

Greenhouse Gas Reporting Monitoring Plan

**The Ohio State University
Columbus, Ohio Campus**

The Ohio State University
Greenhouse Gas Reporting Monitoring Plan

REV #	DATE	AUTHOR	DESCRIPTION	PAGE/SECTION
1.0	3/30/2010	J. Fry	Original Document	
2.0	4/24/2012	J. Fry	Boiler 5 gas fuelflow meter	5 & 6/3.1.1.1
3.0	8/8/2012	J. Fry	Boilers 1, 3, 6 & 7 fuel oil meters	5 & 6/3.1.1.1
3.1	3/6/2013	J. Fry	Appendices B & C	B-2 through B-11; C-2 through C-4
3.2	6/13/2013	J. Fry	Appendices B & C	B-2 through B-12; C-2 through C-4
3.3	10/24/2014	J. Fry	Organization and Responsibility; Appendices B & C	2/2.0; B-1 through B-13; C-4 and C-5
3.4	3/6/2015	J. Fry	Appendices B & C	B-1 through B-13; C-2 through C-5
4.0	3/24/2015	J. Fry	Addition of boiler 8 and its fuelflow meters, revise non-McCracken reporting methodology, and update regulatory citations throughout	2/2.0 and 3/3.1.1; 5-8/3.1.1.1 and 3.1.2

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1.0 MONITORING PLAN OVERVIEW

1.1 Introduction

The Environmental Protection Agency published Federal Regulation 40 CFR 98, the Mandatory Greenhouse Gas Reporting Rule, in the Federal Register on October 30, 2009, and according to Section 98.3 of this rule, a monitoring plan shall be documented and implemented at each affected facility.

This monitoring plan has been developed for The Ohio State University's (OSU) Columbus campus, located in Columbus, Ohio. The OSU Columbus campus is subject to the Mandatory Greenhouse Gas (GHG) Reporting Rule, Subpart A, General Provisions, and Subpart C, General Stationary Fuel Combustion Sources, because combined annual GHG emissions exceed 25,000 metric tons equivalent of carbon dioxide (CO_{2e}).

1.2 Quality Assurance Policy

It is the policy of OSU to adhere to all applicable rules and regulations as set forth in 40 CFR 98. This monitoring plan establishes operational procedures that will ensure data and reporting are accurate.

1.3 Objective

The objective of the monitoring plan is to establish a series of QA activities that will provide a high level of confidence in the data reported while meeting the requirements of Section 98.3(g)(5). This section provides guidelines for implementing QA activities and associated record keeping procedures and policies.

Each monitoring plan shall consist of a written plan that describes in detail (or that refers to separate documents containing) the following elements:

1. Identification of positions of responsibility (i.e., job titles) for collection of the emissions data.
2. Explanation of the processes and methods used to collect the necessary data for the GHG calculations.
3. Description of the procedures and methods used for quality assurance, including maintenance and repair of all flow meters used to provide data for the GHGs to be reported.

2.0 ORGANIZATION AND RESPONSIBILITY

The Environmental Health and Safety (EHS) Environmental Affairs (EA) Department shall be responsible for collecting the data necessary for accurate and timely reporting of the University's Columbus campus GHG emissions. Within EA, individual responsibilities lie with the following personnel:

The EA Director shall be responsible for overseeing the GHG Reporting program.

Emissions from McCracken Power Plant sources shall be the responsibility of the Environmental Compliance Coordinator.

Emissions from non-McCracken Power Plant combustion sources on the Columbus campus shall be the responsibility of the Air Compliance Engineer.

The Office of Energy Services and Sustainability (ESS) shall be responsible for gathering the high heat value (HHV) for the McCracken sources and the fuel usage data for the non-McCracken combustion units included in Groups 1 through 13 of Appendix C on the Columbus campus. Within ESS the Energy Programs Manager shall be responsible for this data.

Student Life shall be responsible for gathering the fuel usage data for the non-McCracken combustion units included in Groups 14 through 21 and individual meter accounts Student Life 152764890058 43 E 11th Ave, Student Life 152764890067 68 E 9th Ave, and Student Life 152764890085 1620 N High St of Appendix C on the Columbus campus. Within Student Life, the Energy Management and Sustainability Manager shall be responsible for this data.

3.0 FACILITY DESCRIPTION AND APPLICABILITY

OSU's Columbus campus consists of nearly 1,000 academic, medical, research, administrative and athletic buildings and facilities.

Most of the University facilities' heating and cooling needs are serviced by the McCracken Power Plant, while others rely on small dedicated boilers. The McCracken Power Plant's CO_{2e} emissions are estimated to exceed 25,000 metric tons. Therefore the University is subject to the Subpart C source category, General Stationary Fuel Combustion Sources.

The McCracken Power Plant boilers do not generate electricity for sale and so are not subject to Subpart D, Electricity Generation.

Numerous emergency generators exist on OSU's Columbus campus. These sources are

exempt from Subpart C.

The Columbus campus houses some livestock for research purposes, but is not subject to the Subpart JJ Manure Management Source Category. The animal population estimates for the Columbus campus are listed in Table 1, OSU Columbus Campus Estimated Livestock Population. Each animal group population meeting or exceeding the limits in Subpart JJ are estimated to exceed 25,000 metric tons of CO_{2e}.

Table 1. OSU Columbus Campus Estimated Livestock Population

Animal Group	OSU Columbus Campus Estimated Livestock Population	Average Annual Animal Population (head)/ Subpart JJ Limit
Beef	80	29,300
Dairy	250	3,200
Swine	500-700	34,100
Poultry - Layers	150	723,600
Poultry - Broilers	75	38,160,000
Poultry - Turkeys	none	7,710,000

The University does not manufacture, produce, refine, or supply any of the other source categories in Subparts D through PP.

The University does not operate a Municipal Solid Waste Landfill, so is not subject to Subpart HH.

The University conducts research across many disciplines. Research and development activities are not considered to be part of any source category.

3.1 General Stationary Fuel Combustion Sources

The combustion sources subject to the GHG Reporting Rule have been categorized in Appendices A and B.

3.1.1 McCracken Power Plant

Boilers 1 (B140), 3 (B141), 6 (B142), 7 (B143), and 8 (B270) are near identical 206 mmBtu/hr institutional water tube boilers. Boiler 8 first came online in March 2015. Boiler 5 (B132) is also located in the McCracken Power Plant. Its capacity is 313.1 mmBtu/hr while burning PNG and 301.1 mmBtu/hr while burning #2 distillate oil. These boilers burn primarily pipeline natural gas (PNG) and are also permitted to burn #2 distillate oil as a secondary fuel. No other type fuel is burned in these units.

The University's Utilities Department receives the HHV from the PNG supplier to McCracken Power Plant on a monthly basis. Samples are taken for each shipment of fuel oil received at the McCracken Power Plant fuel oil storage facility as well as from each boiler each day fuel oil is burned in the units. The samples are analyzed for HHV and other parameters by an independent laboratory, which uses Method ASTM4809-06 for deriving the fuel oil's Btu value.

As such, the McCracken Power Plant boilers will comply with Tier 2 requirements and use Equation C-2a of Section 98.33(a)(2)(i) and (ii) to calculate annual CO_{2e} emissions.

Equation C-2a:

$$CO_2 = 1 \times 10^{-3} * Fuel * HHV * EF$$

Where:

CO₂ = Annual CO₂ mass emissions for a specific fuel type (metric tons).

Fuel = Mass or volume of the fuel combusted during the year (expressed in standard cubic feet for PNG and gallons for fuel oil).

HHV = Annual average high heat value of the fuel from all valid samples for the year (mmBtu per mass or volume). The average HHV shall be calculated according to Equation C-2b in Section 98.33(a)(2)(ii)(A).

