STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
Web Site: portal.ct.gov/csc

VIA ELECTRONIC MAIL

September 2, 2025

Steve Pearson
VFS, LLC
5827 Terex
Clarkstown, MI 48346
spearson@vfsmi.com

RE: **PETITION NO. 1635** – VFS, LLC Declaratory Ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the construction, maintenance and operation of a 195-kilowatt customer-side fuel cell facility and associated equipment to be located at the Taft School, 110 Woodbury Road, Watertown, Connecticut. **Compliance with Condition No. 4.**

Dear Steve Pearson:

The Connecticut Siting Council (Council) is in receipt of the correspondence dated August 27, 2025 regarding compliance with Condition No. 4 of the Declaratory Ruling issued by the Council on October 24, 2024 for the above-referenced facility.

The correspondence includes a post-construction operational noise study that documents compliance with state standards, in accordance with Condition No. 4.

The Council acknowledges that Condition No. 4 has been satisfied by the August 27, 2025 correspondence.

Condition Nos. 2, 3, 7, and 9 remain outstanding. The correspondence does not contain evidence that a copy of the Fuel Cell Emergency Response Plan was submitted to emergency responders, and a Construction Spill Prevention Control and Countermeasure Plan, Fuel Pipe Cleaning information and an Emergency Response/Safety Plan were not submitted to the Council.

Therefore, this acknowledgment applies only to Condition No. 4 satisfied by the August 27, 2025 correspondence.

Please be advised that deviations from the standards established by the Council in the Declaratory Ruling are enforceable under the provisions of Connecticut General Statutes §16-50u.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/MP/dll

c: Service List, dated July 22, 2024
Jeffrey Biolo, Town of Watertown, Building Official (biolo@watertownct.org)

Enclosure: Council Decision Letter dated October 24, 2024

STATE OF CONNECTICUT
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VIA ELECTRONIC & CERTIFIED MAIL
RETURN RECEIPT REQUESTED

October 24, 2024

Steve Pearson
VFS, LLC
5827 Terex
Clarkstown, MI 48346
spearson@vfsmi.com

RE: **PETITION NO. 1635 –** VFS, LLC petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a 195-kilowatt customer-side fuel cell facility and associated equipment to be located at the Taft School, 110 Woodbury Road, Watertown, Connecticut. **Final Decision.**

Dear Steve Pearson:

At a public meeting held on October 24, 2024, the Connecticut Siting Council (Council) considered and ruled that the above-referenced proposal meets air and water quality standards of the Department of Energy and Environmental Protection and would not have a substantial adverse environmental effect, and pursuant to Connecticut General Statutes (CGS) § 16-50k would not require a Certificate of Environmental Compatibility and Public Need and with the following conditions:

1. Approval of any Project changes be delegated to Council staff;

2. Provide a copy of the Fuel Cell Emergency Response Plan to local emergency responders prior to facility operation and provide emergency response training that includes an itemized list of necessary fire suppression equipment;
   R2. Fire Dept. Training is scheduled for Tuesday September 16 at 6:00 pm.
3. Provide a Construction Spill Prevention Control and Countermeasure Plan with contractor information and appropriate reporting forms;
   R3. See Attachment 1
4. Submit a post-construction operational noise study that documents compliance with state standards and the identification of any additional noise mitigation measures that are employed to adhere to the standards;

5. The use of natural gas as a fuel system cleaning medium during fuel cell construction, installation or modification shall be prohibited;

6. The Council shall be notified in writing at least two weeks prior to the commencement of site construction activities;

7. Submit the following information to the Council 15 days prior to any fuel pipe cleaning operations related to fuel cell construction, installation, or modification:
   a. Identification of the cleaning media to be used;
   b. Identification of any known hazards through use of the selected cleaning media;

   R7. See attachment 2

c. Description of how known hazards will be mitigated, including identification of any applicable state or federal regulations concerning hazard mitigation measures for such media;
d. Identification and description of accepted industry practices or relevant regulations concerning the proper use of such media; Provide detailed specifications (narratives/drawings) indicating the location and procedures to be used during the pipe cleaning process, including any necessary worker safety exclusion zones;
e. Identification of the contractor or personnel performing the work, including a description of past project experience and the level of training and qualifications necessary for performance of the work;
f. Contact information for a special inspector hired by the project developer who is a Connecticut Registered Engineer with specific knowledge and experience regarding electric generating facilities or a National Board of Boiler and Pressure Vessel Inspector and written approval of such special inspector by the local fire marshal and building inspector; and
g. Certification of notice regarding pipe cleaning operations to all state agencies listed in CGS § 16-50j(h) and to the Department of Consumer Protection, Department of Labor, Department of Public Safety, Department of Public Works, and the Department of Emergency Management and Homeland Security;

8. Compliance with the following codes and standards during fuel cell construction, installation or modification, as applicable:
    a. NFPA 54
    b. NFPA 853; and
    c. ASME B31;

9. Submit a copy of an Emergency Response/Safety Plan within 90 days of the date of this decision that includes, but is not limited to the following:
    a. A description of the results of any simulated emergency response activities with any state and/or local emergency response officials;
    b. Details of any facility site access system; and
    c. Establishment of an emergency responder/local community notification system for on-site emergencies and planned construction-related activities that could cause community alarm. The system shall include notification to the following: local emergency responders, city or town officials, state legislators, and local residents that wish to participate.

R9. See attachment 3

10. Unless otherwise approved by the Council, if the facility authorized herein is not fully constructed within three years from the date of the mailing of the Council's decision, this decision shall be void, and the facility owner/operator shall dismantle the facility and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made. The time between the filing and resolution of any appeals of the Council's decision shall not be counted in calculating this deadline. Authority to monitor and modify this schedule, as necessary, is delegated to the Executive Director. The facility owner/operator shall provide written notice to the Executive Director of any schedule changes as soon as is practicable;

11. Any request for extension of the time period to fully construct the facility shall be filed with the Council not later than 60 days prior to the expiration date of this decision and shall be served on all parties and intervenors, if applicable, and the Town of Watertown;

12. Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed **along with a representative photograph of the facility**;

13. The facility owner/operator shall remit timely payments associated with annual assessments and invoices submitted by the Council for expenses attributable to the facility under Conn. Gen. Stat. §16-50v;

14. This Declaratory Ruling may be transferred or partially transferred, provided both the facility owner/operator/transferor and the transferee are current with payments to the Council for their respective annual assessments and invoices under CGS §16-50v. The Council shall be notified of such sale and/or transfer and of any change in contact information for the individual or representative responsible for management and operations of the facility within 30 days of the sale and/or transfer. Both the facility owner/operator/transferor and the transferee shall provide the Council with a written agreement as to the entity responsible for any quarterly assessment charges under CGS §16-50v(b)(2) that may be associated with this facility, including contact information for the individual acting on behalf of the transferee; and

15. This Declaratory Ruling may be surrendered by the facility owner/operator upon written notification to the Council.

This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the petition, dated July 22, 2024 and additional information dated July 29 and October 1, 2024, and in compliance with Public Act 11-101, An Act Adopting Certain Safety Recommendations of the Thomas Commission.

