VIA ELECTRONIC MAIL

November 8, 2016

Dawn Mahoney, Esq.
General Counsel
Doosan Fuel Cell America Inc.
195 Governor's Highway
South Windsor, CT 06074

RE: **PETITION NO. 1257** – Doosan Fuel Cell America, Inc. petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required to replace an existing customer-side 400-kW fuel cell with a 440-kW customer-side combined heat and power fuel cell located at the Eastern Connecticut State University Science Building, 83 Windham Street, Willimantic, Connecticut.

Dear Attorney Mahoney:

The Connecticut Siting Council (Council) requests your responses to the enclosed questions no later than November 22, 2016. To help expedite the Council's review, please file individual responses as soon as they are available.

Please forward an original and 15 copies to this office, as well as send a copy via electronic mail. In accordance with the State Solid Waste Management Plan and in accordance with Section 16-50j-12 of the Regulations of Connecticut State Agencies the Council is requesting that all filings be submitted on recyclable paper, primarily regular weight white office paper. Please avoid using heavy stock paper, colored paper, and metal or plastic binders and separators. Fewer copies of bulk material may be provided as appropriate.

Yours very truly,

Melanie Bachman
Acting Executive Director

MB/MP

c: Council Members

Petition No. 1257
Doosan Fuel Cell America, Inc.
83 Windham Street
Willimantic (Windham), CT
Interrogatories

1. Why is the existing 400-kilowatt (kW) fuel cell proposed to be replaced, e.g. age, more electric power capacity, upgrade to more efficient model, etc.? Would the proposed replacement fuel cell be considered an "upgrade?" If yes, explain why, e.g. because of the higher power output, higher efficiency, etc.

R1. A 10% increase in nameplate capacity (440kW vs 400kW). There are no other changes to the fuel cell other than the nameplate certification. At the time the original fuel cell was installed there was no property tax exemption.

2. What is the age of the existing fuel cell, relative to its service life? What is the projected service life of the proposed replacement fuel cell?

R2. The original unit was commissioned on 6/14/2012. The product has a 20 year product life with a projected 10-year overhaul. The replacement fuel cell is the same.

3. What would Doosan Fuel Cell America, Inc. (Doosan) do with the existing fuel cell to be removed? For example, would it be refurbished at the factory for resale or recycled as (mostly) scrap metal? Is there significant monetary recovery for some/all of its contents?

R3. The existing fuel cell is returned to our facility in South Windsor, CT where it is refurbished-(cell stacks replaced) and prepared for a new site.

4. Would Doosan replace or upgrade the existing concrete pad and fence to accommodate the proposed replacement fuel cell and its cooling module? Would bollards be used to protect the fuel cell facility from being accidentally struck by vehicles?

R4. There is no need to replace or upgrade the existing concrete pad and fence. Bollards will protect the fuel cell facility from being accidentally struck by vehicles. If there is a concern, please let us know.

5. Provide a more detailed and "zoomed in" proposed site plan (than currently depicted on page 7 of the Petition) that includes but is not limited to the fuel cell, cooling module, concrete pads, fence design and bollards (if applicable), and utility connections.

R5. Please see attached ECSU-1-ECSU Site Plan.

6. Is the project located outside of the 100-year and 500-year flood zones? If no, would the proposed replacement fuel cell and cooling module be elevated as a flood mitigation measure, e.g. one foot above the 100-year flood elevation?

R6. Please see attached ECSU-2-Flood Zone Map: The fuel cell facility will not be located in a designated flood zone.

7. Is the fuel cell located within any environmentally sensitive areas?

R7. No.

8. Page two of the Petition states that the facility would be "…generating heat that will be used for space heating and cooling." Would the fuel cell's waste heat be used only for heat, dehumidification re-heat, and domestic hot water, or would it also be used for cooling, e.g. absorption cooling?

R8. Building heating only.

