



# FIRE PREVENTION & EMERGENCY PLAN

## Fuel Cell Power Plant

Located at:  
Connecticut Studios  
South Windsor, CT 06704

Plant Owner: CTS Energy LLC  
1300 Division Rd Suite 201  
West Warwick, RI 02893

Contract Operations/Maintenance: FuelCell Energy, Inc.  
3 Great Pasture Rd.  
Danbury, CT 06813

**Plan Revision Date: September 6, 2013**

*A current copy of this Plan is to remain in  
an accessible location on-site at all times.*

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## **Introduction**

### **Purpose:**

This document provides information specific to the Fuel Cell power plant supplied by Fuel Cell Energy, Inc. ("FCE") and located at Connecticut Studios, LLC ("CT Studios"), as described in the Plant Description section, below. This document has been prepared in response to the requirement of Section 8.2, NFPA 853-2010, and pursuant to the Connecticut Siting Council's Final Decision and Order in Docket NT-2010.

## **Plant Description**

The fuel cell power plant ("Plant") will be located in the northwest corner of CT Studios' property in South Windsor, Connecticut, near the intersection of John Fitch Blvd and Chapel Rd. ("Project"). CTS Energy, LLC ("CTS") will own and operate the Plant. FCE will perform the installation and maintenance. The Plant is designed for unattended operation, and will be monitored continuously by FCE.

The Plant will be designed, constructed, and operated in accordance with all applicable codes and standards.

Prior to commissioning and testing of the Plant, representatives of the Project will meet with local and state emergency response officials to review the commissioning, testing, operation, and emergency response plans for the Plant and the Project as a whole. Representatives of the Project will conduct simulated emergency response activities as may be requested by these officials.

### **Plant Model:      DFC-3000**

The DFC3000 unit consists of two (2) DFC modules, a Mechanical Balance-of-Plant (MBOP), and an Electrical Balance of Plant (EBOP).

Number of Installed Units:	2
Total Power Output:	4.98 MW (2.49MW each)
Installation Type:	Outdoors
Fuel type:	Pipeline Natural Gas Pipeline pressure: 40psig. Plant operating pressure: <15psig
Output Voltage:	13,800 VAC
EBOP Manufacturer:	Rockwell International
EBOP 480 VAC Transformer Type:	Oil Filled/Seed-Oil, Fire Resistant Dielectric Fluid
Nitrogen Supply:	Liquid microbulk tank (~250 gal. liquid capacity)

**Additional Appurtenant Equipment**

**Ancillary Equipment:**

(TBD) Potential Heat Recovery Unit (hot water) w/ pumps & MCC/CCB

Electrical Load Leveler  
480VAC Switchgear  
Water Conditioning Skid

**EQUIPMENT NOT DESCRIBED ABOVE IS NOT COVERED BY THIS PLAN**

# FIRE/EMERGENCY PLAN

## **1. *Response to Fire or Other Emergency Condition***

### **1.1 Overview of fire hazards present**

Natural gas (odorized) at a nominal pressure of 40psig is supplied to the Plant via an underground line. The aboveground gas meter, manifold, and shutoff valves (manual and automatic) are on a 12 foot by 4 foot concrete pad located inside the power plant facility surrounded by chain link fence. The Plant immediately reduces the fuel gas pressure to less than 15 psig and directs the gas flow to the plant desulfurization equipment.

The gas line upstream of the metering location will be designed, installed, and operated by Yankee Gas in accordance with natural gas utility standards. The gas line from the metering location to the fuel cell will be designed and installed by FCE in accordance with all applicable codes and standards. During startup and testing, the FCE supplied gas line will be purged with nitrogen (an inert gas) – it will NOT be purged with natural gas.

Natural gas is de-odorized by flowing through the desulfurizer vessels of the Plant. The desulfurizer vessels are each equipped with a safety pressure relief valve, sized for both a failed pressure reducing valve and a fire exposure condition. The pressure relief valves discharge to a vent termination approximately 20' above grade over the desulfurizer vessels. De-odorized fuel flows through the Plant equipment, including the fuel humidifier, the preconverter, and into the fuel cell module. The air heater also operates on an intermittent basis on de-odorized fuel. All fuel gas is confined within code compliant process piping and vessels. All fuel gas sample valve taps are small bore and "double blocked" by virtue of a tethered cap.