Enclosed for your information is a copy of the staff report on this project.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/MP/dll

Enclosure: Staff Report dated October 24, 2024

c: The Honorable Jonathan Ramsay, Chairperson, Town of Watertown (towncouncil@watertownct.org)
Mark A. Raimo, Town Manager, Town of Watertown (raimo@watertownct.org)
Kimberly Calabrese, Fire Marshal, Town of Watertown (calabrese@watertownct.gov)
Service List dated July 22, 2024
CGS §16-50j(g) State Agency Comment List

STATE OF CONNECTICUT)

: ss. Southington, Connecticut October 24, 2024

COUNTY OF HARTFORD)

I hereby certify that the foregoing is a true and correct copy of the Decision and Staff Report in Petition No. 1635 issued by the Connecticut Siting Council, State of Connecticut.

ATTEST:

_____

Melanie A. Bachman
Executive Director
Connecticut Siting Council

STATE OF CONNECTICUT)

: ss. New Britain, Connecticut October 24, 2024

COUNTY OF HARTFORD)

I certify that a copy of the Connecticut Siting Council Decision and Staff Report in Petition No. 1635 has been forwarded by Certified First Class Return Receipt Requested mail, on October 25, 2024, to each party and intervenor, or its authorized representative, as listed on the attached service list, dated July 22, 2024.

ATTEST:

_____

Dakota LaFountain
Office Assistant
Connecticut Siting Council

LIST OF PARTIES AND INTERVENORS
SERVICE LIST

Status Granted	Document Service	Status Holder (name, address & phone number)	Representative (name, address & phone number)
Petitioner	☒ E-mail	VFS, LLC	Steve Pearson VFS, LLC 5827 Terex Clarkstown, MI 48346 Phone: (248) 417-0674 spearson@vfsmi.com Gerry Conboy VFS, LLC 5827 Terex Clarkstown, MI 48346 Phone: (702) 302-8869 gconboy@vfsmi.com

Prepared For: VFS, LLC

Point of Contact: Walter Bonola

Prepared by: Acoustic Technology LLC
50 Myrock Avenue
Waterford, CT 06385-3008

Subject: Town of Watertown
The Taft School
Airborne Noise Test
At 110 Woodbury Road

Author: Carl Cascio

Date: August 27, 2025

Revision: 0

Table of Contents

Summary

This document makes a positive acoustic assessment that should assist in meeting any acoustic noise concerns during the operation of a Bloom Energy 195 KW fuel cell at the Taft School at 110 Woodbury Road in Watertown CT. An acoustic assessment plan was developed and executed to acquire airborne acoustic information useful in explaining and mitigating the potential airborne noise issues associated with operation of the Bloom 195 KW fuel cell. It is important to show that the airborne noise generated by the fuel cell will not significantly impact any of the facility's neighbors.

The airborne noise levels generated by the Bloom fuel cell operating at the Watertown site were measured on August 21 and 25, 2025. The fuel cell plus background noise produced an overall average airborne noise level that varied from 47 to 49 dBA (reference 20 microPascals) at a distance of 2 meters around the noise enclosure. Airborne noise levels with the fuel cell operating were measured at distances from 2 to 300 meters from the fuel cell location at the Taft School. The airborne noise levels from the fuel cell and background at nearby property lines were measured at levels from 42 to 49 dBA. The measurement locations to the east along North Street were influenced by wind noise during the day and cricket noise at night. Analysis of the fuel cell data indicated propagation losses from 11 to 34 dB from the fuel cell location to the nearby Residential property lines.

A prominent discrete tone was found at 6300 Hertz in the measurement location near the gas valve. The CT ordinance states that the overall noise ordinance is thereby reduced by 5 dB changing the day time CT noise limit to 50 dBA and the night time limit to 40 dBA. The Watertown noise ordinance does not discuss discrete tones so its limits are 5 dB higher.

The estimated airborne noise from the fuel cell at all of the nearby residential property lines on North Street are below both the day and night time residential noise limits. (The day time measured airborne noise levels with background are all below 50 dBA with the fuel cell on.) While all of the nearby residential property lines on North Street are above the night time noise limit of 40 dBA with background noise, it is estimated that the fuel cell contribution is no higher than 37 dBA. The day and night time noise produced only by the fuel cell was calculated using the measured noise level at the fuel cell (P3) enclosure closest to the North Street property line and the transfer functions from the fuel cell to the property lines calculated in reference 4. No acoustic issues are expected during operation of the fuel cell.

The State of Connecticut's Noise Code (Ref. 1) and Watertown's Noise Ordinance (Ref. 2) calls for review of acoustic issues associated with impulse noise. Operation of the fuel cell meets all of these impulse noise requirements at all of the nearby properties. The CT Noise Code calls for review of acoustic issues associated with prominent discrete tones, infrasonic and ultrasonic noise. Operation of the fuel cell meets all of these infrasonic and ultrasonic noise requirements at all of the nearby properties. A single prominent discrete tone in the 6300 Hertz one-third octave band implements a 5 dB reduction in the CT overall noise requirements. Operation of the fuel cell meets all of these CT discrete noise requirements at all of the nearby properties. **No acoustic issues** are expected during operation of the fuel cell.

Introduction

Acoustical Technologies Inc. was tasked as part of a VFS, LLC site permitting process with an assessment of potential acoustic issues associated with Bloom fuel cell airborne noise reaching the properties adjacent to the Taft School site at 110 Woodbury Road in Watertown, CT. Responding to a request from Walter Bonola (Venture Funding Specialists, LLC) site visits were made on August 21 and 25, 2025. During the visits, surveys of the airborne noise levels produced by the Bloom 195 KW Fuel Cell were made in order to identify any potential airborne noise issues. Airborne noise measurements were taken during the day and night time hours to quantify the propagation of the fuel cell airborne noise to the adjacent properties. This document provides an acoustic assessment to demonstrate that the fuel cell meets its acoustic requirements and does not generate any noise concerns during its operation at 110 Woodbury Road in Watertown, CT. A description of the fuel cell site is shown in Figure 1. The Bloom fuel cell energy server system is located inside a four-sided noise enclosure shown in Figure 2 below.