EF = Fuel-specific default CO₂ emission factor, from Table C-1 of Subpart C (53.02 kg CO₂/mmBtu for PNG and 73.96 kg CO₂/mmBtu for #2 distillate oil).

1×10^{-3} = Conversion factor from kilograms to metric tons.

For the Tier 2 calculation methodology, the minimum required frequency of the HHV sampling and analysis for natural gas is semiannual (i.e., twice in a calendar year), with consecutive samples taken at least four months apart. The minimum required frequency of the HHV sampling and analysis for fuel oil is at least one representative sample from each fuel lot (a group of trucks). Fuel sampling and analysis is required only for those periods in which the unit operates.

Equation C-2b will be used to derive the fuel specific annual average HHVs from the monthly gas and periodic fuel oil analysis:

$$(HHV)_{annual} = \frac{\sum_{i=1} (HHV)_i * (Fuel)_i}{\sum_{i=1} (Fuel)_i}$$

Where:

(HHV)*annual* = Weighted annual average high heat value of the fuel (mmBtu per mass or volume).

(HHV)*i* = High heat value of the fuel, for month “*i*” (mmBtu per mass or volume).

(Fuel)*i* = Mass or volume of the fuel combusted during month “*i*” (expressed in standard cubic feet for PNG and gallons for fuel oil).

In addition to CO₂ emissions, sources subject to Subpart C must also calculate CH₄ and N₂O emissions. Because the McCracken boilers will use Tier 2 methodology to calculate CO₂ emissions, Equation C-9a must be used for calculating these emissions from both pipeline natural gas and fuel oil.

Equation C-9a:

$$\text{CH}_4 \text{ or N}_2\text{O} = 1 \times 10^{-3} * \text{HHV} * \text{EF} * \text{Fuel}$$

Where:

CH₄ or N₂O = Annual CH₄ or N₂O emissions from the combustion of a particular type of fuel (metric tons).

Fuel = Mass or volume of the fuel combusted during the reporting year (expressed as standard cubic feet for PNG and gallons for fuel oil).

HHV = High heat value of the fuel, averaged for all valid measurements for the reporting year (mmBtu per mass or volume).

EF = Fuel-specific default emission factor for CH₄ or N₂O, from Table C-2 of this subpart (1×10^{-3} kg CH₄/mmBtu and 1×10^{-4} N₂O/mmBtu for PNG and 3×10^{-3} kg CH₄/mmBtu and 6×10^{-4} N₂O/mmBtu for fuel oil).

1×10^{-3} = Conversion factor from kilograms to metric tons.

3.1.1.1 Fuel Flow Meters QA/QC

The amount of fuel burned in each unit is tracked by dedicated natural gas and fuel oil fuel flow meters for each boiler and recorded in the plant’s Experion system.

McCracken boilers 1, 3, 5, 6, and 7 have identical orifice plate meters for natural gas. The natural gas orifice plate meters are Rosemount 3095MV models. McCracken boiler 8 has a Rosemount 3051SMV model natural gas orifice plate meter. These meters, when used to measure natural gas flow, have an accuracy of 1.0% of mass flow rate and a repeatability rating of 1.0% as per 1992 AGA (American Gas Association) Report No 3 or ISO-5167 (2003).

The natural gas orifice plate meters are calibrated by static pressure, differential pressure, and temperature. Each transmitter is calibrated at 0%, 50%, and 100% ranges.

These meters are calibrated annually in-house using a certified National Institute of Standards and Technology (NIST)-traceable calibration meter. The orifice plate meters must be within 5% accuracy to pass calibration. If the meter does not pass calibration, the boiler will either switch fuel or be shutdown until the faulty fuelflow meter is rebuilt by the manufacturer or replaced and retested. The calibration meter is calibrated by an independent test company on an annual basis.

The calibration readings are recorded on an Instrument Calibration Form. The completed forms are maintained in the E-techs office.

Boilers 1, 3, 6, 7, and 8 have identical coriolis meters for measuring fuel oil. The fuel oil fuelflow meters are Micro Motion Elite Mass Flow Coriolis Meter model #CMF100M329N0A2ED22. The Transmitter is model #2400SIA11B2EZZZ. These models and have an accuracy of 0.05% and a repeatability rating of 0.05% when measuring liquid, as per the model's NIST calibration report.

Boiler 5's fuel oil flow meter is also a Micro Motion coriolis meter, model #CFM100M328NABUEZZZ. The transmitter model is #1700R11ABUEZZZ. This model meter has an accuracy rating of 0.10% of flow rate and a repeatability rating of 0.05% when measuring liquid, as per the model's NIST calibration report.

On boilers 1, 3, 5, 6, and 7, the coriolis meters were installed for better accuracy of fuel oil usage during the summer of 2012 as each boiler underwent annual maintenance, replacing orifice plate fuel oil fuelflow meters. The same model coriolis meter was installed on boiler 8 as original equipment.

The serial numbers for the Mass Flow Sensors and Transmitters of these meters are:

Boiler 1: Sensor serial #14271103 / Transmitter serial #25138624
Boiler 3: Sensor serial #14271537 / Transmitter serial #25139025
Boiler 5: Sensor serial #482355 / Transmitter serial #3012909
Boiler 6: Sensor serial #14271106 / Transmitter serial #2513620
Boiler 7: Sensor serial #14268928 / Transmitter serial #25138934
Boiler 8: Sensor serial #14424676 / Transmitter serial #25608351

All of the McCracken Micro Motion coriolis fuel oil fuelflow meters feature Smart Meter Verification technology, which assesses the meter's electronics, sensor, and connecting cable properties both on demand and on a predetermined schedule. A printable verification report with accuracy deviation values is provided. Any fuel oil fuelflow meters with an accuracy of within 5% error as reported by Smart Meter Verification diagnostic scan will be replaced. The boiler will either switch fuel or be shut down until a replacement meter with accuracy within 5% is installed.

3.1.1.2 Recordkeeping for McCracken Sources

Daily fuel usage and steam flow for the McCracken boilers are recorded by the plant's Experion system and the Data Acquisition System (DAS). Monthly HHV is provided by the PNG supplier on a monthly basis and input into the DAS manually. Fuel oil HHV analysis is a requirement of the University's Title V air permit for each shipment of fuel oil received or whenever fuel oil is burned in a boiler. The University submits samples to an independent laboratory for analysis under each scenario. All records will be kept for a minimum of three years.

3.1.1.3 Missing Data Procedures for McCracken Sources

The fuelflow meters are integral to the operation of the boiler. As such, a boiler cannot be operated with a malfunctioning fuelflow meter and is immediately shutdown. Should this scenario occur, at most 1 hour missing data could be incurred during the boiler shutdown process. There is a direct correlation between gas flow and steam flow, therefore steam flow data will be used to derive missing gas flow data.

3.1.2 Non-McCracken Combustion Sources

The non-McCracken combustion sources that are subject to GHG Reporting requirement burn PNG. No other type fuel is burned in these units. These

units including boilers, water heaters, furnaces, and area heaters located in numerous campus buildings. The University does not receive HHV from the PNG supplier on these billing accounts. The maximum rated heat input capacities of the units are 16 mmBtu/hr or less. Fuel consumption from these sources is provided by the PNG supplier based on the usage indicated by the utility meters. Emissions are calculated using this fuel usage amount and the default HHV for PNG from Table C-1.

Appendix B lists the source inventory for the non-McCracken combustion sources. Appendix C lists the utility meters from which PNG usage will be used in calculating GHG emissions.

