



Doosan Fuel Cell America, Inc.
195 Governor's Highway
South Windsor, CT 06074
T - 860 727 2200

December 15, 2016

Responses to PE 1265-(11/23/16 Notice) Interrogatories

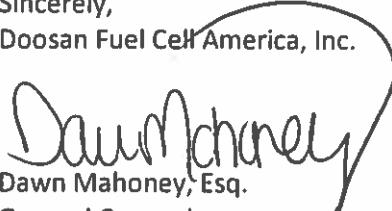
RE: PETITION NO. 1265 - Doosan Fuel Cell America, Inc. petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, maintenance, and operation of a customer-side 460-kilowatt fuel cell facility to be located at the Norwich Inn and Spa, 607 West Thames Street, Norwich, Connecticut

Please see the attached responses to the interrogatories with exhibits to the questions posed by the Connecticut Siting Council on 11/23/16 for PE 1265.

Address additional questions to:

Claudio Borea
195 Governor's Highway
South Windsor, CT 06074
(860) 727-2076
Claudio.Borea@doosan.com

Sincerely,
Doosan Fuel Cell America, Inc.


Dawn Mahoney, Esq.
General Counsel
Doosan Fuel Cell America, Inc.

VIA ELECTRONIC MAIL

November 23, 2016

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

RE: PETITION NO. 1265 - Doosan Fuel Cell America, Inc. petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, maintenance, and operation of a customer-side 460-kilowatt fuel cell facility to be located at the Norwich Inn and Spa, 607 West Thames Street, Norwich, Connecticut.

Dear Attorney Mahoney:

The Connecticut Siting Council (Council) requests your responses to the enclosed questions no later than December 7, 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.

Any request for an extension of time to submit responses to interrogatories shall be submitted to the Council in writing pursuant to §16-50j-22a of the Regulations of Connecticut State Agencies.

Yours very truly,

Melanie Bachman
Acting Executive Director

MB/MP

c: Council Members

Petition No. 1265
Doosan Fuel Cell America, Inc.
607 West Thames Street
Norwich, CT
Interrogatories

1. Did Doosan consult with The Mashantucket Pequot Tribe on the proposed fuel cell facility? If yes what was the Tribe's position. If not, please contact the Tribe and report back on the Tribe's position?
- R1. CMEEC and Norwich Public Utilities consulted with the Norwich Inn and Spa leadership team, which report directly to The Mashantucket Pequot Tribe. While Doosan was not privy to those discussions, it is our understanding the Tribe is fully aware of the project and supports local leadership.
2. Please confirm the owner of the host property was provided notice of the proposed project and provide information regarding certified mail receipts for all recipients that were provided notice including the property owner, abutting property owners, state agencies, and state and local public officials.
- R2. Please find the mail receipts in attachment Norwich-1 Mail Receipts, along with the abutters mail receipts. Doosan certified notice was provided via US First Class Mail to all property owners and abutters on October 28, 2016 as required by RCSCA §16-50j-40. Doosan did not receive any returned mail on any of these notices. In an abundance of caution, Doosan sent notice again via Certified Mail, Return Receipt Requested to all abutters on December 14, 2016. Attached are the receipts.
3. Please provide a detailed site plan for the proposed facility including but not limited to, the dimensions and location of the proposed fuel cell facility, cooling module, concrete pads, fence design and bollards (if applicable) and utility connections.
- R3. Please see attached Norwich Spa-2 Site Plan.
4. Would the proposed fuel cell shut down in the event of a power outage? If so, does it have "black start" capability and the ability to automatically restart?
- R4. When a utility grid outage occurs, the powerplant will automatically disconnect from the facility electrical system using an internal breaker. The powerplant will continue to operate, providing all power required to operate the Model 400 internally. Upon return of the utility supply, the powerplant will automatically reconnect to the grid after a 5 minute time-delay.
5. Could the facility continue to operate during a power outage and provide seamless uninterruptable power?
- R5. When there is an outage of the utility grid, the selected loads for grid-independent operation can be powered by the fuel cell unit. The load will experience an interruption in power and must be powered up in sequence with load management. The grid-independent reconfiguration process takes approximately 10 seconds, during which time the customer load panel will lose power until the plant enters grid-independent operation mode.
6. What is the operational life of the facility?
- R6. The fuel cell 400kW product has a 20 year life with a projected 10-year overhaul.
7. 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.

R7. Please see attached Norwich Spa-3 Emergency Response Plan.

8. 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.

R8. Use atmospheric air under pressure – no solvents or cleaners will be used.

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

R9. 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.

10. Please provide a noise analysis for the proposed facility that shows compliance with state noise regulations at the property boundaries.

R10. Please find attached a report indicating the methodology used to compute noise levels at various frequencies and distances from the PureCell model being installed at the proposed facility in attachment Norwich-4. The proposed facility is located in a Class C land zone. Based on the aforementioned noise study the project will be in compliance with DEEP noise standards for all land use zones A, B & C. In addition, Doosan will perform site specific noise studies at host property boundaries to confirm compliance.

11. Would the proposed fuel cell provide baseload or backup power (or both) to the Norwich Inn & Spa? What percentage of the building's energy usage would the proposed fuel cell facility provide? Would any surplus power be sold to the grid?