9. Would the facility only consume water during the initial commissioning start-up or every time the unit cycles on? How much water is used for a start-up? Would the fuel cell run on mostly a 24/7 basis as a baseload facility and thus have infrequent start-ups?

R9. Unit operates in water balance below 86°F. The initial fill requires 350 gallons. The amount of make-up water above 86°F increases linearly from 0gpm to 1gpm at 110°F.

10. Would the fuel cell facility provide backup power in the event of a power outage? If yes, would the fuel cell first shut down and then automatically "black start" to restore power, or would it continue running seamlessly despite the loss of grid power (i.e. provide uninterruptible power)? Please explain.

R10. No.

11. Would any surplus power be sold to the grid?

R11. No.

12. Please provide an Emergency Response Plan for the proposed facility in accordance with Public Act 11-101, An Act Adopting Certain Safety Recommendations of the Thomas Commission.

R12. Please see attached ECSU-Emergency Response Plan.

13. Please identify media to be used for pipe cleaning procedures at the proposed facility in accordance with Public Act 11-101, An Act Adopting Certain Safety Recommendations of the Thomas Commission.

R13. Use atmospheric air under pressure—no solvents or cleaners.

14. Please submit a noise analysis report to demonstrate compliance with the Connecticut Department of Energy and Environmental Protection (DEEP) noise control standards. In the Petition, Doosan predicts a noise level of not more than 62 dBA at 100+ feet away for the fuel cell. Is the cooling module included in this noise prediction? If no, please update this noise prediction and ensure compliance with DEEP noise control standards.

R14. The cooling module is included as part of the fuel cell facility. The noise sound level on page 8 of the petition includes both the fuel cell plant and the cooling module.

15. Which National Fire Protection Association (NFPA) or other codes and standards apply to fuel cell construction, installation and/or modification?

R15. ANSI FC-1 2014: American National Standard for Stationary Fuel Cell Power Systems. This certification calls out all codes and standards for stationary fuel cell applications.

16. Provide a table showing state criteria thresholds and projected emissions from the proposed facility for all greenhouse gasses listed in the Regulations of Connecticut State Agencies Section 22a-174-1(49) with and without the use of waste heat.

R16. Please see the table below.

The Model 400 is certified by the CARB to meet the Distributed Generation Regulation 2007 Fossil Fuel Emission Standard.

Table 2-5. PureCell® Model 400 Emissions Data

	lb./MWh	*PPMvd @ 15.4% O_2*
NO_x	0.01	0.32
CO	0.02	0.67
VOC	0.02	1.36
CO_2	1050	

17. Quantify the amount of phosphoric acid in the proposed replacement fuel cell.

R17. There is no measurable difference in phosphoric acid content between the new and existing fuel cell. Phosphoric acid is bound within a matrix within the fuel cell stacks and the quantity is proprietary.

18. Which emission rate in pounds of CO_2 per megawatt-hour (MWh) did Doosan use for the eGRID non-baseload generation for the ISO New England, Inc. electric system? Doosan estimates that annual carbon emissions would be reduced by about 300 metric tons per year. Is this only for displacement of non-baseload electric generation, or would the total carbon reduction be potentially higher because the use of waste heat would reduce the runtime of the building's boiler(s)?

R18. We use the 2012 eGrid "Fossil fuel output emission rate (CO2 lbs/MWh)" of 980.27 with a grid loss of 9.17% for a total of 1070 lbs/MWh for the NEWE Region. We account for the CO2 offset to natural gas heating fuel using avoided heat efficiency of 80% in our carbon emissions.

19. Could offsets be used to mitigate air emissions impacts from the facility?

R19. Yes.

20. Discuss other mitigation techniques that could be used to offset air emissions from the proposed facility e.g. planting trees. If planting trees is listed as an option, estimate the number and size of trees required.

R20. Not considered for this replacement.

