STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

PETITION OF HYAXIOM, INC. FOR A DECLARATORY RULING FOR THE LOCATION AND CONSTRUCTION OF A 4.14 MEGAWATT FUEL CELL GRID-SIDE DISTRIBUTED ENERGY RESOURCE AT 35 NORTH MAIN ST., ANSONIA, CONNECTICUT	:	PETITION NO.

PETITION OF HYAXIOM, INC. AS AN OWNER/OPERATOR
FOR A DECLARATORY RULING

Pursuant to Conn. Gen. Stat. §§ 4-176 and 16-50k(a) and Conn. Agencies Regs. § 16-50j-38 et seq., HyAxiom, Inc. ("HyAxiom"), as an Owner/Operator , requests that the Connecticut Siting Council ("Council") approve by declaratory ruling the location and construction of a grid-side distributed resources project comprised of nine (9) new natural-gas fueled PureCell® Model 400+ phosphoric acid fuel cell ("Fuel Cell") and associated equipment (the "Facility"), providing 4.14-megawatts ("MW") (net) of power to the Grid at 35 North Main St., Ansonia, CT (*See Attachment* 1). The Facility will be installed, owned, maintained, and operated by HyAxiom.

Conn. Gen. Stat. § 16-50k(a) provides that:

> Notwithstanding the provisions of this chapter or title 16a, the council shall, in the exercise of its jurisdiction over the siting of generating facilities, approve by declaratory ruling . . . (B) the construction or location of any fuel cell, unless the council finds a substantial adverse environmental effect or of any customer-side distributed resources project or facility . . . with a capacity of not more than sixty-five megawatts, as long as such project meets air and water quality standards of the Department of Energy and Environmental Projection."

I. INTRODUCTION

The proposed Facility will be a grid-side distributed resource under 65 MW that complies with the air and water quality standards of the Department of Energy and Environmental Protection ("DEEP"). Doosan submits that no Certificate of Environmental Compatibility and Public Need is required because the proposed installation will not have a substantial adverse environmental effect.

II. DESCRIPTION AND PURPOSE OF THE PROJECT

HyAxiom Inc. was awarded this project by United Illuminating under the the Shared Clean Energy Facilities program with final approval granted by PURA. The completed facility will be utilize a State designated Brown Field located at 35 North Main St., Ansonia the former site of SHW Castings/Ansonia Copper and Brass and will be operated as a grid-side installed distributed generation resource with grid interconnection to be located at the Site. The proposed Facility will be located in the Northeast corner of the site adjacent to North Main St. within the existing foundation walls (*See Attachments* 1 and 2). The proposed installation consists of nine (9) Fuel Cells manufactured by HyAxiom in South Windsor, Connecticut (*See* Attachment #3) for Model 400+ Data Sheets). The overall dimension of each Fuel Cell is eight feet four inches wide by twenty-seven feet four inches long by nine feet eleven inches tall. The Fuel Cells are totally enclosed and factory-assembled and tested prior to shipment. The total installation will encompass an area 165' x 72'

The purpose of the proposed Facility is to provide distributed generation directly to the grid. The Fuel Cell's will be capable of producing a total of 4.14 MW of continuous, reliable electric power. The Facility will be net metered and will operate in parallel with the utility grid,

any electricity generated will be traded to the grid in accordance with United Illuminating's Interconnection Technical requirements. The installation of the Facility will have an overall annual electrical efficiency of Approx. 41%. The facility will have the capability to provide 11 million BTU's of hot water per hour to future tenants for space heat or cooling significantly improving overall efficiency.

When a utility grid outage occurs, all of the Fuel Cells will automatically disconnect from the utility electrical system using an internal breaker while continuing to operate providing all the internal loads needed to operate the Fuel Cells. Upon return of the utility supply, the fuel cells will monitor the grid for stability for five minutes and then will automatically reconnect and ramp up output.

The Fuel Cells are designed to have a minimum 20-year product life. This requires overhaul or replacement of major components after 10 years of operation. Components requiring overhaul include the cell stack assemblies and components in the fuel processing system.

III. **SAFETY**

The Fuel Cell is certified by CSA international to meet strict ANSI/CSA FC-1 2014 safety standards to protect against risks from electrical, mechanical, chemical, and combustion safety hazards. The Fuel Cell will be installed in accordance with NFPA 853. In accordance with Public Act 11-101, the fuel line pipe cleaning procedure uses inert nitrogen gas or atmospheric air. The following items are a few of the safety measures incorporated into the design. Please also refer to the Ansonia SCEF Emergency Response Plan. (*Attachment* #4).

A. Fire Protection

The Fuel Cell design incorporates a combustible gas sensor and thermal fuses located throughout the Fuel Cell cabinet. The detection of a potential combustible gas mixture, a fire, or the failure of this detection circuit will result in a Fuel Cell shutdown, closing of the natural gas supply valves, and a subsequent inert gas (nitrogen) purge of the Fuel Cell stack and fuel processing system. This event will also result in an alarm callout notification to Doosan service personnel. The Fuel Cell is designed with an integral stop button on the outside of the enclosure to enable immediate shutdown in the event of an emergency. There is also a site-installed manual gas shut-off valve and electrical disconnect switch easily accessible to emergency personnel.

B. Gas Leak

The Fuel Cell is designed with a physical barrier that separates the equipment handling combustible gases (fuel compartment) from electrical or potential spark-creating equipment (motor compartment). The fuel compartment is maintained at a negative pressure relative to both ambient and the motor compartment in order to ensure that any gas leaks do not reach the electrical equipment in the motor compartment. The cabinet ventilation system ("CVS") is designed to dilute a potential gas leak in the fuel compartment to non-combustible levels.

C. Cell Stacks and Hydrogen

The Fuel Cell operates by converting hydrogen to DC electricity. Hydrogen is lighter than air and thus does not pool like other fuels and will readily dissipate with proper ventilation, making it less likely to ignite. Also, the Fuel Cell does not store hydrogen; instead, it produces hydrogen-

rich gas at a rate equal to what it requires to produce power. The Fuel Cell stack is wrapped in a fire-retardant blanket. There are no materials inside the unit that would sustain a flame. There is no large volume of gas or any ignition that occurs within the cell stack.

D. Phosphoric Acid

Phosphoric acid is an integral part of the fuel cell system, acting as the electrolyte within the fuel cell stack. Phosphoric acid is a surprisingly common substance that is contained in common cola drinks. A leak of phosphoric acid is not possible because there is no reservoir of liquid: phosphoric acid is constrained within the porous structure of the fuel cell stack material by capillary action.

E. Fluid Leak

The only fluid source is water. All piping systems and pressurized water vessels are designed and fabricated to the appropriate ASME codes. Water produced through the electrochemical process is "pure" water and is reclaimed and reused by the process. Water mixed with propylene glycol and a rust inhibitor (to prevent rust and freezing in colder climates) is also used in the external cooling module.

IV. **HAZARDOUS MATERIALS**

Each Fuel Cell is capable of delivering 460 kW of electric power. As with other fuel cell technologies, hydrogen and oxygen combine in the presence of a catalyst, which causes an electrochemical reaction to produce an electric current. A phosphoric acid fuel cell uses an inorganic, concentrated phosphoric acid as the electrolyte, allowing the electrochemical reaction

to take place. The Fuel Cell also employs on-board natural gas reforming as part of the balance of plant to provide hydrogen to the fuel cell. Within this Fuel Cell, there are only two components that contain hazardous material: the Cell Stack Assembly ("CSA") and the Integrated Low-Temperature Shift Converter ("ILS") . Neither of these components present risk when servicing the Fuel Cell. The material in both the CSA and the ILS is classified as hazardous material for the purposes of shipping. The CSA is classified as a "bulk bin," made from the repeating elements of the Fuel Cell stack. Some of these repeating elements are porous carbon graphite plates. The phosphoric acid used as the electrolyte is contained by capillary action within the pores of these plates. The ILS is a tank containing a self-heating solid catalyst composed of copper, zinc oxide, and alumina. Safety Data Sheets ("SDS") are available in the Ansonia SCEF Emergency Response Plan (*Attachment* #4).

A. Shipping of Hazardous Material

The Fuel Cell is classified as "hazardous in transportation" under the U.S. Department of Transportation ("DOT") 49CFR regulations, and likewise as dangerous goods under the International Maritime Dangerous Goods ("IMDG") regulations. The description of hazardous materials contained within each Fuel Cell are listed in subsections B and C below.

B. Integrated Low Shift Converter

The tank, a non-DOT specification container as described below, is a SELF HEATING SOLID INORGANIC N.O.S. (contains metallic copper on zinc oxide and alumina), CLASS 4.2, UN3190, PGII, 900 lb. net wt of hazardous material.

C. Cell Stack Assembly

The bulk bin, a non-DOT specification container as described below, is a SOLIDS CONTAINING CORROSIVE LIQUID N.O.S. (contains phosphoric acid), Class 8, UN3244, PGII, 1200 lb. net of hazardous material. The amount of phosphoric acid in the Fuel Cell complies with all applicable state and federal regulations. The exact amount of phosphoric acid is proprietary technical information and is less than the 5,000 lb. reportable quantity under 40 CFR 117.3.

D. Integration into Fuel Cell Power Plant

The above items are individual components assembled side by side, with other non-hazardous components, to form one complete Fuel Cell. The containers holding the hazardous material are non-DOT specification containers. DOT regulations allow for the transportation of the hazardous material noted above in non-DOT specification portable tanks and closed bulk bins, as used for the shipment of the Fuel Cell. IMDG regulations require United Nations ("UN") specified containers or an exemption for international ocean transport.

E. Servicing of Product with Hazardous Material Present

The hazardous material contained within the CSA and the ILS presents no danger to installation and service personnel because direct exposure to the material is not possible. Under normal operating conditions, each container, as defined above, will contain its hazardous material for the life of the component. When end of life requires replacement of either component, no special precautions need to be employed with respect to handling because hazardous material will not come in contact with service personnel.

F. Hazardous Waste

The Fuel Cell does not produce any hazardous waste.

V. **THE SITE**

The Facility is proposed to be located entirely on the Site. The proposed location is former Brass mill presently zoned HI (Heavy Industrial) under the zoning regulations of the City of Ansonia (the "City") with the surrounding parcels similarly zoned (*See Attachment* #5). Attachment #6 shows an aerial map of the location of Facility on the Site. The nearest residential properties are West of the property and over 700 feet from the Facility. The proposed Fuel Cell facility will be fenced for security. No trees are required to be removed for the installation of the Facility. Waterbury Oxford Airport, the nearest airport, is Approx. 7 miles from the proposed facility. The proposed Facility will be a maximum of 25 feet above ground level and does not fall under the FAA notification requirement of 14 CFR Part 77.9 (Attachment #7).

VI. **PROJECT BENEFITS**

Fuel cell technology represents an important step in advancing Connecticut's goal of diversifying its energy supply through the use of renewable energy, as expressed in Connecticut General Statutes Section 16-244 et seq. The Facility will serve as a cost-effective clean energy source while also bolstering the grid from this location. Further, this Fuel Cell installation will support the efforts of the State of Connecticut to be a leader in the utilization of fuel cell technology.

Because a fuel cell does not burn fuel, the system will significantly reduce air emissions associated with acid rain and smog. Emissions standards of Connecticut will further be discussed in the next section. The Facility is designed to operate in total water balance – no make-up water is normally required after start-up and no water discharges to the environment will occur under normal operating circumstances.

VII. ENVIRONMENTAL EFFECTS

1. Water, Heat and Air Emissions

The proposed installation will have no substantial adverse environmental effect. The installation and operation of the Fuel Cell will meet all air and water quality standards of DEEP.

Section 22a-174-42 of the Regulations of Connecticut State Agencies ("RCSA") governing air emissions from new distributed generators exempts fuel cells from air permitting requirements. Notwithstanding this exemption, the Fuel Cell meets the Connecticut emissions standards for a new distributed generator as shown in Table 1 below, and no permits, registrations or applications are required under rules based on the actual emissions of the Fuel Cell. Furthermore, the Fuel Cell is certified by the California Air Resources Board to meet the Distributed Generation Certification Regulation 2007 Fossil Fuel Emissions Standards (*See Attachment* #8).

Table 1: CT Emissions Standards for a New Distributed Generator

Air Pollutant	CT Emissions Standard (lbs/MWh)	PureCell Model 400 Fuel Cell System at Rated Power (lbs/MWh)
Oxides of Nitrogen	0.15	.01

Carbon Monoxide	1	.02
Carbon Dioxide	1650	1,049

With respect to water discharges, the Fuel Cell is designed to operate without water discharge under normal operating conditions. To the extent that minimal water overflow may occasionally occur, such discharges will consist of de-ionized water and will be directed to a site dry well. This discharge will be incorporated into the overall site design and will be covered by the Site's water discharge permit, if necessary. The Fuel Cell operates in water balance below 86°F. The initial fill requires 350 gallons of water. The amount of make-up water above 86°F increases linearly from 0gpm to 1gpm at 110°F.

The Facility will also meet state criteria thresholds and projected emissions for all greenhouse gases defined in as Section 22a-174-1(49) as shown in Table 2. Section 22a-174-1(49) states the following: "Greenhouse gases" or "GHGs" means the aggregate of the following six components gases: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexa fluoride (SF6), any hydrofluorocarbon (HFC) or any perfluorocarbon (PFC)." There is no defined criteria threshold for these compounds, however Section 22a-174-1(21) provides a method for computing carbon dioxide equivalent emissions "CO2e." The proposed Facility will have no emissions of SF6, HFC, and PFC. Emissions of CH4 and N2O will be very low and will not contribute significantly to the GWP of the proposed facility.

Table 2: PureCell® Model Emissions Data

Emission Type	Projected Emissions	GWP in 40 CFR 98, Table A-1	Projected CO2e
CO2	2025 ton/yr	1	2025 ton/yr
CH4	<0.02 ton/yr	25	<0.5 ton/yr
N2O	<0.01 ton/yr	298	<3 ton/yr

SF6	N/A	22,800	N/A
HFC	N/A	12 to 14,900*	N/A
PFC	N/A	7,390 to 17,340	N/A

Current control technologies are not commercially available to reduce the greenhouse gas emissions from the Facility. The utilization of the waste heat from the Facility by the host facilities processes once utilized will significantly raise the overall efficiency of the installation.

2. Wildlife and Habitat

According to the relevant portion of the CT DEEP Ansonia Natural Diverse Database Areas Map (*See attachments* #9), the proposed Site is not located within the Montville Natural Diversity Data Base Areas.

3. Noise Analysis

Based on the engineering study results conducted by a professional acoustic engineer of the proposed Site dated , 2023, the noise level of the Facility will not exceed local and state noise level ordinance levels. Please review the attached Acoustic Survey Report and Recommendations in (*Attachment #10)*.

4. Visual Impact

The Facility will not cause any significant visual effects. The Site hosts a State designated Brown Field. The Fuel Cell Facility will be located some 15' below street level within existing foundation walls and will not be visible from the street. The Facility would be visible only from the Site driveways while on site.

5. Public Notice

Notice was provided via certified mail to all property owners, abutters and state and local officials pursuant to Conn. Agencies Regs.§16-50j-40(a). HyAxiom's copy of the notice letter, Abutters list and Abutters' Map are included in *Attachments* 11, 12 and 13. Prior to filing this Petition, HyAxiom, Inc. sent notices to all applicable Federal, State and Municipal officials of Ansonia as listed in (*Attachment* #14) which shows the certified mail receipts for State and Municipal officials and Abutters.

Project Decommissioning Plan

Following the 20-year operational life of the Facility, the decommissioning plan is as follows:

A) Isolate, lock out and disconnect all piping for cooling module at the power module. Remove gas piping to the unit. Disconnect nitrogen purge system at power module.

B) Disconnect all electrical conductors and conduit at the Fuel Cell to include electrical power, cooling module power, and nitrogen pressure switch. Shore power to be maintained to the unit to maintain temperature as needed.

C) Contractor will work in concert with Doosan's Service Department personnel during decommissioning and shutdown.

D) Return Site to original condition with the exception of the concrete pads.

E) The decommissioned Fuel Cell will be stripped, the parts are separated and either recycled, reclaimed or transported to landfill.

7. Aquifer Protection Area, Coastal Boundaries, and Flood Zones

Based on an analysis of the Federal Emergency Management Agency's ("FEMA") National Flood Insurance Program ("NFIP") flood mapping data for Ansonia (*See Attachment*

#15), the proposed Facility is not situated in a 100 or 500 year flood zone. The Site is in already disturbed condition with existing structures on the Site being demolished and several industrial properties within its vicinity. The City of Ansonia has no Aquifer Protection Areas and there is no wetland close to the proposed installation site with the nearest watercourse over 250' feet away from the proposed Site. No negative impact to the watercourses and wetlands is anticipated throughout the construction or operation of the Fuel Cell.

8. Cultural Resources.

The proposed Facility will be located in an already developed vicinity, consequently construction and operation of the Fuel Cell will have no unpleasant effect on any cultural (historical and archaeological) resources in the area.

9. Natural Gas Desulfurization Process

Sulfur is present in pipeline natural gas. It is primarily used as an odorant so leaks can be easily detected. Unfortunately, sulfur is also a poison to fuel cell systems and must be removed by the Fuel Cell. For further details of desulfurization please refer to the attached Desulfurization Memo (*See Attachment* #16).

VIII. CONSTRUCTION AND MAINTENANCE

Doosan plans to start construction work by March 2024. Construction will take approximately fifteen weeks, followed by approximately four weeks of testing and startup. Regular working hours for the proposed project are Monday through Friday from 8:00 am to

5:00 pm. HyAxiom and its contractors will fully cooperate with the City Inspector and will follow all City of Ansonia and Connecticut State construction policies and codes.

IX. LOCAL INPUT AND STATE FUNDING

HyAxiom met extensively with the local officials and presented the plans for the installation of the Facility. HyAxiom will complete all necessary permitting before installing the Fuel Cell.

X. CONCLUSION

As set forth above, Doosan requests that the Council issue a determination, in the form of a declaratory ruling, that the proposed installation above is not one that would have a substantial adverse effect, and, therefore, that a Certificate is not needed.

Respectfully submitted,

John Prinssen

John Prinssen
Installation Project Manager
HyAxiom, Inc.