Since all these units have a maximum rated heat input capacity of 250 mmBtu/hr or less, OSU will report the GHG emissions for a single unit per Section 98.36(b) or report combined GHG emissions from groups of units based on the PNG utility meters in lieu of reporting GHG emissions from the individual units per Section 98.36(c)(1). As such, the non-McCracken combustion sources will comply with Tier 1 requirements and use Equation C-1 of Section 98.33(a)(1) to calculate annual CO_{2e} emissions.

Equation C-1:

$$CO_2 = 1 \times 10^{-3} * Fuel * HHV * EF$$

Where:

CO₂ = Annual CO₂ mass emissions for a specific fuel type (metric tons).

Fuel = Volume of the fuel combusted during the year (expressed in standard cubic feet for PNG).

HHV = Default high heat value of the fuel from Table C-1 (1.028 E-03 mmBtu/scf for PNG).

EF = Fuel-specific default CO₂ emission factor, from Table C-1 (53.02 kg CO₂/mmBtu for PNG).

1 x 10⁻³ = Conversion factor from kilograms to metric tons.

In addition to CO₂ emissions, sources subject to Subpart C must also calculate CH₄ and N₂O emissions. Because the non-McCracken sources will use Tier 1 methodology to calculate CO₂ emissions, Equation C-8 must be used for calculating these emissions from pipeline natural gas.

Equation C-8:

$$CH_4 \text{ or } N_2O = 1 \times 10^{-3} * HHV * EF * Fuel$$

Where:

CH_4 or N_2O = Annual CH_4 or N_2O emissions from the combustion of a particular type of fuel (metric tons).

Fuel = Volume of the fuel combusted during the reporting year (expressed in standard cubic feet for PNG).

HHV = Default high heat value of the fuel from Table C-1 (1.028 E-3 mmBtu/scf for PNG).

EF = Fuel-specific default CH_4 or N_2O emission factor, from Table C-2 (1.0 E-03 kg CH_4 /mmBtu and 1.0 E-04 N_2O /mmBtu for PNG).

1×10^{-3} = Conversion factor from kilograms to metric tons.

3.1.2.1 Recordkeeping for Non-McCracken Sources

Monthly fuel consumption for each utility meter will be provided by PNG supplier. The entire usage from the meters will be used to calculate the GHG emissions for all non-McCracken sources. All records will be kept for a minimum of three years.

3.1.2.2 Missing Data Procedures for Non-McCracken Sources

If monthly fuel usage is not available, OSU will rely on the supplier's estimated usage for that period.

APPENDIX A

Combustion Sources Included in the Calculation and Reporting of GHG Emissions

Combustion Sources Included in the Calculation and Reporting of GHG Emissions

Source ID #	Source Name	Location	Type	Capacity	Fuel	Calculation Methodology
B132	Boiler 5	McCracken Power Plant	Institutional Boiler	313.1 mmBtu/hr	PNG (primary fuel) or distillate oil (secondary)	Tier 2 CO _{2e} Equation C-2a CH ₄ and N ₂ O Equation C-9a
B140	Boiler 1	McCracken Power Plant	Institutional Boiler	206 mmBtu/hr	PNG (primary fuel) or distillate oil (secondary)	Tier 2 CO _{2e} Equation C-2a CH ₄ and N ₂ O Equation C-9a
B141	Boiler 3	McCracken Power Plant	Institutional Boiler	206 mmBtu/hr	PNG (primary fuel) or distillate oil (secondary)	Tier 2 CO _{2e} Equation C-2a CH ₄ and N ₂ O Equation C-9a
B142	Boiler 6	McCracken Power Plant	Institutional Boiler	206 mmBtu/hr	PNG (primary fuel) or distillate oil (secondary)	Tier 2 CO _{2e} Equation C-2a CH ₄ and N ₂ O Equation C-9a
B143	Boiler 7	McCracken Power Plant	Institutional Boiler	206 mmBtu/hr	PNG (primary fuel) or distillate oil (secondary)	Tier 2 CO _{2e} Equation C-2a CH ₄ and N ₂ O Equation C-9a
Non-McCracken combustion sources*	Various boilers and other types*	Columbus Campus buildings	Boilers, water and area heaters	Various sizes	PNG	Tier 1 CO _{2e} Equation C-1 CH ₄ and N ₂ O Equation C-8

* See Appendix B

APPENDIX B

Non-McCracken Combustion Sources

GHG QA/QC Monitoring Plan Appendix B					
Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
	FURNACE		862	1620 N. High ST, Gateway Apts.	100,000
06-0052	BOILER PULSE NATURAL GAS	HYDRO-THERM	373	1100 Kinnear Rd	1,200,000
06-0052A	BOILER PULSE NATURAL GAS	HYDRO-THERM	373	1100 Kinnear Rd	1,200,000
06-0052B	BOILER PULSE NATURAL GAS	HYDRO-THERM	373	1100 Kinnear Rd	1,200,000
06-0052C	BOILER PULSE NATURAL GAS	HYDRO-THERM	373	1100 Kinnear Rd	1,200,000
27-0092	HOT WATER HEATER	A.O.SMITH	373	1100 Kinnear Rd	80,000
27-0093	HOT WATER HEATER	A.O.SMITH	373	1100 Kinnear Rd	80,000
30-0020	GAS HEATING UNIT	BT 100 9620	373	1100 Kinnear Rd	50,000
27-0118B	HOT WATER HEATER	A.O. SMITH	932	1165 Kinnear Rd	50,000
27-01184	HOT WATER HEATER	DAYTON	932	1165 Kinnear Rd	50,000
27-0118	HOT WATER HEATER	VANGUARD	932	1165 Kinnear Rd	50,000
27-0215	HOT WATER HEATER	LOCHINVAR	378	1212 Kinnear Rd	50,000
27-0215A	HOT WATER HEATER	LOCHINVAR	378	1212 Kinnear Rd	50,000
	BOILER	BRYAN	374	1224 Kinnear Road	650,000
27-1048	HOT WATER HEATER	BRADFORD WHITE	128	1260 Kinnear Road	50,000
	heating hot water boiler	WEIL-MCLAIN	395	1275 Kinnear Road	5,845,000
	heating hot water boiler	WEIL-MCLAIN	395	1275 Kinnear Road	5,845,000
	HOT WATER HEATER	LOCHINVAR		1275 Kinnear Road	250,000
27-0470	HOT WATER HEATER	CEMLINE	126	1314 Kinnear Road	50,000
06-4455	heating hot water boiler	PEERLESS	951	1315 Kinnear Rd	1,861,000
06-4457	heating hot water boiler	PEERLESS	951	1315 Kinnear Rd	1,861,000
27-6060	HOT WATER HEATER	PVI	951	1315 Kinnear Rd	200,000
06-4459	BOILER GAS	HYDRO-THERM	951	1315 Kinnear Rd	150,000
06-4461	BOILER GAS	HYDRO-THERM	951	1315 Kinnear Rd	150,000
Kinnear boiler #1	heating hot water boiler	Bryan	974	1381 Kinnear Road	4,200,000
Kinnear boiler #2	heating hot water boiler	Bryan	974	1381 Kinnear Road	4,200,000
	BOILERS	PATTERSON- KELLEY	974	1381 Kinnear Road	900,000
	BOILERS	PATTERSON- KELLEY	974	1381 Kinnear Road	900,000
	Boiler	Bryan		1478 Pennsylvania Ave	500,000
	HOT WATER HEATER	A.O. Smith		1478 Pennsylvania Ave	50,000
06-0505	BOILERS	DEDIETRICH	232	1900 Kenny Rd	500,000
06-0506	BOILERS	DEDIETRICH	232	1900 Kenny Rd	500,000