The Plant operates at high internal temperatures. Temperatures inside the insulated fuel cell module are approximately 1200°F and the fuel fired air heater also operates at temperatures of up to 1200°F. The fuel humidifier and connecting pipes also operate at high temperature. Insulation is provided to maintain external skin surfaces at safe temperatures.

Numerous pieces of electrical equipment are provided with or are appurtenant to the Plant. Some electrical equipment operate at high current and/or medium voltage (>500V) and may generate appreciable heat. All electrical equipment is designed to applicable codes, including provisions for adequate heat dissipation.

### **1.2 Notifications and coordination**

Upon discovery of a fire or other emergency condition, or acknowledgement of a fire alarm associated with the Plant, the discovering or acknowledging person shall make notifications to the appropriate persons as outlined in Appendix B, Site Contacts / Notifications. Further community notifications will rely upon the procedures adopted by those persons or organizations.

A person who is trained in the operation and maintenance of the Plant shall remain on-site through the emergency response time frame to assist and support responders with technical expertise.

An on-site discovering person who is a representative or agent of CTS shall remain on-site through the emergency response time frame to assist and support responders with Plant information and resources, including access to required resources and traffic control.

### **1.3 Plant security**

Access to the site is restricted by chain-link fence. The fence will be equipped with hinged personnel gates sliding vehicle gates as appropriate for maintenance and equipment access. All gates will be kept locked when facility personnel are not present. A Knox Box located outside the fence will contain keys to the gates. Adequate lighting, including emergency lighting, is provided at all times. The area surrounding the plant will be patrolled by CT Studios security personnel in accordance with the overall CT Studios security plan.

### **1.4 Evacuation and restriction of non-response personnel**

Upon discovery of a fire or other emergency condition associated with the Plant, the Plant area shall be immediately evacuated of all non-response personnel to a minimum distance of 100 feet. Plant owner representatives and qualified contracted operating personnel shall identify themselves to responding personnel and remain nearby and available to assist in response activity planning and support, as necessary.

### **1.5 Operator activities**

On-site personnel:

- Upon discovery of a fire or other Plant emergency condition with the Plant still running, while immediately evacuating the area of others and self, depress any Emergency ShutDown (“ESD”) pushbutton if it is safe to do so. ESD buttons are situated at several locations around the Plant as indicated in Appendix A, and can be identified by their red mushroom caps and labeling, as depicted in Figure 1 of Fire and Emergency Prevention Plan.
- Upon discovery of a fire or other emergency condition when the Plant has experienced an ESD, immediately evacuate others and self.
- Make notifications per Appendix B.
- Remain on-site at a safe distance to assist and support responding personnel, including providing Plant access, restricting access to non-responding personnel and clearing traffic.

Remote Global Technology Assistance Center (“GTAC”) operators:

- Upon acknowledgement of a fire related Emergency Shutdown or knowledge of other emergency condition, make notifications as described in Appendix B.

- Dispatch field service personnel to site to assist and support response personnel with fuel cell technical expertise.

## **2. Fire Extinguishment / Emergency Plant Shutdown**

Upon ESD of the Plant, all fuel gas supplies to the plant are automatically shut off via two in-line fast-acting spring-loaded isolation valves.

**FOLLOWING AN ESD, SOME NATURAL GAS WILL REMAIN ISOLATED WITHIN THE FUEL DESULFURIZER VESSELS**, however, these vessels are protected from overpressurization by pressure safety valves sized for fire exposure applications. Following an ESD, nitrogen gas is supplied from either a liquid or compressed gas source to flow through the Plant equipment and purge remaining natural gas. As with the desulfurizers, the nitrogen source supply is protected against overpressurization by safety relief valves provided by the gas supplier.

**FOLLOWING AN EMERGENCY SHUTDOWN, ELECTRICAL ISOLATION IS NOT ASSURED.** Substantial AC and/or DC voltages may still remain for significant durations following an ESD event.

A Site Plan is provided in Appendix A. The location of key utility shutoffs (fuel gas and electrical) are indicated on the Site Plan.

### **2.1 Fire water application concerns**

**FIRE WATER SHALL NOT BE APPLIED TO COMPONENTS OF THE PLANT AT ANY TIME.** Certain Plant components may remain electrically energized with either alternating current or direct current voltage even after system shutdown via ESD pushbutton switches.

### **2.2 Appropriate extinguishing media**

Only fire extinguishing media appropriate for live electrical equipment shall be applied to Plant components. At least two 20 lb. listed A:B:C fire extinguishers are provided inside the Plant's enclosed area.

