currently certified equipment under this regulation.

The proposed fuel cell (FuelCell Energy, Inc., model SureSource 3000) was previously certified by the DG Regulation under Executive Order DG-048, but was not renewed upon expiration. The fuel cell was certified with the use of digester gas as the fuel. The manufacturer is proposing to recertify the fuel cell, as well.

As part of the certification process, the manufacturer is required to source test the equipment to show compliance with the emission standards.

Sacramento Metropolitan AQMD

BACT
Source: BACT Clearinghouse

None

RULE REQUIREMENTS:

None

South Coast AQMD

BACT
Source: SCAQMD BACT Guidelines for Non-Major Polluting Facilities

None

RULE REQUIREMENTS:

Rule 219 (Equipment Not Requiring a Written Permit Pursuant to Regulation II) Section (d)(2)(G) exempts fuel cells which produce electricity in an electro-chemical reaction and use phosphoric acid, molten carbonate, proton exchange membrane, or solid oxide technologies.

The fuel cell used for the proposed project uses molten carbonate as the electrolyte membrane, which would qualify for exemption under this rule.

San Diego County APCD

BACT
Source: NSR Requirements for BACT

None

RULE REQUIREMENTS:

Rule 11 (Exemptions from Rule 10 Permit Requirements) Section (d)(19)(xxvii), exempts fuel cells used in power and/or heat generating equipment that are certified under California Air Resources Board's Distributed Generation Program or meet the emission standards of that program.

Bay Area AQMD

BACT
Source: BAAQMD BACT Guideline

None

RULE REQUIREMENTS:

None

San Joaquin Valley APCD

BACT
Source: SJVAPCD BACT Clearinghouse

None

RULE REQUIREMENTS:

None

Summary of Achieved in Practice Control Technologies

The following control technologies have been identified and are ranked based on stringency:

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
VOC	0.02 lb/MW-hr – [CARB]
NOx	0.07 lb/MW-hr – [CARB]
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	0.10 lb/MW-hr – [CARB]

The following control technologies have been identified as the most stringent, achieved in practice control technologies:

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
VOC	0.02 lb/MW-hr	CARB
NOx	0.07 lb/MW-hr	CARB
SOx	No standard	
PM10	No standard	
PM2.5	No standard	
CO	0.10 lb/MW-hr	CARB

B. TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (Rule 202, §205.1.b.):

Technologically Feasible Alternatives:
Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

The table below shows the technologically feasible alternatives identified as capable of reducing emissions beyond the levels determined to be "Achieved in Practice" as per Rule 202, §205.1.a.

Pollutant	Technologically Feasible Alternatives
VOC	No other technologically feasible option identified
NOx	No other technologically feasible option identified
SOx	No other technologically feasible option identified (A)
PM10	No other technologically feasible option identified (A)
PM2.5	No other technologically feasible option identified (A)
CO	No other technologically feasible option identified

(A) As stated in the introduction section of this document, the PM and SOx emissions from fuel cells are so low, that they would not trigger the 2.0 lb/day permitting requirement. The emissions would also not trigger the BACT threshold of the SMAQMD. Therefore, these emissions will not be evaluated under this section.

C. SELECTION OF BACT:

BACT FOR WASTE GAS AND/OR NATURAL GAS FUELED FUEL CELLS		
Pollutant	**Standard (A)**	**Source**
VOC	0.02 lb/MW-hr	CARB
NOx	0.07 lb/MW-hr	CARB
SOx	No Standard	
PM10	No Standard	
PM2.5	No Standard	
CO	0.10 lb/MW-hr	CARB

(A) DG Units that produce combined heat and power may take a credit to meet the emission standard above. Credit shall be at the rate of one MW-hr for each 3.4 million Btu's of heat recovered. To take the credit, the following must apply: (1) DG Units are sold with combined heat and power technology integrated into a standardized package by the manufacturer; and (2) DG Units achieve a minimum energy efficiency of 60 percent.

APPROVED BY: Brian F Krebs **DATE:** 02-15-2024