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GHG QA/QC Monitoring Plan Appendix B					
Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
	HOT WATER HEATER	BRYANT	232	1900 Kenny Rd	50,000
	HOT WATER HEATER	WEIL-MCLAIN	200	1960 Kenny Rd	50,000
27-0154	HOT WATER HEATER	A.O. SMITH	213	2000 Kenny Rd	50,000
27-0155	HOT WATER HEATER	A.O. SMITH	213	2000 Kenny Rd	50,000
27-0160	HOT WATER HEATER	A.O. SMITH	214	2006 Kenny Rd	50,000
27-0158	HOT WATER HEATER	A.O. SMITH	214	2006 Kenny Rd	50,000
27-0159	HOT WATER HEATER	A.O. SMITH	214	2006 Kenny Rd	50,000
27-0161	HOT WATER HEATER	A.O. SMITH	214	2006 Kenny Rd	50,000
06-0112	BOILER	PENNCO	094	2470 Northstar Road	525,000
27-5402	HOT WATER HEATER	MOR-FLO	043	2566 Kenny Road	50,000
	FURNACE		868	68 E. 9th Ave, Gateway Apts.	100,000
	FURNACE			43 E. 11th Ave, Gateway Apts.	100,000
06-0034	heating hot water boiler	WEIL-MCCLAIN	193	33 W. 11th Ave	1,703,000
27-2023	HOT WATER HEATER	LOCHINVAR	193	33 W. 11th Ave	50,000
	FURNACE		964	43 W E 11th Ave	100,000
29-0480	FURNACE		964	45 W. 11th Ave	100,000
29-0481	FURNACE		964	45 W. 11th Ave	100,000
27-0483	HOT WATER HEATER	VANGUARD	964	45 W. 11th Ave	36,000
29-0055	FURNACE		902	53 W. 11th Ave	100,000
29-0056	FURNACE		902	53 W. 11th Ave	100,000
27-0479	HOT WATER HEATER	LOCKINVAR	902	53 W. 11th Ave	30,000
30-0310	GAS HEATING UNIT	JACKSON & CHURCH	227	930 Kinnear Rd	100,000
30-0311	GAS HEATING UNIT	JACKSON & CHURCH	227	930 Kinnear Rd	100,000
06-0090	BOILER GAS HEATING WATER	LOCHINVAR CORP.	227	930 Kinnear Rd	100,000
27-0063	HOT WATER HEATER	LOCHINVAR	227	930 Kinnear Rd	50,000
	Forced Air Maintenance		931	960 Kinnear Road	147,000
	Forced Air Whse Ofc		931	960 Kinnear Road	135,000
	Roof Top Heater #2		931	960 Kinnear Road	125,000
	Roof Top Heater #4		931	960 Kinnear Road	120,000
	Roof Top Heater #1		931	960 Kinnear Road	100,000
	Roof Top Heater #3		931	960 Kinnear Road	100,000
	Ceiling Mount Heater		931	960 Kinnear Road	20,000
Ackerman boiler #1	heating hot water boiler	Bryan		Ackerman	2,400,000
Ackerman boiler #2	heating hot water boiler	Bryan		Ackerman	2,400,000
Ackerman boiler #3	heating hot water boiler	Bryan		Ackerman	2,100,000
Ackerman boiler#4	heating hot water boiler	Bryan		Ackerman	2,100,000
Ackerman	steam generator	Dristeem		Ackerman	

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Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
SG1					300,000
	HOT WATER HEATER			Ackerman	75,100
27-14193	HOT WATER HEATER			Ackerman	75,100
	HOT WATER HEATER			Ackerman	75,100
	HOT WATER HEATER			Ackerman	75,100
06-0042	heating hot water boiler	Bryan	243	Ackerman Library	9,000,000
27-0296	HOT WATER HEATER	LOCHINVAR	243	Ackerman Library	50,000
29-0042	AHU #1		211	Adventure Rec. Ctr.	2,500,000
29-0043	AHU #6		211	Adventure Rec. Ctr.	2,500,000
29-0041	AHU #7		211	Adventure Rec. Ctr.	1,750,000
29-0040	AHU #2		211	Adventure Rec. Ctr.	1,400,000
29-0039	AHU #3		211	Adventure Rec. Ctr.	700,000
27-0144	HOT WATER HEATER	P.V.I.	211	Adventure Rec. Ctr.	399,000
29-0037	AHU #5		211	Adventure Rec. Ctr.	100,000
29-0036	AHU #4		211	Adventure Rec. Ctr.	40,000
29-0038	AHU #8		211	Adventure Rec. Ctr.	36,000
01-9366	Ceiling Mount Heater		211	Adventure Rec. Ctr.	24,000
01-9367	Ceiling Mount Heater		211	Adventure Rec. Ctr.	24,000
01-9380	Ceiling Mount Heater		211	Adventure Rec. Ctr.	24,000
	Heating Boiler #1 Basement		801	Ashtabula Bldg AA	225,000
	Heating Boiler #2 Basement		801	Ashtabula Bldg AA	225,000
	Domestic Hotwater Boiler		801	Ashtabula Bldg AA	199,000
	Heating Boiler Basement		801	Ashtabula Bldg Y	337,600
	Domestic Hotwater Boiler		801	Ashtabula Bldg Y	199,000
	Heating Boiler Basement		801	Ashtabula Bldg Z	262,600
	Domestic Hotwater Boiler		801	Ashtabula Bldg Z	199,000
	Gas heating unit Trane		304	Athletic Maintenance Bldg	90,000
	Gas heating unit CoRayVac		304	Athletic Maintenance Bldg	80,000
	Gas heating unit CoRayVac		304	Athletic Maintenance Bldg	80,000
	Gas heating unit CoRayVac		304	Athletic Maintenance Bldg	80,000
	Gas heating unit CoRayVac		304	Athletic Maintenance Bldg	80,000
	Gas heating unit CoRayVac		304	Athletic Maintenance Bldg	80,000
	Gas heating unit CoRayVac		304	Athletic Maintenance Bldg	80,000
06-0017	heating hot water boiler	WEIL-MCLAIN	306	Atwell Hall	5,600,000

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GHG QA/QC Monitoring Plan Appendix B					
Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
06-0018	heating hot water boiler	WEIL-MCLAIN	306	Atwell Hall	5,600,000
06-0087	heating hot water boiler	KEWANEE	307	Bevis Hall	6,200,000
06-0086	heating hot water boiler	KEWANEE	307	Bevis Hall	6,200,000
06-0085	heating hot water boiler	KEWANEE	307	Bevis Hall	6,200,000
27-0060A	HOT WATER HEATER	A.O. SMITH	307	Bevis Hall	50,000
27-0060	HOT WATER HEATER	LOCHINVAR	307	Bevis Hall	50,000
Biocon #1	heating hot water boiler	Fulton	345	Biocontainment Lab/BSL3	2,000,000
Biocon #2	heating hot water boiler	Fulton	345	Biocontainment Lab/BSL3	2,000,000
06-0271	heating hot water boiler	KEWANEE	394	Biotech Support	5,230,000
06-0270	heating hot water boiler		394	Biotech Support	1,800,000
06-0270A	heating hot water boiler		394	Biotech Support	1,800,000
27-0292	HOT WATER HEATER	ADAMSON	394	Biotech Support	50,000
	HOT WATER HEATER	LOCHINVAR	394	Biotech Support	50,000
	HOT WATER HEATER	LOCHINVAR	394	Biotech Support	50,000
30-0007	GAS HEATING UNIT	TRANE	360	Blankenship Hall	350,000
27-0030	HOT WATER HEATER	P.V.I	360	Blankenship Hall	200,000
27-0031	HOT WATER HEATER	RHEEM/RUUD	360	Blankenship Hall	199,900
30-0005	GAS HEATING UNIT		360	Blankenship Hall	50,000
30-0006	GAS HEATING UNIT		360	Blankenship Hall	50,000
06-0100	BOILER HOT WATER	HYDRO-THERM	350	Book Depository	1,500,000
06-0097	BOILER HOT WATER	AJAX	350	Book Depository	350,000
06-0098	BOILER HOT WATER	AJAX	350	Book Depository	350,000
06-4466	heating hot water boiler	CLEAVER BROOKS	362	Bulk Chemical Warehouse	2,095,000
06-4467	heating hot water boiler	CLEAVER BROOKS	362	Bulk Chemical Warehouse	2,095,000
	Heating Boiler #1 upstairs		801	BVCC - Day Care	850,000
	Heating Boiler #2 upstairs		801	BVCC - Day Care	850,000
	Hot Water Boiler #1		801	BVCC - Day Care	150,000
	Hot Water Boiler #2		801	BVCC - Day Care	150,000
27-0047	HOT WATER HEATER	A.O. SMITH	987	Campus Shop Bldg	100,000
27-8107	HOT WATER HEATER	P-V-I	385	Child Care Center	180,000
06-5001	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5003	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5005	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5009	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5013	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5015	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5017	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5019	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5007	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000
06-5011	BOILER GAS WATER	HYDRO-THERM	385	Child Care Center	150,000