R11. The fuel cell will provide both baseload and backup power to the Norwich Inn & Spa. Under normal conditions, 100% of the building's energy usage will be provided by the fuel cell facility. The fuel cell will be owned and operated by the utility generation provider CMEEC. Excess fuel cell electrical generation will go to the grid offsetting CMEEC's other means of providing electrical generation to Norwich Public Utilities.

12. Would any waste heat from the fuel cell be used for the building's internal use such as to provide or supplement domestic heating and/or hot water?

R12. Yes, the waste heat from the fuel cell is being used to supply the building heating loop.

13. Would the proposed facility be enclosed by a fence? Provide the detail specifications of the proposed fence. If the proposed fence is chain link, has Doosan considered an anti-climb design? Would bollards be used to protect the fuel cell facility from being accidentally struck by vehicles?

R13. Bollards will be used to protect the facility from vehicles. A fence is not required by the host facility.

14. What is the distance and direction of the nearest residence from the proposed fuel cell facility?

R14. The nearest residence to the facility is approximately 85 yards away in a Southern direction.

15. What is the municipal zoning of the host property? What surrounding land uses are adjacent to the host property?

R15. Please see attached Norwich-5 Zoning Map. The facility is located in the Planned Commercial (PC) Zone. The surrounding land adjacent to the proposed site includes Recreational Open Space (ROS) Zone, Multifamily (MF) Zone & Waterfront Development (WD) Zone.

16. Provide the number of trees six inches in diameter or greater that would be removed for installation of the proposed facility.

R16. No trees are required to be removed for the install of the facility.

17. Would the proposed facility be within the 100-year or 500-year flood zone? If so, could the proposed facility be raised to one-foot above the 100-year flood zone? Please provide a FEMA flood map showing the proposed facility.

R17. Please see attached Norwich Spa-6 Flood Zone Map. The fuel cell facility is not located in any flood zones.

18. Provide the distance and direction of the nearest wetland.

R18. The closest wetland is approximately 275 yards South East from the proposed facility.

19. Is the proposed facility within a Department of Energy and Environmental Protection-designated Aquifer Protection Area?

R19. Norwich is a town without an Aquifer Protection Area. A map is not available for this town.

20. Is the proposed site within a Coastal Boundary? Provide a map. If so, provide a Coastal Consistency Review form.

R20. The proposed site in Norwich is not located within a Coastal Boundary. Therefore, a Coastal Consistency review form is not required.

21. What is the distance of the nearest portion of the proposed fuel cell facility to the nearest edge of the Thames River?

R21. The proposed facility is approximately 1050 yards from the nearest edge of the Thames River.

22. Describe the visibility of the proposed facility from the surrounding area.

R22. The facility will be located at the rear of the hotel hidden from the arriving guests. The Norwich Inn and Spa property is bordered by trees. The facility will not be easily visible from surrounding area.

23. What is the distance and directions of the proposed facility to the nearest airport? Did the petitioner provide notification to the Federal Aviation Administration regarding the proposed fuel cell facility?

R23. The nearest airport is the private Gardner Lake Airport which is approximately 9 miles West of the facility. No notification has been given to the Federal Aviation Administration.

24. 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.

R24. Section 22a-174-1(49) references greenhouse gases" or "GHGs" means the aggregate of the following six component gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), any hydrofluorocarbon (HFC) or any perfluorocarbon (PFC).

Doosan PureCell model has negligible CH₄, SF₆, HFC or PFC emissions from our unit. The PureCell virtually eliminates NO_x, SO_x, CO, VOCs & particulate matter emissions from the energy production process. The small emissions are highlighted below in Table 1 for the unit operation with and without heat.

Table 1: PureCell® Model Emissions Data

	PureCell Output electric only (lb/MWh)	PureCell Output with heat (lb/MWh)	State Emission Standards (lb/MWh)
NO _x	0.01	0.01	0.15
CO	0.02	0.02	1
VOC	0.02	0.02	Not Listed
CO ₂	1050	815	1650

25. Provide information regarding available technologies and/ or mitigation techniques to reduce greenhouse gas emissions from the proposed facility.

R25. Current control technologies are not available to reduce the greenhouse gas emissions from the facility. The utilization of the waste heat in the facility into the buildings on site reduces the greenhouse gas emissions impact on the environment.

26. Would the proposed facility's air emissions rate in pounds of CO₂ per megawatt-hour be lower than the eGRID non-baseload emissions rate for the ISO New England, Inc, territory?

R26. Doosan uses the 2012 eGrid "Fossil fuel output emission rate (CO₂ lb/MWh)" of 980.27 with a grid loss of 9.17% for a total of 1070 lb/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.

27. Would methane (CH₄) be emitted from the proposed fuel cell facility?

R27. Methane is not emitted from the unit.

28. Does the amount of phosphoric acid in the fuel cell comply with the applicable state and federal regulations?

R28. Phosphoric acid is bound within a matrix within the fuel cell stacks and the quantity is proprietary. The amount does comply with the State and Federal regulations.

29. Natural gas has sulfur dioxide injected as an odorant. Please submit a desulfurization plan narrative for the proposed fuel cell facility containing the following information:

- Chemical reaction overview concerning what substances are produced from the desulfurization process, as well as plans for their containment and transport;
- How much solid sulfur oxide would result from the desulfurization process, and methods and locations for containment, transport, and disposal;
- Whether any of these desulfurization substances are considered hazardous, and if so, plans for the containment, transport, and disposal of hazardous substances;
- 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.