LIST OF ATTACHMENTS

Attachment 1: Site Plan and One Line Electrical drawing

Attachment 2: Rendering

Attachment 3: Doosan PureCell® Model 400 Datasheet

Attachment 4: Ansonia SCEF Emergency Response Plan

Attachment 5: City Zoning Map

Attachment 6: Aerial Map

Attachment 7: 14CFR Part 77.9

Attachment 8: California Air Resources Board Emission Certification

Attachment 9: National Diverse Database Areas Map

Attachment 10: Acoustic Site Survey Report

Attachment 11: Abutters Notification Letter

Attachment 12: Abutters and Officials List

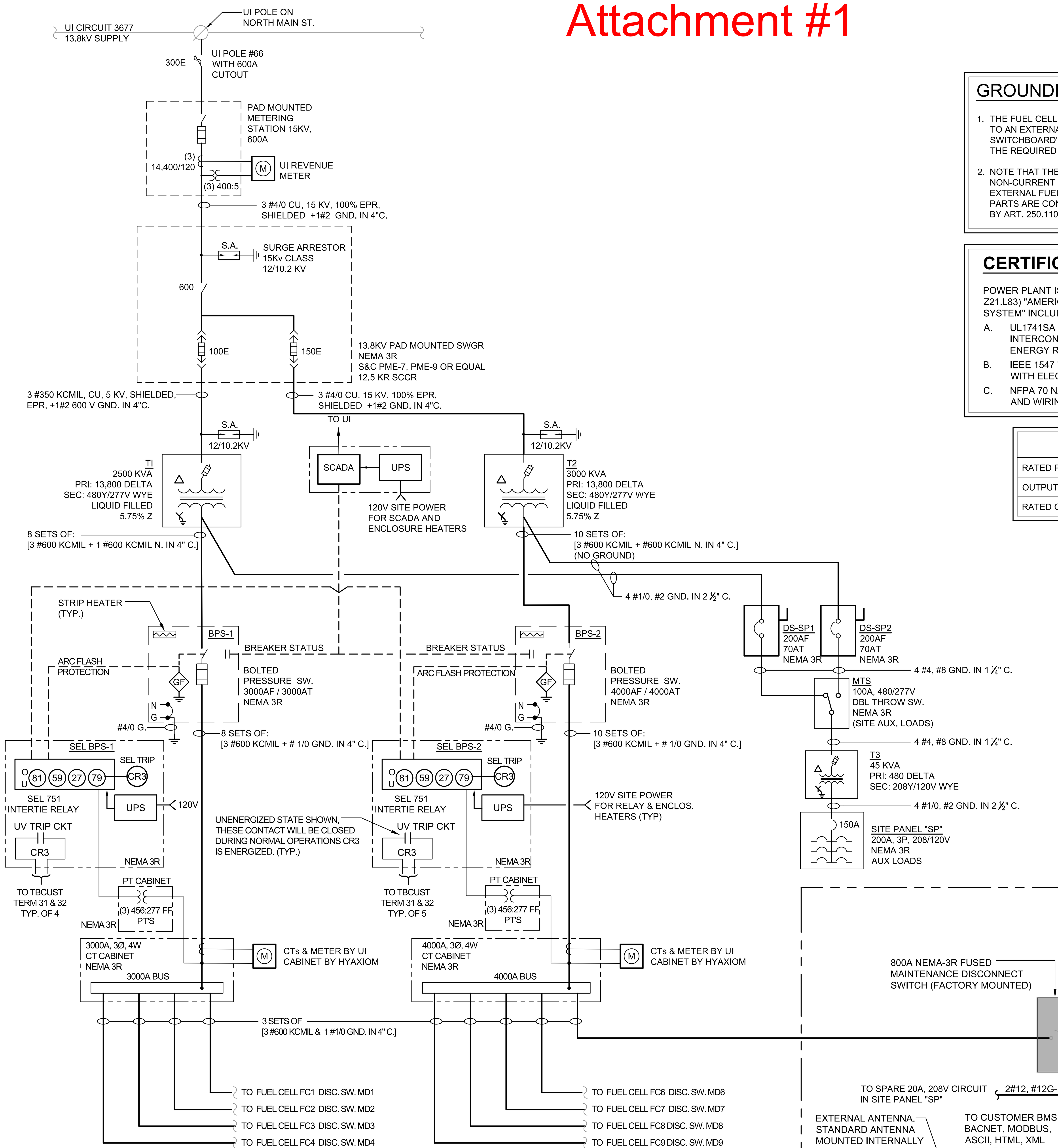
Attachment 13: Abutters Map

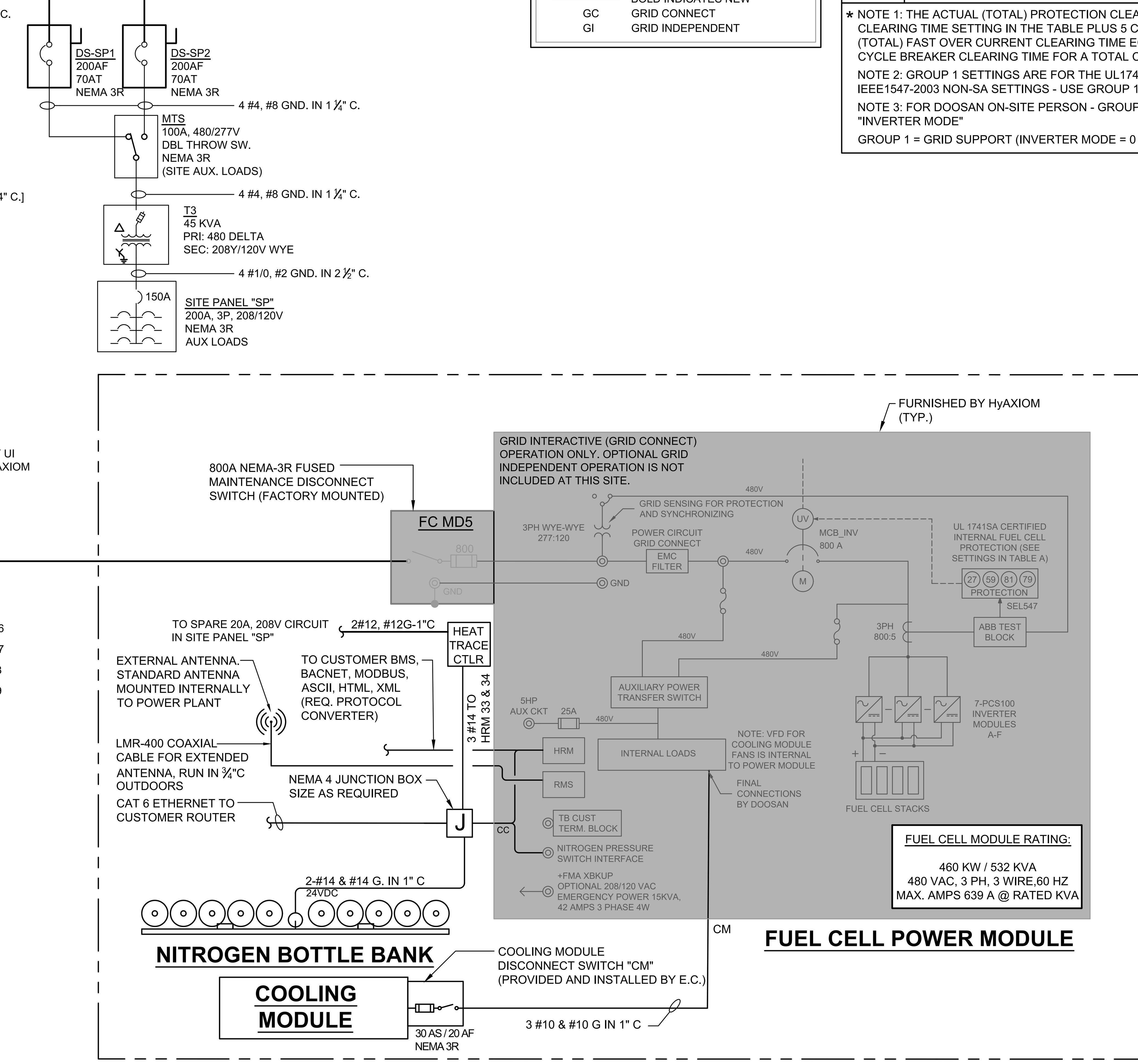
Attachment 14: Proof of Mailing

Attachment 15: Flood Map

Attachment 16: Desulpherization Memo

Attachment #1





TYPICAL FOR (9) FOUR MODEL 400 PureCell SYSTEM POWER PLANTS

GENERAL NOTES

1. PROVIDE SIGNAGE AS REQUIRED BY CODE AND AS INDICATED ON DWG E2.0.
2. CONSULT DOOSAN MODEL 400 INSTALLATION DESIGN GUIDE (FUEL CELL POWER PLANT) AND STANDARD INSTALLATION DRAWINGS FOR TECHNICAL REFERENCE.

GROUNDING NOTES:

1. THE FUEL CELL GROUND LUG INSIDE DISCONNECT SWITCH MD-1 SHALL BE CONNECTED TO AN EXTERNAL #1/0 COPPER EQUIPMENT GROUNDING CONDUCTOR FROM MAIN SWITCHBOARD'S GROUNDED CONDUCTOR PER NEC ART 692.44, IN ORDER TO PROVIDE THE REQUIRED SINGLE POINT GROUND PER NEC ART 250.24.A & D.
2. NOTE THAT THE FUEL CELL GROUND LUG INSIDE MD-1 IS BONDED TO ALL METALLIC NON-CURRENT CARRYING METAL PARTS BOTH INSIDE THE FUEL CELL AND ALSO AT EXTERNAL FUEL CELL ASSEMBLIES SUCH AS THE COOLING MODULE, SO ALL FUEL CELL PARTS ARE CONNECTED TO THE EQUIPMENT GROUNDING CONDUCTOR AS REQUIRED BY ART. 250.110.

CERTIFICATION:

POWER PLANT IS CERTIFIED TO: ANSI/CSA AMERICA FC 1 - 2014 (FORMALLY ANSI Z21.L83) "AMERICAN NATIONAL STANDARD FOR STATIONARY FUEL CELL POWER SYSTEM" INCLUDING,

A. UL1741SA "INVERTERS, CONVERTERS, CONTROLLERS AND INTERCONNECTION SYSTEM EQUIPMENT FOR USE WITH DISTRIBUTED ENERGY RESOURCES."
B. IEEE 1547 "STANDARD FOR INTERCONNECTING DISTRIBUTED RESOURCES WITH ELECTRIC POWER SYSTEMS."
C. NFPA 70 NATIONAL ELECTRIC CODE (FOR INTERFACES TO CUSTOMER WIRING AND WIRING BETWEEN MODULES).

POWER PLANT SPECIFICATIONS

RATED POWER OUTPUT	460 kW / 532 kVA
OUTPUT TYPE	480VAC, 60 HZ, 3 PHASE, 3 WIRE
RATED OUTPUT CURRENT	639 AMPS AT RATED kVA

LEGEND

(light line)	LIGHT INDICATES EXISTING
(bold line)	BOLD INDICATES NEW
GC	GRID CONNECT
GI	GRID INDEPENDENT

TABLE A - SEL547 RELAY
IEEE1547 / UL 1741SA GRID PROTECTION PARAMETER SETTINGS

THE REQUIRED GRID PROTECTION FUNCTIONS AND SETTINGS PER UL1741SA/IEEE1547 RESIDE IN THE INTERNAL SEL547 RELAY WITH SETTING NAMES AS SHOWN BELOW.

SETTING NAME	DESCRIPTION	GROUP 1 - "SUPPORT" 60 Hz SETTING 480Vac Tx RATIO 2.31 : 1	VOLTAGE P.U.	ANSI C37 DEVICE NUMBER
27P1P	UNDER VOLTAGE LEVEL 88%(V)	106	0.88	27
27P2P	MID UNDER VOLTAGE	106	0.88	
27P3P	UNDER VOLTAGE LEVEL 50% (V)	60	0.50	27
59P1P	OVER VOLTAGE LEVEL 110% (V)	132	1.1	59
59P2P	OVER VOLTAGE LEVEL 120% (V)	144	1.2	59
81D1P	FAST UNDER FREQUENCY LEVEL (Hz)	56.5		81U
81D2P	SLOW UNDER FREQUENCY LEVEL (Hz)	58.5		81U
81D3P	SLOW OVER FREQUENCY LEVEL (Hz)	61.2		81O
81D4P	FAST OVER FREQUENCY LEVEL (Hz)	62		81O
SV1PU	RECONNECTION TIME DELAY (CYCLES)	18,000		
SV2PU	FAST OVER FREQUENCY CLEARING TIME (CYCLES)	*5		
SV3PU	SLOW OVER FREQUENCY CLEARING TIME (CYCLES)	18,000		
SV4PU	FAST UNDERFREQUENCY CLEARING TIME (CYCLES)	18,000		
SV5PU	FAST UNDER FREQUENCY CLEARING TIME (CYCLES)	*5		
SV6PU	OVER VOLTAGE 120% CLEARING TIME (CYCLES)	*5		
SV7PU	OVER VOLTAGE 110% CLEARING TIME (CYCLES)	120		
SV8PU	UNDER VOLTAGE 88% CLEARING TIME (CYCLES)	120		
SV9PU	MID UNDER VOLTAGE 88% CLEARING TIME (CYCLES)	120		
SV10PU	UNDER VOLTAGE 50% CLEARING TIME (CYCLES)	66		
SV12PU	DELAY BETWEEN GRID OK STATUS AND BREAKER OPENING (CYCLES)	0		

* NOTE 1: THE ACTUAL (TOTAL) PROTECTION CLEARING TIME EQUALS THE SUM OF THE PARAMETER CLEARING TIME SETTING IN THE TABLE PLUS 5 CYCLE BREAKER'S TRIPPING TIME. FOR EXAMPLE ACTUAL (TOTAL) FAST OVER CURRENT CLEARING TIME EQUALS PARAMETER SV6PU 5 CYCLES SETTING PLUS THE 5 CYCLE BREAKER CLEARING TIME FOR A TOTAL CLEARING TIME OF 10 CYCLES (0.16 SEC)

NOTE 2: GROUP 1 SETTINGS ARE FOR THE UL1741SA "GRID SUPPORT" AND GROUP 2 SETTINGS ARE FOR IEEE1547-2003 NON-SA SETTINGS - USE GROUP 1 FOR UL1741SA SITES.

NOTE 3: FOR DOOSAN ON-SITE PERSON - GROUP 1 OR GROUP 2 IS SET BY GROUP 9 PARAMETER "INVERTER MODE"

GROUP 1 = GRID SUPPORT (INVERTER MODE = 0 = FALSE) =UL1741SA

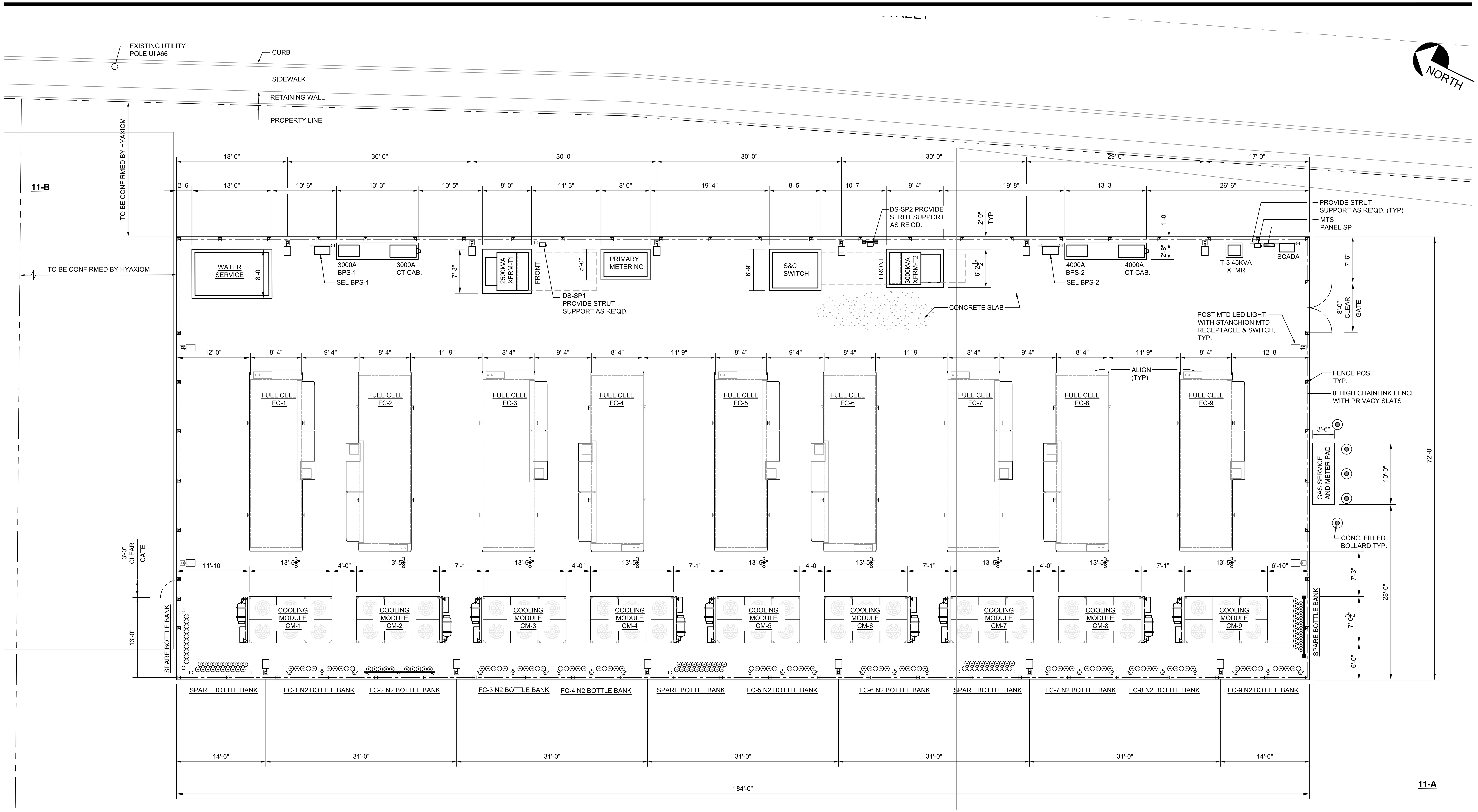
Rev.	Date	Description
A	09/22/23	UTILITY INTERCONNECTION AND CONNECTICUT SITING COUNCIL

ICDS
Innovative Construction & Design Solutions, LLC
10 White Wood Lane
N. Branford, CT 06471
Phone:(203) 453-8596
Email: info@icdsllc.com

ANSONIA SCEF
35 NORTH MAIN ST, ANSONIA, CT
9 FUEL CELL INSTALLATION

ELECTRICAL ONE-LINE DIAGRAM

Project No.:	Drawn By: KFH
Date: 09/21/23	Design By: DSF
Scale: NTS	Check By: DSF
Drawing No.: E1.0	



1 GENERAL ARRANGEMENT
Scale: 1/8" = 1'-0"

AREA MAP

Rev.	Date	Description
A	09/22/23	UTILITY INTERCONNECTION AND CONNECTICUT SITING COUNCIL

ICDS
Innovative Construction & Design Solutions, LLC
10 White Wood Lane
N. Branford, CT 06471
Phone:(203) 453-8596
Email: info@icdsllc.com

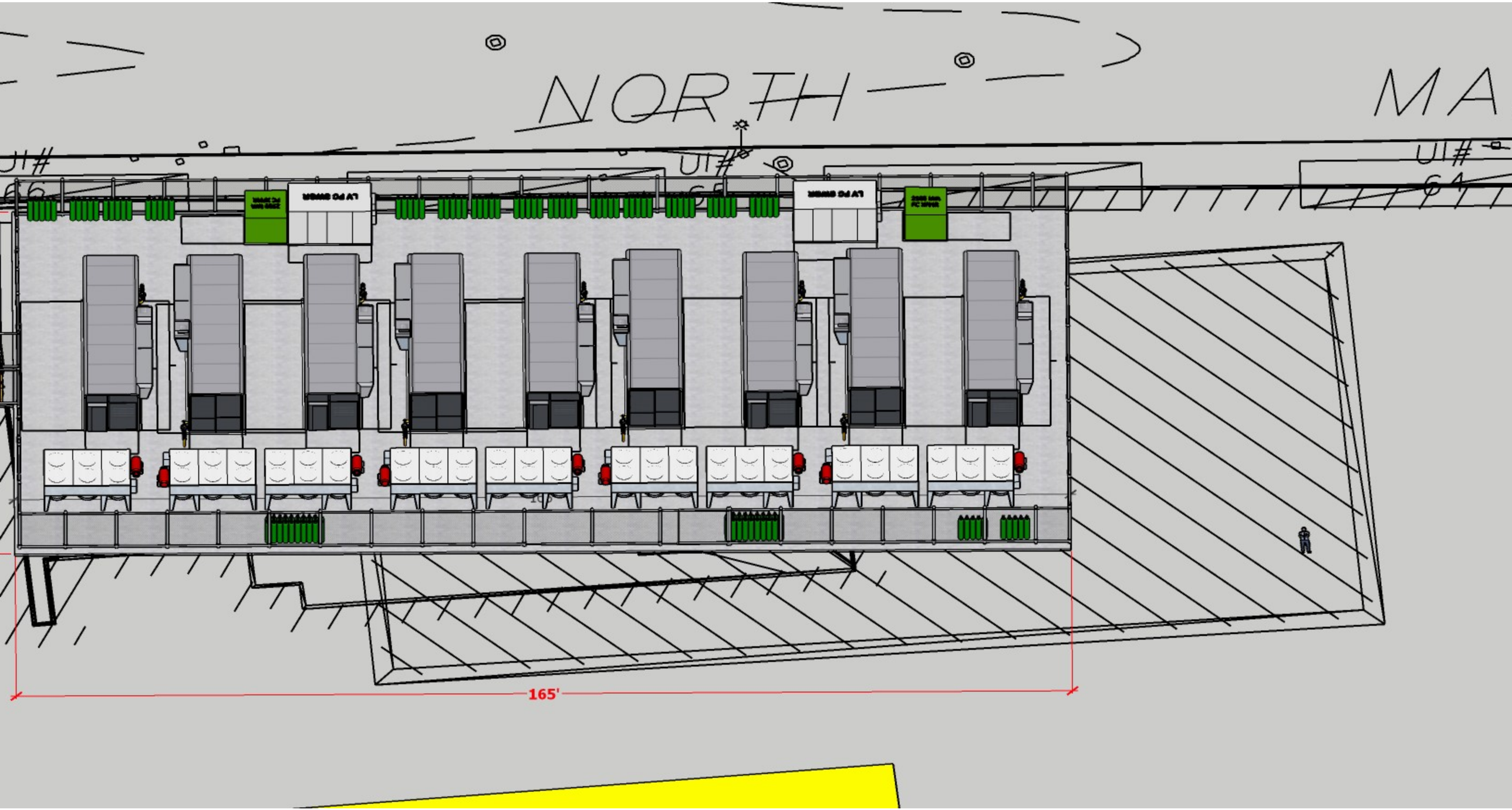
ANSONIA SCEF
35 NORTH MAIN ST, ANSONIA, CT
9 FUEL CELL INSTALLATION

GENERAL ARRANGEMENT

Project No.:	Drawn By: KFH
Date: 09/22/23	Design By: DSF
Scale: 1/8" = 1'-0"	Check By: DSF