### **2.2 Other Emergencies**

**Hazardous material spills** – Hazardous materials that may be temporarily present on-site, other than natural gas, are typically solids, and usually only in small quantities. Trained hazardous material operations and response personnel are on-site for any operations or maintenance activities that involve the handling of bulk or containerized hazardous materials.

**Personnel injuries** – For injuries requiring medical attention, the injured party or his/her companion shall seek appropriate medical attention for the injured. **For serious injuries, call 911.** For less serious injuries that require medical attention the injured shall obtain medical treatment at the nearest emergency medical care facility. All accidents shall be reported to FCE's GTAC operators and to FCE's Environmental Health & Safety (EHS).

### **3. *Plan Validation***

The executable elements of this Fire Emergency Plan consist of the manual activation of an ESD upon discovery, evacuation of the Plant area and notifications.

ESD buttons are all hard-wired in a fail-safe circuit. All fuel cell operating personnel are trained and regularly re-trained in a complete suite of safety programs.

CTS is responsible for updating the information contained in this Plan, including Appendix B - Site Contacts / Notifications as information changes.

## EMERGENCY AND FIRE PREVENTION

### 1. *Egress*

A Site Plan is provided in Appendix A.

### 2. *Emergency Alarms and ShutDowns*

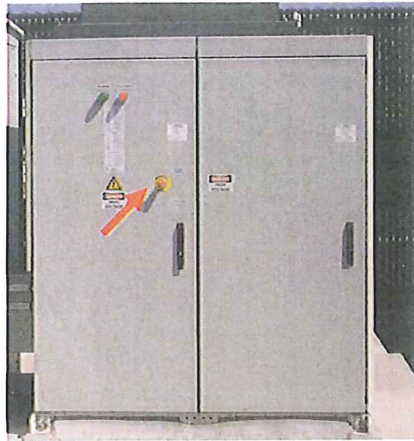
The Plant is provided with ESD pushbuttons. ESD pushbuttons have red mushroom caps and are clearly labeled. ESD pushbutton locations are indicated in Appendix A. Photos of typical ESD pushbuttons are shown in Figure 1. Depressing an ESD pushbutton will immediately shut down fuel flow to the Plant as well as shut down all of the mechanical balance of plant equipment. **HOWEVER, THE ESD DOES NOT OPEN THE ELECTRICAL GRID TIE BREAKER, SO ELECTRICAL BALANCE OF POWER PLANT COMPONENTS WILL REMAIN ENERGIZED. ADDITIONALLY, UNINTERRUPTABLE POWER SUPPLIES (UPS) WILL PROVIDE POWER TO A NUMBER OF MECHANICAL BALANCE OF POWER PLANT COMPONENTS AND THE FUEL CELL MODULE WILL RETAIN SIGNIFICANT DC VOLTAGE POTENTIAL ENERGY IF OPERATING PREVIOUS TO THE ESD.**

The following types of automatic emergency sensors are provided with the Plant:

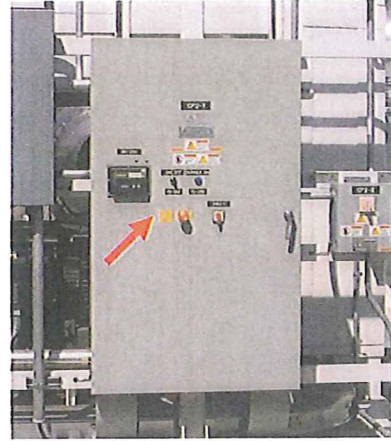
- Combustible gas detectors
- UV/IR Flame detectors
- Smoke detectors

Sensor detection of flame, MBOP smoke, or presence of excessive combustible gas concentration (50% of Lower Explosive Limit [LEL]) will result in an ESD of the Plant. In the case of combustible gases, detection of a concentration of approximately 25% LEL will result in a high LEL warning alarm. EBOP smoke detectors provide an alarm function only as other performance shutdowns protect the equipment in case of actual fire.

In addition process flows, temperatures, pressures and voltages are continuously monitored for deviations from expected values. Process sensors are used to verify proper operation of process and will quickly sense and shutdown the process upon severe deviations, such as would occur in the case of excessive seismic activity. Emergency sensors have supervisory signals and the plant will ESD on the loss of any one of those signals. Emergency sensors are calibrated in accordance with an established schedule as described in the maintenance manual.