R29a. 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.

R29b. 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.

R29c. The by-product, zinc-sulfide, is sealed within the fuel cell system. As noted above, when the desulfurized system is overhauled, it is sealed and transported back to the manufacturing facility for recycling.

R29d. As noted above, the only by-product is zinc-sulfide, which is transported back to the manufacturing facility for recycling.

R29e. 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.

30. If the project is approved, approximately when would construction commence and when is it expected to be completed and operational? What are the expected typical work hours and days of the week that construction would occur?

R30. Doosan plans to start construction work by April 2017. The work is to be completed and commissioned by the end of October 2017. Regular work hours are Monday through Friday 7:00am to 5:00pm.

31. Please provide a decommissioning plan for the proposed facility.

R31. The decommissioning plan is as follows:

1 – 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.

2 – Disconnect all electrical conductors and conduit at the unit to include electrical power, ACM power, nitrogen pressure switch, RMS power and RMS ethernet. Shore power to be maintained to the unit to maintain temperature as needed.

3 – Contractor will work in concert with Doosan Service Dept. personnel during decommissioning and shutdown.

4 – Contractor to supply rigging labor and equipment including crane service sufficient to safely lift unit and place on Doosan supplied flatbed truck. Contractor to supply labor to install travel tarp (Doosan supplied) on unit prior to being transported.

5 – Return facility to original condition with the exception of the concrete pads.

Attachments

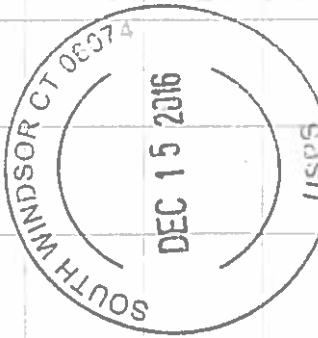
Norwich-1
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GROTON, CT 063403. HAXHE PROPERTIES LLC
543 WEST THAMES ST
NORWICH, CT 063604. PJ + A LLC
PO BOX 325
UNCASVILLE, CT 063825. MA PEGGY HUNG CHUN +
214 WEST 72ND ST APT 3
NEW YORK, NY 100236. B+M PROPERTY MANAGEMENT LLC
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586 West Thames St #404
Norwich, CT 063604. Epstein Patricia C
49 Lucas Park Rd
Norwich, CT 063605. Tse Wing M Trustee Of
18 Madison Ave
Quincy, MA 021696. Wawrzynowicz Paul V +
21 Lucas Park Rd
Norwich, CT 063607. Daigneault Audrey I
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Wanted at Post Office

Listed by Sender

PS Form 3877 February 2002 (Page 1 of 3)

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Name and Address of Sender

Check type of mail or service:

Certified Recorded Delivery (International)
 COD Registered
 Delivery Confirmation Return Receipt for Merchandise
 Express Mail Signature Confirmation
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Addressee (Name, Street, City, State, & Zip Code)

Article Number	Postage	Fee	Handling Charge	Actual Value if Registered	Insured Value	Due Sender if COD	DC Fee	SC Fee	SH Fee	RD Fee	RR Fee
1. MASHANTUCKET PEQUOT TRIBE 1 607 WEST THAMES STREET NORWICH, CT 06360											
2. PJ + A LLC PO BOX 325 UNCASVILLE, CT 06382											
3. AGARD DONALD W + 586 WEST THAMES ST UNIT 204 NORWICH, CT 06360											
4.											
8.											



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Total Number of Pieces Received at Post Office

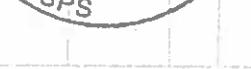
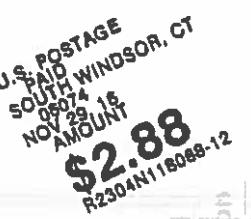
Total Number of Pieces Listed by Sender

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Mayor of Norwich City Deberey Hinchee 100 Broadway Norwich CT 06360											
Emmett Riley Rep District 46 25 Sherwood LN Norwich CT 06360-5219											
Joe Courtney 77 Hazard Avenue Unit J Enfiled, CT 06082											
Tianne Curtis Zoning Enforcement Officer 23 Union Street, 1st Floor Norwich CT 06360											
Arpin Greg Assistant Building Officer 23 Union Street, 1st Floor Norwich CT 06360											
Doug Dubitsky Rep District 47 PO Box 70 North Windham 06256-0070											
Cathy Osten Rep District 19 187 Scotland Rd Baltic 06330-1113											
Kevin Ryan House District 139 21 Terrace Dr Oakdale CT 06370-115											
Postmaster, Per (Name of receiving employee)											
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Postmaster, Per (Name of receiving postoffice)

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<input checked="" type="checkbox"/> COD	<input type="checkbox"/> Registered
<input checked="" type="checkbox"/> Delivery Confirmation	<input type="checkbox"/> Return Receipt for Merchandise
<input type="checkbox"/> Express Mail	<input type="checkbox"/> Signature Confirmation
<input type="checkbox"/> Insured	