Drawing No.:
GA1.0

Attachment #2



Attachment #3

PureCell® Model 400

PURECELL SYSTEM BENEFITS

Energy Security

Proven PAFC fuel cell technology that is setting durability records

Energy Productivity

Increased efficiency and continuous on-site generation reduces energy costs

Energy Responsibility

Ultra-low emissions equals sustainability

PURECELL SYSTEM COMPETITIVE ADVANTAGES

Long Life

Industry leading 10-year cell stack life assures high availability and low service cost

Modular & Scalable

Solutions for multi-megawatt applications to meet growing energy demand

Experience

Most knowledgeable and experienced team in the industry

High Efficiency

Up to 90% total CHP Efficiency

Grid-Independence

Proven performance delivering power when the utility grid fails

Load Following

Capable of dispatching power to match building needs

Small Footprint

Highest power density among clean generation technologies

Flexible Siting

Indoor, outdoor, rooftop, multi-unit

RATED POWER OUTPUT: 460KW, 480VAC, 60HZ

Characteristic	Units	Operating Mode	
		Power 460kW	Eco 440kW
Electric Power Output[1]	kW/kVA	460/532	440/517
Electrical Efficiency	%, LHV	43.5%	44.4%
Peak Overall Efficiency	%, LHV	90%	90%
Gas Consumption[1]	MMBtu/h, HHV (kW)	4.04 (1,185)	3.78 (1,108)
Gas Consumption[1,2]	SCFH (Nm^3/h)	3,941 (106)	3,688 (98.7)
High Grade Heat Output @ up to 250°F[1]	MMBtu/h (kW)	1.30 (382)	1.16 (341)
Low Grade Heat Output @ up to 140°F[1,6]	MMBtu/h (kW)	1.68 (492)	1.54 (452)

FUEL

Supply ..... Natural Gas
Inlet Pressure ..... 10 to 14 in. water (2.5 - 3.5 mbar)

EMISSIONS[3,4]

NOx ..... 0.02 lbs/MWh (0.009 kg/MWh)
CO ..... 0.01 lbs/MWh (0.005 kg/MWh)
VOC ..... 0.01 lbs/MWh (0.005 kg/MWh)
SO_2 ..... Negligible
Particulate Matter ..... Negligible
CO_2[1] (electric only) ..... 1,006 lbs/MWh (456 kg/MWh)
(with High-Grade heat recovery) ..... 567 lbs/MWh[5] (257 kg/MWh)
(with full heat recovery) ..... 496 lbs/MWh[5] (225 kg/MWh)

OTHER

Ambient Operating Temp ..... -20°F to 104°F (-29°C to 40°C)
Relative Humidity ..... 0 to 95% (non-condensing)
Sound Level ..... <65 dBA[6] @ 33 ft. (10m)
Water Consumption ..... None (up to 86°F (30°C) Ambient Temp.)
Water Discharge ..... None (Normal Operating Conditions)

CODES AND STANDARDS

ANSI/CSA FC1-2014: Stationary Fuel Cell Power Systems
UL1741 SA: Inverters for Use With Distributed Energy Resources

NOTES

1. Average performance during 1st year of operation.
2. Based on natural gas higher heating value of 1025 Btu/SCF (40.4 MJ/Nm3)
3. Emissions based on 440 kW operation.
4. Fuel cells are exempt from air permitting in many U.S. states.
5. Includes CO_2 emissions savings due to reduced on-site boiler gas consumption
6. With optional equipment

HyAxiom, Inc.
Corporate Headquarters
101 East River Drive
East Hartford, CT 06108
(860)727-2253
www.hyaxiom.com
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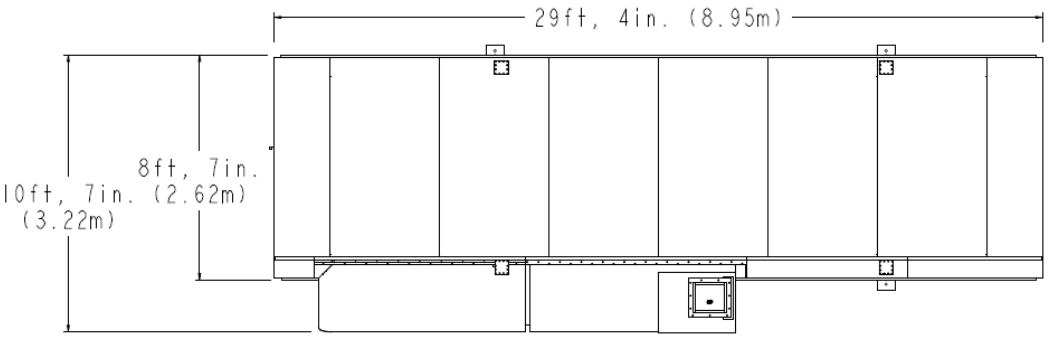
HyAxiom
A Doosan Company

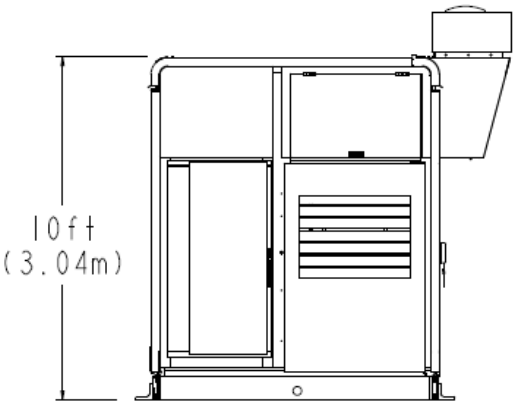
PureCell® Model 400

SYSTEM DIMENSIONS

Power Module

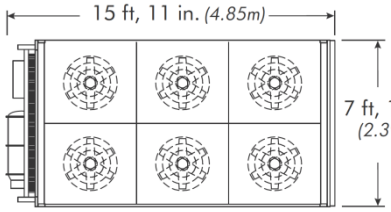


Top View

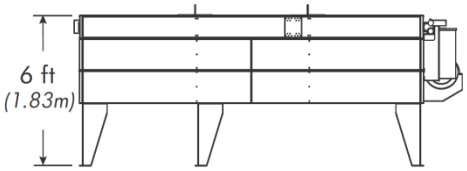


Side View

Cooling Module



Top View



Side View

PHYSICAL SPECIFICATIONS

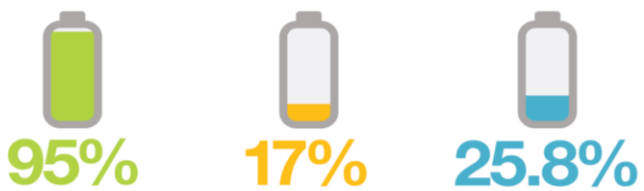
	Power Module	Cooling Module
Length	29′ 4″ (8.95m)	15′ 11″ (4.85m)
Width	8′ 7″ (2.62m)	7′ 10″ (2.39m)
Height	10′ (3.02m)	6′ 0″ (1.83m)
Weight	57,000 lb (27,216 kg)	3,190lb (1,447 kg)

PURECELL ADVANTAGE

OFFSET 3x MORE CO_2

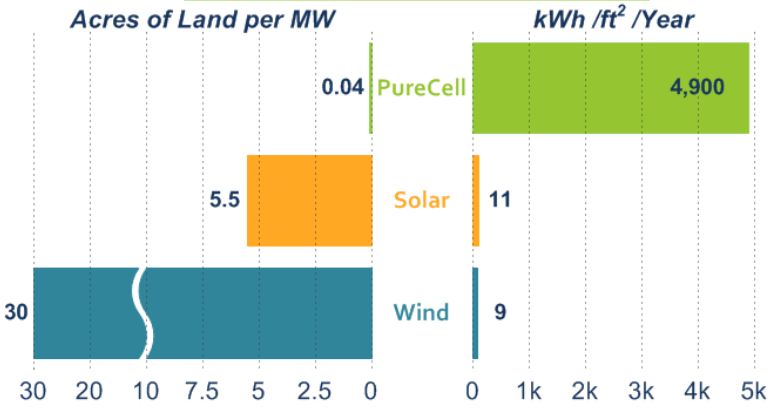
PureCell® System vs. Solar vs. Wind

CAPACITY FACTOR



CO_2 OFFSET

USE LESS LAND



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Fuel Cell Emergency Response Guide

Ansonia SCEF

35 North Main St.

Ansonia, CT 06401

DISCLAIMER

HyAxiom reserves the right to change or modify, without notice, the design or equipment specifications of the PureCell® system Model 400 without obligation with respect to equipment either previously sold or to be sold. This guide is provided by HyAxiom, and no liability will accrue to HyAxiom based on the information or specifications included herein. No warranties or representations are made by this guide and no warranties or representations shall apply to the equipment except as stated in HyAxiom's standard terms and conditions of sale applicable at the time of purchase, a copy of which will be provided upon request. The Model 400 is designed to provide safe and reliable service when operated within design specifications, according to all

applicable instructions, and with the appropriate operating materials. When operating this equipment, use good judgment and follow safety precautions to avoid damage to equipment and property or injury to personnel. Be sure to understand and follow the procedures and safety precautions contained in all applicable instructions, operating materials, and those listed in this guide. All information in this document is as of January 25, 2016.

Policy

The following plan has been developed to minimize the severity of damage to human health, the environment, and property in the event of an unexpected failure.

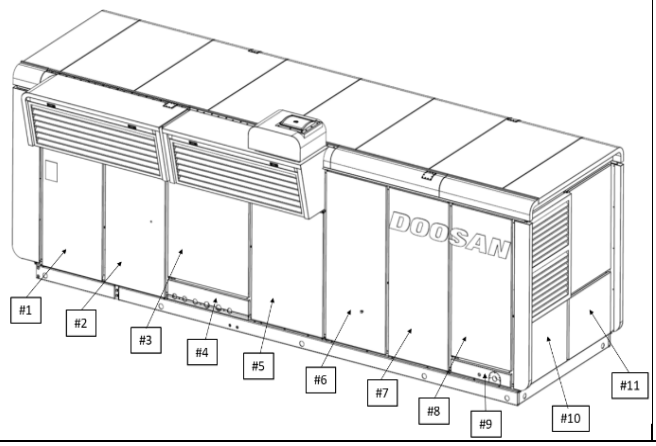
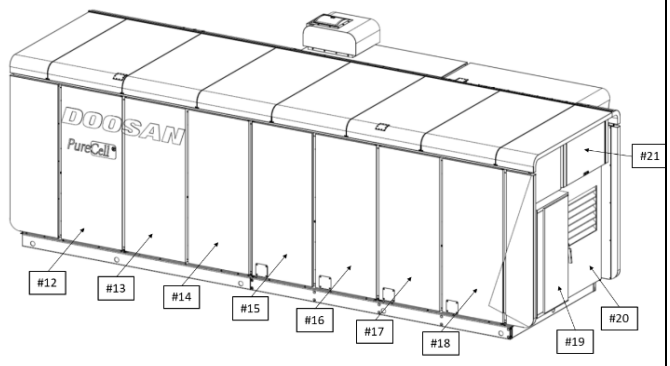
Scope

This Emergency Response Guide shall be integrated into the site Emergency Response Plan. Information contained in this document shall be customized to meet local requirements and shall be shared with local responders as necessary. This guide is only a template and in no way assumes or transfers liability or ownership. HyAxiom should be contacted if clarification is needed.

Emergency Contacts and Numbers

Local Emergency Number	**911**
HyAxiom Control Center	**860.727.2847**
Fire Department – Non-emergency number	**City of Ansonia Fire Department** **203.734.8055**
Hospital – Non-emergency number	**Griffin Hospital** **130 Division St.** **Derby, CT 06418** **203.735.7421**
Electric Utility Name: United Illuminating	**800.722.5584**
Gas Utility Name: Eversource	**888-688-7267** ***Gas Leaks Only: 877- 944-5323**
Local Oil & Chemical Spill Response Division	**800-645-8265**
Connecticut Oil & Chemical Spill Response Division	**860-424-3338**
EPA - Environmental Protection Agency Region 1	**(800) 424-8802** Environmental Emergency
OSHA - Occupational Safety and Health Admin. Emergency Number	**(800) 321-6742** National Emergency Number
Poison Control Center	**(800) 222-1222** National Emergency Number

Fuel Cell Hazard Overview

Front	Back
	

Rear View	Front View
	

Rear View Panel	Primary Hazard	Front View Panel	Primary Hazard
1 (Computer Terminal)	Electrical = 120 VAC	**12 (Reformer)**	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam
		13 (Reformer)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam
2 (Swing Door)	Electrical = 480 VAC	**14 (Reformer)**	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam
3 (Mechanical Entry)	Electrical = 480 VAC Chemical = Propylene Glycol Thermal = 350°F Steam Pressure = 150 psi Steam	**15 (DC Cell Stack)**	Electrical = 300 VDC Chemical = Solid phosphoric acid / combustibles
4 (Mechanical Entry)	Chemical = Propylene Glycol Thermal = 350°F Steam Pressure = 150 psi Steam	**16 (DC Cell Stack)**	Electrical = 300 VDC Chemical = Solid phosphoric acid / combustibles
5 (TMS)	Electrical = 480 VAC Chemical = Propylene Glycol / Deionized Water / Resin Thermal = 350oF Steam Pressure = 150 psi Steam	**17 (DC Cell Stack)**	Electrical = 300 VDC Chemical = Solid phosphoric acid / combustibles
6 (ILS)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	**18 (DC Cell Stack)**	Electrical = 300 VDC Chemical = Solid phosphoric acid / combustibles
7 (Fuel Processing Area)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	**19**	Not accessible
8 (Fuel Processing Area)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	**20 (Grid Connect Disconnect)**	Electrical = 480 VAC
9 (Gas/Nitrogen Inlet)	Chemical = combustibles	**21 (Blower 110)**	Electrical = 300 VDC Mechanical = Blower
10 (Reformer)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	**22**	Electrical = 1400 VDC / 480 VAC
11 (Reformer)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	**ALL Roof Panels**	Multiple Hazards DO NOT WALK ON ROOF!

Conditional Assessment

Normal Condition	Potential Abnormal Condition	Response
Fuel Cell White steam exiting power plant at exhaust chimney, above panel #6 (It can be a large amount of white steam depending on ambient conditions)	Dark colored smoke exiting chimney or any other part of enclosure	1. Establish safe perimeter 2. Contact HyAxiom Control Center **(860) 727-2847**
	Observable fire or heavy smoke at any point on fuel cell	1. Press Fuel Cell 'Stop Button' – Only if safely accessible! 2. Dial 911 or Local Emergency Response Number 3. Establish safe perimeter 4. Contact HyAxiom Control Center **(860) 727-2847**
Fuel Cell Moderate humming, clicking and fan sounds	Grinding or loud intermittent noises	1. Contact HyAxiom Control Center **(860) 727-2847**
	Observable fire or heavy smoke at any point on fuel cell	1. Press Fuel Cell 'Stop Button' – Only if safely accessible! 2. Dial 911 or Local Emergency Response Number 3. Establish safe perimeter 4. Contact HyAxiom Control Center **(860) 727-2847**
Cooling Module Fan humming	Smoke or fire coming from module	1. Press Fuel Cell 'Stop Button' – Only if safely accessible! 2. Dial 911 or Local Emergency Response Number 3. Establish safe perimeter 4. Contact HyAxiom Control Center **(860) 727-2847**

	Grinding or loud noise coming from fans	1. Contact HyAxiom Control Center **(860) 727-2847**
Cooling Module No leaking from cooling loop piping or coils	Small leak dripping from joint, valve or connection	1. Contact HyAxiom Control Center **(860) 727-2847**
	Medium to large leak	1. Follow local spill response protocol or contact Clean Harbors Emergency Cleanup Response **(800) 645-8265** 2. Contact HyAxiom Control Center **(860) 727-2847**
Mechanical Hi/Lo Grade Piping Small amounts of condensate dripping from piping	Small leak dripping from joint, valve or connection	1. Contact HyAxiom Control Center **(860) 727-2847**
	Medium to large leak	1. Follow local spill response protocol or contact Clean Harbors Emergency Cleanup Response **(800) 645-8265** 2. Contact HyAxiom Control Center **(860) 727-2847**
Disconnects/Other Equipment No leaks or smoke	Smoke or fire coming from equipment	1. Dial 911 or Local Emergency Response Number 2. Establish safe perimeter 3. Contact HyAxiom Control Center **(860) 727-2847**
Compressed Gas Manifold (N2/H2) No leaks, May hear intermittent gas flow during purges	Leaks – may be able to hear hissing sound.	1. **If Indoors – Evacuate Immediately!** Dial 911 or Local Emergency Response Number 2. Establish safe perimeter 3. Contact HyAxiom Control Center **(860) 727-2847**

Fuel Cell Related Safety Data Sheets (SDS)

1	Propylene Glycol – DowFrost®
2	Phosphoric Acid – Solid
3	Reformer/ILS Catalysts
4	Anion/Cation Resin
5	Nitrogen / Hydrogen Compressed Gas Mixture (non-flammable)

Inspections

Inspection Type	Equipment Requirements	Frequency Required
General Maintenance	Laptop, Service Vehicle	Monthly
General Housekeeping	N/A	Monthly
Waste and Chemical Storage*	N/A	Weekly
Internal Combustible Gas Monitor	AT-160 Calibration Kit	Annual
Fire Prevention	N/A	Monthly

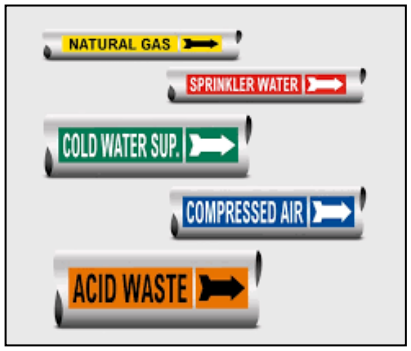
*When applicable

Fuel Cell operation is monitored and controlled remotely 24 hours a day 7 days a week by the HyAxiom Control Center. Upset or abnormal occurrences outside of normal operating parameters are immediately identified and service technicians are dispatched within 24 hours to respond when required.

Emergency Procedures

Alarms	There are no audible or visual alarms on Fuel Cell. Alarm conditions are relayed immediately to the HyAxiom Control Center. The HyAxiom Control Center will then contact the appropriate site personnel on the site's emergency contact list.
Emergency Shut Down Onsite	Actuate Fuel Cell Stop Button
Emergency Area Egress - Gas Odor	Evacuate 330 Feet in all directions
Emergency Area Egress - Fire	Evacuate 330 Feet in all directions – CV000 automatic natural gas supply shut off
Emergency Egress - General	Fuel cell is unmanned remotely monitored and controlled. No HyAxiom employees attending unit unless service or maintenance is required.

Signage and labeling



General:

Safety Hazard Analysis

The PureCell® Model 400 fuel cell system has been designed to meet strict ANSI/CSA safety standards to protect against risks from electrical, mechanical, chemical, and combustion safety hazards. The following items are a few of the safety measures incorporated into the design.

Fire Detection and Protection:

The power plant design incorporates a combustible gas sensor as well as thermal fuses located throughout the power module cabinet to detect fire. The detection of a potential flammable gas mixture, a fire, or the failure of this detection circuit will result in a power plant shutdown and a subsequent inert gas (nitrogen) purge of the fuel cell stack and fuel processing system. This event will also result in an alarm callout notification to HyAxiom service personnel. The power plant is designed with an integral emergency-stop button on the outside of the enclosure to enable immediate shutdown in the event of an emergency. There is also a gas shut-off valve and electrical disconnect switch easily accessible to emergency personnel. There are no restrictions for type of fire suppression equipment.

Gas Leak:

Augmenting the internal combustible gas sensor, the power plant also monitors the flow rate of natural gas. If the gas flow rate exceeds the equivalent power production of the power plant then a shutdown will result. The largest possible accumulation from a leak prior to shutdown is below combustible limits. Fuel valves inside the power plant are “fail safe” and will return to their normally closed position upon loss of power. The power plant is designed to have a physical barrier that separates the equipment handling combustible gases (fuel compartment) from electrical or potential spark-creating equipment (motor compartment). The fuel compartment is kept at a negative pressure to contain and remove any potential gas leaks, whereas the motor compartment is pressurized by a fan source to prevent combustible gases from entering.