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Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
27-8109	HOT WATER HEATER	A.O.SMITH	385	Child Care Center	50,000
	GAS FURNACE		056	Converse Hall	1,250,000
	GAS FURNACE		056	Converse Hall	1,250,000
06-0080	BOILER	THERMAL SOLUTIONS	056	Converse Hall	750,000
06-0081	BOILER	THERMAL SOLUTIONS	056	Converse Hall	750,000
	Domestic Hotwater Boiler	A.O. Smith	801	Cuyahoga Bldg A	199,000
	Heating Boiler #1 Basement	Lochinvar	801	Cuyahoga Bldg A	180,000
	Heating Boiler #2 Basement	Lochinvar	801	Cuyahoga Bldg A	180,000
	Heating Boiler #1 Basement	Lochinvar	801	Cuyahoga Bldg B	225,000
	Heating Boiler #2 Basement	Lochinvar	801	Cuyahoga Bldg B	225,000
	Domestic Hotwater Boiler	A.O. Smith	801	Cuyahoga Bldg B	199,000
	Heating Boiler #1 Basement	Lochinvar	801	Cuyahoga Bldg C	270,000
	Heating Boiler #2 Basement	Lochinvar	801	Cuyahoga Bldg C	270,000
	Domestic Hotwater Boiler	A.O. Smith	801	Cuyahoga Bldg C	199,000
	Heating Boiler #1 Basement	Lochinvar	801	Cuyahoga Bldg D	270,000
	Heating Boiler #2 Basement	Lochinvar	801	Cuyahoga Bldg D	270,000
	Domestic Hotwater Boiler	A.O. Smith	801	Cuyahoga Bldg D	199,000
27-0222	HOT WATER HEATER	MOR-FLO	316	Dairy Calf Barn	50,000
27-0226	HOT WATER HEATER	RUUD	023	Dairy Research Barn	50,000
	Heating Boiler #1 Basement	Lochinvar	801	Defiance Bldg E	225,000
	Heating Boiler #2 Basement	Lochinvar	801	Defiance Bldg E	225,000
	Domestic Hotwater Boiler	A.O. Smith	801	Defiance Bldg E	199,000
	Domestic Hotwater Boiler	A.O. Smith	801	Defiance Laundry	660,000
	Heating Boiler #1 Basement	Lochinvar	801	Defiance Maint.	270,000
	Domestic Hotwater Boiler	A.O. Smith	801	Defiance Maint.	40,000
	Furnace Forced Air	Trane	801	Defiance Old Rec Center	300,000
	Domestic Hotwater Boiler	A. O. SMITH	801	Defiance Old Rec Center	40,000

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GHG QA/QC Monitoring Plan Appendix B					
Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
	heating hot water boiler	Bryan	171	Dodd Hall	8,000,000
	heating hot water boiler	Bryan	171	Dodd Hall	8,000,000
	heating hot water boiler	Bryan	171	Dodd Hall	5,000,000
Dodd SB-2	Steam Boiler	Fulton	171	Dodd Hall	2,100,000
	Steam Boiler	Fulton	171	Dodd Hall	1,255,000
	Heating Hot Water Boiler		171	Dodd Hall	670,000
	Heating Hot Water Boiler		171	Dodd Hall	670,000
L-32864	heating hot water boiler	Cleaver Brooks	189	Drackett Tower	5,200,000
L-32870	heating hot water boiler	Cleaver Brooks	189	Drackett Tower	5,200,000
27-0056	HOT WATER HEATER	A.O.SMITH	319	Farm Shop	34,000
	heating hot water boiler	Cleaver Brooks	284	Fawcett Center	6,600,000
Fawcett Center b #2	heating hot water boiler	AERCO	284	Fawcett Center	2,000,000
27-0065	HOT WATER HEATER	AERCO	282	Galbreath Equine Ctr	50,000
	Furnace #2	Concord	965	German House	50,000
	Furnace #1	Trane	965	German House	50,000
	Furnace	Goodman	965	German House	42,000
	Hot Water Tank	Bradford White	965	German House	40,000
27-0082	HOT WATER HEATER		037	Hagerty Hall	250,000
	Hot Water Tank #1	Ruud	052	Hanley House	40,000
	Hot Water Tank #2	Ruud	864	Hanley House	40,000
	Furnace	Lennox	864	Hanley House	40,000
	Furnace	Magic Chef	864	Hanley House	40,000
27-0071	HOT WATER HEATER	A.O. SMITH	297	Howlett Greenhouse	100,000
	HOT WATER BOILER	Bryan	878	Institute for Behavioral Medicine Research (IBMR)	4,200,000
	HOT WATER BOILER	RBI Futera II	878	IBMR	1,950,000
	HOT WATER BOILER	RBI Futera II	878	IBMR	1,950,000
	HOT WATER BOILER	RBI Futera II	878	IBMR	1,950,000
	HOT WATER BOILER	RBI Futera II	878	IBMR	1,950,000
	HOT WATER BOILER	RBI Futera II	878	IBMR	1,950,000
U-10001-1406-03-09	heating hot water boiler	De-Dietrich	267	Jones Tower	5,100,000
U-10001-1406-03-09	heating hot water boiler	De-Dietrich	267	Jones Tower	5,100,000
	heating hot water boiler	Cleaver Brooks	267	Jones Tower	5,000,000
	heating hot water boiler	Cleaver Brooks	267	Jones Tower	5,000,000
	HOT WATER HEATER	A.O. SMITH	267	Jones Tower	831,600
	HOT WATER HEATER	A.O. SMITH	267	Jones Tower	831,600
06-4450	BOILER GAS HOT WATER	PEERLESS	364	KRC Bldg A	1,530,000
06-4475	BOILER	PEERLESS	365	KRC Bldg B	500,000
LARH Boiler	BOILER	Lochinvar	891	Lane Avenue	1,000,000