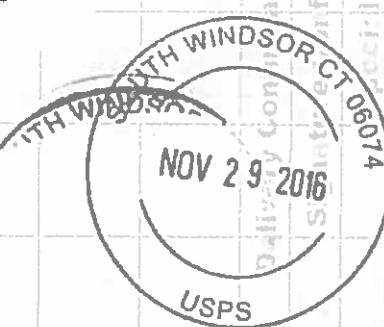
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Addressee (Name, Street, City, State, & ZIP Code)	Postage	Fee	Handling Charge	Actual Value If Registered	Insured Value	Due Sender If COD	OC Fee	SC Fee	SH Fee	RD Fee	RR Fee
SENATOR CHRISTOPHER S MURPHY ONE CONSTITUTIONAL PLAZA HARTFORD, CT 06103											
SUSAN MERROW - CHAIR STATE COUNCIL OF ENVIRONMENTAL QUALITY, 79 ELM STREET HARTFORD, CT 06106											
GEORGE JEPSEN - ATTORNEY GENERAL OFFICE OF THE ATTORNEY GENERAL 55 ELM STREET HARTFORD, CT 06106											
BENJAMIN BARNES - SECRETARY OFFICE OF POLICY & MANAGEMENT 450 CAPITAL AVENUE HARTFORD, CT 06106											
DR. JEWEL MULLEN - COMMISSIONER STATE DEPT OF PUBLIC HEALTH 410 CAPITOL AVENUE HARTFORD, CT 06106											
CATHERINE SMITH - COMMISSIONER CT DEPT OF ECONOMIC & COMM.DEV 505 HUDSON STREET HARTFORD, CT 06106-7106											
TIMOTHY M HERBST 1ST SELECTMAN TRUMBULL TOWN 5866 MAIN STREET TRUMBULL CT 06611											
DORA B. SCHIRO - COMMISSIONER DEPT OF EMERGENCY SERVICES AND PUBLIC PROTECTION 1111 COUNTRY CLUB ROAD MIDDLETON, CT 06457											

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Admission to the House of Representatives is 710 (7/10/11)

Marilyn Moore
Senate District 22
666 Cleveland Avenue
Bridgeport, CT 06604-1606
MELODY A CURREY - COMMISSIONER
STATE DEPARTMENT OF ADMINISTRATIVE
SERVICES
165 CAPITAL AVENUE
HARTFORD, CT 06106
JAMES P REDEKER - COMMISSIONER
DEPARTMENT OF TRANSPORTATION 2800
BERLIN TURNPIKE
NEWINGTON, CT 06111
STEVEN K REVICZKY - COMMISSIONER
STATE DEPARTMENT OF AGRICULTURE
165 CAPITAL AVENUE
HARTFORD, CT 06106
SCOTT D JACKSON - COMMISSIONER
DEPARTMENT OF LABOR
200 FOLLY BROOK BOULEVARD
WETHERSFIELD, CT 06109
ROBERT KLEE - COMMISSIONER
STATE DEPARTMENT OF ENERGY &
ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106
SENATOR
RICHARD BLUMENTHAL
90 STATE HOUSE SQUARE
HARTFORD, CT 06103
Brian Biddell - Executive Director
CT Metropolitan Council of GORV
1000 Lafayette Blvd, Ste 925
Bridgeport
CT 06604-4902

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Priority Mail

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SOUTH WINDSOR CT

NOV 29 2016

USPS

Delivery Confirmation
Signature Confirmation
Special Handling
Restricter Delivery
Return Receipt

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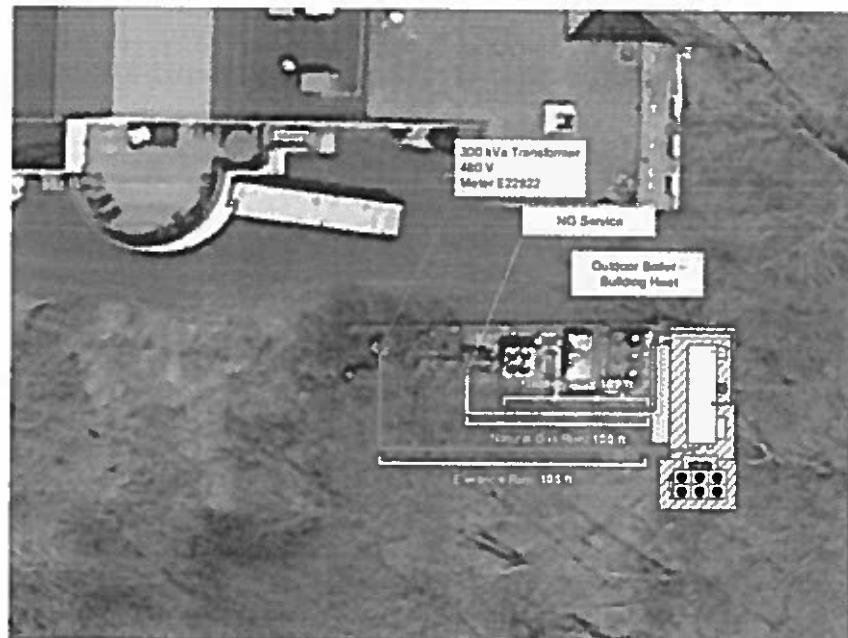
Norwich-2