Hydrogen:

Hydrogen is lighter than air and thus does not pool like other fuels and will readily dissipate with proper ventilation making it less likely to ignite. Although hydrogen has low self-ignition characteristics, the fuel in the power plant is not pure hydrogen. Also, the power plant is not producing or storing hydrogen, it consumes hydrogen-rich gas equal to what it requires to produce power. The fuel cell stack is wrapped in a fire retardant blanket. There are no materials inside the unit that would sustain a flame. There is no large volume of gas or any ignition that occurs within the cell stack.

Phosphoric Acid:

Phosphoric acid is integral part of the fuel cell system, acting as the electrolyte within the fuel cell stack. Phosphoric acid is a surprisingly common substance that is contained in common cola drinks. A leak of phosphoric acid is not possible because phosphoric acid is not in liquid form once applied in the equipment. There is no reservoir of liquid. Phosphoric acid is contained in the porous structure of the fuel cell stack material by capillary action, similar to how ink is absorbed into a blotter.

Fluid Leak:

The only fluid source is water. All pressurized water vessels are designed to ASME boiler codes and inspected annually. All piping, welds, etc. meet pressurized piping standards. Water produced through the electrochemical process is “pure” water and is reclaimed and reused by the process. The other source of water is water used in the external cooling module, which is mixed with a polypropylene glycol and a rust inhibitor to prevent rust and freezing in colder climates.

Hazardous Waste:

The fuel cell does not produce any hazardous waste. Standard Material Safety Data Sheets (MSDS) are available upon request.

APPENDIX 1 – SAFETY DATA SHEETS

AVANTOR PERFORMANCE MATERIALS

Version: 1.0
Revision date: 04-07-2014

SAFETY DATA SHEET

1. Identification

Product identifier: PHOSPHORIC ACID

Other means of identification

Synonyms: Ortho-Phosphoric Acid, White Phosphoric Acid

Product No.: 0240, 6908, 2798, 2797, 5854, 2796, 5804, 2788, 0259, 5372, 0274, 0269, 0268, 0265, 0264, 0262, 0260, 0255, 0251

Recommended use and restriction on use

Recommended use: Not available.

Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:

24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Physical hazards

Corrosive to metals	Category 1

Health hazards

Acute toxicity (Oral)	Category 4
Skin corrosion/irritation	Category 1
Serious eye damage/eye irritation	Category 1
Specific target organ toxicity - single exposure	Category 3

Unknown toxicity

Acute toxicity, oral	0 %
Acute toxicity, dermal	0 %
Acute toxicity, inhalation, vapor	100 %
Acute toxicity, inhalation, dust or mist	100 %

Unknown toxicity

Acute hazards to the aquatic environment	84 %
Chronic hazards to the aquatic environment	84 %

Label elements

Hazard symbol:

Signal word: Danger

Hazard statement:
May be corrosive to metals.
Harmful if swallowed.
Causes severe skin burns and eye damage.
May cause respiratory irritation.

Precautionary statement

Prevention: Keep only in original container. Do not breathe dust/fume/mist/vapors. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection. Wash thoroughly after handling.

Response: Absorb spillage to prevent material damage. IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.

Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed. Store in corrosive resistant container with a resistant inner liner.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Mixtures

Chemical identity	Common name and synonyms	CAS number	Content in percent (%)*
PHOSPHORIC ACID		7664-38-2	80 - 90%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion:	Do NOT induce vomiting. Call a physician or poison control center immediately. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Inhalation:	Move to fresh air. Call a physician or poison control center immediately. Apply artificial respiration if victim is not breathing If breathing is difficult, give oxygen.
Skin contact:	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician or poison control center immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.
Eye contact:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a physician or poison control center immediately. In case of irritation from airborne exposure, move to fresh air. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Symptoms:	Causes severe skin and eye burns. Causes digestive tract burns.

Indication of immediate medical attention and special treatment needed

Treatment:	Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General fire hazards:	No data available.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:	The product is non-combustible. Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media:	None known.
Specific hazards arising from the chemical:	Not combustible, but if involved in a fire decomposes to produce toxic gases.

Special protective equipment and precautions for firefighters

Special fire fighting procedures:	Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool.
Special protective equipment for fire-fighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Product is highly acidic. Wear protective gear if spilled during fire fighting.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	See Section 8 of the MSDS for Personal Protective Equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep unauthorized personnel away. Keep upwind. Ventilate closed spaces before entering them.

Methods and material for containment and cleaning up:	Neutralize with lime or soda ash. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.
Notification Procedures:	Inform authorities if large amounts are involved.
Environmental precautions:	Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling:	Do not get in eyes, on skin, on clothing. Do not taste or swallow. Wash thoroughly after handling. Do not eat, drink or smoke when using the product. Use caution when adding this material to water. Add material slowly when mixing with water. Do not add water to the material; instead, add the material to the water.
Conditions for safe storage, including any incompatibilities:	Do not store in metal containers. Keep container tightly closed. Store in a well-ventilated place.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Chemical identity	Type	Exposure Limit values	Source
PHOSPHORIC ACID	TWA	1 mg/m3	US. ACGIH Threshold Limit Values (2011)
	STEL	3 mg/m3	US. ACGIH Threshold Limit Values (2011)
	REL	1 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	STEL	3 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	PEL	1 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	TWA	1 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	3 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	TWA	1 mg/m3	US. Tennessee. OELs. Occupational Exposure Limits, Table Z1A (06 2008)
	STEL	3 mg/m3	US. Tennessee. OELs. Occupational Exposure Limits, Table Z1A (06 2008)
	ST ESL	10 µg/m3	US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (12 2010)
	AN ESL	1 µg/m3	US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (12 2010)
	TWA PEL	1 mg/m3	US. California Code of Regulations, Title 8, Section 5155. Airborne Contaminants (08 2010)
	STEL	3 mg/m3	US. California Code of Regulations, Title 8, Section 5155. Airborne Contaminants (08 2010)

Appropriate engineering controls	No data available.

Individual protection measures, such as personal protective equipment

General information:	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.
Eye/face protection:	Wear safety glasses with side shields (or goggles) and a face shield.
Skin protection	
Hand protection:	Chemical resistant gloves
Other:	Wear suitable protective clothing and gloves.
Respiratory protection:	In case of inadequate ventilation use suitable respirator. Respirator type: Chemical respirator with acid gas cartridge.
Hygiene measures:	Provide eyewash station and safety shower. Observe good industrial hygiene practices. Wash hands before breaks and immediately after handling the product. Wash contaminated clothing before reuse. Avoid contact with eyes. Avoid contact with skin.

9. Physical and chemical properties

Appearance	
Physical state:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Odorless
Odor threshold:	No data available.
pH:	1.5 0.1 N Aqueous solution
Melting point/freezing point:	21.1 °C
Initial boiling point and boiling range:	158 °C
Flash Point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	0.3 kPa
Vapor density:	No data available.
Relative density:	1.69 (20 °C)
Solubility(ies)	
Solubility in water:	Miscible with water.
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	No data available.

10. Stability and reactivity

Reactivity:	No dangerous reaction known under conditions of normal use.
Chemical stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur.
Conditions to avoid:	Avoid contact with oxidizing agents. Avoid contact with strong reducing agents. Contact with alkalis.
Incompatible materials:	Strong reducing agents. Alkalies. Strong oxidizing agents. Metals.
Hazardous decomposition products:	oxides of phosphorus

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Harmful if swallowed.
Inhalation:	Severely irritating to respiratory system.
Skin contact:	Causes severe skin burns.
Eye contact:	Causes serious eye damage.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: ATEmix (Rat): 1,700 mg/kg

Dermal
Product: ATEmix (): 3,044.44 mg/kg

Inhalation
Product: No data available.

Repeated dose toxicity
Product: No data available.

Skin corrosion/irritation
Product: Causes severe skin burns.

Serious eye damage/eye irritation
Product: Causes serious eye damage.

Respiratory or skin sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ cell mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive toxicity
Product: No components toxic to reproduction

Specific target organ toxicity - single exposure
Product: None known.

Specific target organ toxicity - repeated exposure
Product: None known.

Aspiration hazard
Product: Not classified

Other effects: Not known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic invertebrates
Product: No data available.

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and degradability

Biodegradation
Product: Expected to be readily biodegradable.

BOD/COD ratio
Product: No data available.

Bioaccumulative potential
Bioconcentration factor (BCF)
Product: No data available on bioaccumulation.

Partition coefficient n-octanol / water (log Kow)
Product: No data available.

Mobility in soil: The product is water soluble and may spread in water systems.

Other adverse effects: The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number:	UN 1805
UN proper shipping name:	Phosphoric acid solution
Transport hazard class(es)	
Class(es):	8
Label(s):	8
Packing group:	III
Marine Pollutant:	No

IMDG

UN number:	UN 1805
UN proper shipping name:	PHOSPHORIC ACID SOLUTION
Transport hazard class(es)	
Class(es):	8
Label(s):	8
EmS No.:	F-A, S-B
Packing group:	III
Marine Pollutant:	No

IATA

UN number:	UN 1805
Proper Shipping Name:	Phosphoric acid, solution
Transport hazard class(es):	
Class(es):	8
Label(s):	8
Marine Pollutant:	No
Packing group:	III

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

PHOSPHORIC ACID Reportable quantity: 5000 lbs.

Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

[X] Acute (Immediate) [X] Chronic (Delayed) [ ] Fire [ ] Reactive [ ] Pressure Generating

SARA 302 Extremely hazardous substance
None present or none present in regulated quantities.

SARA 304 Emergency release notification

Chemical identity	RQ
PHOSPHORIC ACID	5000 lbs.

SARA 311/312 Hazardous chemical

Chemical identity	Threshold Planning Quantity
PHOSPHORIC ACID	500 lbs

SARA 313 (TRI reporting)
None present or none present in regulated quantities.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
PHOSPHORIC ACID Reportable quantity: 5000 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
None present or none present in regulated quantities.

US state regulations

US. California Proposition 65
No ingredient regulated by CA Prop 65 present.

US. New Jersey Worker and Community Right-to-Know Act
PHOSPHORIC ACID Listed

US. Massachusetts RTK - Substance List
PHOSPHORIC ACID Listed

US. Pennsylvania RTK - Hazardous Substances
PHOSPHORIC ACID Listed

US. Rhode Island RTK
PHOSPHORIC ACID Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory
Japan (ENCS) List:	On or in compliance with the inventory
China Inv. Existing Chemical Substances:	Not in compliance with the inventory.
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Japan ISHL Listing:	Not in compliance with the inventory.
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue date:	04-07-2014
Revision date:	No data available.
Version #:	1.0
Further information:	No data available.
Disclaimer:	THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED "AS IS," AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION, WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.

NN53

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Shift Max 230, Reduced Heterogeneous Catalyst, FC72372

SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Doosan Fuel Cell America, Inc.
195 Governors Hwy.
South Windsor, CT 06074
USA

TELEPHONE: 24 HOUR EMERGENCY: 1-800-424-9300 (CHEMTREC)
PRODUCT INFORMATION: 860-727-2300

MSDS NO: NN53 INITIAL RELEASE DATE: 4/23/2009 REVISION DATE:

GENERIC DESCRIPTION: Reduced catalyst
PHYSICAL FORM: Cylindrical tablets
COLOR: Dark brown
ODOR: None
NFPA 704 CODES: HEALTH: 1 FLAMMABILITY: 4 REACTIVITY: 2

NOTE: NFPA = NATIONAL FIRE PROTECTION ASSOCIATION

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

CAS NUMBER	%WT/VOL.	COMPONENTS	EXPOSURE LIMITS OSHA	EXPOSURE LIMITS ACGIH
The following is the composition of the packed tablets:				
1344-28-1	9-12	Aluminum oxide	15 mg/m3 5 mg/m3 (respirable)	1 mg/m^3 (respirable)
7440-50-8	55-62	Copper	1 mg/m3	1 mg/m^3 (dust)
1314-13-2	28-33	Zinc oxide	15 mg/m3 5 mg/m3 (respirable)	2 mg/m^3 (respirable)

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Shift Max 230, Reduced Heterogeneous Catalyst, FC72372

SECTION 3. EFFECTS OF OVEREXPOSURE

ACUTE EFFECTS:

EYE:	May cause irritation
SKIN:	Frequent or prolonged contact may irritate the skin and cause a skin rash (dermatitis).
INHALATION:	Prolonged or repeated inhalation may cause lung damage. Prolonged or excessive inhalation may cause respiratory tract irritation.
ORAL:	Moderately toxic and may be harmful if swallowed; may damage the liver, pancreas, kidney or nervous systems.

REPEATED EXPOSURE EFFECTS:

EYE:	Signs and symptoms of overexposure may include scratch or abrasion, damage to cornea (necrosis).
SKIN:	Overexposure may cause skin rash, dermatitis and or itching.
INHALATION:	Overexposure may cause coughing, wheezing, shortness of breath, difficult breathing, chest pain.
ORAL:	Ingestion may cause upset stomach and intestinal distress.

SECTION 3. EFFECTS OF OVEREXPOSURE

NOTE TO PHYSICIANS: N/D

THIS MATERIAL CONTAINS THE FOLLOWING COMPONENTS WITH THE SPECIAL HAZARDS LISTED BELOW.

CARCINOGENS	N/A
TERATOGENS	N/A
MUTAGENS	N/A
REPRODUCTIVE TOXINS	N/A
SENSITIZERS	N/A
COMMENTS:	None
NTP CLASSIFICATION:	N/A
IARC CLASSIFICATION:	N/A
OSHA CLASSIFICATION:	N/A

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Shift Max 230, Reduced Heterogeneous Catalyst, FC72372

SECTION 4. FIRST AID MEASURES

EYE:	**Immediately flush eyes with plenty of water for at least 30 minutes. Get immediate medical attention.**
SKIN:	**Wash with plenty of soap and water. Get medical attention if irritation develops or persists.**
INHALATION:	**Remove to fresh air. If breathing is difficult seek immediate medical attention.**
ORAL:	**If swallowed, do NOT induce vomiting. Give victim large quantities of water. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.**
COMMENTS:	**Exposure to fumes of the metal oxides may cause metal fume fever including irritation of eyes and respiratory tract and flu-like symptoms.**

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT (METHOD):	N/A
AUTOIGNITION TEMPERATURE:	N/A
FLAMMABILITY LIMITS IN AIR:	N/A
EXTINGUISHING MEDIA:	Protect exposures; cool with water fog. For small fires use Class D extinguishing media.
UNSUITABLE EXTINGUISHING MEDIA:	N/D
FIRE FIGHTING PROCEDURES:	Wear full protective clothing and SCBA's.
UNUSUAL FIRE HAZARDS:	Packed material will spontaneously oxidize in air, producing significant heat. Keep away from combustible materials.
HAZARDOUS DECOMPOSITION PRODUCTS:	Toxic metal fumes may be emitted if thermally decomposed.

SECTION 6. ACCIDENTAL RELEASE MEASURES

CONTAINMENT / CLEAN UP:

Small spill	With shovel or scoop, place material onto clean, dry non-flammable surface to allow catalyst to oxidize. Place oxidized catalyst into container and cover loosely. Remove containers from spill area. Protect against inhalation of dusts or fumes, Wear eye protection.
Large spill	Wet methods of cleanup are preferred. Keep airborne particulates to a minimum. Protect against inhalation of dusts or fumes, Wear eye protection. Place in appropriate containers for disposal.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Shift Max 230, Reduced Heterogeneous Catalyst, FC72372

SECTION 7. HANDLING AND STORAGE

HANDLING: No special precautions for intact containers.

STORAGE: Store in dry area. Prevent exposure to air by maintaining under an inert gas atmosphere such as nitrogen. Use additional precautions to prevent asphyxiant hazards due to inert gas usage.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS

LOCAL EXHAUST: If user operations generate dust or fume, use ventilation to keep exposure to airborne contaminates below the exposure limits.

GENERAL VENTILATION: N/A

PERSONAL PROTECTIVE EQUIPMENT FOR ROUTINE HANDLING

EYES: Wear safety glasses with side shields or goggles.

SKIN: Wear protective clothing, including long sleeves and gloves to prevent skin contact.

SUITABLE GLOVES: Impermeable, such as latex, Nitrile, etc.

INHALATION: Wear NIOSH approved respirator with particulate filter.

PERSONAL PROTECTIVE EQUIPMENT FOR SPILLS

EYES: Chemical goggles

SKIN: Chemical resistant gloves

INHALATION / SUITABLE RESPIRATOR: (Min) Use NIOSH-approved respirator with particulate filter

PRECAUTIONARY MEASURES: N/D

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Shift Max 230, Reduced Heterogeneous Catalyst, FC72372

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

TYPICAL PHYSICAL PROPERTIES ARE GIVEN BELOW.

APPEARANCE: Cylindrical tablets
COLOR: Dark brown
ODOR: None
ODOR THRESHOLD: N/A
pH: N/A
BOILING POINT C (F): N/A
MELTING POINT C (F): N/A
SOLUBILITY IN WATER: Insoluble
VISCOSITY AT_____: N/A
VISCOSITY AT_____:
RELATIVE DENSITY TO: 65-85 lb./CF (bulk)

POUR POINT C (F): N/A
FREEZING POINT C (F): N/A
VOLATILE ORGANIC COMPOUND:
SPECIFIC GRAVITY: (H_2O = 1) >8
VAPOR PRESSURE - mmHg: N/A
VAPOR DENSITY @ TEMP:_____: N/A
EVAPORATION RATE RELATIVE TO_____: N/A
EXPLOSIVE PROPERTIES: Will not explode
OXIDIZING PROPERTIES: Not an oxidizer

SECTION 10. STABILITY AND REACTIVITY

STABILITY (THERMAL, LIGHT, ETC.): Generally considered stable when contained under an inert atmosphere.

CONDITIONS TO AVOID: Exposure to air.

INCOMPATIBILITY (MATERIALS TO AVOID): Combustible materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce metal oxide fumes.

HAZARDOUS POLYMERIZATION: Not expected to occur.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Shift Max 230, Reduced Heterogeneous Catalyst, FC72372

SECTION 11. TOXICOLOGICAL DATA

Exposure to metal oxide fume may produce "metal fume fever" which is characterized by flu-like symptoms including fever, chills and general aches.

SECTION 12. ECOLOGICAL INFORMATION

No data available.

SECTION 13. DISPOSAL CONSIDERATIONS

Local regulations may vary; all waste must be disposed/recycled/reclaimed in accordance with federal, state and local environmental control regulations.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME: Self-heating solid, inorganic, N.O.S.

HAZARD TECHNICAL NAME: Reduced copper catalysts.

HAZARD CLASS: 4.2

UN NUMBER: 3190

PACKING GROUP: II

SECTION 15. REGULATORY INFORMATION

TSCA STATUS: Component materials are in the TSCA inventory.

EPA SARA TITLE III CHEMICAL LISTINGS:

SECTION 302 HAZARDOUS SUBSTANCES: No

SECTION 355 EXTREMELY HAZARDOUS SUBSTANCES: No

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Shift Max 230, Reduced Heterogeneous Catalyst, FC72372

SECTION 15. REGULATORY INFORMATION, CONTINUED

SECTION 312 HAZARD CLASS:

ACUTE:	Yes
CHRONIC:	Yes
FIRE:	Yes
PRESSURE:	No
REACTIVE:	No

SECTION 372 TOXIC CHEMICALS: Copper.

SECTION 16. OTHER INFORMATION

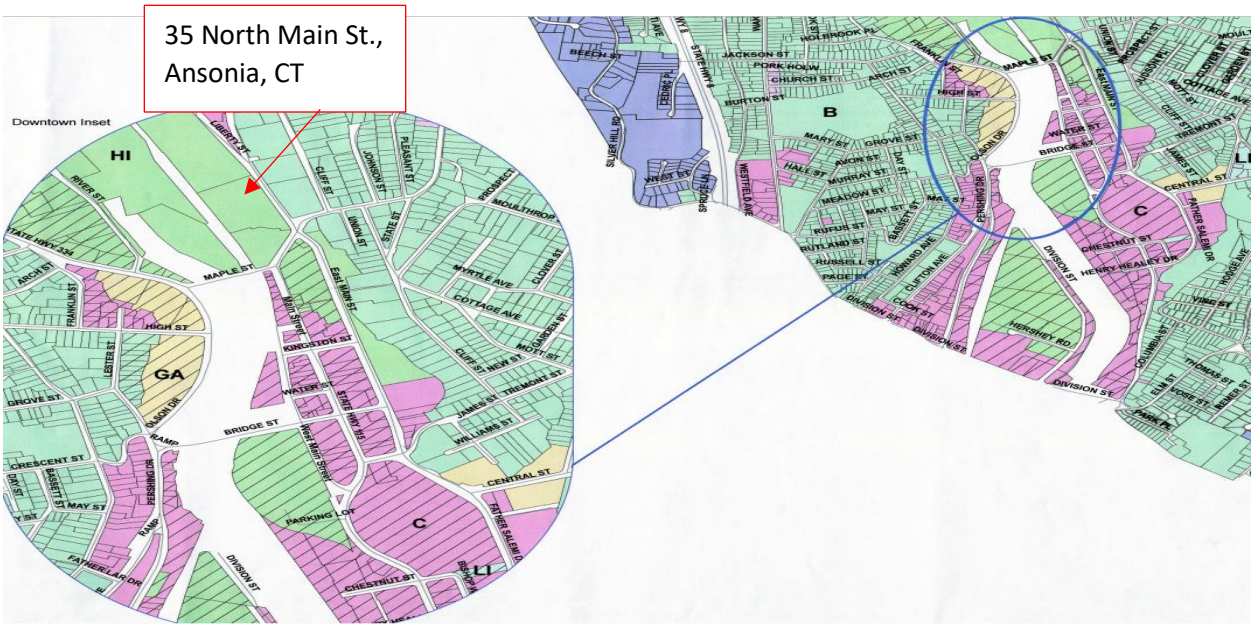
COMMENTS: N/D = Not Determined
N/A = Not Applicable

As a unit, the materials do not pose a hazard. However, should the container be compromised and the packed catalyst become available, measures must be taken to prevent exposure to air.