Figure 1. Bloom Energy Fuel Cell Information

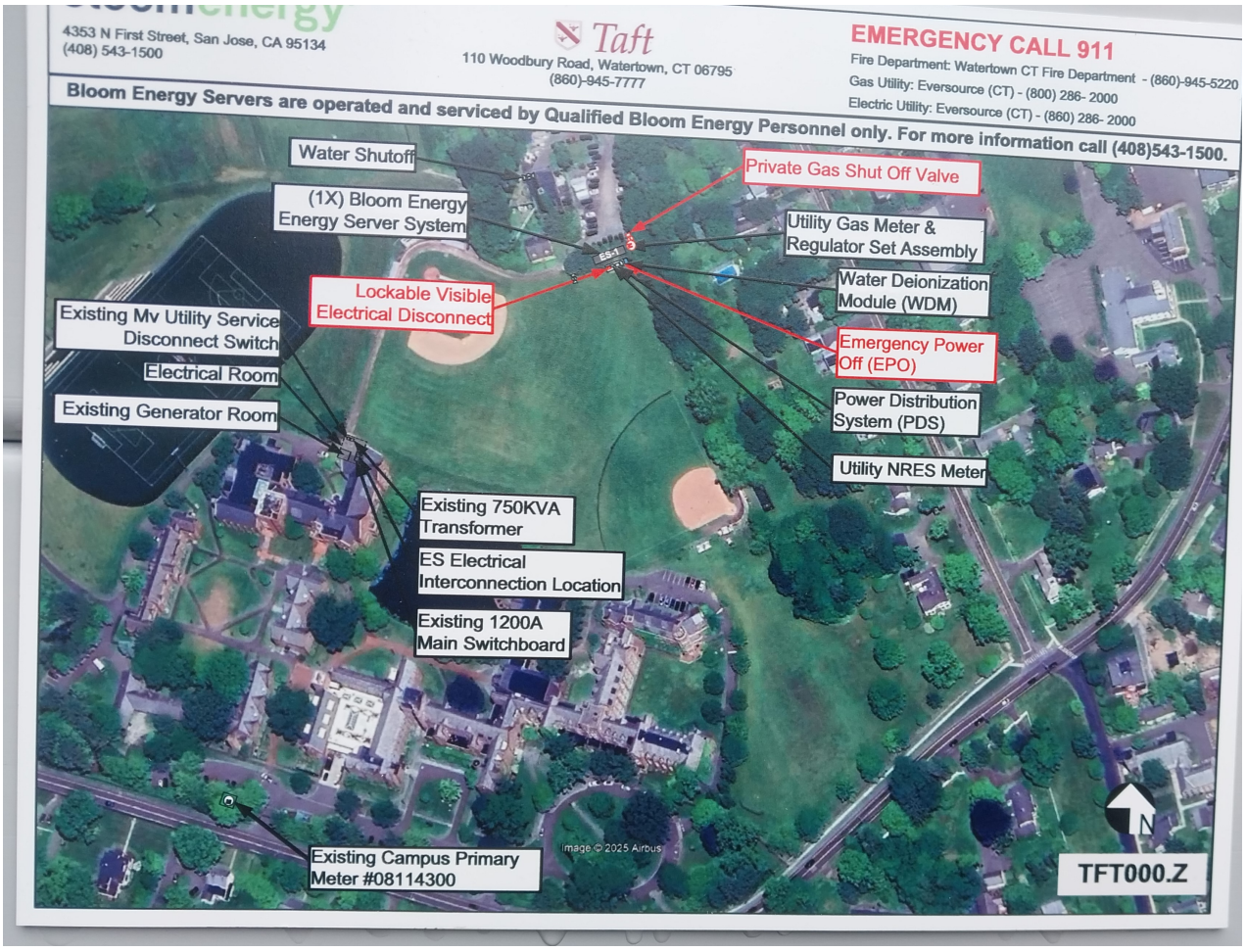


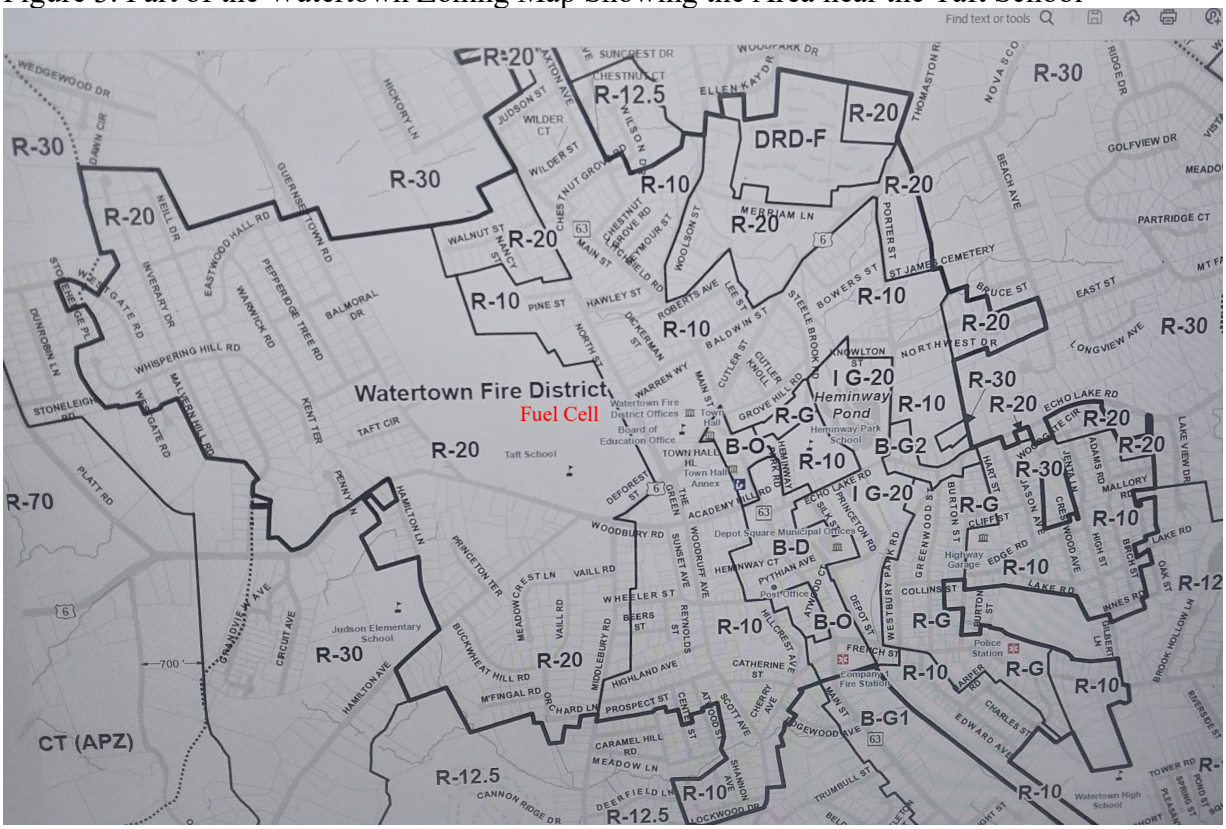
Figure 2. Photo of the Bloom Fuel Cell Noise Enclosure

Development of the Acoustic Assessment Plan

The purpose of this effort is to acquire acoustic information useful in understanding the potential airborne noise issues associated with the operation of a Bloom 195 KW fuel cell at the Taft School. The Watertown site is located in a Residential Zone next to North Street and is surrounded by other Residential Zones. (The Watertown zoning map is given below.) It is important to determine whether the airborne noise generated by the Bloom fuel cell will negatively impact these neighbors.

The acoustic impact is assessed in the following way. The fuel cell operating airborne noise levels were measured at the new site on August 21 and 25, 2025. Using this data, the noise levels are compared to the allowable noise levels in the State of Connecticut[1] and Town of Watertown[2] Noise Ordinances. With the full cell operating at full power, this approach then follows the traditional "What is the airborne noise level at the neighbor's property line?". Is the airborne noise below the allowable airborne noise levels? This measured site data can also be used to estimate noise levels at other neighbor's property lines. The effect of background noise can also be considered. The Town of Watertown and the State of Connecticut's Noise Code will be consulted to assess the impact of the measured and estimated acoustic levels. Because of the closeness of the Bloom fuel cell site to the nearest property lines noise mitigation was recommended[3]. (The airborne noise estimated for the fuel cell without mitigation was expected to exceed the airborne noise requirements at the closest neighbors' property lines.) As shown above, the Bloom fuel cell was enclosed within the noise enclosure except for the gas line and gas valve located on the east side of the enclosure.