21. Natural gas has sulfur dioxide injected as an odorant. Is desulfurization required, e.g. to protect the fuel cell stack from sulfur? Explain. If yes, please submit a desulfurization plan narrative for the proposed fuel cell facility containing the following information:
    a) Chemical reaction overview concerning what substances are produced from the desulfurization process, as well as plans for their containment and transport;
    b) How much solid sulfur oxide would result from the desulfurization process, and methods and locations for containment, transport, and disposal;
    c) Whether any of these desulfurization substances are considered hazardous, and if so, plans for the containment, transport, and disposal of hazardous substances;
    d) Anticipated method of disposal for any other desulfurization substances; and
    e) Whether any gaseous substances resulting from desulfurization can be expected to vent from the fuel cells, as well as the applicable DEEP limits regarding discharge of these gasses.

R21a. The Model 400 desulfurizer system removes sulfur used as an odorant in natural gas. 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. At no time is sulfur or zinc-sulfide accessible or removed during the operation or service of the fuel cell. When the desulfurized system is overhauled, it is sealed and transported back to the manufacturing facility for recycling.

R21b. There is no solid sulfur oxide result from the desulfurization process; all natural gas odorant, as noted above, converts to zinc-sulfide and remains sealed within the fuel cell.

R21c. The by product, zinc-sulfide, is sealed within the fuel cell system, and as noted above, when the desulfurized system is overhauled, it is sealed and transported back to the manufacturing facility for recycling.

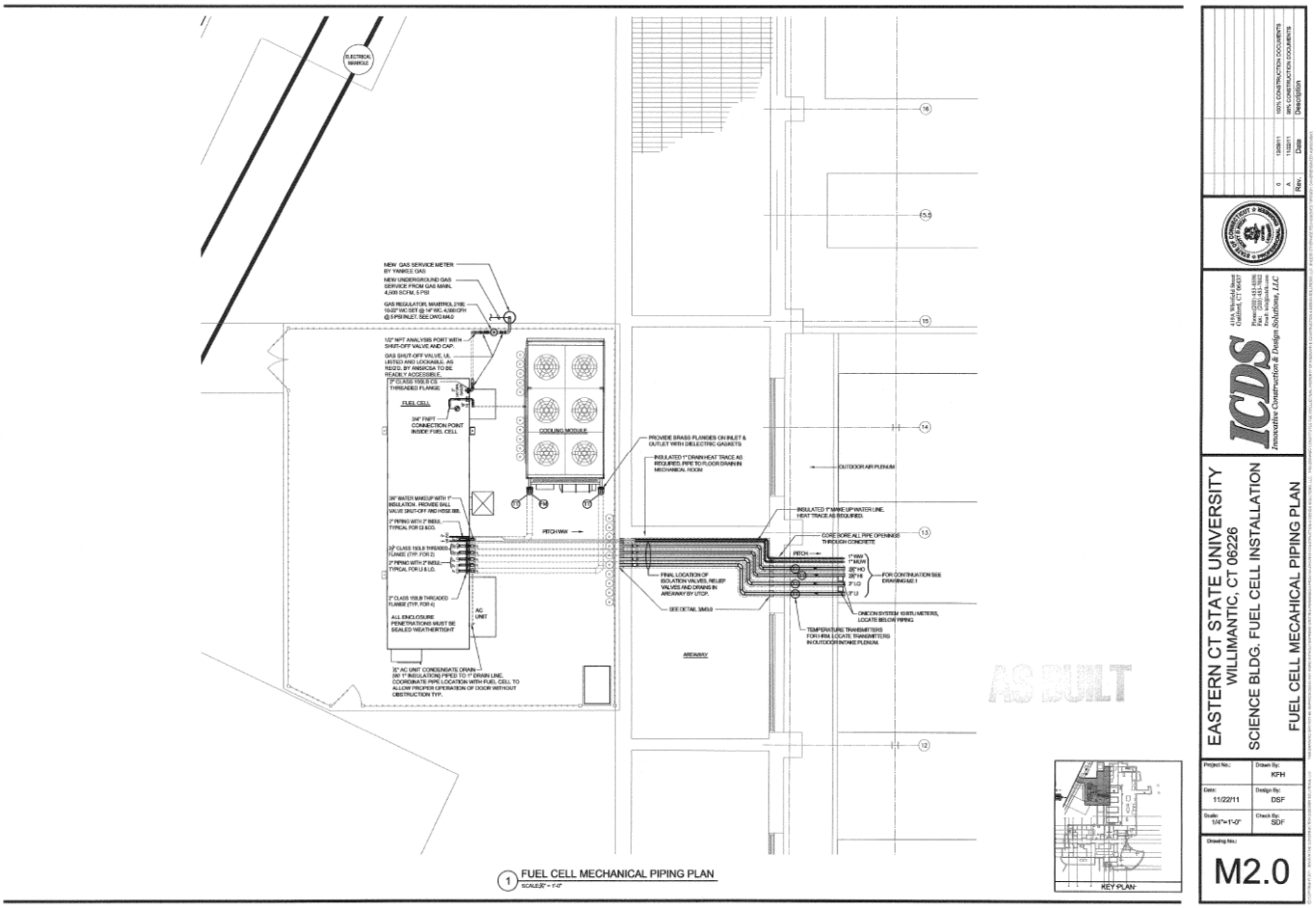
R21d. As noted above, the only by product is zinc-sulfide, which is transported back to the manufacturing facility for recycling.