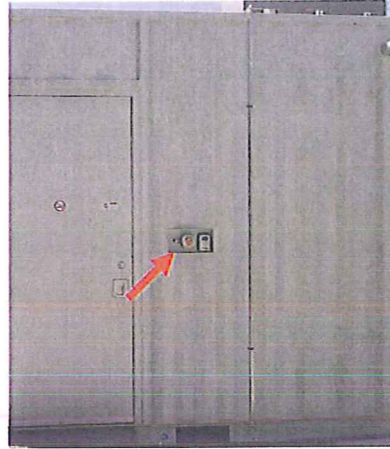
Tie Breaker Switchgear



Skid 2, Main Process Skid,  
Control Panel



Electrical Balance of Plant



Skid 1, Electric & Controls /  
Water Treatment System  
Skid

**Figure 1: Typical Emergency ShutDown (ESD) Pushbuttons**

Plant operating personnel are provided with portable gas detectors for use in operating and maintenance tasks including surveillance for gas leaks should such be necessary.

### **3. Fire Prevention**

The fire prevention strategy for the Plant consists of the following Plan elements:

#### **3.1 Housekeeping**

The area around the Plant shall be kept orderly and free of combustible and flammable materials, including combustible and flammable liquids, flammable gases and combustible and flammable solid materials. Trash shall not be allowed to accumulate. The water treatment system container shall not be used for general material storage.

#### **3.2 Storage and Handling of flammables/combustibles**

**STORAGE OF FLAMMABLE AND COMBUSTIBLE MATERIALS IS PROHIBITED WITHIN THE PLANT ENCLOSURE WITHOUT PRIOR WRITTEN PERMISSION FROM THE LOCAL AUTHORITY HAVING JURISDICTION.** Transient flammables and combustibles may include gases, small containers of flammable liquids such as solvents, trash and virgin and spent consumables used in the fuel cell process. These materials are to always be stored in packaging appropriate for their material properties and retained on site for as short of a duration as feasible. Flammable and combustible materials are to be kept separated from sources of ignition, fuel piping and processing equipment and electrical equipment and shall be protected from weather. Appropriate packaging materials for consumable materials are as follows:

- Catalysts, virgin or spent – steel drums
- Desulfurizer media, virgin – manufacturer's original packaging
- Desulfurizer media, spent – steel drums

Notification to the local authority having jurisdiction shall be made prior to performing preconverter catalyst maintenance and the bringing on site of replacement preconverter catalyst.

#### **3.3 Flammable/combustible materials and potential ignition sources**

The following are flammable/combustible materials *potentially* present at the Plant:

- Natural gas (present in piping and desulfurizer vessels only - no on-site storage)
- Electrical equipment
- Plastics
- Insulation jacketing
- Desulfurizer media (activated carbon)
- Transformer oil or dielectric fluid
- Miscellaneous new and used filter elements, PPE, packaging, etc.

- Granular nickel-based catalyst (DOT Div. 4.2, PG II/III; transient, not stored nor on-site for a long-term)

Natural gas piping (also referred to as “fuel gas”) within the Plant area is identified with yellow “Natural Gas” pipe markers, complying with ANSI A13.1 requirements.

The following are potential ignition sources present at the Plant:

- Heat from process
- Electrical equipment
- Catalysts
- Hot work
- Smoking, open flame
- Internal combustion equipment/vehicles

The Plant design and procedures established to operate and maintain the Plant have been formalized to minimize any potential for fire.

- The entire Plant has been designed to and complies with the provisions of the ANSI/CSA FC 1-2004 - *America Standard For Stationary Fuel Cell Power Systems*.
- The Plant is equipped with automatic safety sensors to safely shut down the process in cases of leaking fuel or fire (Section 2.)
- All fuel gas is pipeline delivered with minimal fuel gas holdup.
- Desulfurizer vessels have been provided with pressure safety relief valves sized for fire emergencies.
- All of the Plant piping has been designed in accordance with ASME B31.3. Piping is marked in accordance with ANSI A13.1.
- Areas of potential hazardous (classified) atmospheres have been identified and sources of potential ignition have been removed and electrical equipment within complies with the area classification designation.
- Electrical equipment is designed to and complies with the provisions of UL1741.
- Smoking is NOT allowed within the Plant area.
- Hot Work within the Plant area is by Permit only, with potential sources of flammable materials removed from the area of potential ignition when hot work is conducted. Hot Work Permits shall be issued by CTS or an appropriate representative with the necessary expertise in fuel cell operations. Additionally, any hot work conducted under the supervision of FCE shall also be permitted under the FCE Hot Work Permit program.