Figure 3. Part of the Watertown Zoning Map Showing the Area near the Taft School



Acoustic Measurement Program

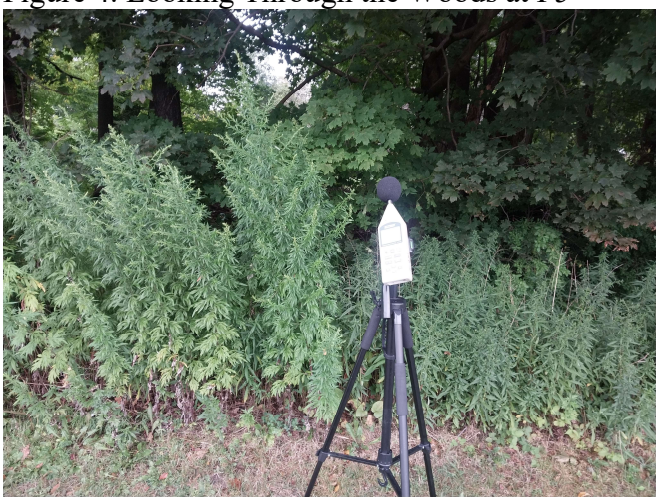
The acoustic data necessary to assess the impact of the 195 KW Bloom Fuel Cell are described below: Airborne sound pressure measurements and spectral analysis were conducted at the Watertown site on and near 110 Woodbury Road on August 21 and 25, 2025 during the daylight and night time hours. This testing established combined background airborne noise levels and fuel cell operating noise levels. (The fuel cell could not be turned off to make independent background measurements.) The overall A-weighted airborne noise measurements were made with an ExTech model 407780A Digital Sound Level Meter (s/n 140401544) that had been calibrated prior to and just after the test with a Quest model QC-10 Calibrator (s/n Q19080194). Measurements were all taken with A-weighting (frequency filtering that corresponds to human hearing) and with the sound level meter in a Slow response mode. The post-test spectral analysis was made with a Hewlett Packard Dynamic Signal Analyzer (model 3561A s/n 2502A01592) playing sound levels recorded at P11on a Zoom F3 digital recorder. This data was taken using two PCB microphones (model 130F20 s/n 53933 and model 378C01 s/n 121246) using two Wilcoxon model P702B power supplies. The PCB microphones were also calibrated prior to and after the test with the Quest model QC-10 Calibrator (s/n Q19080194). All measurements were made with the microphones at a height above ground between five and six feet. The Hewlett Packard model HP3561A Dynamic Signal Analyzer was also used to perform A-weighted spectral analysis to confirm the ExTech overall readings. For reference, a noise level increase of 1 dB is equal to an airborne sound pressure increase of 12.2 per cent.

At the Taft School fuel cell operating airborne noise measurements were taken at the following ten nearby property lines in the Residential Zone and the four sides of the fuel cell enclosure:

Location	Business	Distance	Zone	Type
P1 – 107 North Street	Home	70 meters	RS-20	Residential
P2 – 99 North Street	Home	48 meters	RS-20	Residential
P3 – 93 North Street	Home	46 meters	RS-20	Residential
P4 – 87 North Street	Home	47 meters	RS-20	Residential
P5 – 71 North Street	Home	69 meters	RS-20	Residential
P6 – 59 North Street	Home	83 meters	RS-20	Residential
P7 – 49 North Street	Home	119 meters	RS-20	Residential
P8 – 37 North Street	Home	156 meters	RS-20	Residential
P9 – 66 Guernseytown Road	Home	215 meters	RS-20	Residential
P10 – Opposite Watertown Green	Open Space	300 meters	RS-20	Residential
P11 – Enclosure East Side	Taft School	2 meters	RS-20	Residential
P12 – Enclosure North Side	Taft School	2 meters	RS-20	Residential
P13 – Enclosure South Side	Taft School	2 meters	RS-20	Residential
P14 – Enclosure West Side	Taft School	2 meters	RS-20	Residential

Positions 11, 12, 13 and P14 were located at 2 meters from the center and outside the noise enclosure walls on each side of the enclosure. See the Google satellite map in Figure 5 below for approximate locations of all the measurement positions. Measurements at P11 near the gas valves shown in Figure 6 were taken with the ExTech sound level meter and two microphones recording on the Zoom F3 digital recorder. Both microphones were 1 meter from the gas valve with channel 1 having a low frequency response up to 20 KHz while the channel 2 microphone had a higher frequency response up to 100 KHz. Measurements at all the other positions were taken with just the ExTech sound level meter. Figures 6 and 7 provide photographs of the site locations for the gas valve (P11) and the property line (P3). At each location, a one-minute record of the acoustic noise was analyzed. Two minutes of data were recorded at the gas valve on the Zoom F3 digital recorder.

Figure 4. Looking Through the Woods at P5



Because of the dense woods at locations P1 through P5 the actual measurements were at less distance to the property line and thus would be somewhat higher in level than a measurement taken further away at the property line. Figure 4 shows the P5 measurement location with the house at 71 North Street in the background.

Figure 5. Google Map Showing Measurement Positions P1 through P14

Figure 6. Gas Valve Location Looking West Towards Taft School Campus

Figure 7. P3 Location Looking East Towards 93 North Street

Airborne noise measurements taken outside are corrupted by rain and wind so a day was selected when the winds were expected to be 10 miles per hour or less. Table 1 provides the weather data at Danbury Airport (closest to Watertown) for the measurements on August 21 and 25, 2025. Data were taken over the period from noon to1:15 pm and again from 9 pm to 10:30 pm on the 21st and from 10:30 to 11:55 am on the 25th . The table below shows the temperature and wind speeds in hourly intervals. Wind conditions were not good for the day time measurements on the 21st with steady winds of about 15 mph and wind gusts up to speeds of 26 mph. Fortunately, all of airborne measurements were below the day time requirement of 50 dBA. Measurements were suspended during truck, car and plane passing and these short periods did not adversely affect the operating airborne noise measurements. The wind did raise the daytime background levels as the airborne noise level typically dropped to about 42 dBA for the brief periods when the wind abated. There was no rain during all of the testing on August 21and 25. The wind was not an issue on the 25th but insect noise kept the background above 45 dBA. The only useful data taken on the 25th was on the digital data recorded at the gas valve location (P3). The night time measurements were not affected by wind noise as the wind speed dropped below 10 mph and no gusts were present. The sound of crickets chirping was the predominant background noise during the night time testing. The HVAC system at the Taft School was also observable in positions P5 through P10. The sound of crickets chirping was the predominant background noise during the night time testing. The cricket noise kept the minimum noise levels above 45 dBA. The fuel cell could not be shut down so there is no true background data.