Site Plan

Site Layout

- Visualization showing proposed location of unit

Proposed Fuel Cell Location

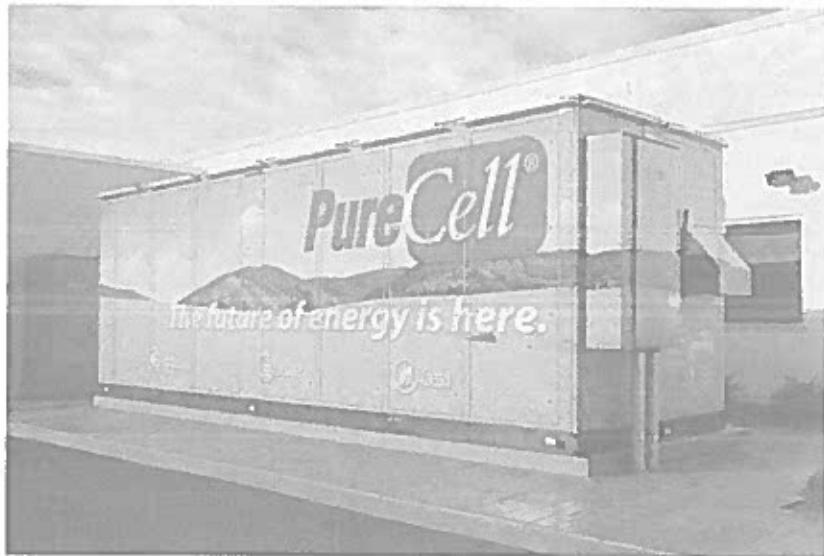


Norwich-3
Emergency Response Plan



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

Norwich Inn & Spa
607 West Thames St,
Norwich, CT 06360



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

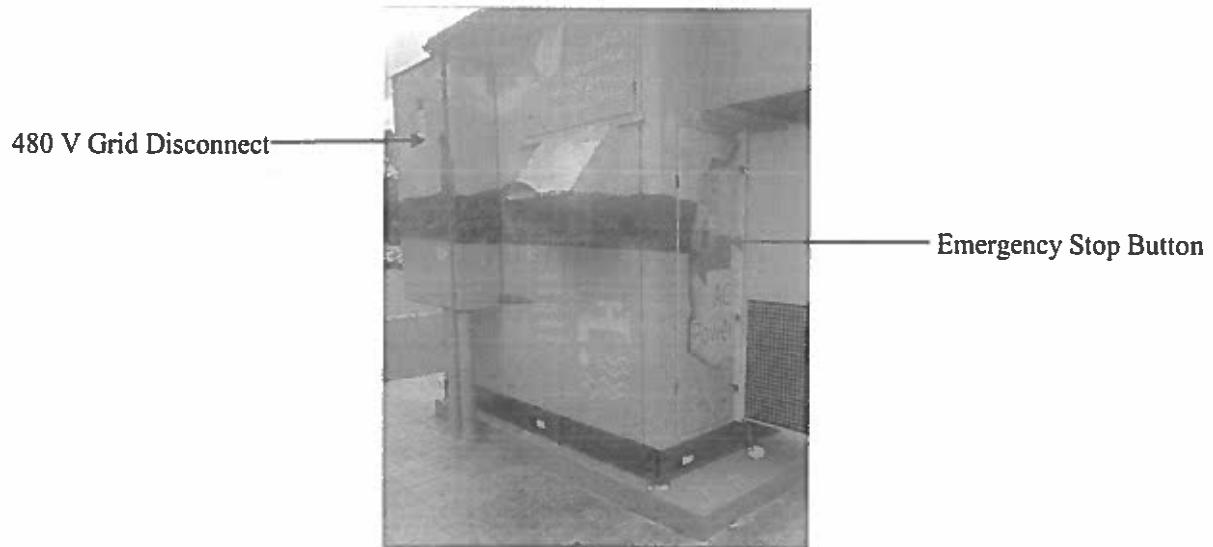
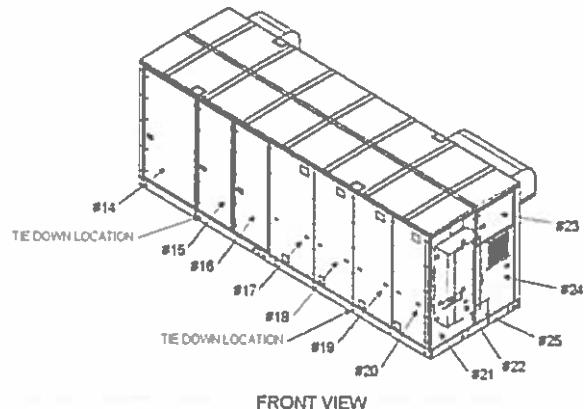
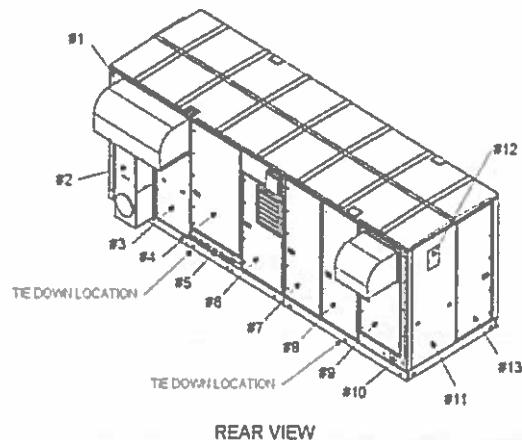
This Emergency Response Guide shall be integrated into the site Emergency Response Plan. Information contained in this document shall be customized to meet local requirements and shall be shared with local responders as necessary. This guide is only a template and in no way assumes or transfers liability 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	Norwich Fire Department (203) 254-4700
Hospital – Non-emergency number	William W. Backus Hospital 326 Washington St, CT 06360 (860) 889-8331
Electric Utility Name: Norwich Public Utilities	860-887-2555
Gas Utility Name: Norwich Public Utilities	860-887-2555
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



