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DBA of Hydrogen Safety, LLC
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Fitch Fuel Heating Oil Savings / Efficiency Program Fitch Fuel Catalyst NYSERDA In-Field Demonstration Report

Revised: May 17, 2010

Report Submitted to: NYSERDA
17 Columbia Circle
Albany, NY 12203-6399

Personnel Involved:

Ichabod Crane Central School (ICS)

Mr. James Dexter (ICS Superintendent)
Mr. Steve Marotta (ICS Facility Director),
Mr. Bob Thorsey (ICS Technician),
Mr. Harold Hutchinson (ICS Technician)

NY State Senator Saland's office:

Ms. Carol Wilben (Assistant to NY Senator Saland)

NY State Senator Maziarz's Office:

Mr. Matt Nelligan (Legislative Director of NY Senate Energy Committee)

NYSERDA:

Mr. Bryan Barry (Associate Project Manager, Buildings R&D),
Mr. Kevin Carey (Senior Project Manager, Governmental Affairs Specialist)

Advanced Power Systems Inc (APSI):

Alan M. "Mickey" Wiernasz (Fitch Fuel Catalyst – Director of Development)

Purpose: To obtain performance measurements of the impacts of the installation of Fitch Fuel Catalysts on two oil fired boilers at the Ichabod Crane Central School. Members of the NY State Legislature and NYSERDA (Building R&D and Energy Efficiency Programs) attended the evaluation. The protocols used were based upon standard manufacturer's recommended

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installation procedures, including a Pre and Post evaluation of the oil heat systems performance and operating characteristics.

Background:

Location: Ichabod Crane School System
Middle School & Bus Garage Boilers
2910 Route 9
Valatie, NY 12184

Boilers / Furnaces

Unit #1: Hydro Term boiler equipped with a Beckett oil fired burner

Unit #2: Buderus boiler equipped with a Rellio oil fired burner

Fuel: #2 Fuel Oil

Test Equipment: UEI Eagle C127 Combustion Analyzer (Note: The Ichabod Crane School's UEI printer that was used was NOT set to the correct date as seen on the results printouts)

Fitch Catalyst: Model HO-5UL installed on both boilers

Record of Events:

1. Unit #1 Boiler was cleaned on April 26, 2010 by Ichabod Crane School maintenance personnel;
2. Baseline readings for stack temperature, efficiency, and emissions were taken on that date and record in Table A;
3. On May 6, 2010, the Fitch Fuel Catalyst was engaged by Ichabod Crane School Technicians on both units in the presence of witness personnel;
4. The heating systems were placed in normal operation with cycle times relatively short
5. Post Fitch Catalyst installation retest was performed with stack temperature, efficiency, and emission data recoded and shown in Table A;
6. Combustion analysis indicated a reduction in burner nozzle size reducing fuel supply to Boilers #1 and #2 were warranted to maintain optimal efficiency;
7. Boiler #1 burner nozzle of 1.50 GPH was downsized to 1.20GPH. With the Fitch Fuel Catalyst installed, the readings for stack temperature, efficiency, and emissions are shown in Table A;.
8. Boiler #2 burner nozzle was not changed as the unit was in operation. The stack temperature on Unit #2 indicated that a nozzle change from 1.20 GPH to 1.00 GPH was warranted. (Note that at the 140 psi fuel operating pressure the change in nozzle size (1.20 to 1.00) results in a 0.24 GPH reduced flow (1.47 GPH to 1.23 GPH), which is equivalent to a 16% reduction in fuel flow.)

Comparison of Baseline and Retrofit Installation Data – Table A

Test Boiler	Categories	Stack Temp. Measurement Before (BC) & After Cleaning(AC) (4-26-10)	Baseline Data (5-6-10)	Fitch w/nozzle adjustment
Hydro Thermo Pride/Beckett				
	Stack Temp °F	Before Cleaning: 677 After Cleaning: 547	529.6	511.6
	CO2	n/a	11.7	11.4
	Efficiency %	n/a	81.6	81.9
	Nozzle Size	n/a	1.50 GPH	1.20 GPH

Test Boiler	Categories	Stack Temp. Measurement Before & Cleaning (4-26-10)	Baseline Data (5-6-10)	
Buderus/Relio				
	Stack Temp °F	431.7	434.4	
	CO2	n/a		
	Efficiency %	n/a		
	Nozzle Size	n/a	GPH	GPH

Table A

Comments:

- 1) Due to the facilities' heating / hot water demands at the time and time of the demonstration, which was May 6, 2010, the boilers maintained a constant operating output for 6 – 8 minutes for each measurement segment. Thus these short operating cycles limited the achievement of the full impact of the catalyst, which could have been more readily demonstrated in longer cycle time is continuous normal operating conditions.
- 2) Prior to the Fitch Installation, the April 26, 2010 cleaning of the Hydro-Therm boiler resulted in temperature decrease from 677 °F to 547 °F, which illustrates the difference a clean boiler has on operating efficiency.