Table 1. Weather Data near Watertown on August 21 and 25, 2025
https://www.wunderground.com/history/daily/us/ct/danbury/KDXR/date/2025-8-21

Time (EST)	Temp. (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Condition
10:53 AM	66 °F	55 °F	68 %	ENE	9 mph	18 mph	Cloudy
11:53 AM	67 °F	56 °F	68 %	ENE	15 mph	24 mph	Cloudy
12:00 PM	67 °F	56 °F	68 %	ENE	16 mph	26 mph	Cloudy
12:53 PM	68 °F	55 °F	63 %	ENE	14 mph	25 mph	Cloudy
1:53 PM	69 °F	56 °F	63 %	ENE	12 mph	20 mph	Cloudy
2:06 PM	70 °F	56 °F	61 %	ENE	15 mph	25 mph	Cloudy
6:53 PM	70 °F	55 °F	59 %	NE	9 mph	0 mph	Fair
7:53 PM	68 °F	54 °F	61 %	NE	6 mph	0 mph	Fair
8:53 PM	62 °F	54 °F	75 %	CALM	0 mph	0 mph	Fair
9:53 PM	58 °F	55 °F	90 %	CALM	0 mph	0 mph	Fair
August 25	Below		August 21	Above			
9:53 AM	73 °F	66 °F	79 %	CALM	0 mph	0 mph	Cloudy
10:45 AM	76 °F	65 °F	69 %	W	8 mph	0 mph	Mostly Cloudy
10:53 AM	77 °F	66 °F	69 %	SW	6 mph	0 mph	Mostly Cloudy
11:16 AM	76 °F	64 °F	67 %	W	8 mph	0 mph	Mostly Cloudy
11:28 AM	78 °F	64 °F	62 %	W	8 mph	16 mph	Partly Cloudy
11:53 AM	79 °F	62 °F	56 %	VAR	5 mph	0 mph	Fair

Data Analysis

This section analyzes the airborne noise levels measured at the Taft School site and then documents the airborne noise levels at the property lines during fuel cell operation. These levels will be compared to the noise limits in the Connecticut and Watertown noise ordinances. The measured fuel cell operating noise levels are reported in Tables 2 and 3. These values include both background and fuel cell operating noise. The gas valve (P3) data will later be used to correct the measured operating airborne noise levels (Leq) providing estimates of only the fuel cell noise contribution at all the property line locations. (All of the locations have airborne noise levels in Table 2 that are below the allowable day time noise limit even with the background contribution during the day time hours on August 21.) Table 3 shows that the high background levels caused the measured airborne noise to exceed the night time requirement. Table 4 then reports background corrected fuel cell operating noise levels that do meet the night time noise requirements. Comparing the Taft School fuel cell estimated levels with the state and town noise limits will identify which nearby locations do or do not meet the airborne noise requirements.

As stated above, the complete set of overall A-weighted airborne noise levels that were measured in Watertown are provided in Tables 2 and 3. Figure 3 is a map showing part of the Watertown zoning districts in the Taft School area. The GPS range from the fuel cell to the property line locations that are shown in Tables 2 and 3 were calculated with Google Maps. The closest measurement location is P3, which is about 46 meters east to the home at 93 North Street. The next two closest measurement locations are P4 and P2 which 47 and 48 meters to the east respectively. The remaining locations are at least 69 meters away and at these residential locations the airborne noise from the operating fuel cell could not be heard.

The ExTech model 407780A Digital Sound Level Meter provided the following acoustic calculations which have been recorded in Tables 2 and 3 for each sensor location. In the "Slow" measurement mode one second sound pressure samples are taken for a period of one minute and analyzed as follows:

Leq : Equivalent continuous sound level over one-minute measurement period.
SPL MAX : Maximum sound level over one-minute measurement period.
SPL MIN : Minimum sound level over one-minute measurement period.
L:90□90% percentile sound level – **this is the level to be identified as estimated fuel cell noise**

The Connecticut State Noise Ordinance identifies the L90 calculation as useful in estimating background noise levels. We use it here to eliminate some of the background airborne noise that is combined with the fuel cell noise. L90 is the level that is exceeded 90% of the time. Because the fuel cell noise is essentially constant the L90 value excludes some of the transient noise made by the wind and other non-fuel cell sources like the HVAC plant at the Taft School. The L90 value averages 1.4 dB lower than the Leq value for Table 2 during the day and 0.9 dB lower than the Leq value for Table 3 during the night.

Table 2 shows the daytime noise L90 levels at the property lines to range from 41.9 to 47.7 dBA while the night time levels vary from 45.5 to 48.8 dBA at the property lines. The high winds during the day and the crickets at night dominated the property line measurements.

Table 2. Day Time Measured Overall Sound Pressure Levels in dBA reference 20 microPascals

Location	Range in Meters	Direction	Time	Leq	Max	Min	L90
P1-107 North	70	East	12:01 pm	50.2	54.2	46.8	47.7
P2 –99 North	48	East	12:04 pm	46.6	49.1	45.2	45.5
P3 -93 North	46	East	12:09 pm	47.3	51.7	45.8	46.2
P4 -87 North	47	East	12:14 pm	46.9	48.3	45.8	46.1
P5 -71 North	69	East	12:57 pm	47.1	49.3	45.9	46.1
P6 -59 North	83	East	12:55 pm	47.4	51.2	45.7	46.2
P7 -17 North	119	East	12:46 pm	49.1	65.6	47.0	47.7
P8 -37 North	156	East	12:40 pm	48.0	55.5	46.2	46.5
P9 -66 Gurn.	215	East	12:32 pm	45.5	57.9	41.4	41.9
P10 - Green	300	East	12:25 pm	47.5	62.7	45.2	45.8
P11 - East	2	East	1:00 pm	49.2	52.0	48.6	48.9
P12 - North	2	North	1:07 pm	49.9	53.7	48.1	48.8
P13 - South	2	South	1:03 pm	49.0	51.3	47.7	48.0
P14 - West	2	West	1:05 pm	48.8	50.8	47.9	48.1