R21e. No gaseous substances resulting from desulfurization are expected to vent from the fuel cell—as noted above, the desulfurization process is sealed within the fuel cell system.

22. If the project is approved by the Council, approximately when would construction commence and when would it be completed? What are the estimated work hours and days of the week, e.g. Monday through Friday 7:00 a.m. to 5:00 p.m.?

R22. We plan to start construction work by November 15, 2016. The work is to be completed and commissioned by the end of December 2016. Work hours are as permitted by the school: Monday through Friday 7:00am to 5:00pm—to adjust as the school requires.

ECSU-1 ECSU Site Plan



1 FUEL CELL MECHANICAL PIPING PLAN
SCALE:3/8" = 1'-0"

Rev.	Date	Description
0	12/09/11	100% CONSTRUCTION DOCUMENTS
A	11/22/11	90% CONSTRUCTION DOCUMENTS

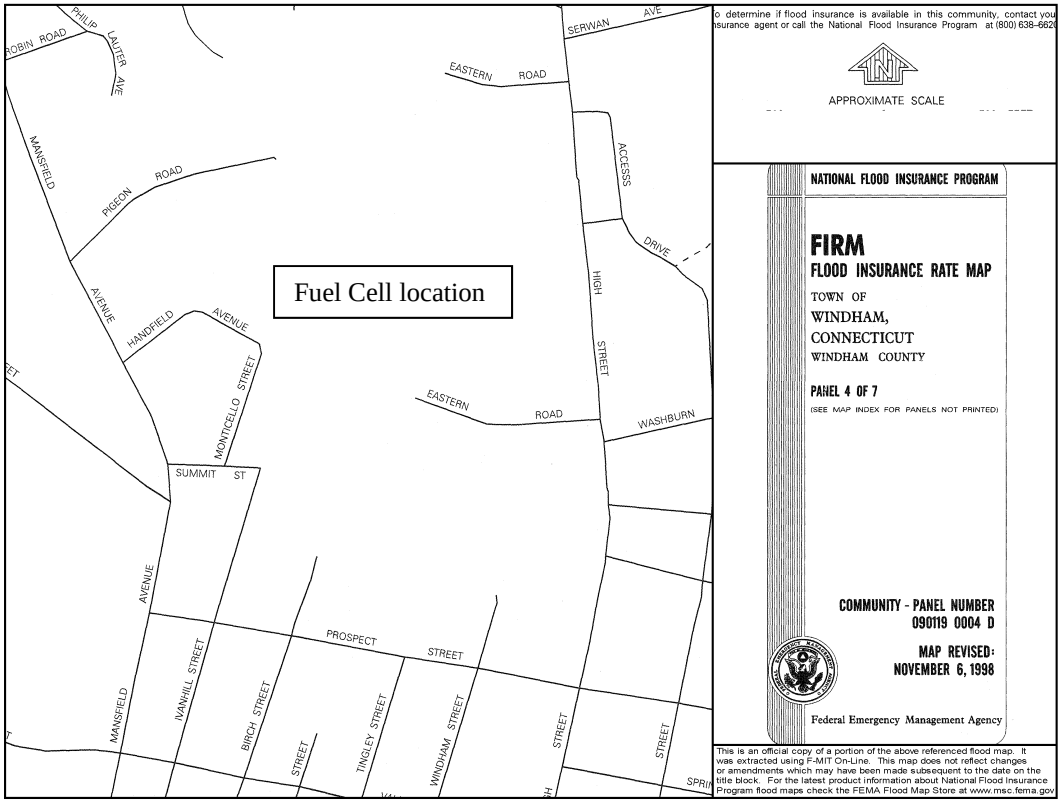
ICDS
Innovative Construction & Design Solutions, LLC