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Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
1				Residence Hall (LARH)	
LARH Boiler 2	BOILER	Lochinvar	891	Lane Avenue Residence Hall (LARH)	1,000,000
960	BOILER	Lochinvar	891	Lane Avenue Residence Hall (LARH)	1,000,000
LARH Boiler 4	BOILER	Lochinvar	891	Lane Avenue Residence Hall (LARH)	1,000,000
27-0107	HOT WATER HEATER	A. O. SMITH	289	Laundry Bldg	50,000
27-0109	HOT WATER HEATER	DAYTON	289	Laundry Bldg	50,000
27-0106	HOT WATER HEATER	LOCHINVAR	289	Laundry Bldg	50,000
27-0108	HOT WATER HEATER	RICHMOND	289	Laundry Bldg	50,000
06-0276	BOILER NATURL GAS DOMEST HOT WATER	LOCHINVAR	022	Longaberger	120,000
06-0275	BOILER NATURAL GAS	CLEAVER BROOKS	022	Longaberger; no internal tank	500,000
	Heating Boiler Basement	Peerless	801	Lorain Bldg BB	375,100
	Domestic Hotwater Boiler	A. O. SMITH	801	Lorain Bldg BB	199,000
	Heating Boiler Basement	Peerless	801	Lorain Bldg CC	337,600
	Domestic Hotwater Boiler	A. O. SMITH	801	Lorain Bldg CC	199,000
	Heating Boiler Basement	Peerless	801	Lorain Bldg DD	375,100
	Domestic Hotwater Boiler	A. O. SMITH	801	Lorain Bldg DD	199,000
	Heating Boiler Basement	Peerless	801	Lorain Bldg EE	375,100
	Domestic Hotwater Boiler	A. O. SMITH	801	Lorain Bldg EE	199,000
	Heating Boiler #1 Basement	Lochinvar	801	Mahoney Bldg J	225,000
	Heating Boiler #2 Basement	Lochinvar	801	Mahoney Bldg J	225,000
	Domestic Hotwater Boiler	A. O. SMITH	801	Mahoney Bldg J	199,000
	Heating Boiler #1 Basement	Lochinvar	801	Mahoney Bldg K	225,000
	Heating Boiler #2 Basement	Lochinvar	801	Mahoney Bldg K	225,000
	Domestic Hotwater Boiler	A. O. SMITH	801	Mahoney Bldg K	199,000
	Heating Boiler #1 Basement	Lochinvar	801	Mahoney Bldg L	225,000

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Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
	Heating Boiler #2 Basement	Lochinvar	801	Mahoney Bldg L	225,000
	Domestic Hotwater Boiler	A. O. SMITH	801	Mahoney Bldg L	199,000
27-0220	HOT WATER HEATER	LOCHINVAR	317	Main Dairy Barn	100,000
27-0221	HOT WATER HEATER	RUDD	317	Main Dairy Barn	50,000
McC Campbell boiler #1	Condensing Boiler	AERCO	303	McC Campbell Hall	2,000,000
McC Campbell boiler #2	Condensing Boiler	AERCO	303	McC Campbell Hall	2,000,000
McC Campbell boiler #3	Condensing Boiler	AERCO	303	McC Campbell Hall	2,000,000
McC Campbell boiler #4	Condensing Boiler	AERCO	303	McC Campbell Hall	2,000,000
McC Campbell boiler #5	Condensing Boiler	AERCO	303	McC Campbell Hall	2,000,000
30-0001	GAS HEATING UNIT	HASTINGS	053	McPherson Lab	12,600
27-0326	HOT WATER HEATER	A. O. SMITH	055	Mershon Auditorium	50,000
06-0032	heating hot water boiler	Bryan Flexible	047	Mershon Center	2,700,000
	Heating Boiler #1 Basement	Lochinvar	801	Montgomery Building M	215,000
	Heating Boiler #2 Basement	Lochinvar	801	Montgomery Building M	215,000
	Domestic Hotwater Boiler	A. O. SMITH	801	Montgomery Building M	199,000
	Domestic Hotwater Boiler	A. O. SMITH	801	Montgomery Building N	199,000
	Heating Boiler #1 Basement	Lochinvar	801	Montgomery Building N	180,000
	Heating Boiler #2 Basement	Lochinvar	801	Montgomery Building N	180,000
	Heating Boiler #1 Basement	Amer. Standard	801	Montgomery Building P	480,000
	Domestic Hotwater Boiler	A. O. SMITH	801	Montgomery Building P	199,000
	Heating Boiler #1 Basement	Amer. Standard	801	Montgomery Building R	600,000
	Domestic Hotwater Boiler	A. O. SMITH	801	Montgomery Building R	199,000
06-0260	heating hot water boiler	WEIL-MCLAIN	311	Mount Hall	3,150,000
06-0261	heating hot water boiler	WEIL-MCLAIN	311	Mount Hall	3,150,000
27-0346	HOT WATER HEATER	A.O.SMITH	311	Mount Hall	40,000
27-0245	HOT WATER HEATER	LOCHINVAR	311	Mount Hall	40,000
	Heating Boiler Basement	Peerless	801	Muskingum Bldg FF	337,600
	Domestic Hotwater Boiler	A. O. SMITH	801	Muskingum Bldg FF	199,000
	Heating Boiler Basement	Peerless	801	Muskingum Bldg GG	337,600

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Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
	Domestic Hotwater Boiler	A. O. SMITH	801	Muskingum Bldg GG	199,000
	Heating Boiler Basement	Peerless	801	Muskingum Bldg HH	262,600
	Domestic Hotwater Boiler	A. O. SMITH	801	Muskingum Bldg HH	199,000
1903237	BOILER	Teledyne Larrs	260	Neilwood Gables	600,000
G0034191	BOILER	Slant Fin	260	Neilwood Gables	182,000
G0034406	BOILER	Slant Fin	260	Neilwood Gables	182,000
L-36086	heating hot water boiler	Cleaver Brooks	192	North Commons	4,100,000
L-36085	heating hot water boiler	Cleaver Brooks	192	North Commons	4,100,000
L-36084	heating hot water boiler	Cleaver Brooks	192	North Commons	4,100,000
06-0036	BOILER GAS	WEIL-MCCLAIN	357	Northwood-High Bldg	810,000
06-0037	BOILER GAS	WEIL-MCCLAIN	357	Northwood-High Bldg	810,000
27-9200	HOT WATER HEATER	A.O.SMITH	357	Northwood-High Bldg	50,000
27-8181	HOT WATER HEATER	PATTERSON-KELLEY	012	Ornamental Plant Center	50,000
27-0123	HOT WATER HEATER	LOCHINVAR	347	Owens Rec Ctr No	50,000
30-3025	GAS HEATING UNIT	REZNOR	347	Owens Rec Ctr No	50,000
30-3027	GAS HEATING UNIT	REZNOR	347	Owens Rec Ctr No	50,000
27-0124	HOT WATER HEATER	A. O. SMITH	348	Owens Rec Ctr So	50,000
30-0024	GAS HEATING UNIT	REZNOR	349	Owens Tennis Ctr	50,000
30-0025	GAS HEATING UNIT	REZNOR	349	Owens Tennis Ctr	50,000
27-0140	HOT WATER HEATER	A.O. SMITH	066	Plumb Hall	199,900
	Furnace	Carrier	869	Pomerene House	120,000
	Hot Water Tank #1	A.O Smith	869	Pomerene House	40,000
	Hot Water Tank #2	A.O Smith	869	Pomerene House	40,000
06-0110	BOILER GAS WATER	PEERLESS	154	Poultry House #2	50,000
06-0225	heating hot water boiler	CLEAVER BROOKS	130	Power House	4,200,000
06-0227	heating hot water boiler	CLEAVER BROOKS	130	Power House	4,185,000
06-0228	heating hot water boiler	CLEAVER BROOKS	130	Power House	4,185,000
06-0230	heating hot water boiler	CLEAVER BROOKS	130	Power House	4,185,000
06-0229	heating hot water boiler	CLEAVER BROOKS	130	Power House	4,180,000
06-0255	heating hot water boiler	Bryan	309	Pressey Hall	5,250,000
06-0256	heating hot water boiler	Bryan	309	Pressey Hall	5,250,000
06-0256A	Steam Boiler	PRIMERA	309	Pressey Hall	750,000
27-0965	HOT WATER HEATER	LOCHINVAR	309	Pressey Hall	50,000
06-0216	heating hot water boiler	CLEAVER BROOKS	290	Printing Facility	2,511,000
06-0217	heating hot water boiler	CLEAVER BROOKS	290	Printing Facility	2,511,000
L-38268	heating hot water boiler	Cleaver Brooks	269	Raney Commons	6,200,000

