**Energy Demand Characterization and Surface Plant Modeling**

The purpose of this document is to describe the contents of information contained within a submission to the Geothermal Data Repository (GDR) node of the National Geothermal Data System (NGDS) in support of Feasibility of Deep Direct-Use Geothermal on the West Virginia University Campus-Morgantown, WV.

**Abstract**: This dataset provides information gathered to determine end use load and assessment of existing DHS. It also provides Aspen simulation files used to model hybrid geothermal natural gas GDHC system along with Exchange Design and Rating (EDR) files to design Plate Heat Exchanger (PHE) and Capital cost estimator project set up used for capital cost evaluation of surface plant and retrofit distribution lines. In addition, ChemCAD files used for preliminary analysis of conversion of steam-based to hot water based system are included. Detailed descriptions of the contents of this repository are provided below.

**Key Words**: Appalachian Basin, West Virginia University, Hybrid Geothermal natural gas system, Deep direct-use, ASPEN HYSYS, ACCE, ChEMCAD.

**Citation**: When referencing this data, please use the following citation information:

**Title**: WVU DDU: Surface Plant Analysis for GDHC at WVU campus, Morgantown, WV

**Author(s)**: West Virginia University

**Date**: January 9, 2020

**Software Requirement Note:**

A combination of proprietary and free software may be required to view some of the information provided. Software used for surface modeling, capital cost analysis include ASPEN Suite (HYSYS, EDR, ACCE). For ACCE template files, you will have to change the directories of the files to match your computer.

**Contents of Submission**:

**Folder: Facilities**

Contains files gathered to determine end use load.

**Contents**

1. **Folder: SteamMeterReadings**

Contains monthly recorded data of steam temperature, pressure flowrate along with condensate flow rate and temperature at four (Med center, Towers, Ag. Science, Downtown) distribution points along with gas data at the buildings where natural gas boilers are located.

1. **File. MEA OneLine.pdf**

One-line drawing of current Morgantown Energy Association’s (MEA) distribution pipelines with meter points along with linear pipe distances, and pipe sizes.

1. **File: Pipeline elevations\_GoogleMaps.docx**

Contains figures of google map estimations of the pipeline elevations between the distribution points.

1. **File: MEA Meter Points Google Maps.xlsx, Evansdale Campus Distances.xlsx**

Google map showing the current locations of meter points and the distribution pipeline path, pipelines in red are owned by MEA and in green are owned by WVU.

**Folder: ASPEN**

Contains ASPEN files related to hybrid geothermal natural gas system.

**Contents**

1. **Folder: HYSYS**
2. **File: scenario1.hsc, scenario2.hsc**

Aspen HYSYS files for modeling hybrid GDHC system to produce steam at 250 PSIG and 500°F for entire campus (Scenario1), and to produce saturated steam for supplying Evansdale and Health Science campus (Scenario 2).

1. **File: scenario1\_heatpump.hsc, scenario2\_heatpump.hsc**

Aspen HYSYS files for modeling improved hybrid GDHC system with a heat pump to produce steam at 250 PSIG and 500°F for entire campus (Scenario1), and to produce saturated steam for supplying Evansdale and Health Science campus (Scenario 2).

1. **Folder: EDR**
2. **File: GEO-PHE\_Sceanrio1.EDR, GEO-PHE\_Sceanrio2.EDR**

Aspen Exchange Design and Rating (EDR) files to design plate and heat exchanger (PHE) for scenario 1 and scenario 2 for hybrid GDHC system.

1. **File: GEO-PHE\_Sceanrio1\_HeatPump.EDR, GEO-PHE\_Sceanrio2\_HeatPump.EDR**

Aspen EDR files to design PHE for scenario 1 and scenario 2 for improved hybrid GDHC system with heat pump.

1. **Folder: ACCE**
2. **Folder: Distribution**

Aspen ACCE template file used to calculate the capital cost of pipelines for distribution network.

1. **Folder: Equipment**

Aspen ACCE template file used to calculate the capital cost of PHE and condensate tank.

**Folder: ChemCAD**

Contains files related to hot water-based geothermal system.

**Contents**

1. **File: Total Integrated Design\_Hotwater.cc7**

ChemCAD file used to model the hot water geothermal system for Evansdale and Health Science campuses.

1. **File: Hotwater\_Results table.xlsx**

ChemCAD results along with capital costs are presented in this excel file.