EASTERN CT STATE UNIVERSITY
WILLIMANTIC, CT 06226
SCIENCE BLDG. FUEL CELL INSTALLATION
FUEL CELL MECAHICAL PIPING PLAN

Project No.:	Drawn By: KFH
Date: 11/22/11	Design By: DSF
Scale: 1/4"=1'-0"	Check By: SDF

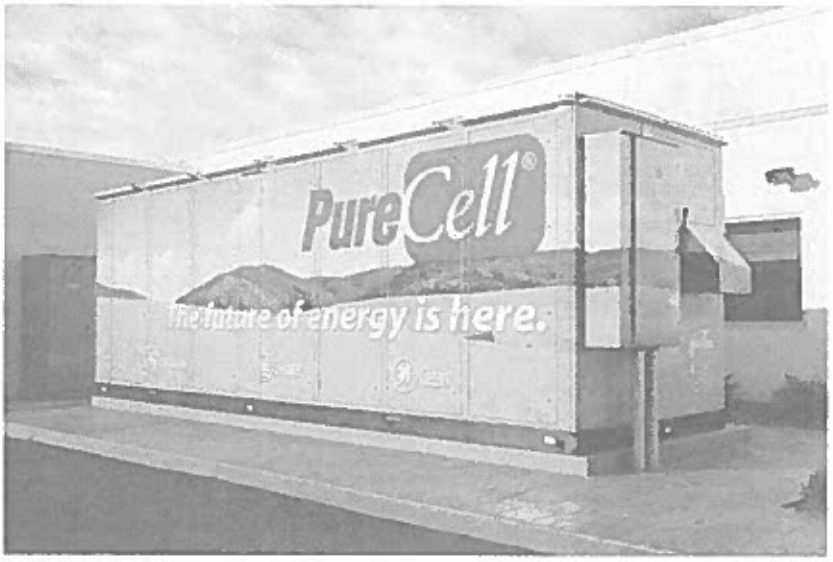
Drawing No.: M2.0

ECSU-2 Flood Zone Map



Doosan Fuel Cell America, Inc.
Fuel Cell Emergency Response Guide

ECSU
83 Windham Street
Willimantic, CT 06226



DISCLAIMER

Doosan Fuel Cell America 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 Doosan Fuel Cell America, and no liability will accrue to Doosan Fuel Cell America 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 Doosan Fuel Cell America'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 May 30, 2015.

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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. Doosan Fuel Cell America should be contacted if clarification is needed.