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Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
L-38269	heating hot water boiler	Cleaver Brooks	269	Raney Commons	6,200,000
L-38270	heating hot water boiler	Cleaver Brooks	269	Raney Commons	4,100,000
27-0533	HOT WATER HEATER	LOCHINVAR	158	Reactor Bldg	34,000
27-0009	HOT WATER HEATER	A.O.SMITH	217	Rec. Field Support	50,000
27-0008	HOT WATER HEATER	A.O SMITH	218	Rec. Service Bldg.	50,000
27-0066	HOT WATER HEATER	A.O. SMITH	073	Research Center	50,000
27-0066A	HOT WATER HEATER	RUUD	073	Research Center	50,000
	HOT WATER BOILER	RBI Futera	850	Residence on Tenth	1,500,000
	HOT WATER BOILER	RBI Futera	850	Residence on Tenth	1,500,000
	HOT WATER BOILER	RBI Futera	850	Residence on Tenth	1,500,000
	HOT WATER HEATER	PLATINUM	850	Residence on Tenth	399,000
	HOT WATER HEATER	PLATINUM	850	Residence on Tenth	399,000
	HOT WATER HEATER	PLATINUM	850	Residence on Tenth	399,000
06-0235	Steam Boiler	LATTNER	308	Rightmire Hall	1,600,000
06-0233	Steam Boiler	LATTNER	308	Rightmire Hall	1,000,000
27-2066	HOT WATER HEATER	WEBEN-JARCO INC	308	Rightmire Hall	700,000
27-2068	HOT WATER HEATER	WEBEN-JARCO INC	308	Rightmire Hall	700,000
06-0237	BOILER GAS	LOCHINVAR POWER FIN	308	Rightmire Hall	500,000
06-0239	BOILER GAS WATER	LOCHINVAR POWER FIN	308	Rightmire Hall	500,000
27-8100	HOT WATER HEATER		384	Rothenbuhler Bee Lab	40,000
L-28455	heating hot water boiler	Cleaver Brooks	183	Royer Commons	4,200,000
L-28459	heating hot water boiler	Cleaver Brooks	183	Royer Commons	4,200,000
L-28458	heating hot water boiler	Cleaver Brooks	183	Royer Commons	4,200,000
	BOILER	RBI Futera Fusion	081	Schottenstein Center	1,000,000
	BOILER	RBI Futera III	081	Schottenstein Center	1,000,000
	BOILER	RBI Futera III	081	Schottenstein Center	1,000,000
06-0251	heating hot water boiler	CLEAVER-BROOKS	310	Scott Hall	10,461,000
06-0252	heating hot water boiler	CLEAVER-BROOKS	310	Scott Hall	10,461,000
27-0232	HOT WATER HEATER	NICKELSHIELD	310	Scott Hall	400,000
L-77119	BOILER	Cleaver Brooks	188	Scott House	500,000
L-29585	BOILER	Cleaver Brooks	188	Scott House	500,000
L-77118	BOILER	Cleaver Brooks	188	Scott House	500,000
27-8116	HOT WATER HEATER	A.O.SMITH	318	Sheep Barn	50,000
30-0490	GAS HEATING UNIT	BDP COMPANY	358	Sherman Art Ctr	74,000
30-0497	GAS HEATING UNIT	BDP COMPANY	358	Sherman Art Ctr	69,000
27-0499	HOT WATER HEATER	A.O.SMITH	358	Sherman Art Ctr	50,000
27-0487	HOT WATER HEATER	A.O.SMITH	358	Sherman Art Ctr	50,000
30-0486	GAS HEATING UNIT	ABSOLUTAIRE	358	Sherman Art Ctr	50,000
30-0500	GAS HEATING UNIT	ABSOLUTAIRE	358	Sherman Art Ctr	50,000

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Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
27-0495	HOT WATER HEATER	LOCHINVAR	358	Sherman Art Ctr	50,000
	Heating Boiler #1 Basement		801	Stark Bldg F	270,000
	Heating Boiler #2 Basement		801	Stark Bldg F	270,000
	Domestic Hotwater Boiler		801	Stark Bldg F	199,000
	Heating Boiler #1 Basement		801	Stark Bldg G	270,000
	Heating Boiler #2 Basement		801	Stark Bldg G	270,000
	Domestic Hotwater Boiler		801	Stark Bldg G	199,000
	Heating Boiler Basement		801	Stark Bldg H	650,000
	Domestic Hotwater Boiler		801	Stark Bldg H	199,000
06-4451	BOILER GAS	PEERLESS	381	Stores & Receiving	630,000
29-0027	FURNACE	TRANE	381	Stores & Receiving	250,000
29-0026	FURNACE	TRANE	381	Stores & Receiving	250,000
29-0025	FURNACE	YORK	381	Stores & Receiving	200,000
27-6051	HOT WATER HEATER	RUUD	381	Stores & Receiving	154,000
L-77118	heating hot water boiler	Cleaver Brooks	268	Taylor Tower	5,200,000
L-77119	heating hot water boiler	Cleaver Brooks	268	Taylor Tower	5,200,000
	BOILER	Lochinvar	268	Taylor Tower	745,000
	BOILER	Lochinvar	268	Taylor Tower	745,000
	Heating Boiler Basement		801	Trumbull Bldg X	337,600
	Domestic Hotwater Boiler		801	Trumbull Bldg X	199,000
	Heating Boiler Basement		801	Trumbull Bldg Y	375,100
	Domestic Hotwater Boiler		801	Trumbull Bldg Y	199,000
	Heating Boiler Basement		801	Tuscarawas Bldg S	262,600
	Domestic Hotwater Boiler		801	Tuscarawas Bldg S	199,000
	Heating Boiler Basement		801	Tuscarawas Bldg T	375,100
	Domestic Hotwater Boiler		801	Tuscarawas Bldg T	199,000
	Heating Boiler Basement		801	Tuscarawas Bldg U	337,600
	Domestic Hotwater Boiler		801	Tuscarawas Bldg U	199,000
	Heating Boiler Basement		801	Tuscarawas Bldg V	375,100
	Domestic Hotwater		801	Tuscarawas Bldg V	

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Serial #	Equipment Description	Manufacturer	Bldg. #	Building Name	Input BTU
	Boiler				199,000
27-0521	HOT WATER HEATER	LOCHINVAR	137	Van De Graaff Lab	50,000
27-0078	HOT WATER HEATER	A. O. SMITH	179	Waterman Lab	50,000
06-0266	BOILER	BRYAN	222	Wetland Research Bldg	900,000
27-0102	HOT WATER HEATER	A. O. SMITH	222	Wetland Research Bldg	50,000
06-0280	heating hot water boiler	BRYANT	029	Women's Field House	225,000
27-0116	HOT WATER HEATER	A.O. SMITH	029	Women's Field House	50,000
06-0011	heating hot water boiler	Bryan	270	Woody Hayes Athletics Center	2,400,000
06-0012	heating hot water boiler	Bryan	270	Woody Hayes Athletics Center	2,400,000
Biggs #1	domestic hot water boiler	FirePower	270	Woody Hayes Athletics Center	2,010,000
Biggs #2	domestic hot water boiler	FirePower	270	Woody Hayes Athletics Center	2,010,000
Younkin #1	heating hot water boiler	Bryan Flex-Tube	052	Younkin Success Center	2,000,000
Younkin #2	heating hot water boiler	Bryan Flex-Tube	052	Younkin Success Center	2,000,000
	HOT WATER HEATER	A.O. Smith	052	Younkin Success Center	50,000