Fuel Cell Hazard Overview



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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 = 350°F 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!



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)	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
No leaks, May hear intermittent gas flow during purges		

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.



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:





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.

Norwich-4
Octave Sound Measurements

Objective

The purpose of this memorandum is to document 1/3 octave sound measurements at various locations around 9582 to support the applications group

Test Hardware

Quest Model 1800 Sound Level Meter
Quest Model OB-300 1/1 – 1/3 Octave Band Filter

Test Conditions

Weather: 45°F, Wind NW @ 8mph, mostly cloudy
Time: 20:23 – 21:45 17 February 2012
9582 Operating at 400kW, 976 Volts, 440 amps, VSD800 @ 100%, no heat recovery

Test Plan

1. Follow the Meter Settings listed below to properly setup and configure the Sound level meter & 1/3 Octave Filter:

Model 1800 Settings: Sound Level Meter

Response: Slow

Weighting: A

Mode: SPL

dB Range: 40-100

Power: On

Model OB-300 Settings: 1/3-1/1 Octave Band Filter

Power: Manual

Time Mode: 1/3

Start: ▲ or ▼ to select Freq. : (Hz) (Red LED Indicates Monitor Frequency being displayed)

2. See Location Map for measurement *Location: A,B,C,&D*.
3. Measure distances from power plant in Location A THRU D.
4. Face Sound meter microphone toward PPL and press the 'RUN' button on the 1800 meter. (Noise level displayed in window)
5. Record 1/3 Octave Noise Level readings at each frequency on Data Sheet.
6. Repeat steps 6 thru 9 for all Locations A thru J as shown on Location Map.