Emergency Contacts and Numbers

Local Emergency Number	**911**
Doosan Fuel Cell America Control Center	**(860) 727-2847**
Clean Harbors Emergency Cleanup Response	**(800) 645-8265**
Fire Department – Non-emergency number	Willamantic Fire Department: (860) 465-3120
Hospital – Non-emergency number	Windham Hospital 112 Mansfield Ave. Willamantic, CT. 06226 (860) 456-9116
Electric Utility Name: Eversource Energy	**800-286-5000**
Gas Utility Name: Eversource Energy	***Gas Leaks Only: 877-944-5325**
Local Oil & Chemical Spill Response Division	**800-645-8265**
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

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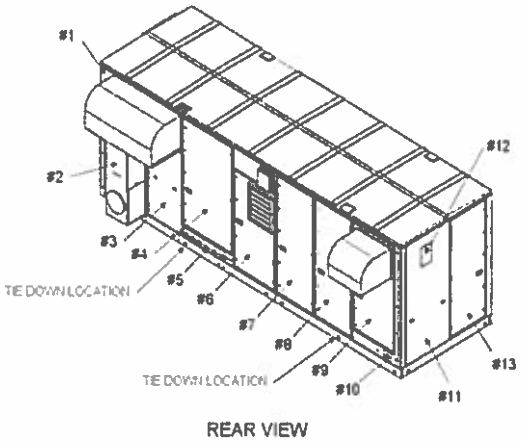
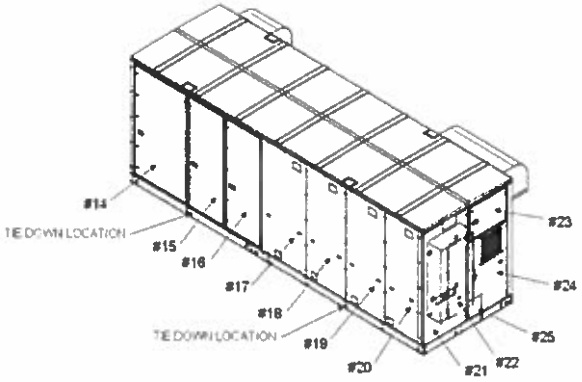
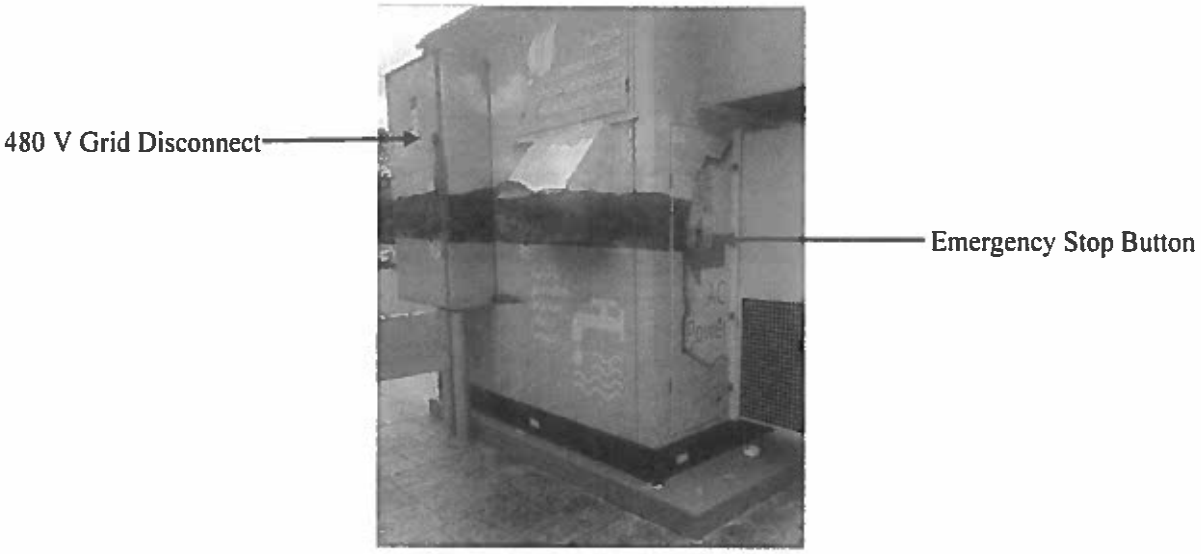
Fuel Cell Hazard Overview