PREPARED BY: D. Black, J. Preston
Revision By: DATE: 4/23/2009

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

Attachment #5



As Amended:
May 31, 1990
September 28, 1992
December 14, 1992
March 11, 1994
November 10, 1994
January 30, 2001
April 2, 2002
February 2008

N

Legend

Zoning Districts

- A Residence District
- AA Residence District
- AAA Residence District
- B Residence District
- BB Multi-Family District
- C Central Commercial District
- CP Commerce Park District
- GA Multi-Family District
- HI Heavy Industrial District
- LI Light Industrial Disrtict
- NR Neighborhood Retail District
- RR Multi-Family Residence District
- City Center Zone
- Street

As Amended:
May 31, 1990
September 28, 1992
December 14, 1992
March 11, 1994
November 10, 1994
January 30, 2001
April 2, 2002
February 2008

Legend

Zoning Districts

- A Residence District
- AA Residence District
- AAA Residence District
- B Residence District
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As Amended:
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Zoning Districts

- A Residence District
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- AAA Residence District
- B Residence District
- BB Multi-Family District
- C Central Commercial District
- CP Commerce Park District
- GA Multi-Family District
- HI Heavy Industrial District

Attachment #6

Attachment #7

Title 14 —Aeronautics and Space
Chapter I —Federal Aviation Administration, Department of Transportation
Subchapter E —Airspace
Part 77 —Safe, Efficient Use, and Preservation of the Navigable Airspace
Subpart B —Notice Requirements

Authority: 49 U.S.C. 106 (g), 40103, 40113–40114, 44502, 44701, 44718, 46101–46102, 46104.
Source: Docket No. FAA–2006–25002, 75 FR 42303, July 21, 2010, unless otherwise noted.

§ 77.9 Construction or alteration requiring notice.

If requested by the FAA, or if you propose any of the following types of construction or alteration, you must file notice with the FAA of:

(a) Any construction or alteration that is more than 200 ft. AGL at its site.

(b) Any construction or alteration that exceeds an imaginary surface extending outward and upward at any of the following slopes:

(1) 100 to 1 for a horizontal distance of 20,000 ft. from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway more than 3,200 ft. in actual length, excluding heliports.

(2) 50 to 1 for a horizontal distance of 10,000 ft. from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway no more than 3,200 ft. in actual length, excluding heliports.

(3) 25 to 1 for a horizontal distance of 5,000 ft. from the nearest point of the nearest landing and takeoff area of each heliport described in paragraph (d) of this section.

(c) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a) or (b) of this section.

(d) Any construction or alteration on any of the following airports and heliports:

(1) A public use airport listed in the Airport/Facility Directory, Alaska Supplement, or Pacific Chart Supplement of the U.S. Government Flight Information Publications;

(2) A military airport under construction, or an airport under construction that will be available for public use;

(3) An airport operated by a Federal agency or the DOD.

(4) An airport or heliport with at least one FAA-approved instrument approach procedure.

(e) You do not need to file notice for construction or alteration of:

(1) Any object that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height, and will be located in the congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation;

(2) Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device meeting FAA-approved siting criteria or an appropriate military service siting criteria on military airports, the location and height of which are fixed by its functional purpose;

(3) Any construction or alteration for which notice is required by any other FAA regulation.

(4) Any antenna structure of 20 feet or less in height, except one that would increase the height of another antenna structure.

Attachment #8

State of California
AIR RESOURCES BOARD
Executive Order DG-047
Distributed Generation Certification of
Doosan Fuel Cell America, Inc.
460 kW PureCell Model 400

WHEREAS, the Air Resources Board (ARB) was given the authority under California Health and Safety Code section 41514.9 to establish a statewide Distributed Generation (DG) Certification Program to certify electrical generation technologies that are exempt from the permit requirements of air pollution control or air quality management districts;

WHEREAS, this DG Certification does not constitute an air pollution permit or eliminate the responsibility of the end user to comply with all federal, state, and local laws, rules and regulations;

WHEREAS, on October 26, 2017, Doosan Fuel Cell America, Inc. applied for a DG Certification of its 460 kW PureCell Model 400 fuel cell power plant and whose application was deemed complete on February 7, 2018;

WHEREAS, Doosan Fuel Cell America, Inc. has demonstrated, according to test methods specified in title 17, California Code of Regulations (CCR), section 94207, that its natural-gas-fueled 460 kW PureCell Model 400 fuel cell power plant has complied with the following emission standards:

1. Emissions of oxides of nitrogen no greater than 0.07 pounds per megawatt-hour; and

2. Emissions of carbon monoxide no greater than 0.10 pounds per megawatt-hour; and

3. Emissions of volatile organic compounds no greater than 0.02 pounds per megawatt-hour.

WHEREAS, Doosan Fuel Cell America, Inc. has demonstrated that its 460 kW PureCell Model 400 fuel cell power plant complies with the emission durability requirements in title 17, CCR, section 94203 (d);

WHEREAS, I find that the Applicant, Doosan Fuel Cell America, Inc., has met the requirements specified in article 3, title 17, CCR, and has satisfactorily demonstrated that the 460 kW PureCell Model 400 fuel cell power plant meets the DG Certification Regulation 2007 Fossil Fuel Emission Standards;

NOW THEREFORE, IT IS HEREBY ORDERED, that a DG Certification, Executive Order DG-047 is granted.

This DG Certification:

1) is subject to all conditions and requirements of the ARB's DG Certification Program, article 3, title 17, CCR, including the provisions relating to inspection, denial, suspension, and revocation; and

2) shall be void if any manufacturer's modification results in an increase in emissions or changes the efficiency or operating conditions of a model, such that the model no longer meets the DG Certification Regulation 2007 Fossil Fuel Emission Standards; and

3) shall expire on the 5th day of April, 2023.

Executed at Sacramento, California, this 6th day of April 2018.

/S/

Floyd V. Vergara, Esq., P.E.
Chief, Industrial Strategies Division

Attachment #9

Natural Diversity Data Base Areas

ANSONIA, CT

June 2023

- State and Federal Listed Species
- Critical Habitat
- Town Boundary

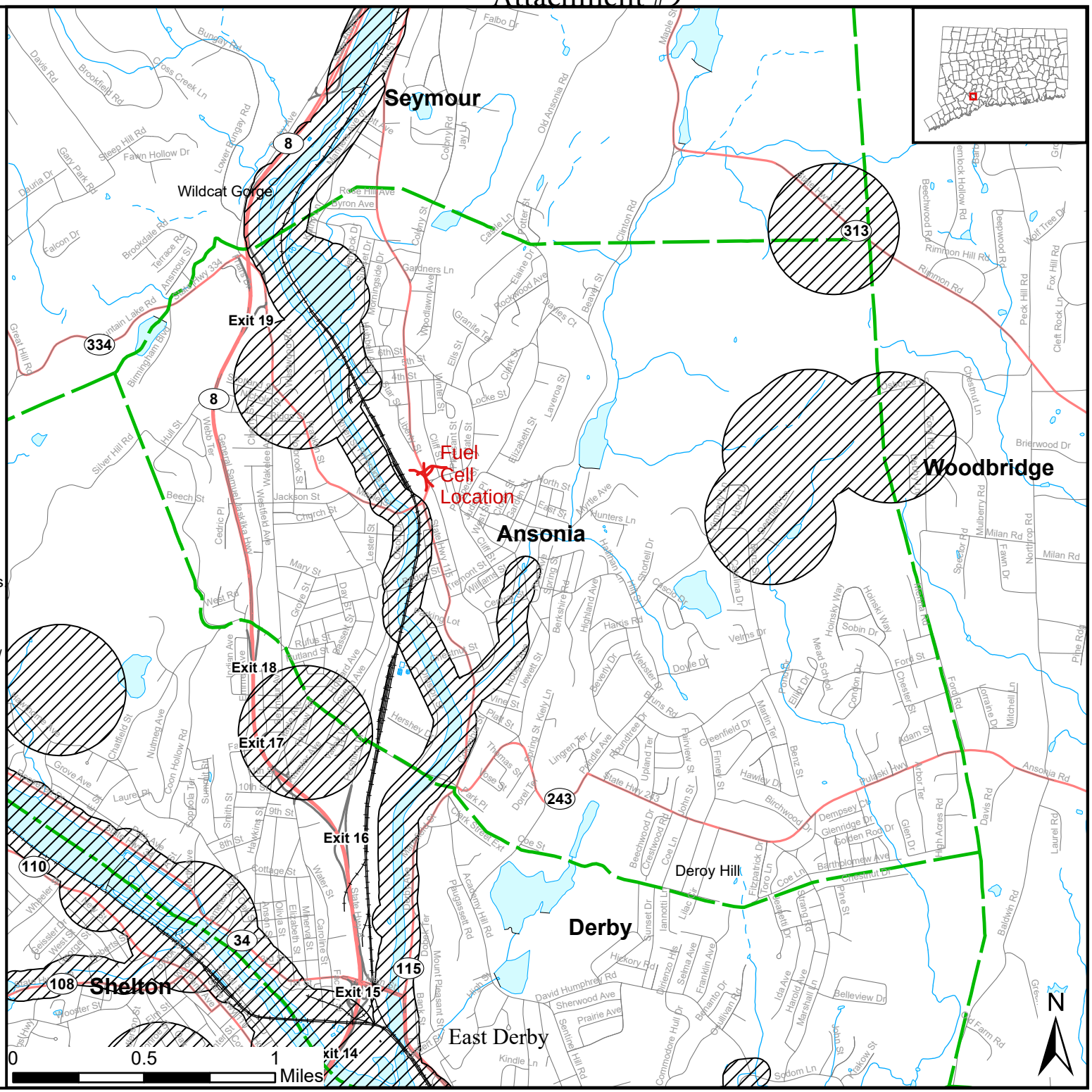
NOTE: This map shows known locations of State and Federal Listed Species and Critical Habitats. Information on listed species is collected and compiled by the Natural Diversity Data Base (NDDB) from a variety of data sources . Exact locations of species have been buffered to produce the generalized locations.

This map is intended for use as a preliminary screening tool for conducting a Natural Diversity Data Base Review Request. To use the map, locate the project boundaries and any additional affected areas If the project is within a hatched area there may be a potential conflict with a listed species. For more information, use DEEP ezFile https://filings.deep.ct.gov/DEEPPortal/ to submit a Request for Natural Diversity Data Base State Listed Species Review or Site Assessment. More detailed instructions are provided along with the request form on our website. https://portal.ct.gov/deep-nddbrequest

Use the CTECO Interactive Map Viewers at http://cteco.uconn.edu to more precisely search for and locate a site and to view aerial imagery with NDDB Areas.

QUESTIONS: Department of Energy and Environmental Protection (DEEP)
79 Elm St, Hartford, CT 06106
email: deep.nddbrequest@ct.gov
Phone: (860) 424-3011

Connecticut Department of Energy & Environmental Protection



Attachment #10

Prepared For: **HiAxiom, Inc.**

Point of Contact: **Walter Bonola**

Prepared by: **Acoustical Technologies Inc.**
50 Myrock Avenue
Waterford, CT 06385-3008

Subject: **Nine Fuel Cells**
Airborne Noise Assessment
At 35 North Main Street
Ansonia, CT 06401

Author: **Carl Cascio**

Date: **October 11, 2023**

Revision: **0**

Table of Contents

Summary

This document makes a positive acoustic assessment that should assist in meeting any acoustic noise concerns during the operation of nine HiAxiom 460 KW fuel cells at the down town Ansonia site at 35 North Main Street in Ansonia, CT. An acoustic assessment plan was developed and executed to acquire airborne acoustic information useful in explaining and mitigating the potential airborne noise issues during operation of the nine 460 KW fuel cells. It is important to show that the airborne noise generated by the fuel cells will not significantly impact the facility's neighbors.

The airborne noise levels expected to be generated by the HiAxiom fuel cells operating at the Ansonia site were simulated by exciting a Soundboks speaker at two of the fuel cell Cooling Module positions. (The Cooling Module is the dominant noise source.) The Soundboks speaker produced an overall airborne noise level that was 14 to 17 dB higher than the levels measured for a single HiAxiom fuel cell installed at Montville, CT. One-third octave band analysis showed the speakers' level to be near the Montville fuel cell airborne noise levels at low frequencies where the airborne noise levels were low and to exceed the fuel cell signature by 10 to 15 dB at higher frequencies where the fuel cell signature was higher in noise level.

Airborne noise levels with the speakers operating were measured at distances from 5 to 185 meters from the proposed fuel cell location on North Main Street. The speaker produced overall A-weighted sound pressure levels of approximately 86 to 88 dBA at 5 meters and 79 to 82 dBA at 10 meters (reference 20 microPascals) at the proposed fuel cell locations. The airborne noise levels from the speakers received at nearby properties on site were measured at noise levels of 40 to 60 dBA. Residential measurement locations to the west were too far away to be able to measure the airborne noise with the speaker on. Analysis of the speaker data indicated propagation losses of at least 18 to 41dB from the fuel cells' location to the nearby properties. The source level at 10 meters from the operation of a HiAxiom fuel cell at Montville, CT was then used as a basis for making the Ansonia fuel cell airborne noise estimates.

Operation of the nine HiAxiom fuel cells will have no significant acoustic impact at all but one of the nearby properties adjacent to the HiAxiom fuel cell site on North Main Street. The adjacent property on 61 Cliff Street is open land between a Church and a garage on a hill about 50 feet above North Main Street. The first 20 meters of this property abutting North Main Street is a steep hill that no one normally occupies. The location of the cooling modules at 15 meters from the wall results in a 53 dBA noise level at position 2 and a 56.3 dBA level at position 3. The location of the cooling modules at 3 meters from the wall results in a 50.7 dBA noise level at position 2 and a 54 dBA level at position 3. The wall provides additional noise attenuation so it is recommended to move the cooling modules as close as possible to the wall on North Main Street. This can be done by moving the power modules away from the wall. (The fans at one end of the power module produce about 4 dB less noise than the cooling module and can still be kept closer to the wall than the cooling module at 15 meters.)

The Connecticut's Noise Code (Reference 1) also calls for review of acoustic issues associated with impulse noise, prominent discrete tones, infrasonic and ultrasonic noise. Operation of the fuel cells is expected to meet all of these requirements at all of the nearby property lines.

.Introduction

Acoustical Technologies Inc. was tasked as part of a HiAxiom site permitting process with an assessment of potential acoustic issues associated with fuel cell airborne noise reaching the properties adjacent to the Farrel Corporation site at 35 North Main Street in Ansonia, CT. Responding to a request from Walter Bonola, a site visit was made on October 3, 2023. During the visit, a survey of the airborne noise levels produced by a Soundboks speaker simulating the airborne noise produced by a HiAxiom Fuel Cell was made in order to identify potential airborne noise issues. Airborne noise measurements were taken to quantify the propagation of the simulated fuel cell airborne noise to the adjacent properties. Background airborne noise levels were also made with the speaker off. This document provides an acoustic assessment to assist in meeting acoustic noise concerns during the permitting process for the siting of nine HiAxiom fuel cells at the 35 North Main Street site.

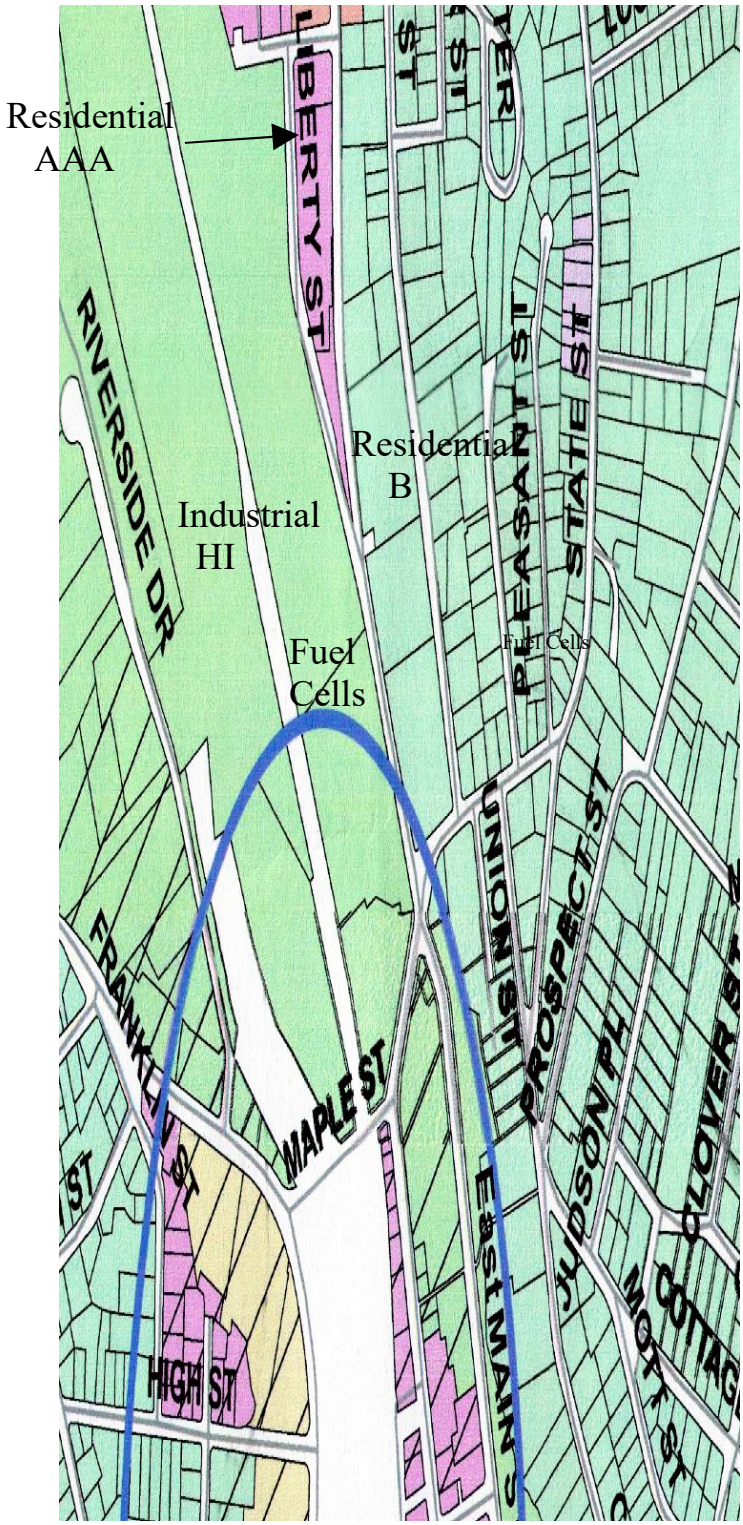
Development of the Acoustic Assessment Plan

The purpose of this effort is to acquire acoustic information useful in explaining the potential airborne noise issues associated with the operation of nine HiAxiom 460 KW fuel cells at the Farrel Corporation site on North Main Street. The proposed site at 35 North Main Street is located in a Heavy Industrial (HI) Zone. This Industrial Zone is surrounded by Residential AAA and B Zones to the north, east and south with the Naugatuck River to the west. The westerly direction is blocked by tall buildings and no sound propagation to the west is anticipated. (If the buildings were removed, the property on the other side of the river is more than 280 meters away and would not be affected by the fuel cell noise. Figure 1 shows a section of the Ansonia zoning map. It is important to determine whether the airborne noise generated by the nine HiAxiom fuel cells will impact these neighbors.