Figure 8. Google Maps Showing Distance from Gas Valve to Closest Property Line

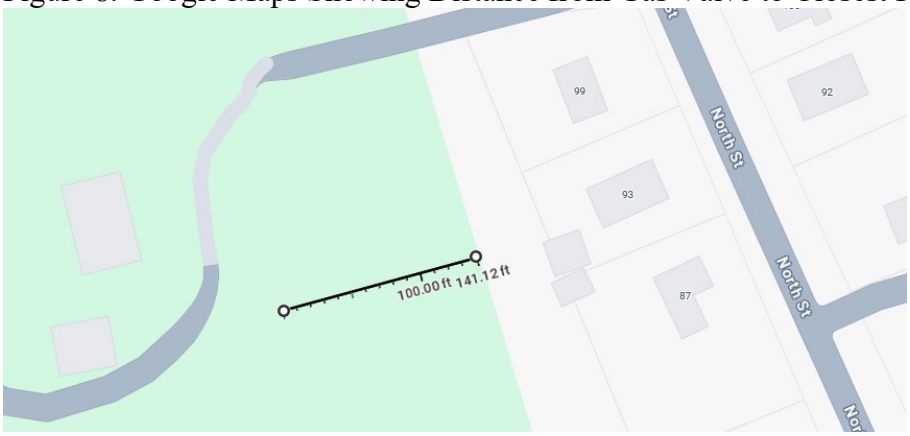
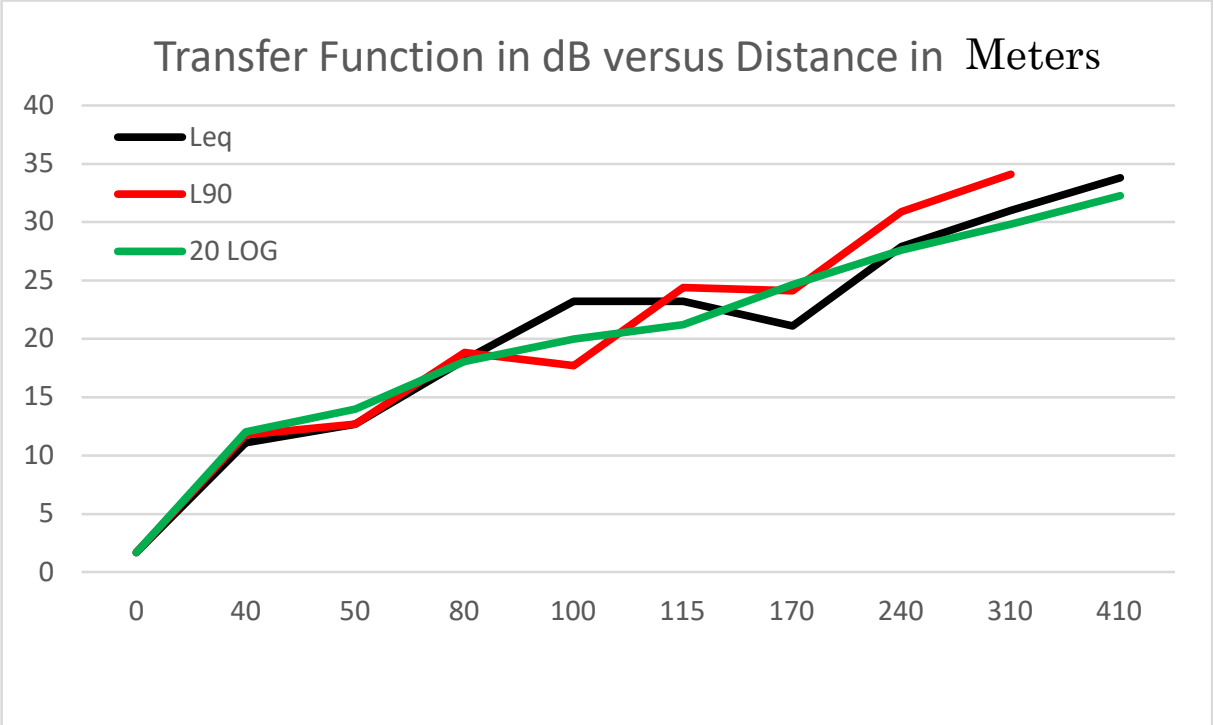


Table 3. Night Time Measured Overall Sound Pressure Levels in dBA reference 20 microPascals

Location	Range in Meters	Direction	Time	Leq	Max	Min	L90
P1-107 North	70	East	9:37 PM	48.3	61.7	45	45.5
P2 –99 North	48	East	9:40 PM	47.4	49.6	45.7	46.8
P3 -93 North	46	East	9:45 PM	49.5	52.2	48.4	48.8
P4 -87 North	47	East	9:47 PM	49.3	55.2	47.3	48.2
P5 -71 North	69	East	9:52 PM	49.4	50.8	46.9	48.2
P6 -59 North	83	East	9:54 PM	48.5	55.1	47	47.2
P7 -17 North	119	East	9:57 PM	47.1	48.1	46.3	46.8
P8 -37 North	156	East					
P9 -66 Gurn.	215	East					
P10 - Green	300	East					
P11 - East	2	East	10:01 PM	48.6	49.9	47.2	48.1
P12 - North	2	North	10:10 PM	47.2	48.8	46.2	46.7
P13 - South	2	South	10:12 PM	47.9	50.5	47.1	47.4
P14 - West	2	West	10:15 PM	47.5	49.4	46.1	46.7

Figure 9. Speaker Noise Level Versus Distance from the Speaker to the Property Line[4]



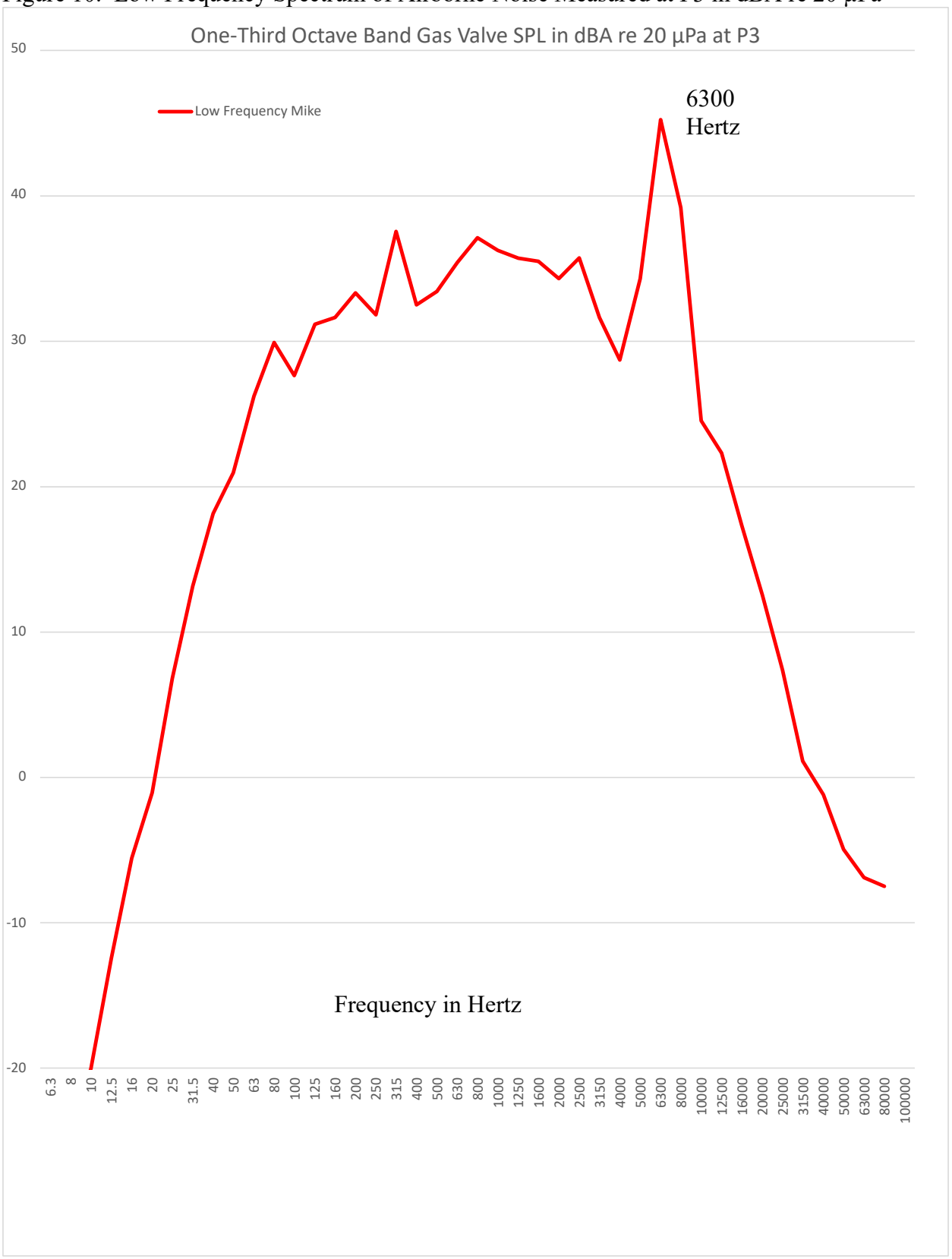
Airborne L90 noise levels at the noise enclosure were influenced more by the adjacent fuel cell with airborne noise levels that varied from 46.7 to 48.9 dBA for positions P11 to P14. The east side next to the gas valve had the highest levels with 48.9 dBA on the 21st and 48.1 dBA on the 25th of August. The gas valve faces the homes on North Street and thus radiates toward the closest property line. The transfer functions measured in reference 4 and shown in Figure 9 above will be used with the 48.9 dBA source level measured at location P11 to estimate the property line airborne noise in Table 4 without the background's influence. The expected Airborne noise levels at the property line due to the operating fuel cell are all below 40 dBA. As expected, the highest level of 37 dBA is at the closest location (P3), the home at 93 North.