REAR VIEW



FRONT VIEW



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Rear View Panel	Primary Hazard	Front View Panel	Primary Hazard
1 (Computer Terminal)	Electrical = 120 VAC	14 (Reformer)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam
2 (Air Conditioner)	Electrical = 480 VAC Chemical = Refrigerant	15 (Reformer)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam
3 (Swing Door)	Electrical = 480 VAC	16 (Reformer)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam
4 (Mechanical Entry)	Electrical = 480 VAC Chemical = Propylene Glycol Thermal = 350°F Steam Pressure = 150 psi Steam	17 (DC Cell Stack)	Electrical = 300 VDC Chemical = Solid phosphoric acid / combustibles
5 (Mechanical Entry)	Chemical = Propylene Glycol Thermal = 350°F Steam Pressure = 150 psi Steam	18 (DC Cell Stack)	Electrical = 300 VDC Chemical = Solid phosphoric acid / combustibles
6 (TMS)	Electrical = 480 VAC Chemical = Propylene Glycol / Deionized Water / Resin Thermal = 350oF Steam Pressure = 150 psi Steam	19 (DC Cell Stack)	Electrical = 300 VDC Chemical = Solid phosphoric acid / combustibles
7 (ILS)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	20 (DC Cell Stack)	Electrical = 300 VDC Chemical = Solid phosphoric acid / combustibles
8 (Fuel Processing Area)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	21	Not accessible
9 (Fuel Processing Area)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	22 (Grid Connect Disconnect)	Electrical = 480 VAC
10 (Gas/Nitrogen Inlet)	Chemical = combustibles	23 (Blower 110)	Electrical = 300 VDC Mechanical = Blower
11 (Reformer)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	24 (Inverter)	Electrical = 1400 VDC / 480 VAC
12 (Reformer)	Electrical = 480 VAC Chemical = Air sensitive catalyst / combustibles Thermal = 600°F Reformer Pressure = 150 psi steam	25 (Grid Independent Circuit)	Electrical = 480 VAC
13 (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!

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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 Doosan Fuel Cell America 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 Doosan Fuel Cell America Control Center **(860) 727-2847**
Fuel Cell Moderate humming, clicking and fan sounds	Grinding or loud intermittent noises	1. Contact Doosan Fuel Cell America 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 Doosan Fuel Cell America 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 Doosan Fuel Cell America Control Center **(860) 727-2847**
	Grinding or loud noise coming from fans	1. Contact Doosan Fuel Cell America 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 Doosan Fuel Cell America 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 Doosan Fuel Cell America 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 Doosan Fuel Cell America 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 Doosan Fuel Cell America 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 Doosan Fuel Cell America Control Center **(860) 727-2847**

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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 Doosan Fuel Cell America Control Center **(860) 727-2847**

Fuel Cell Related Material Safety Data Sheets (MSDS)

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 Doosan Fuel Cell America 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 Doosan Fuel Cell America Control Center. The Doosan Fuel Cell America 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 Doosan Fuel Cell America employees attending unit unless service or maintenance is required.

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Signage and Labeling

External service lines will be clearly identified. Labeling will be in accordance with ANSI A13.1. Labeling will be similar to example below:

Perimeter fencing will have signage clearly identifying that "No smoking, no ignition sources" on every side of the fence. Signage will be similar to the sign below:

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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 Doosan Fuel Cell America 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.

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