Conclusions – Results from Fitch Installation

1. A reduction in fuel consumption of greater than 10% without a sacrifice in the boiler heat output was achieved through installation of the Fitch Fuel Catalyst on both Boiler #1 and Boiler #2.

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- a. Boiler #1 - 1.5 GPH nozzle was lowered to 1.2 GPH reducing fuel flow by 20%.
 - b. The Fitch Catalyst impact on the burner prior to nozzle reduction produced an increase in the operating stack temperature of 32 °F at operating cycle time ten minutes. Approximately 2/3 of that temperature increase was realized within 5-7 minutes in the full load operating mode.
2. The test verified the performance improvement claim of the manufacturer, which is Same Heat – Less Fuel, by the Fitch Fuel Catalyst manufacturer Advanced Power Systems Inc.
 3. Lower fuel consumption for the same heat results in a direct reduction of Greenhouse Gas Emissions (every gallon saved = 22.2 lbs CO₂ not produced and emitted).

Report Clarifications

The author of this report was not present at the demonstration on May 6, 2010. This report is based solely upon emissions data printouts from the UEI Combustion Analyzer, photos, and record of events provided by Advanced Power Systems representative as witnessed by Personnel in attendance listed on Page 1 of this report.

Report submitted by: Mr. Douglas Rode, P.E. Principal and Managing Director of ErgCubed



Signature
Connecticut PE License: PEN.0011021

May 17, 2010
Date

BEFORE CLEANING

← w/FITCH

SMOKE TEST

4-26-10

HYDRO THERM

UNACCEPTABLE SMOKE TEST

BEFORE CLEANING

HI-677°

CO PPM	91
CO2 PPM	---
FLUE °F	671
AMBIENT °F	63
NETT °F	608
EFF (G)	---
LOSSES	---
XAIR %	---

SMOKE

5.47

COMBUSTION

APPROX

FUEL	NAT	GAS
O2 %		5.1
CO2 %		9.0
CO PPM		97
NO PPM		95
FLUE °F		547.8
INLT °F		56.7
NETT °F		491.1
EFF (G)		76.9
LOSSES		23.1
XAIR %		32.3
CO/CO2	0.0010	
CO AIR FREE	128	
PR6 hPa	0.00	

547.8°

Customer

Appliance

w/FITCH

C127 1.3

TEMP 583°

DATE 02/19/10
TIME 20:26:03

COMBUSTION

FUEL	NAT	GAS
O2 %		4.7
CO2 %		9.2
CO PPM		78
NO PPM		100
FLUE °F		583.0
INLT °F		59.6
NETT °F		523.4
EFF (G)		76.2
LOSSES		23.8
XAIR %		29.6

NO FITCH

w/o 1.5 GPH

C127 1.3

140 PSI

DIFF TEMP

TIME 18:07 03/01/10

T1	°F	539.6
T2	°F	63.0
ΔT	°F	466.6

Customer
BASE LINE TEMP
Appliance

Ref.

Avq. 530°
C127 1.3

DATE 03/01/10
TIME 18:08:43

COMBUSTION

FUEL	L	OIL
O2 %	5.1	
CO2 %	11.7	
CO ppm	82	
NO ppm	86	
FLUE °F	534.4	
INLT °F	63.0	
NETT °F	471.4	
EFF (G)	81.6	
LOSSES	18.4	
XAIR %	32.3	
CO/CO2	0.0007	
CO AIR FREE	108	
PRS hPa	0.01	

Customer
Appliance
Ref.

PSI 140-1.72

C127 1.3

DIFF TEMP w/FITCH

TIME 18:17 03/01/10

T1	°F	555.9
T2	°F	95.1
ΔT	°F	460.8

Customer
Appliance
1.5 GPH

C127 1.3

DATE 03/01/10
TIME 18:40:46

COMBUSTION

FUEL	L	OIL
O2 %	5.5	
CO2 %	11.4	
CO ppm	66	
NO ppm	94	
FLUE °F	511.6	
INLT °F	61.2	
NETT °F	450.4	
EFF (G)	81.9	
LOSSES	18.1	
XAIR %	35.7	
CO/CO2	0.0005	
CO AIR FREE	89	
PRS hPa	0.10	

Customer
Appliance
Ref.

w/FITCH
C127 1.3
1.2 NOZZLE

DATE 03/01/10
TIME 18:39:03

140 PSI

COMBUSTION

FUEL	L	OIL
O2 %	5.4	
CO2 %	11.5	
CO ppm	76	
NO ppm	92	
FLUE °F	509.6	
INLT °F	61.2	
NETT °F	448.4	
EFF (G)	82.0	
LOSSES	18.0	
XAIR %	34.8	
CO/CO2	0.0006	
CO AIR FREE	102	
PRS hPa	0.09	

PSI 140-1.42
Customer
1.20 GPH
Appliance
Ref. 515°

Ichabod Crane Central School