Table 4. Estimated Overall Sound Pressure Levels in dBA reference 20 microPascals

Location	Range in Meters	Direction	L90 Day	L90 Night	Transfer Function	SPL Estimate
P1-107 North	70	East	47.7	45.5	16.7	32.2
P2 –99 North	48	East	45.5	46.8	12.7	36.2
P3 -93 North	46	East	46.2	48.8	11.8	37.1
P4 -87 North	47	East	46.1	48.2	12.3	36.6
P5 -71 North	69	East	46.1	48.2	17	31.9
P6 -59 North	83	East	46.2	47.2	19.6	29.3
P7 -17 North	119	East	47.7	46.8	25	23.9
P8 -37 North	156	East	46.5		27	21.9
P9 -66 Gurn.	215	East	41.9		30	18.9
P10 - Green	300	East	45.8		34	14.9

The CT noise ordinance in section *22a-69-3.3 Prominent discrete tones* states that the normal day time and night time requirements shall be reduced by 5 dB if a prominent discrete tone exists in the fuel cell noise spectrum. Figure 10 graphs the one-third octave spectrum at P3 showing a distinctive tone in the 6300 Hertz one-third octave band. This tone sounds like whistling from the gas valve. The discrete tone criteria states that the average of the adjacent frequency bands can be no more than 4 dB lower than the tone. In this case the 45.2 dBA 6.3 KHz tone level is 8.5 dB higher than the average of the two adjacent bands. As a result, the CT day time noise requirement becomes 50 dBA in a residential zone while the CT night time requirement becomes 40 dBA. (The Watertown overall requirements are not changed.) Even with the high background noise, the day time noise levels are all below 50 dBA by at least 2 dB. Since the night time measured levels are as much as 9 dB higher than the 40 dBA requirement, it is necessary to remove the high background noise to determine the contribution from just the fuel cell. This was done above and the results in the last column of Table 4 show that the fuel cell should meet the 40 dBA night time requirement by about 3 dB at the closest property line (P3). The remaining property lines are expected to have fuel cell contributions below 37 dBA.

Figure 10. Low Frequency Spectrum of Airborne Noise Measured at P3 in dBA re 20 µPa



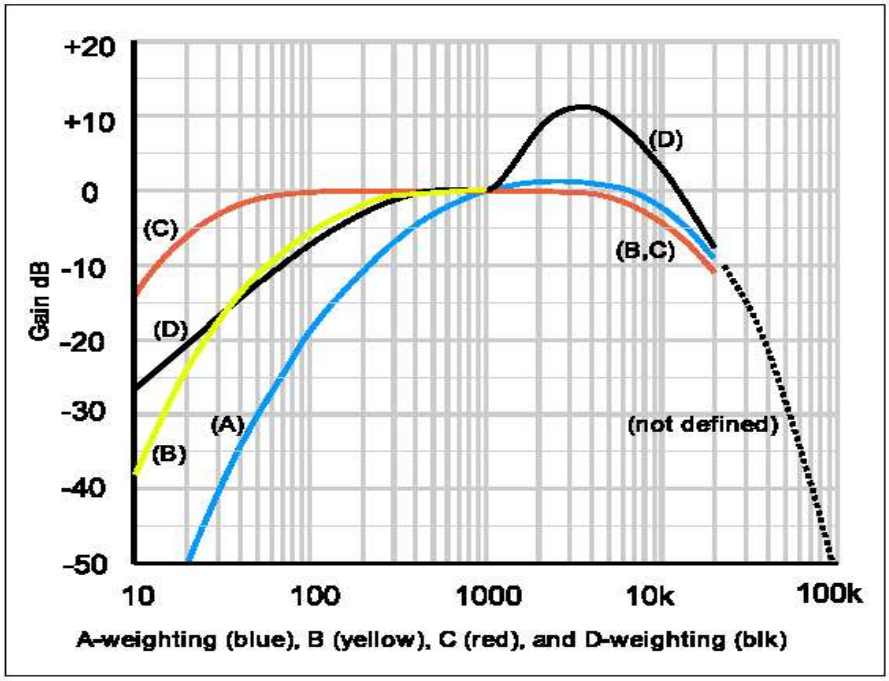
Allowable Noise Levels

The Connecticut regulation for the control of noise provides in *CT section 22a-69*-3 (Ref. 1) the requirements for noise emission in Connecticut. *CT section 22a-69*-3.1 states that no person shall cause or allow the emission of excessive noise beyond the boundaries of his/her Noise Zone so as to violate any provisions of these Regulations. The Watertown Noise Ordinance (Ref. 2) has the same allowable noise levels as the CT ordinance with a 2-hour change in the day-night hours on Sunday. The night time hours are also changed to start at 9:30 pm instead of 10 pm all week. The two ordinances will be used to evaluate the noise generated by the Bloom Fuel Cell. Following sections discuss each type of noise using the results obtained from the August 2025 fuel cell measurements at the Taft School in Watertown.

A part of the Watertown zoning map is given in Figure 3. As stated above, the Taft School site at 110 Woodbury Road is located in a Residential Zone that is surrounded by other residential zones. The acoustic estimates from all the nearby locations on North Street show that the fuel cell noise is expected to be below 40 dBA. As a result, the Bloom fuel cell will meet all the day and night time overall noise requirements. Other nearby residential properties at greater distances are also expected to be well below the day and night time Residential Zone noise limits for an emitter in a residential zone for both the CT and Watertown ordinances.

Figure 11. Acoustic Airborne Noise Weighting Curves

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



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

Impulse Noise

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

Impulse noise in excess of 80 dBA was not observed during any of the ten property line measurements of the Bloom 195 KW fuel cell made at the Watertown site in August 2025. The maximum level measured was 65.6 dBA at location P7 using the ExTech sound level meter. This and the other levels above 60 dBA were caused by vehicle traffic and not by the fuel cell. Given the steady state nature of the fuel cell's noise signature there should be no acoustic issues with the State of Connecticut's or the Town of Watertown's impulse noise requirements.