APPENDIX C

Utility PNG Meters for Non-McCracken Combustion Sources Included in the Calculation and Reporting of GHG Emissions

The Ohio State University
Greenhouse Gas Reporting Monitoring Plan

Pipeline Natural Gas Supplier Information			
Building Numbers Included on COH (Columbia of Ohio) Account	COH (Columbia of Ohio) Account Number	Highest Capacity Source	GHG Report Group or Single Combustion Unit
003, 010, 012, 014, 017, 018, 020, 023 , 024, 026, 028, 029 , 037 , 038, 041, 050, 053 , 054, 060, 061, 065, 066 , 067, 069, 070, 071, <u>079</u> , 080, 083, 087, 089, 105, 106, 111, 112, 113, 131, 132, 136, 144, 145, 146, 148, 149, 150, 153, 156, 157, 161, 163, 165, 176, 180, 183 , 188 , 189 , 192 , 193 , 246, <u>263</u> , 265, 267 , 268 , 269 , 270 , 271, 272, 273, 276, 280, 284 , 289 , 290 , 293, 296, 297 , 298, 299, 304 , 307 , 308 , 309 , 310 , <u>311</u> , 316 , 337, 340, 345 , 354, 358 , 362 , 371, 372, 384 , 394 , 801 , 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, <u>833</u> , 835, 903, 987 , others	11897636 002 000 5	10.461 mmBtu boiler (Bldg. #310/1090 Carmack Rd/Scott Hall)	Group-1 (GP-1)
022 , 047 , 048, 056 , 073 , 081 , 170, 171 , 226, 227 , 241, 260 , 270 , 275, 277, 302, 303 , 306 , 347 , 348 , 349 , 350 , 364 , 367, 373 , 374 , 378 , 381 , 382, 395 , 846, 878 , 881, 951 , 964 , 983	11897636 117 000 7	5.845 mmBtu boiler (Bldg. #395/1275 Kinnear Rd)	Group-2 (GP-2)
211	00017872 000 000 4	2.5 mmBtu Air Handling Unit (855 Woody Hayes Dr /Adventure Recreation Center)	Group-3 (GP-3)
091	00017873 000 000 2	No combustion sources subject to GHG Rule	
380	11767745 001 000 2	Not Subject (not contiguous with OSU Campus)	
213	11897636 035 000 6	0.05 mmBtu water heater (2000 Kenny Rd/Center for Integrated Medicine)	Group-4 (GP-4)
214	11897636 036 000 5	0.05 mmBtu water heater (2006 Kenny Rd)	Group-5 (GP-5)
214	11897636 037 000 4	0.05 mmBtu water heater (2016 Kenny Rd)	Group-6 (GP-6)

The Ohio State University
Greenhouse Gas Reporting Monitoring Plan

Pipeline Natural Gas Supplier Information			
Building Numbers Included on COH (Columbia of Ohio) Account	COH (Columbia of Ohio) Account Number	Highest Capacity Source	GHG Report Group or Single Combustion Unit
214	11897636 038 000 3	No combustion sources subject to GHG Rule	
214	11897636 039 000 2	0.05 mmBtu water heater (2012 Kenny Rd)	Group-7 (GP-7)
214	11897636 040 000 9	0.05 mmBtu water heater (2012 Kenny Rd)	Group-8 (GP-8)
214	11897636 041 000 8	No combustion sources subject to GHG Rule	
Fisher College of Business	11897636 052 000 5	Not Subject (emergency generators for Fisher College of Business)	
213	11897636 057 000 0	0.05 mmBtu water heater (2404 Kenny Rd/Center for Integrated Medicine)	Group-9 (GP-9)
923	11897636 119 000 5	No combustion sources subject to GHG Rule	
923	11897636 120 000 2	No combustion sources subject to GHG Rule	
918	11897636 124 000 8	No combustion sources subject to GHG Rule	
160	11897636 125 111 7	No combustion sources subject to GHG Rule	
932	12564480 002 000 6	0.05 mmBtu water heater (1165 Kenny Rd/Surplus)	Group-10 (GP-10)
907	13054255 001 000 9	No combustion sources subject to GHG Rule	
924	13054255 004 000 6	No combustion sources subject to GHG Rule	
950	13079054 002 0005	Not Subject (not contiguous with OSU Campus/private residence)	
357	14110088 001 0003	0.81 mmBtu boiler (2231 N. High St/Northwood-High Bldg)	Group-11 (GP-11)
254	15920997 001 000 4	No combustion sources subject to GHG Rule	

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Pipeline Natural Gas Supplier Information			
Building Numbers Included on COH (Columbia of Ohio) Account	COH (Columbia of Ohio) Account Number	Highest Capacity Source	GHG Report Group or Single Combustion Unit
253	15954589 001 000 9	No combustion sources subject to GHG Rule (it was determined that the 0.2 mmBtu water heater listed in previous versions of this Plan is electric powered instead of gas-fired, and therefore not subject to reporting).	Previously reported as Group 12 (GP-12)
222	16156106 001 000 5	0.9 mmBtu boiler (352 W. Dodridge/Wetland Research)	Group-13 (GP-13)
860	16792369 001 000 9	No combustion sources subject to GHG Rule	
965	129362620019	0.05 mmBtu boiler (German House, 141 W 11 th Ave)	Group-14 (GP-14)
052	118976360472	2.0 mmBtu boiler (Younkin Success Center, 1634 Neil Ave)	Group-15 (GP-15)
864	146202810016	0.04 mmBtu boiler (Hanley House, 225 W. 10 th Ave)	Group-16 (GP-16)
850	167523560952	1.5 mmBtu boiler (Residences on 10 th , 230 W 10 th Ave)	Group-17 (GP-17)
869	123539291073	0.12 mmBtu furnace (Pomerene House, 231 W 10 th Ave)	Group-18 (GP-18)
891	118976361220	1.0 mmBtu boiler (Lane Ave Residence Hall (LARH), 328 W Lane Ave)	Group-19 (GP-19)
931	145132170020	0.14 mmBtu forced air heater (Student Life IT, 960 Kinnear Rd)	Group-20 (GP-20)
931	145132170039	0.15 mmBtu forced air heater (RR, 960 Kinnear Rd)	Group-21 (GP-21)
	152764890058	0.1 mmBtu furnace (Gateway Apts., 43 E 11 th Ave)	Student Life 152764890058 43 E 11 th Ave
868	152764890067	0.1 mmBtu furnace (Gateway Apts., 68 E 9 th Ave., F2)	Student Life 152764890067 68 E 9 th Ave

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Pipeline Natural Gas Supplier Information			
Building Numbers Included on COH (Columbia of Ohio) Account	COH (Columbia of Ohio) Account Number	Highest Capacity Source	GHG Report Group or Single Combustion Unit
862	152764890085	0.1 mmBtu furnace (Gateway Apts., 1620 N High St., B)	Student Life 152764890085 1620 N High St

Group 1 (GP-1) and Group 2 (GP-2) building numbers in **bold** type contain sources subject to GHG reporting as listed in Appendix B.

The underlined building numbers in Group 1 (GP-1) are the locations of major meters included in invoice 11897636 002 000 5:

079 OSU Substation / Main Campus 18 psig System
 192 North Commons / Main Campus 6 psig System
 193 33 W. 11th Ave. / South Medical Center
 284 Fawcett Center / Midwest Campus
 311 Mount Hall / Carmack System
 833 Buckeye Village Student Housing Administrative Office / Buckeye Village

Groups 14 through 21 (GP-14 through GP-21) are utility accounts maintained by Student Life. Student Life also maintains three accounts with a single combustion unit subject to GHG reporting. These accounts are listed as such (Student Life 152764890058 43 E 11th Ave, Student Life 152764890067 68 E 9th Ave, and Student Life 152764890085 1620 N High St).