The acoustic impact is assessed in the following way. The fuel cells are yet to be installed so there is no way to measure fuel cell operating airborne noise levels at the new site. The fuel cell airborne noise has been measured at other sites and both overall and one-third octave band airborne noise data of a typical HiAxiom 460 KW fuel cell are available (Reference 3). Using this data, a Soundboks speaker has been programmed through a set of filters to generate a noise spectrum similar to that of the 460 KW fuel cell. (It is assumed that the Cooling and Power Module noise in the existing measured 460 KW fuel cell are similar to the new units.) This spectrum will then be played through an audio amplifier to create the electrical voltage necessary to drive the Soundboks speaker. In order to overcome the potentially high background noise at the Ansonia site the speaker output will be increased to a level more than 15 dB higher than the overall dBA noise level measured on a 460 KW fuel cell at a distance of 10 meters. With the speaker on, this approach then follows the traditional “What is the airborne noise level at the neighbor’s property line?”. The speaker will be run and airborne measurements made near the proposed fuel cell locations and at several of the nearest neighbor’s properties. This measured site data can also be used to estimate noise levels at other neighbor’s property lines. The State of Connecticut’s Noise Ordinance[1] and the City of Ansonia Noise Ordinance[2] will then be consulted to assess the impact of the measured and estimated acoustic levels. Because of the closeness of the proposed fuel cell site to the nearest properties noise mitigation may be

recommended if the airborne noise estimated for nine fuel cells comes near or exceeds the noise requirements at the neighbors' property lines.

Figure 1. Center of the Ansonia Zoning Map Showing the Area near the Nine Fuel Cells



Acoustic Measurement Program

The acoustic data necessary to assess the impact of nine 460 KW HiAxiom Fuel Cells are described below: Airborne sound pressure measurements were conducted at the 35 North Main Street site on October 3, 2023 during the morning hours. This testing established both background airborne noise levels and simulated airborne noise levels with the speaker operating. The overall A-weighted airborne noise measurements were made with an ExTech model 407780A Digital Sound Level Meter (s/n 140401544) that had been calibrated prior to and just after the test with a Quest model QC-10 Calibrator (s/n Q19080194). Measurements were taken with A-weighting (frequency filtering that corresponds to human hearing) and with the sound level meter in a Slow response mode. For reference, a noise level increase of 1 dB is equal to an airborne sound pressure increase of 12.2 per cent. All measurements were made with the microphone at a height above ground between five and six feet. The sound pressure data reported herein are all given in dB reference 20 microPascals.

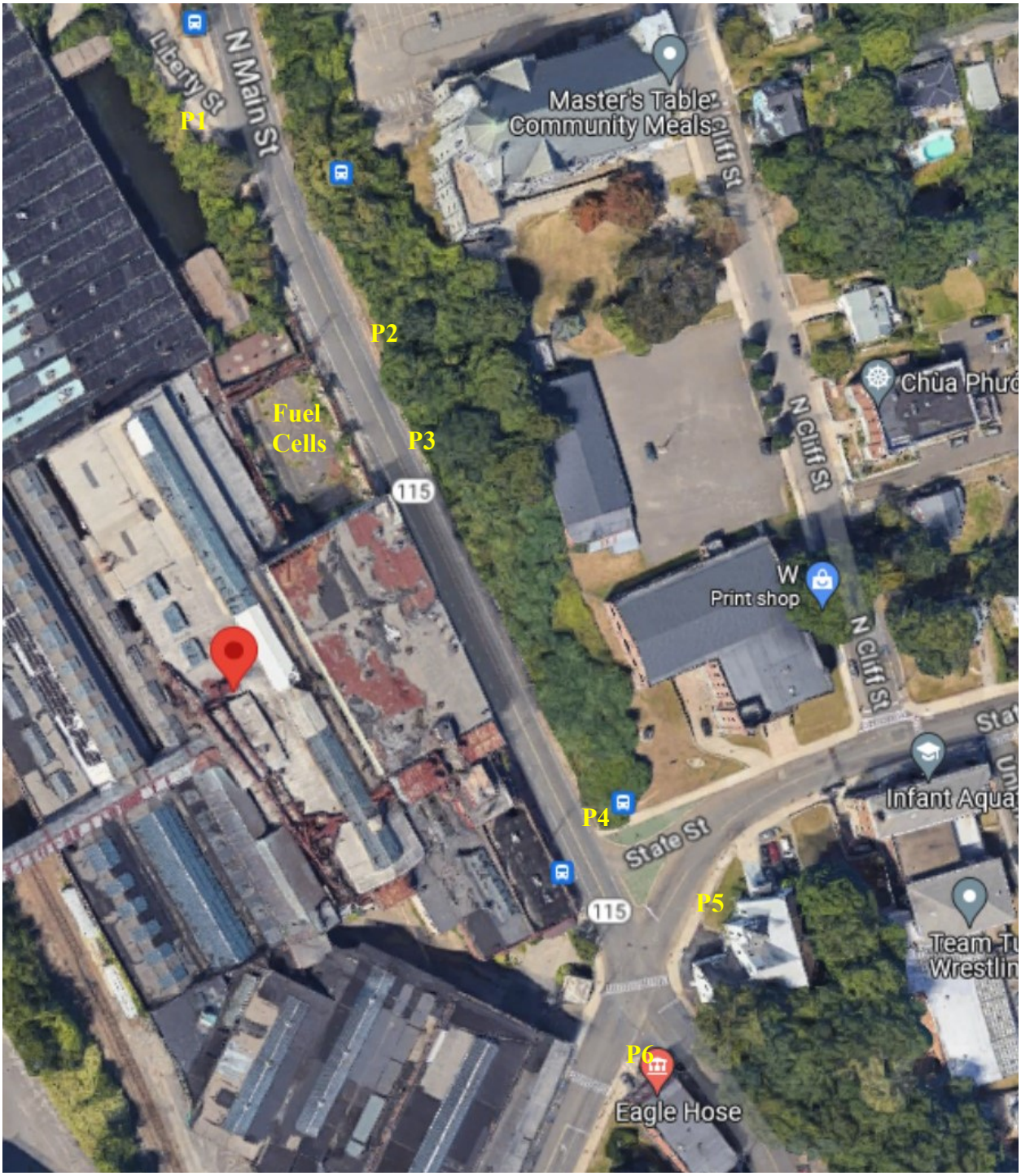
In Ansonia "speaker on" and background airborne noise measurements were taken at 5 and 10 meters from the proposed 460 KW fuel cell site and at the following six nearby properties.

Location	**Business**	**Distance**	**Zone**	**Type**
1 – Fuel Cell North End	HiAxiom	5 meters	HI	Industrial
2 – Fuel Cell North End	HiAxiom	10 meters	HI	Industrial
3 – Fuel Cell South End	HiAxiom	5 meters	HI	Industrial
4 – Fuel Cell South End	HiAxiom	10 meters	HI	Industrial
P1 – 10 Liberty Street	Corner	104 meters	AAA	Residential
P2– 61 North Cliff Street	Church	25 meters	B	Residential
P3 – 31 North Cliff Street	Church	25 meters	B	Residential
P4 – 5 State Street	Church	100 meters	B	Residential
P5 – 10 State Street	Church	137 meters	B	Residential
P6 – 1 Main Street	Fire House	165 meters	HI	Industrial

See the Google satellite map in Figure 2 for the approximate measurement locations. Measurements were made near the proposed north and south Cooling Module units. Sound pressure data were taken with the ExTech sound level meter. Figures 3 and 4 provide photographs of the speaker location for the North position and the measurement location across the street, respectively. At these locations, a one-minute record of the acoustic noise was analyzed for the speakers in the "on" condition. One minute of background noise data was also analyzed at 5 and 10 meters with the same speaker positions and at the six nearby property lines.

Airborne noise measurements taken outside are corrupted by rain and wind so a day was selected when the winds were expected to be 10 miles per hour or less. Table 1 provides the weather data in Ansonia for the acoustic measurements on October 3, 2022. Measurements were taken over the period from 10:00 am until 2:00 pm. Table 1 shows the temperature and wind speeds in hourly intervals. Wind conditions were very good during all the testing. Also, there was no rain during the testing. Vehicle traffic along Main Street was heavy and many of the measurements had to be delayed until all visible traffic was absent.

Figure 2. Google Map Showing Measurement Positions P1 through P6



Because of the distant traffic noise, background noise levels at all of the property line measurement positions were high with levels from 44 to 57 dBA. At all of the measurement locations it was possible to audibly hear the airborne noise from the speaker over the background noise. Airborne noise loss versus range was determined at all these locations.

The highest airborne noise levels were obtained directly across North Main Street from the two speaker locations. These transfer functions were then applied to the 460 KW data from Montville[3] in order to estimate the received levels for the new 460 KW fuel cells in Ansonia. Nine fuel cells could make as much as 9.5 dB more noise than one fuel cell if they were all in one place. Since they are spread out the highest level across the street would be across from the middle of the nine units. Reasonable estimates for this and the other locations were calculated by looking at the relative distances to the property line for each of the nine fuel cells. For properties to the east the nine cooling modules are side by side so the distance to the property is slightly different for each fuel cell. Each cooling module will be modeled at a 10-meter source level of 65 dBA while each power module will be modeled at a 10-meter source level of 61 dBA.[3]

Figure 3. HiAxiom North Cooling Module Location Looking East at North Main Street

The east direction requires a combination of cooling module and power module noise. This direction will produce the highest property line noise levels since the property lines are closest (about 30 meters). The north and south property lines are more than 100 meters away and should have noise levels at least 10 dB lower. The airborne noise at the closest property line on North Main Street is calculated by combining nine power modules and nine cooling modules. The cooling module and power module noise is adjusted a bit according to the different distances

from each module to the property line. Calculations are made on North Main Street for the middle and each end of the fuel cell locations (P2 and P3) as well as the other locations.

Figure 4. HiAxiom P2 Location Looking South at North Main Street across from the Speaker

Table 1. Weather Data near Ansonia on October 3, 2023
https://www.wunderground.com/history/daily/us/ct/east-haven/KHVN/date/2023-10-3

Time (EST)	Temp. (°F)	Humidity (%)	Dew Point (°F)	Barometer (in HG)	Wind Speed (mph)	Wind Direction	Condition
8:53 AM	63 °F	84 %	58 °F	30.18 in	0 mph	CALM	Fair
9:53 AM	67 °F	79 %	60 °F	30.17 in	3 mph	VAR	Fair
10:53 AM	72 °F	68 %	61 °F	30.16 in	6 mph	SSW	Fair
11:53 AM	72 °F	76 %	64 °F	30.15 in	7 mph	S	Fair
12:53 PM	73 °F	76 %	65 °F	30.15 in	7 mph	SSW	Fair
1:53 PM	74 °F	71 %	64 °F	30.13 in	7 mph	SW	Fair
2:53 PM	75 °F	69 %	64 °F	30.11 in	10 mph	SSW	Fair
3:53 PM	77 °F	62 %	63 °F	30.10 in	12 mph	WSW	Fair
4:53 PM	77 °F	62 %	63 °F	30.10 in	9 mph	WSW	Fair

Data Analysis

This section analyzes the airborne noise levels measured at the Ansonia site and then estimates the received level and transmission loss to nearby properties expected during actual fuel cell operation. These estimated levels will be compared to the noise limits in the Connecticut and Ansonia noise ordinances. Speaker operating noise levels at the Ansonia site are reported in Table 2. Background noise levels at the Ansonia site are reported in Table 3. The background data are used to correct the speaker levels providing estimates in Table 4 of only the speaker noise contribution at each location. Table 4 also reports the transfer functions and the operating noise levels estimated for the nine new 460 KW fuel cells.

Figure 5. Proposed Layout of Four Fuel Cells to Be Expanded to Nine in Ansonia

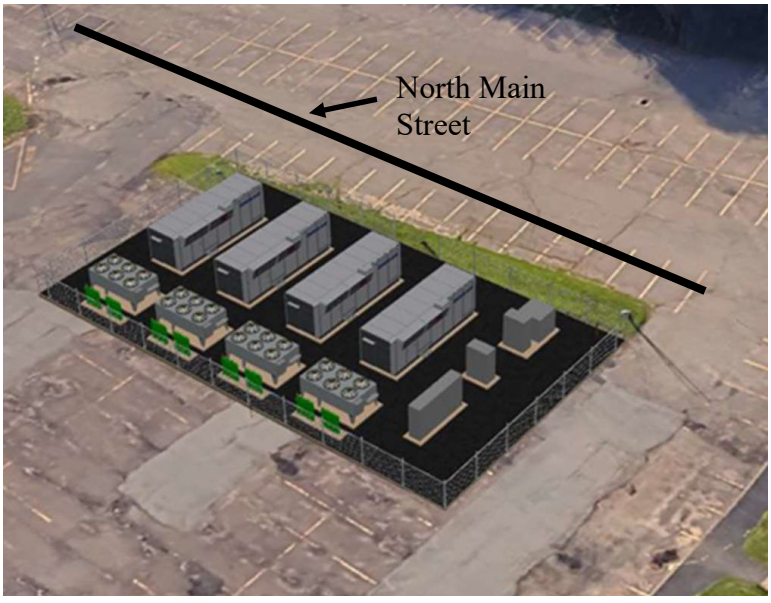


Figure 5 illustrates how the nine fuel cell cooling and power modules will be located along North Main Street. The power modules will block some of the airborne noise directed towards North Main Street. A Noise Tools Model[4] is used to account for the wall along North Main Street and blocking by the power modules. See Figures 6 and 7 for sample calculations. This configuration exceeds the night time noise limit so a calculation with the cooling modules next to the wall proved better by about 3 to 4 dB.

Table 2. Measured Overall Sound Pressure Levels in dBA ref. 20 microPascals with **Speaker On**

Location	Range in Meters	Location	Leq	Max	Min	L10	L90
Speaker On	5	North	87.7	88.0	87.3	87.8	**87.6**
Speaker On	10	North	82.0	82.7	81.6	82.5	**81.8**
Speaker On	5	South	86.4	86.8	86.2	86.6	**86.4**
Speaker On	10	South	79.0	80.6	75.5	80.2	**76.7**
North Speaker							
10 Liberty	104	North	52.4	76.5	47.2	55.3	**47.9**
61 North Cliff	30	East	60.6	85.4	59.7	61.3	**59.9**
31 North Cliff	50	East	57.7	81.7	53.2	61.1	**54.1**
5 State Street	125	South East	57.6	82.3	50.8	60	**52.7**
10 State Street	160	South East	55.0	89.8	49.6	57.3	**50.7**
1 Main Street	185	South	59.4	83.3	57.1	59.9	**57.4**
South Speaker							
61 North Cliff	50	East	54.2	81.0	51.5	56.7	**51.8**
31 North Cliff	30	East	60.0	80.9	59.3	60.8	**59.6**
5 State Street	100	South East	56.7	82.2	50.5	60.4	**50.7**
10 State Street	137	South East	54.9	57.6	52.6	56.5	**53.2**
1 Main Street	165	South	58.5	77.6	49.9	59.6	**50.2**

Leq: Equivalent continuous sound level over the measurement period. – **this is normally the level to be identified as the value to be compared with the steady state overall noise requirement. Because of the heavy traffic noise, the L90 value is used instead.**

SPL MAX: Maximum one-second sound level observed during the measurement period.
SPL MIN: Minimum one-second sound level observed during the measurement period.
L10 - 10% percentile sound level –L10 is the noise level that is exceeded only 10% of the time.
L90: - 90% percentile sound level –L90 is the level that is exceeded 90% of the time.
The CT State Noise Ordinance[1] identifies the L90 acoustic calculation as useful in determining background airborne noise. **This value will also be used as the background noise level.**

The overall airborne noise levels are 14 dB to 17 dB higher for the speakers as compared to what was measured from the HiAxiom 460 KW cooling module at Montville, CT. These 14 to 17 dB differences in level were subtracted from the Ansonia measured levels to estimate the expected fuel cell acoustic signature for one fuel cell. Column 4 of Table 4 provides the background corrected data for the speaker. The transfer function to each property line is shown in column 5 and the estimated level for nine fuel cells in shown in column 6. The 10-meter Montville airborne noise levels were used with the Ansonia transmission loss data to estimate the expected nine fuel cell airborne noise at the six nearby neighbors. Only the locations closest to the fuel cells on North Main Street are near or above the night time 51 dBA noise limit.

Table 3 Measured Overall Sound Pressure Levels in dBA ref. 20 microPascals with **Speaker Off**

Location	Range in Meters	Direction	Leq	Max	Min	L10	L90
Speaker Off	5	North	55.9	58.3	52.2	57.6	**53.4**
Speaker Off	10	North	53.7	57.5	41.3	56.5	**42.5**
Speaker Off	5	South	53.9	57.9	47.1	56.5	**48.6**
Speaker Off	10	South	55.3	67.7	47.8	56.1	**49.1**
North Speaker							
10 Liberty	104	North	65.6	74.8	45.6	70.6	**46.3**
61 North Cliff	30	East	54.7	80.4	43.4	58.2	**43.9**
31 North Cliff	50	East	70.1	78.3	49.2	75.0	**51.9**
5 State Street	125	South East	67.2	76.0	57.0	71.0	**59.6**
10 State Street	160	South East	57.8	71.8	51.1	59.9	**52.2**
1 Main Street	185	South	61.9	80.1	56.0	63.3	**59.6**

Table 4 Background Corrected L90 Sound Pressure Levels in dBA ref. 20 microPascals

Location	Range in Meters	Location	L90 Estimate	Transfer Function	Property Line	Night Spec	Over Spec
North Speaker			In dBA	In dB	dBA	dBA	dBA
10 Liberty	104	North	**45.6**	36.2	36.5	51	
61 North Cliff	30	East	**59.8**	22	50.7	51	
31 North Cliff	50	East	**52.1**	29.7	43	51	
5 State Street	125	South East	**44.7**	37.1	35.6	51	
10 State Street	160	South East	**42.7**	39.1	33.6	51	
1 Main Street	185	South	**41**	40.8	31.9	70	
South Speaker							
61 North Cliff	50	East	**51.1**	25.6	46.2	51	
31 North Cliff	30	East	**58.9**	17.8	**54**	51	3 dB
5 State Street	100	South East	**42.7**	34	37.8	51	
10 State Street	137	South East	**42.7**	34	37.8	51	
1 Main Street	165	South	**40.2**	36.5	35.3	70	

The South transfer function appears to be about 4 dB stronger than the North transfer function causing the closest property line to exceed the 51 dBA night time noise limit by 3 dB at the very closest location. This calculation was done with the cooling modules 3 meters from the wall rather than 15 meters, a change that lowers the noise levels across the street by about 4 dB. Locations further than 30 meters from the cooling modules will meet all the requirements.