A few words are in order to discuss the difference between A-weighted and un-weighted impulse noise. A-weighting emphasizes the middle and higher frequencies while reducing the influence of the low frequencies. Figure 11 plots the A-weighting curve versus frequency in blue. Below a frequency of 1 kiloHertz the acoustic level is attenuated by increasing amounts. The reduction is about 10 dB at 200 Hertz, 20 dB at 90 Hertz and 30 dB at 50 Hertz. It also reduces the level at very high frequency being down in level by 10 dB at 20 kiloHertz. Other fuel cell measurements show the unweighted overall levels to be about 10 dB higher than the A-weighted noise levels. This implies that the vehicle caused impulses in the 60 dBA range might increase to the 70 dB range without the A-weighted filter. These levels are still below the 80 dB night time limit.

Prominent Discrete Tones

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

To Class C 62 dBA To Class B 62 dBA To Class A 55 dBA (day) 45 dBA (night)

Discrete tones limits are 5 dBA lower so the overall level may be no higher than the following:

To Class C 57 dBA To Class B 57 dBA To Class A 50 dBA (day) 40 dBA (night)

The Watertown Noise Ordinance does not discuss discrete tones so the CT Noise Ordinance will be used. To address the discrete tone issue, we use measured spectral data from the August 25, 2025 testing. Figure 9 plots the airborne noise measured 1 meter from the gas valve for frequencies from 6.3 Hz to 100,000 Hz in 1-3rd octave bands. This figure shows the large discrete tone at 6300 Hertz produced by the gas valve. The discrete tone criteria states that the average of the adjacent frequency bands can be no more than 4 dB lower than the tone at 6300 Hertz. In this case the 45.2 dBA 6.3 KHz tone level is 8.5 dB higher than the average of the two adjacent bands and qualifies as a prominent discrete tone. Another smaller tone exists at 315 Hertz. The discrete tone criteria states that the average of the adjacent frequency bands can be no more than 8 dB lower than the tone at 315 Hertz. In this case the 45.2 dBA 315 Hz tone level is only 5.5 dB higher than the average of the two adjacent bands. This tone at 315 is not a prominent discrete tone. As a result of the presence of the 6300 Hertz tone, the CT day time and night time noise requirements are lowered by 5 dB. Operating the Bloom fuel cell should produce airborne noise levels below the reduced overall noise requirements at all the residential property lines. There should be no acoustic issue with the CT discrete tone noise requirements.

Infrasonic and Ultrasonic Noise

The Connecticut regulation for the control of noise states in *CT section 22a-69-3.4 Infrasonic and Ultrasonic* that no person shall emit beyond his/her property infrasonic or ultrasonic sound in excess of 100 dB at any time. 100 dB with respect to the reference of 20 microPascals is a sound pressure of 2 Pascals or 0.00029 psi. Infrasonic sounds are sound pressure fluctuations below a frequency of 20 Hertz. Ultrasonic sounds are sound pressure fluctuations at frequencies above 20,000 Hertz. The Watertown Noise Ordinance does not discuss infrasonic or ultrasonic noise so the State of CT Noise Ordinance will be discussed.

One-third octave sound pressure spectrums in dB reference 20 microPascals at the P3 measurement location can be used to compare with these infrasonic and ultrasonic noise requirements. The P3 airborne noise data were processed without A-weighting in the 6.3 Hertz to 100,000 Hertz one-third octave band frequency range. The infrasonic noise for frequencies up to 20 Hertz have a maximum amplitude of 51.3 dB. The entire 20 Hertz band can be power summed and never exceeds 56 dB reference 20 microPascals at the gas valve. The minimum transmission loss to the nearest residential property line is at least 11.8 dB so the maximum possible infrasonic noise at the eastern property line would be less than 45 dB. There should be no issue with the infrasonic noise requirement at any of the neighboring properties.

The maximum ultrasonic noise for frequencies up to 100 KiloHertz is 31.7 dB at 80 KHz. The entire 80 KiloHertz band from 20 to 100 kiloHertz has been power summed and never exceeds a noise level of 36.3 dB reference 20 microPascals at the gas valve. The minimum transmission loss to the nearest residential property line is at least 11.8 dB so the maximum possible ultrasonic noise at the eastern property line would be less than 25 dB. The noise levels at the residential neighbors will be much lower and there should be no issue with ultrasonic noise at any of the neighboring properties.

It should be noted that the spectrum analysis covers frequencies up to 100 kiloHertz and the PCB microphone model 378C01 s/n 121246 has a sensor that can measure up to 100 KHz.

Overall Sound Pressure Levels

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

To Class C 62 dBA To Class B 62 dBA To Class A 55 dBA (day) 45 dBA (night)

The Taft School is in a Residential Zone that is surrounded by Residential Zones. The nearby neighbors are classified as residential with residential noise limits of 55 dBA during the day and 45 dBA at night. The CT airborne noise limit is reduced to 50 dBA during the day and 40 dBA at night because of the presence of a prominent discrete tone. The Watertown Noise Ordinance (Reference 2) does not have a discrete tone criterion like the State of CT does.

The estimated overall A-weighted sound pressure level measurements in dBA reference 20 microPascals are given in Table 4 above for the background corrected measurements made on August 21 and 25, 2025. The second column gives the approximate distance from the fuel cell to the measurement location, with locations identified by a P number in Figure 5. The airborne noise values given in column 4 and 5 are the day and night measured levels (L90), respectively. These levels are contaminated with high background noise due to wind and crickets. The transfer functions measured from the fuel cell to the property lines[4] are given in column 6. These transfer functions are used with the source level measured at P3 to estimate the fuel cell contribution at the property line that is given in Column 7. This is an upper limit to the fuel cell noise. (The fuel cell could not be turned off to make a true background measurement.) The values in Column 7 show that the estimated levels are below both the day and night requirements. The closest P3 residential property line should see airborne noise levels no higher than 37 dBA with the fuel cell operating. The residential properties to the east should all be lower than 37 dBA.

Operation of the Bloom fuel cell will have no acoustic impact at all of the residential properties adjacent to the Taft School. Background airborne levels from the wind and crickets increased the measured noise levels to as much as 49 dBA. This necessitated the use of previously measured transfer functions to estimate the fuel cell contribution at the property lines. No acoustic issues are expected during operation of the Bloom fuel cell.

Conclusions

The purpose of this effort is to evaluate the acoustical environment at the Taft School during operation of the Bloom fuel cell. This effort has been accomplished and the results show that the operation of a Bloom 195 KW fuel cell will meet all of the State of Connecticut and Town of Watertown airborne noise requirements at all the residential properties to the east. Residences to the west, south and north are also expected to meet all the noise requirements because they are further away from the new fuel cell.

References

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

2) www.townofWatertown.org › form-repository › DownloadFile
Watertown Noise Control Ordinance

3) The Taft School Noise Recommendations, Acoustical Technologies Inc., July 27, 2024

4) 460 KW Fuel Cell Airborne Noise Assessment at The Taft School, Acoustical Technologies Inc., June 15, 2024