### **3.4 Portable Fire Extinguishers**

Sufficient type A:B:C portable fire extinguishers (20 lb. minimum) are provided and maintained by CTS for this Plant, such that the travel distance to nearest extinguisher does not exceed 50 feet. Portable fire extinguishers are located

inside the Plant fenced area. Portable fire extinguishers required for specific maintenance procedures are brought to site by service personnel as special equipment for that procedure.

### 3.5 Inspections of Plant area and fire prevention equipment

All inspections and maintenance of fuel cell components and systems are to be performed in accordance with the latest revision of the Plant maintenance manual. Operating personnel also conduct an informal "walk around" inspection every time they visit the Plant. As the Plant operates remotely without the presence of operators, the purpose of the "walk around" inspection is to check for any "out of the ordinary" situations or accumulated materials. FCE operators log findings into a "turnback" database. Sensors are calibrated or replaced in accordance with an established maintenance schedule based on equipment manufacturer's instructions; with work orders scheduled and records maintained by the database.

If, during an operator site visit or "walk around" inspection, a fuel leak is discovered, an immediate evaluation and disposition shall be undertaken. For sizeable leaks, an immediate Plant shutdown may be necessary, while leaks of a very minor nature might be addressed by such remedies as flange bolt retorquing or other measures. Contracted operators are equipped with portable fuel gas (LEL) meters to assist in the evaluation of leak severity. Any discovered leak and its corrective measures shall be recorded in the turnback database.

UV/IR flame detectors, combustible gas (LEL) sensors and smoke detector automatic sensors shall be tested, calibrated, maintained and/or replaced at the frequency provided in the DFC-3000 plant maintenance manual. A summary of these requirements is provided below:

Automatic Sensor	Frequency	Maintenance Action
Skid 1 Smoke Detectors	18 mos.	Test & replace if req'd.
EBOP Smoke Detectors	18 mos.	Test & replace if req'd.
Combustible Gas Detectors	18 mos.	Clean & calibrate
UV/IR Flame Detector	12 mos.	Clean & Test

### 3.6 Fire protection system/equipment impairment

The South Windsor Fire Department shall be notified immediately in the case of any impairment of the fire protection/detection system and an impairment tag affixed to the system. The South Windsor Fire Department ("SWFD") shall also be notified immediately upon the impairment correction and tag removal.

Unintended impairment of any fire protection sensor system will automatically ESD the Plant. Manual short-term sensor impairment for the purpose of on-site maintenance occurs only at times when maintenance personnel are on-site and vigilant for signs of fire or potential fire. As a policy, extended system impairment is not permitted with rare exceptions and only when alternative

monitoring methods can be implemented by remote monitoring and for as short of a duration as possible.

### **3.7 Incident investigation and reporting**

Any fire-related incident shall be immediately reported to the SWFD as “lead investigator.” CTS or its representatives, as well as FCE qualified personnel, will be called upon to assist in the site and technical aspects of the investigation. Such incidents will also be investigated by CTS/FCE as required by the manufacturer’s Certifying Agency. Results/conclusions of the investigation shall be reported to the SWFD and CTS. External reporting to other agencies will be as directed by the responding department commanders and as required by regulation, as established at the time of incident.

## **Appendix A: Site/Plant Drawings**

- Fuel Cell Power Plant, CT Studios, South Windsor, CT

**(replace with detailed site drawing when complete)**

## Appendix B: Site Contacts / Notifications

<b>Contact Organization</b>	<b>Name(s)</b>	<b>Phone Number</b>	<b>Alt. Phone Number</b>	<b>Notification Required ?</b>
Fire Department	South Windsor Fire Department	<b>911</b>		<b>YES</b>
GTAC (remote plant operator)	FCE Global Technology Assistance Center (GTAC)	(203) 825-6077		<b>YES</b>
Plant/Site Owner	CTS Energy, LLC	TBD		By GTAC
Gas Supplier	Yankee Gas	TBD		As req'd., FYI
Spill Responders	South Windsor EMS	<b>911</b>		As req'd., FYI
Electrical Utility	Connecticut Light & Power	TBD		As req'd., FYI
Police	South Windsor	<b>911</b>		As req'd., FYI
Ambulance	TBD	<b>911</b>		As req'd., FYI
Hospital	TBD	TBD		As req'd., FYI
FuelCell Energy	Environmental, Health & Safety (EHS)	(203) 825-6000		Injuries, Hot Work Permit