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Figure 6. Noise Tool Model of Noise Speaker Location with P2 Measurement of 59.8 dBA

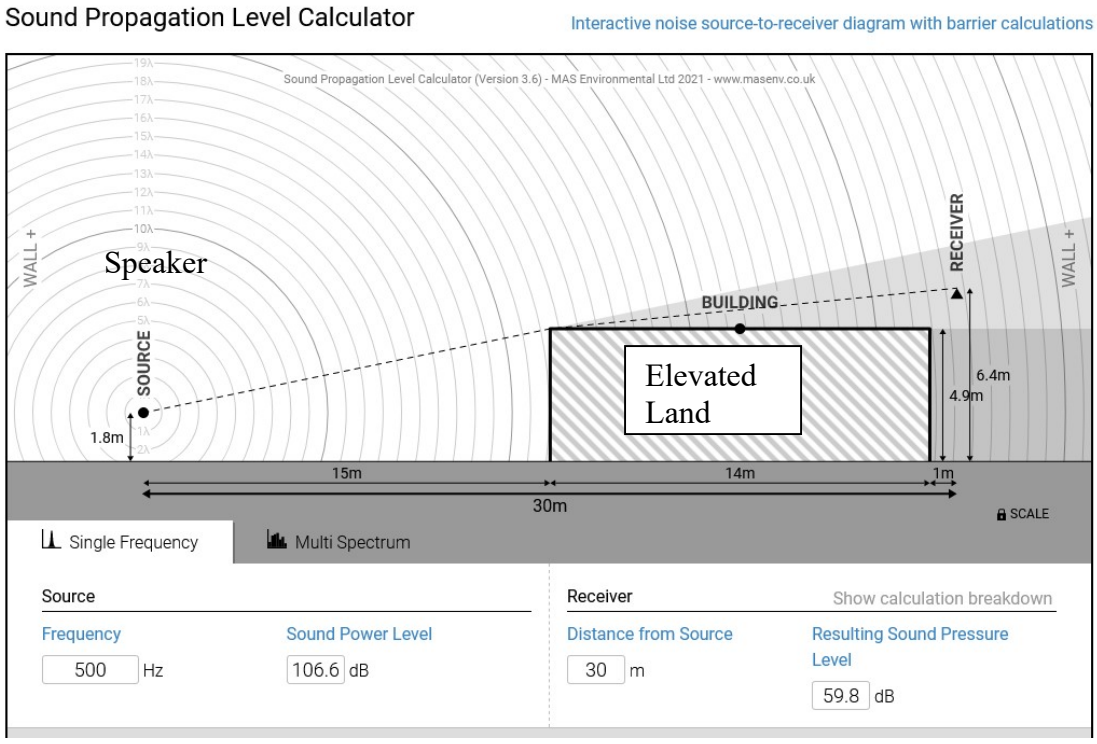


Figure 7. Noise Tool Model of Expected Noise from One Cooling Module at 30 Meters

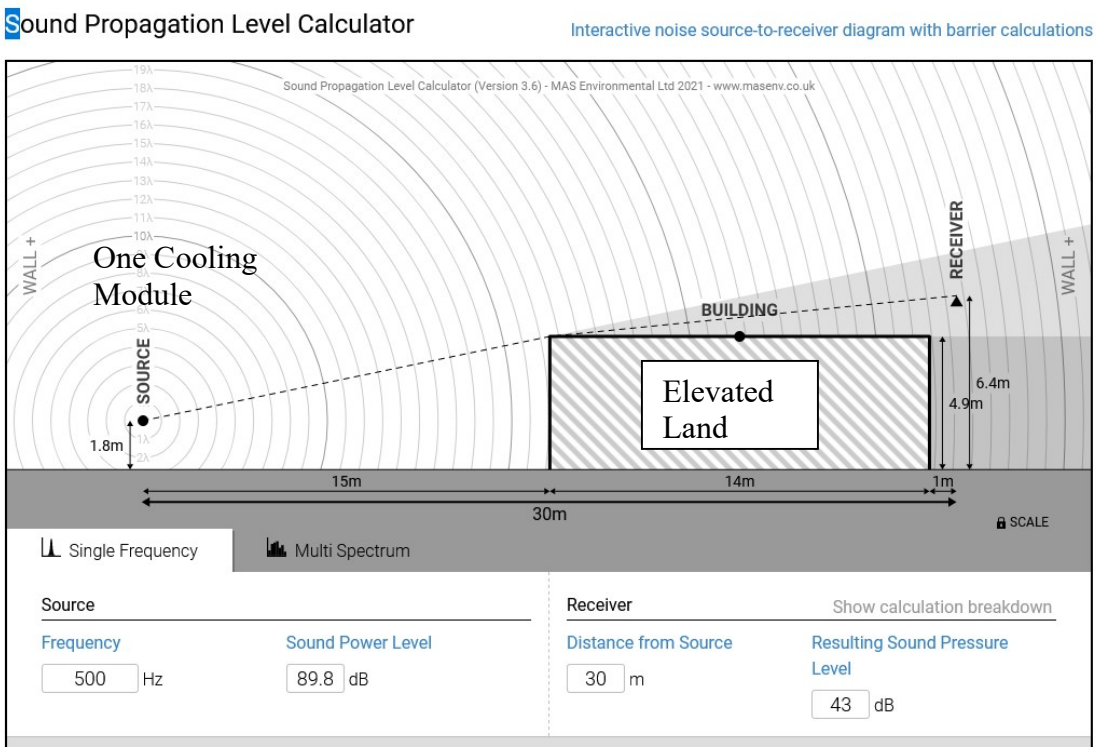
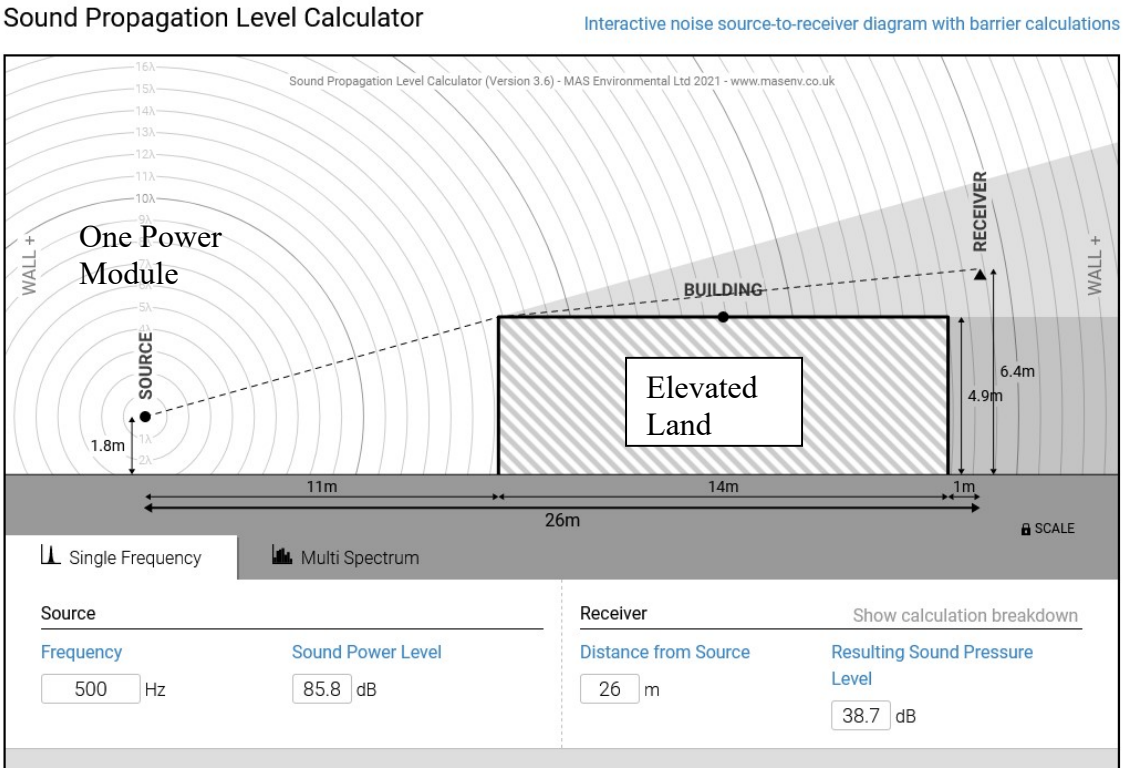


Figure 8. Noise Tool Model of Expected Noise from One Power Module at 26 Meters



The airborne noise levels to be produced by the HiAxiom fuel cells are shown in Table 4. For each of the six locations the Ansonia measurements are corrected to account for the higher speaker levels. The fuel cell noise correction for the Cooling Module is estimated to be 17dB for the North location because the speaker levels are that much higher than the Montville Cooling Module levels. The speaker at the South location was estimated to be 14 dB higher than the Montville Power Module levels.

The measurements at Ansonia were taken at various distances from the speakers and then corrected to estimate the expected noise from nine fuel cells. Except for the closest location at 30 meters, the airborne noise levels are all below 47 dBA, 4 dB below the lowest residential night time noise limit. The other properties not on North Main Street are expected to be below 38 dBA depending on how close the locations are to the fuel cells.

Allowable Noise Levels

Connecticut's regulation for the control of noise provides in *CT section 22a-69*-3[1] the requirements for noise emission in Connecticut. *Section 22a-69*-3.1 states that no person shall cause or allow the emission of excessive noise beyond the boundaries of his/her Noise Zone so as to violate any provisions of these Regulations. The CT ordinance will be used to evaluate the noise generated by the HiAxiom 460 KW Fuel Cells. (The Ansonia noise ordinance has the same noise limits.) Following sections discuss each type of noise using the results obtained from the October 3, 2023 speaker measurements in Ansonia and the HiAxiom 460 KW fuel cell test in Montville, CT reported on July 13, 2020.

As stated above, the Ansonia site is located in an Industrial Zone on North Main Street and is surrounded by Residential Zones. The closest residential zone is only 30 meters away. Based on the analysis resulting in Table 4 the airborne noise from the nine new fuel cells should be below the 51 dBA noise limit at distances greater than 30 meters. A 100-meter-long stretch of North Main Street opposite the fuel cells will see airborne noise levels slightly above 51 dBA. All other nearby residential properties at greater distances are expected to be well below the day time and night time Residential Zone noise limits for an emitter in an Industrial zone.

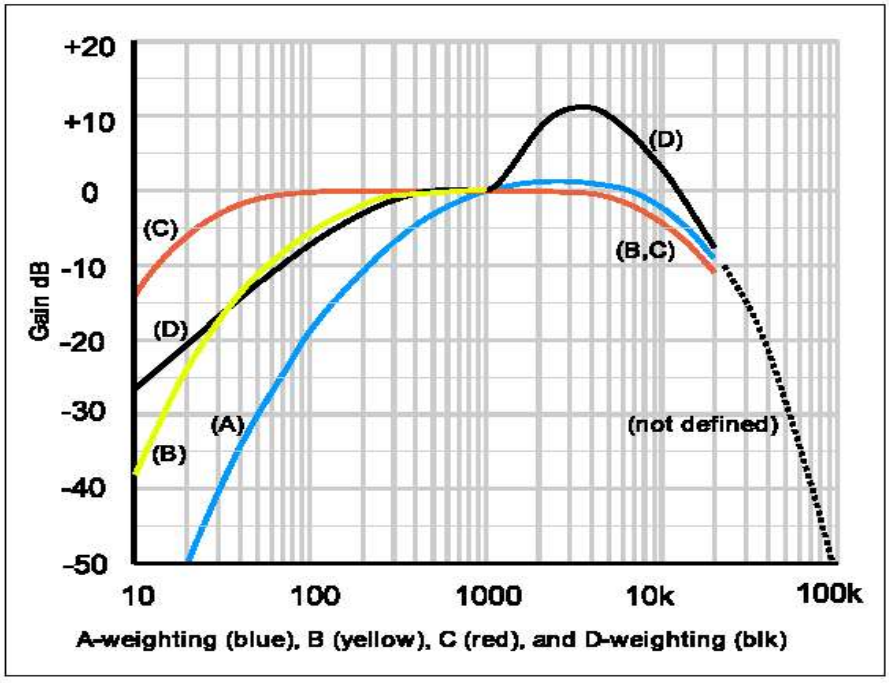
Because of the traffic noise on North Main Street, experience suggests a noise level less than 5 dB above the requirement would not be objectionable since the fuel cells generate mostly random noise. Nine fuel cells will probably be heard at low level along North Main Street.

Impulse Noise

The Connecticut noise code states in *CT section 22a-69*-3.2 (part a) *Impulse Noise* that no person shall cause or allow the emission of impulse noise in excess of 80 dB peak sound pressure level during the night time to any class A Noise Zone. Night time is defined as 10 pm to 7 am. *CT section 22a-69-3.2 (part b) Impulse Noise* states that no person shall cause or allow the emission of impulse noise in excess of 100 dB peak sound pressure level at any time to any Noise Zone. The Ansonia noise ordinance sets the same limits for Impulse Noise.

Figure 9. Acoustic Airborne Noise Weighting Curves

http://upload.wikimedia.org/wikipedia/commons/3/39/Acoustic_weighting_curves_(1).svg



1 of 1 1/25/2013 9:35 PM

Impulse noise in excess of 80 dBA was not observed during any of the ten property line measurements of the Doosan 460 KW fuel cell made at the Montville site on 7 July, 2020[3]. The maximum level measured was 79.7 dBA at location P2 using the ExTech sound level meter. This and the other levels above 70 dBA were caused by vehicle traffic and not by the fuel cell. Unweighted impulse noise levels were determined using a Hewlett Packard HP3561A spectrum analyzer. (The maximum level ten meters from the fuel cell was 77 dBA.) The closest Ansonia property showed 18 dB of transmission loss so the highest expected level would be below 60 dB. Given the steady state nature of the fuel cell's noise signature there should be no acoustic issues with the State of Connecticut's or the City of Ansonia's impulse noise requirements.

A few words are in order to discuss the difference between A-weighted and un-weighted impulse noise. A-weighting emphasizes the middle and higher frequencies while reducing the influence of the low frequencies. Figure 9 above plots the A-weighting curve versus frequency in blue. Below a frequency of 1 kiloHertz the acoustic level is attenuated by increasing amounts. The reduction is about 10 dB at 200 Hertz, 20 dB at 90 Hertz and 30 dB at 50 Hertz. It also reduces the level at very high frequency being down in level by 10 dB at 20 kiloHertz. The fuel cell measurements show the unweighted overall levels to be about 9 dB higher than the A-weighted noise levels. Adding 9 dB to the Montville measured levels brings the peak impulse up to about 69 dB reference 20 microPascals. The impulse noise levels on North Main Street should be no higher than 69 dB reference 20 microPascals, well below the 100 dB limit.

Prominent Discrete Tones

The Connecticut regulation for the control of noise states in *CT section 22a-69-3.3 Prominent discrete tones:* Continuous noise measured beyond the boundary of the Noise Zone of the noise emitter in any other Noise Zone which possesses one or more audible discrete tones shall be considered excessive noise when a level of 5 dBA below the levels specified in section 3 of these Regulations is exceeded. The CT Regulations establish different noise limits for different land use zones. Residential (homes and condominiums) and hotel uses are in Class A. Schools, business, parks, recreational activities and government services are in Class B. Forestry and related services are in Class C. By my reading of the regulations the Ansonia is a Class C emitter in an Industrial Zone. The noise zone standards in *CT section 22a-69-3.5* state that a Class C emitter cannot exceed the following overall sound pressure levels:

To Class C 70 dBA To Class B 66 dBA To Class A 61 dBA (day) 51 dBA (night)

The discrete tones limits are 5 dBA lower so that no tone may be higher than the following:

To Class C 65 dBA To Class B 61 dBA To Class A 56 dBA (day) 46 dBA (night)

The Ansonia noise ordinance does not discuss discrete tones so the CT Noise Ordinance will be used. To address the discrete tone issue, we use measured spectral data from the Reference 3 Montville testing. The data is the maximum level received in 1/30 octave bands for frequencies from 0.32 to 100,000 Hz. Figure 10 plots the airborne noise measured 10 meters from the Cooling and Power Modules in 1-30th octave bands. This figure shows some discrete tones in the middle frequencies produced by the HiAxiom Fuel Cell Cooling and Power Modules. The

eight largest tones are given in Table 5. The highest is 55.1 dB reference 20 microPascals at 302 Hz. The second highest tone is at 213.8 Hz at a level of 54.3 dB reference 20 microPascals. All the remaining tones are below 53 dBA. The A-weighted discrete tone corrections are given in the 4th row of Table 5. Incorporating the transmission loss to the properties gives the A-weighted levels in the last three rows of Table 5 after the 9.5 dB correction for nine units is added. (The 9.5 dB correction for 9 units over estimates by about 1.5 dB the combination of nine fuel cells spaced 10 meters apart.) All the frequencies at the nearest residences on North Main Street have levels that are below the 46 dBA requirement in a Residential Zone by at least 3 dB. All the nearby residential properties should meet all the discrete tone requirements. There should be no acoustic issue with the CT discrete tone noise requirements at any of the nearby properties.

Figure 10. Montville Tones 460 KW Fuel Cell Cooling & Power Modules in 1-30th octave bands

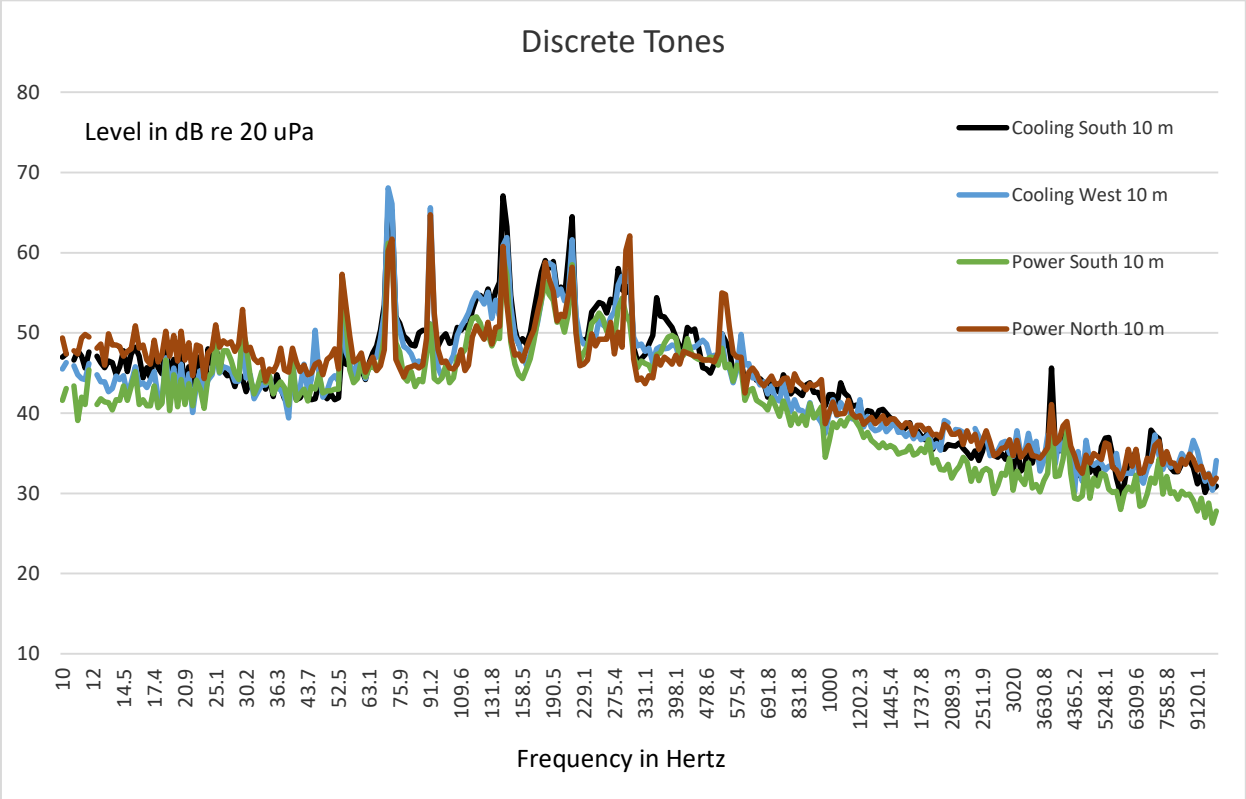


Table 5. Peak Discrete Sound Pressure Level Estimates in dB ref. 20 microPascals

Location	Range Meters	53.7 Hz	70.8 Hz	91.2 Hz	141.3 Hz	213.8 Hz	302 Hz	3801 Hz	4169 Hz
Allowed Level		**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**
Montville	10	57.3	68.1	65.6	67.1	64.5	62.1	45.6	39
A Weighting		-29.0	-24.3	-20.5	-14.7	-10.2	-7.0	1.0	0.9
Ansonia 1 unit	10	28.3	43.8	45.1	52.4	54.3	55.1	46.6	39.9
9 Fuel Cells	10	37.8	53.3	54.6	61.9	63.8	64.6	56.1	49.4
P1– 10 Liberty	104	1.6	17.1	18.4	25.7	27.6	28.4	19.9	13.2
P2– 61 NMain	30	15.8	31.3	32.6	39.9	41.8	42.6	34.1	27.4
P3– 31 NMain	50	8.1	23.6	24.9	32.2	34.1	34.9	26.4	19.7
P4– 10 State	125	0.7	16.2	17.5	24.8	26.7	27.5	19.0	12.3

Infrasonic and Ultrasonic Noise

The Connecticut regulation for the control of noise states in *CT section 22a-69-3.4 Infrasonic and Ultrasonic* that no person shall emit beyond his/her property infrasonic or ultrasonic sound in excess of 100 dB at any time. 100 dB with respect to the reference of 20 microPascals is a sound pressure of 2 Pascals or 0.00029 psi. Infrasonic sounds are sound pressure fluctuations below a frequency of 20 Hertz. Ultrasonic sounds are sound pressure fluctuations at frequencies above 20,000 Hertz. There is no mention in the Ansonia Noise Ordinance that limits infrasonic or ultrasonic noise so the State of CT Noise Ordinance will be used.

Narrow bandwidth sound pressure spectrums in dB reference 20 microPascals made at the Montville western 10-meter Cooling Module location can be used to compare with the infrasonic and ultrasonic noise requirements. The Montville airborne noise data were processed in the 0 to 200 Hertz and 0 to 100,000 Hertz frequency ranges. The bandwidth of each data point is 0.75 Hertz for the 200 Hertz range and 375 Hertz for the 100,000 Hertz frequency range. The infrasonic noise for frequencies up to 20 Hertz is shown in Figure 11 for the 460 KW unit at Montville[3]. The maximum level at 10 meters is 48 dB reference 20 microPascals. The entire 20 Hertz band can be power summed and never exceeds 70 dB reference 20 microPascals at 10 meters in Montville. After subtracting 17.8 dB for the maximum transfer function correction at Point P3, the closest site, and adding the gain of 9.5 dB for nine units, the 61.7 dB level is well below the Infrasonic requirement of 100 dB for the Ansonia site. The noise levels at all the other nearby residential neighbors will be lower. There should be no issue with the infrasonic noise requirement at any of the neighboring residential properties.