Figure 1: Test Locations

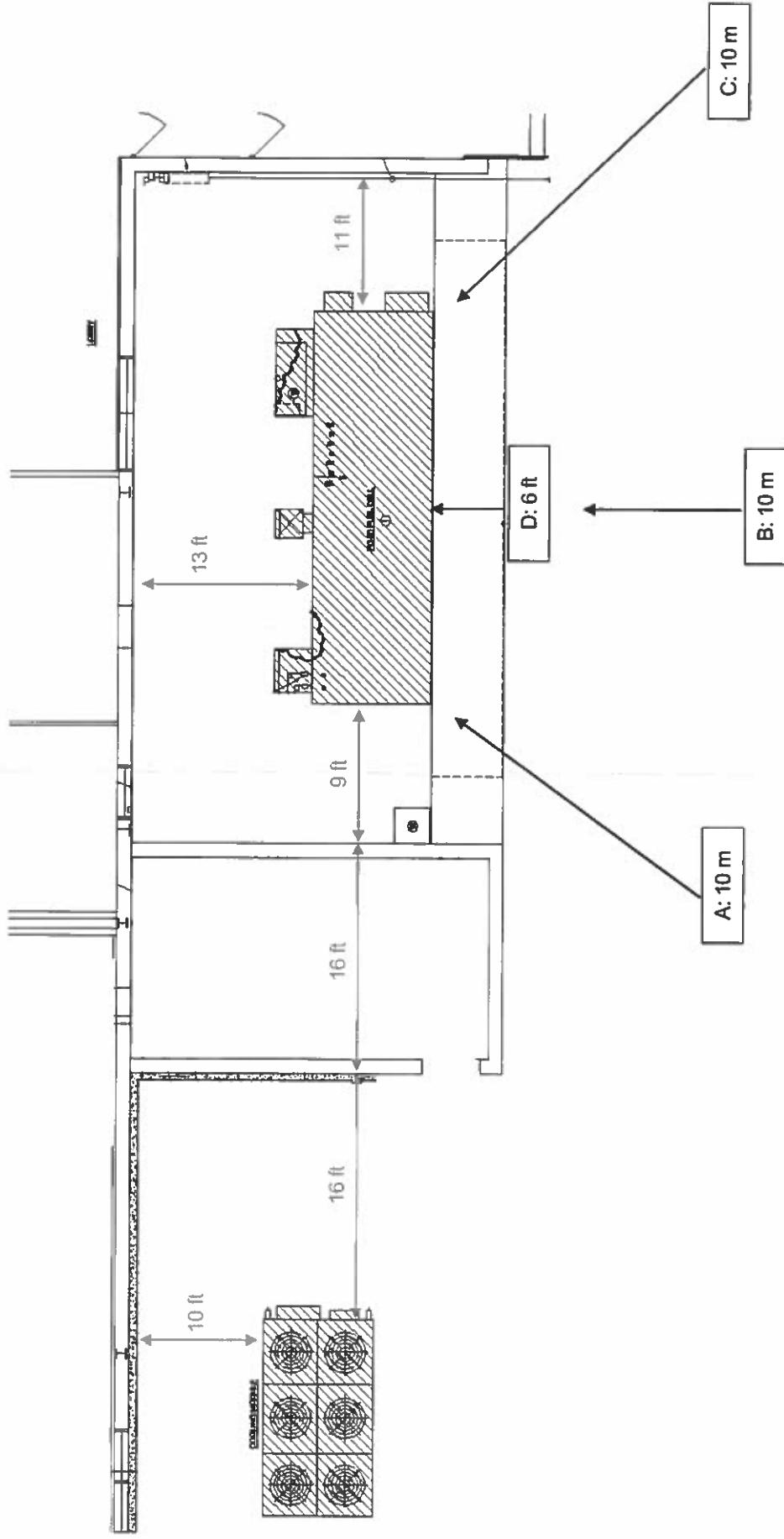
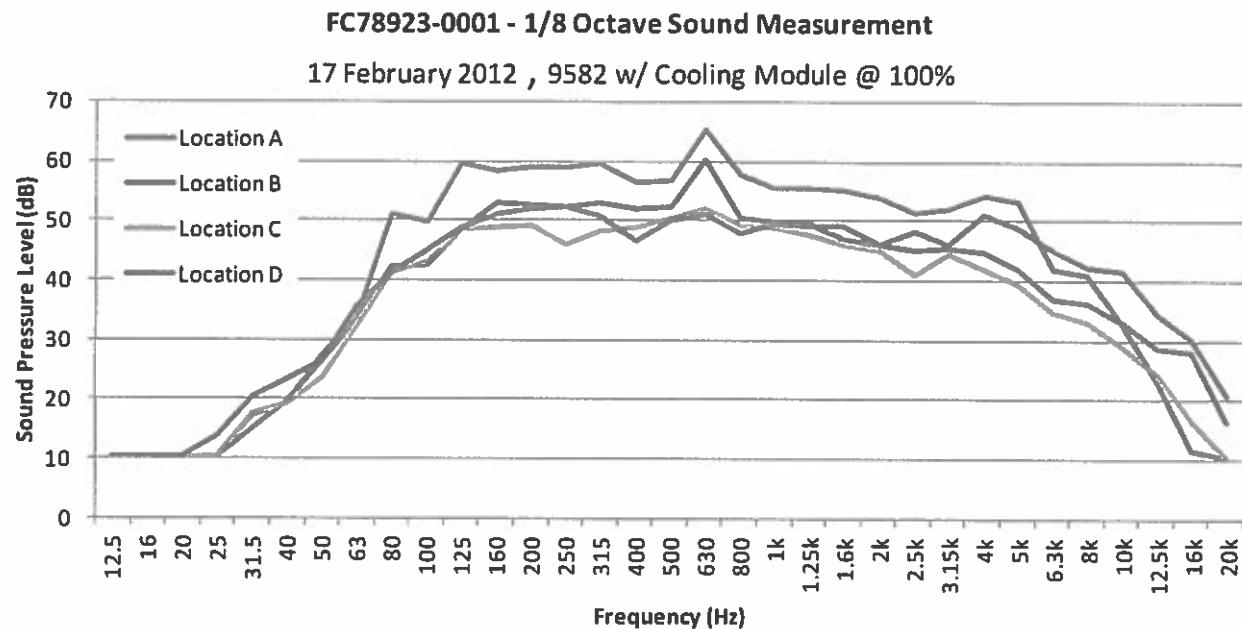




Table 1: 1/3 Octave Noise Data Sheet

Freq.: (Hz)	Location A	Location B	Location C	Location D
dBA	67.7	64.2	60.5	62.5
20k	10.3	16.3	10.3	20.8
16k	11.7	28.0	16.5	30.2
12.5k	23.1	28.7	24.2	34.3
10k	32.8	33.2	29.1	41.5
8k	41.0	36.2	32.9	42.3
6.3k	41.8	36.7	34.5	45.0
5k	53.4	41.9	39.3	48.8
4k	54.2	44.7	41.9	51.2
3.15k	52.1	45.5	44.4	46.0
2.5k	51.3	45.2	41.1	48.2
2k	53.8	46.0	45.2	46.0
1.6k	55.3	47.1	45.9	49.3
1.25k	55.4	49.5	47.5	49.0
1k	55.6	49.7	48.9	49.4
800	57.8	50.3	49.0	48.0
630	65.3	60.2	51.9	51.0
500	56.8	52.2	50.3	50.1
400	56.4	51.9	48.7	46.6
315	59.6	52.9	48.2	50.8
250	59.1	52.3	45.9	52.4
200	58.9	52.5	49.3	52.1
160	58.4	53.0	48.8	51.2
125	59.5	48.4	48.4	48.7
100	49.9	42.6	43.0	44.9
80	50.9	42.3	41.4	41.3
63	33.3	33.2	32.2	35.5
50	27.3	26.4	23.7	26.3
40	19.3	19.5	19.1	23.4
31.5	17.2	15.0	17.5	20.5
25	10.3	10.4	10.3	13.8
20	10.3	10.3	10.3	10.3
16	10.3	10.3	10.3	10.3
12.5	10.3	10.3	10.3	10.3