The ultrasonic noise for frequencies up to 100 KiloHertz is given in Figure 12. The Montville data uses a microphone with flat high frequency performance and provides a good estimate for the 460 KW fuel cell. The entire 80 KiloHertz band from 20 to 100 kiloHertz has been power summed and never exceeds a noise level of 62 dB reference 20 microPascals 10 meters from the

fuel cell at Montville. After subtracting 17.8 dB for the maximum transfer function correction at Point P3, the closest site, and adding the gain of 9.5 dB for nine units, the ultrasonic level of about 53.7 dB is well below the requirement of 100 dB for the Ansonia site. The noise levels at all the other nearby residential neighbors will be lower and there should be no issue with ultrasonic noise at any of the neighboring properties.

Figure 11. Infrasonic Noise from Montville Fuel Cell Cooling Modules in 1-30th octave bands

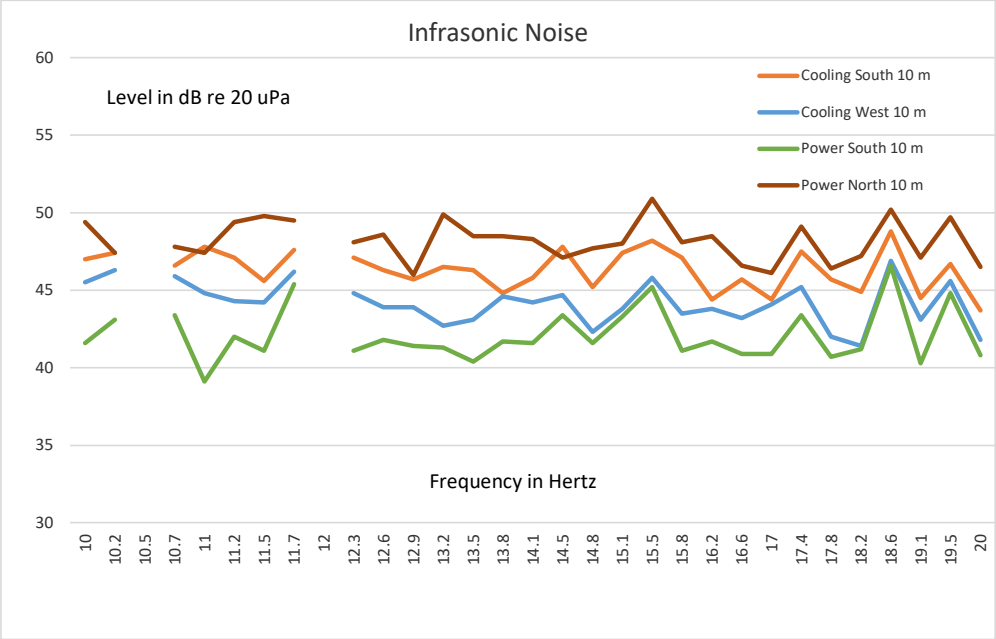
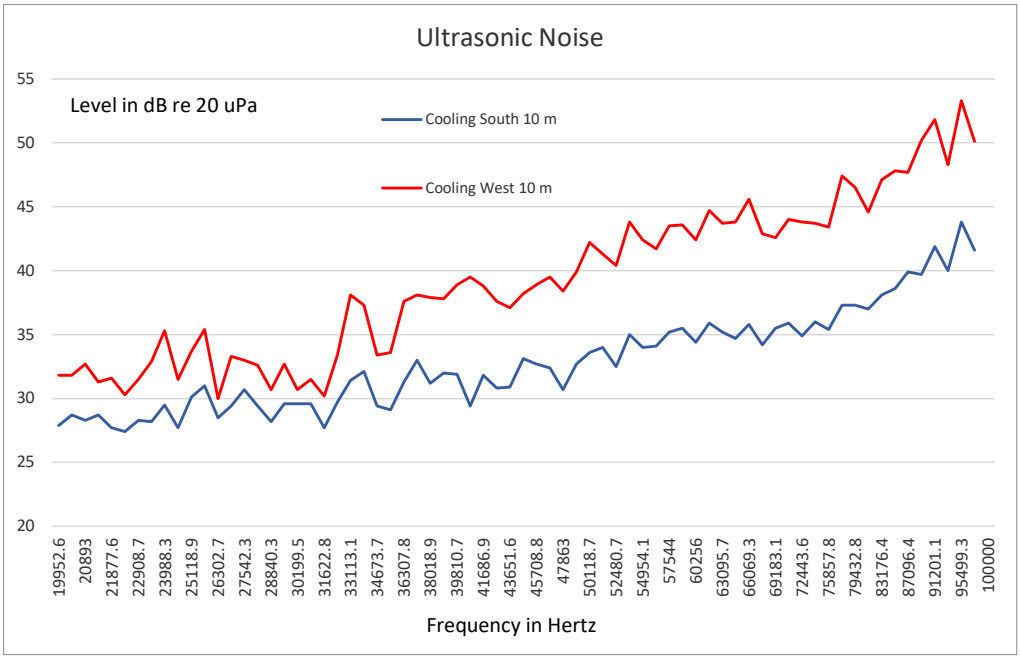


Figure 12. Ultrasonic Noise from Montville Fuel Cell Cooling Modules in 1-30th octave bands



Overall Sound Pressure Levels

The Connecticut regulations for the control of noise state that
(a) No person in a Class C Noise Zone shall emit noise exceeding the levels below:

To Class C 70 dBA To Class B 66 dBA To Class A 61 dBA (day) 51 dBA (night)

The Ansonia site is in an Industrial Zone that has surrounding Residential Zones. The nearby neighbors in AAA and B residential zones have airborne noise limits of 61 dBA during the day and 51 dBA at night. The Industrial Zone limit is 70 dBA.

The estimated overall A-weighted sound pressure levels for nine fuel cells in dBA reference 20 microPascals are given in column 6 of Table 4 above using the background corrected measurements made on October 3, 2022. The second column gives the approximate distance from the fuel cells to the measurement location, with locations identified by a P number in Figure 2. Column 3 gives the direction from the fuel cell to the property. The airborne noise values given in column 4 are the estimated received level for one speaker. The transfer functions in column 7 provide the loss in sound level from the fuel cells to the property lines. The values in column 6 provide the estimated airborne noise levels at the property lines with nine fuel cells operating. The values are all below the industrial zone noise limit and below the residential noise limits except for position P3 which is across the street from the fuel cells. The increasing loss with distance to the surrounding residential properties means all should be lower than 51 dBA.

Operation of the nine HiAxiom fuel cells will have no significant acoustic impact at all but one of the nearby properties adjacent to the HiAxiom fuel cell site on North Main Street. The adjacent property at 61 Cliff Street is open land between a Church and a garage on a hill about 50 feet above North Main Street. The first 20 meters of this property abutting North Main Street is a steep hill that no one normally occupies. The location of the cooling modules at 15 meters from the wall results in a 53 dBA noise level at position 2 and a 56.3 dBA level at position 3. The location of the cooling modules at 3 meters from the wall results in a 50.7 dBA noise level at position 2 and a 54 dBA level at position 3. It is recommended to move the cooling modules as close as possible to the wall on North Main Street.

The other properties close to the fuel cells should see overall airborne noise levels from the fuel cells below the 51 dBA airborne noise requirement. Some of these properties may be able to hear the fuel cells at noise levels below the background noise below 51 dBA when no traffic is present. Residential properties not on North Main Street in the Industrial and Residential Zones are not expected to hear the fuel cells. All of the nearby residential and industrial properties should not be affected by the operation of the nine fuel cells.

Conclusions

The purpose of this effort is to evaluate the acoustical environment at the Ansonia sire during operation of the nine HiAxiom 460 KW fuel cells. This effort has been accomplished and the results show that the operation of the nine HiAxiom 460 KW fuel cells will meet all of the State of Connecticut and City of Ansonia airborne noise requirements at all the nearby properties

except for one property across the street. Other residences in all directions are expected to meet all the noise requirements because they are far enough away from the new fuel cells and have airborne noise levels below 51 dBA. Locations at distances greater than 150 meters should not hear the operating 460 KW fuel cells.

References

1) CT DE&EP *Noise Control Regulation RCSA Section 22a-69*-1 to 22a-69-7.4 http://www.ct.gov/dep/lib/dep/regulations/22a/22a-69-1through7.pdf

2) Ansonia Noise Ordinance, http://portal.ct.gov/AnsoniaNoiseOrdinancepdf.pdf

3) Town of Montville Water Pollution Control Authority Airborne Noise Test

   At 83 Pink Row, Acoustical Technologies Inc., July 13, 2020

4) https://noisetools.net/barriercalculator was used in the sound pressure calculations

HyAxiom Inc,
A Doosan Company
101 East River Drive
East Hartford, CT 06108

October 6, 2023

RE: Petition For a Declaratory Ruling That No Certificate of Environmental Compatibility And Public Need is Required ("Petition") for the Installation of Nine (9) on-site, 460 kW Fuel Cells at 35 North Main Street, Ansonia, CT 06401.

Dear Recipient,

Pursuant to Section 16-50j-40 of the Connecticut Siting Council's (the "Council") Rules of Practice, we are notifying you that HyAxiom, Inc. intends to file a petition for declaratory ruling with the Connecticut Siting Council ("Council") on or about October 9, 2023. The petition will request the Council's approval of the installation of Nine (9) 460kW fuel cells and ancillary equipment in support of a grid-side, distributed generation project at 35 North Main St. Ansonia, CT 06401. The fuel cells will be powered by natural gas and the generated electricity will be distributed directly to the Power Grid.

The proposed placement of the fuel cells are located within the confines of the Old Ferrell Foundry property. The fuel cells will be arranged in a fenced area in the Northeast corner of the property.

If you have any questions regarding the proposed work, please contact any of the following:

HyAxiom, Inc.

John Prinssen
101 Riverside Drive
East Hartford, Ct 06108
Tel: (860) 727-2091
john.prinssen@doosan.com

Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051
Tel: 860-827-2935

Attachment #12

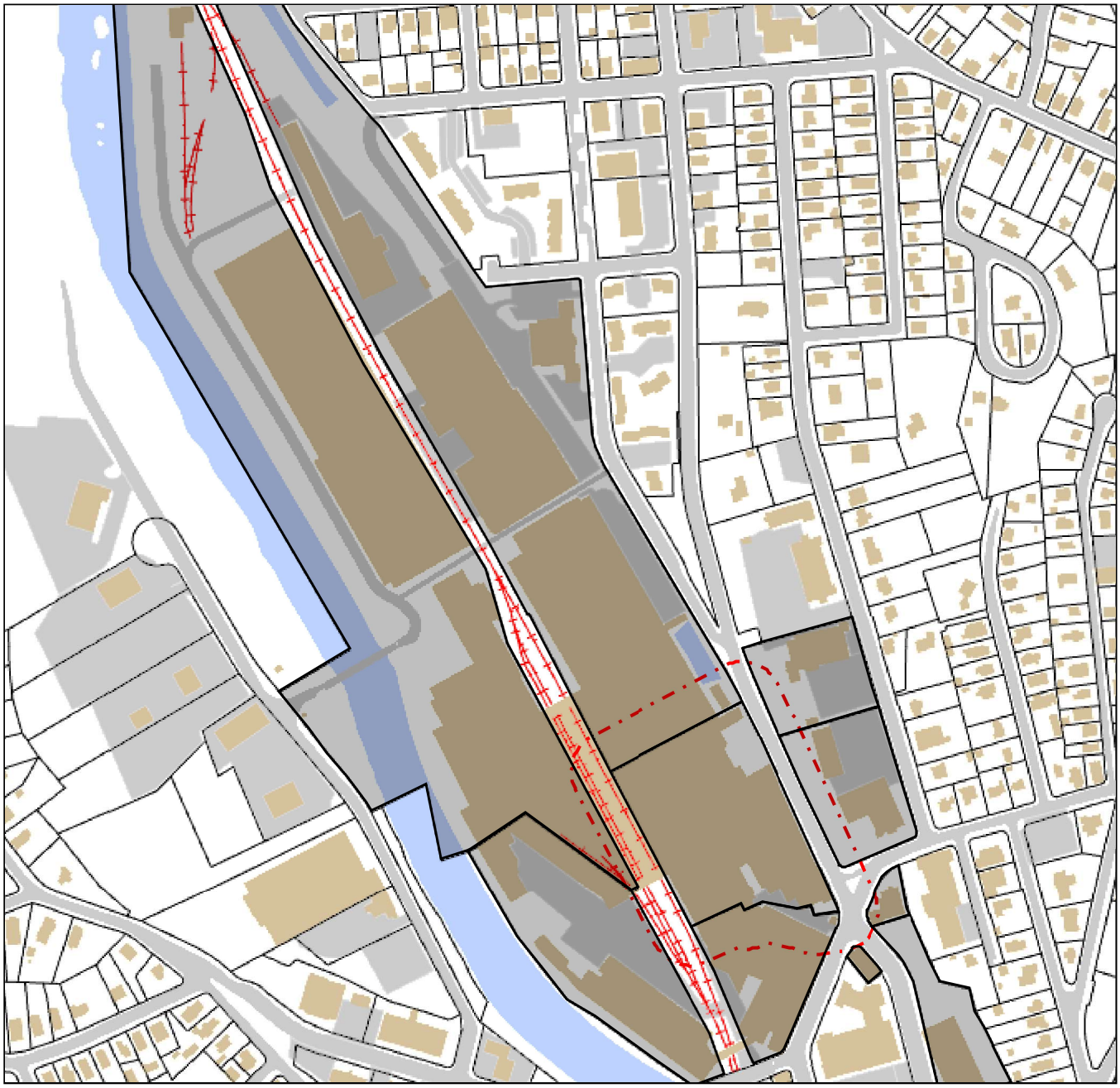
Parcel ID	Site Address	Owner Name	Mailing Address	Mailing City	Mailing State	Mailing Zip
033 0019 0000	75 LIBERTY ST	ANSONIA COPPER & BRASS INC	7 PINE LEDGE RD	BRANT LAKE	NY	12815- 0000
032 01-2 0000	1 W MAIN ST	WEST MAIN LLC & THE SEARLE SELMON &	1 W MAIN ST	ANSONIA	CT	06401- 0000
044 0038 0000	540 E MAIN ST	KBR ENTERPRISES LLC	46 SKOKORAT ST	SEYMOUR	CT	06483- 0000
043 0001 0000	35 MAIN ST	WEST MAIN LLC & THE SEARLE SELMON &	35 MAIN ST	ANSONIA	CT	06401- 0000
043 0001 0001	35 N MAIN ST	CITY OF ANSONIA THE	253 MAIN ST	ANSONIA	CT	06401- 0000
043 0002 0000	25 N CLIFF ST	CHURCH OF ASSUMPTION	61 N CLIFF ST	ANSONIA	CT	06401- 0000
043 0003 0000	5 STATE ST	CITY OF ANSONIA	5 STATE ST	ANSONIA	CT	06401- 0000
044 0001 0000	20 MAIN ST	CITY OF ANSONIA	1 N DIVISION ST	ANSONIA	CT	06401- 0000
043 0004 0000	10 STATE ST	CHURCH PROPERTY JOINT VENTURE TRUSTEE	10 STATE ST	ANSONIA	CT	06401- 0000
035 0001 0004	7 RIVERSIDE DR	ANSONIA COPPER & BRASS	7 PINE LEDGE RD	BRANT LAKE	NY	12815- 0000
	Mayor	David Cassetti	253 MAIN ST	ANSONIA	CT	06401- 0000
	Zoning	David Blackwell	253 MAIN ST	ANSONIA	CT	06401- 0000
	Land Use	Ronda Porrini	253 MAIN ST	ANSONIA	CT	06401- 0000
	Fire Marshal	Darrick Lundeen	PO BOX 421	ANSONIA	CT	06401- 0000
	Town Clerk	Beth Shortell Lynch	253 MAIN ST	ANSONIA	CT	06401- 0000
	City Records	Jan Silva	253 MAIN ST	ANSONIA	CT	06401- 0000
	Town Assessor	David Graybosch	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Daniel King	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Gary Farrar Jr.	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Steven Adamowski	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Bobbi Tar	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Joseph Cassetti	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Joe Jeanette Jr.	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Robert Knott	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Nate Hardy	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Joseph Jaumann	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Chicago Rivers	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Josh Shuart	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Tony Mammone	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Tony Levinsky	253 MAIN ST	ANSONIA	CT	06401- 0000
	Aldermen	Mario Durante	253 MAIN ST	ANSONIA	CT	06401- 0000
	Economic Development	Shelia O' Maley	253 MAIN ST	ANSONIA	CT	06401- 0000
	US Senator	Richard Blumenthal	655 Dirksen Senate Office Bldg.	Washington	DC	20510
	US Senator	Chris Murphy	303 Hart Senate Office Bldg.	Washington	DC	20510
	104th district	Kara Rochelle	**Legislative Office Bldg. Rm 4000**	Hartford	CT	06106-1591
	State Senator 17th district	Jorge Cabrera	**Legislative Office Bldg. Rm 2800**	Hartford	CT	06106-1591
	US Representative 3rd district	Rosa Delauro	2413 Rayburn House Office Bldg	Washington	DC	20515
	Secretary of the state	Stephanie Thomas	PO Box 150470 165 Capitol Ave Suite 1000	Hartford	CT	06115-0470
	Comptroller	Sean Scanlon	165 Capitol Avenue	Hartford	CT	06106-0000
	CT DEEP	Katie Dykes	79 Elm Street	Hartford	CT	06106-5127
	Federal DEP	David Cash	1 Ashburton Place	Boston	MA	02108-0000
	CT Historic Preservation Office	Jonathan Kinney	450 Columbus Boulevard Suite 5	Hartford	CT	06103-0000
	Office of Policy and Management	Jeffrey Beckham	450 Capitol Ave	Hartford	CT	06106-0000

Attachment #13

City of Ansonia

Geographic Information System (GIS)

Date Printed: 10/5/2023



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This map is for assessment purposes only. It is not for legal description or conveyances. All information is subject to verification by any user. The City of Ansonia and its mapping contractors assume no legal responsibility for the information contained herein.

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Attachment #15

PureCell Model 400 Fuel Processing System (FPS)

The FPS converts pipeline-quality natural gas into hydrogen reformate – a hydrogen-rich gas that is delivered to the anode side of the fuel cell stacks. This module includes a condenser to recover water generated in the fuel cell reaction by condensing water vapor from the process exhaust. This eliminates the need for makeup water under most operating conditions. The recovered water is used in the steam reformation process. The main components of the FPS include the following:

Hydro-Desulfurizer

The desulfurizer system removes sulfur used as an odorant in natural gas, which is a poison to the catalysts used in the fuel cell systems. Sulfur is converted to zinc-sulfide, a non-hazardous waste, within the desulfurizer and remains there until an overhaul is required, nominally after 10 years. This system will also remove small amounts of oxygen in the gas.

Steam Reformer

Steam (H_2O) generated in the cell stack cooling loop of the TMS is combined in the reformer with methane (CH_4) in the natural gas to generate a gas composed of hydrogen (H_2), carbon monoxide (CO), and carbon dioxide (CO_2).

$2CH_4 + 3H_2O = 7H_2 + CO + CO_2$ *Equation 1*

Integrated Low-Temperature Shift Converter

The integrated low-temperature shift converter (ILS) generates additional hydrogen through a water-gas reaction in which CO and water is converted to hydrogen and CO_2. The reduced CO content minimizes its adverse effect on fuel cell stack performance.

$CO + H2O = H2 + CO2$ *Equation 2*

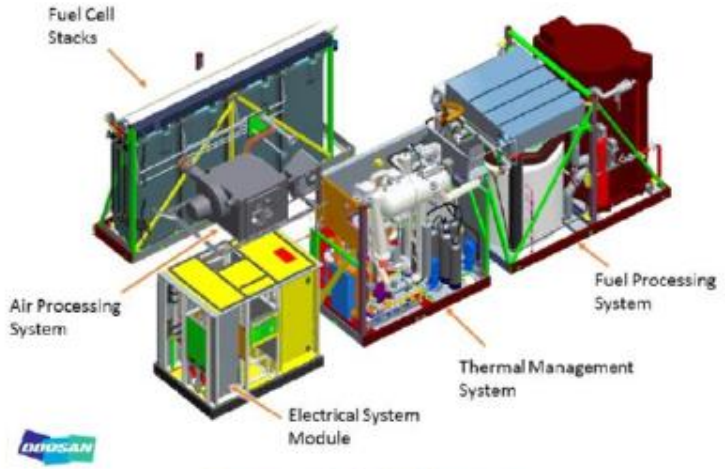

Figure 1. PureCell Model 400 Subsystems