Figure 2:



Observations

Limit of the meter is 10.3 dB

Orientation of the meter is important, it was directed per the arrows in the diagram

References

Manual: Quest Technologies Model 1800 Sound Meter- <http://www.ierents.com/Manuals/Quest1800.pdf>

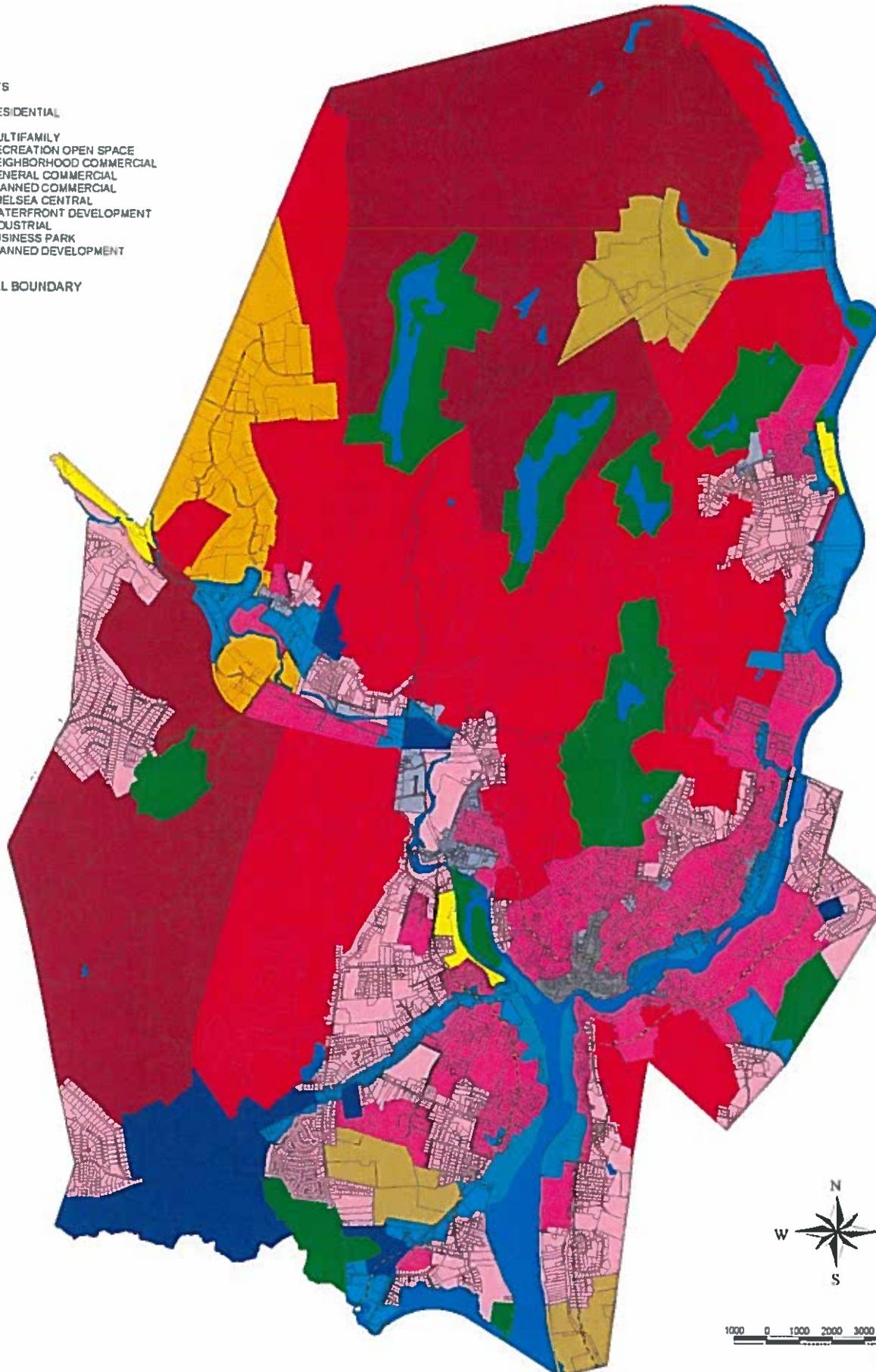
Revision Record

REVISION	DATE	AUTHOR	DESCRIPTION
A	2012-02-17	B. Fleming	Initial Release. 12-0320
			•
			•

Norwich-5
Zoning Map

ZONING DISTRICTS	
R-20	RESIDENTIAL
R-40	
R-80	
MF	MULTIFAMILY
ROS	RECREATION OPEN SPACE
NC	NEIGHBORHOOD COMMERCIAL
GC	GENERAL COMMERCIAL
PC	PLANNED COMMERCIAL
CC	CHELSEA CENTRAL
WD	WATERFRONT DEVELOPMENT
ID	INDUSTRIAL
BP	BUSINESS PARK
PDD	PLANNED DEVELOPMENT

~ COASTAL BOUNDARY



ZONING MAP OF THE CITY OF NORWICH

EFFECTIVE: MARCH 27, 2018

Norwich-6
Flood Zone Map

