



# **Rock Eval™, Total Organic Carbon and Adsorption Isotherms of the Duvernay and Muskwa Formations in Alberta: Shale Gas Data Release**

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## **Abstract**

This report is a data release of Rock Eval™, total organic carbon and adsorption isotherms for selected samples of the Duvernay and Muskwa formations generated for the Energy Resources Conservation Board/Alberta Geological Survey project on shale gas resources in Alberta. A few samples were also taken in adjoining formations, such as the Majeau Lake, Beaverhill Lake, Ireton, Fort Simpson, Cooking Lake and Swan Hills. This data release complements other reports and data from the same project, as listed in Table 1.

# 1 Introduction

The Energy Resources Conservation Board/Alberta Geological Survey (ERCB/AGS) initiated a project in 2007 to evaluate shale gas resources in Alberta, to determine the quantity and spatial extent of these resources. Alberta Geological Survey (AGS) is releasing a series of reports to disseminate data and knowledge from the project. The first formations chosen for evaluation were the Colorado Group (Beaton et al., 2009a; Pawlowicz et al., 2009b) and the Banff and Exshaw formations (Beaton et al., 2009b; Pawlowicz et al., 2009a). Readers can download these publications from the AGS website (<http://www.ags.gov.ab.ca/publications>).

This report disseminates results from adsorption isotherms, Rock Eval™ and total organic carbon (TOC) analysis associated with the Duvernay and Muskwa formations. In addition to the analyses listed above, AGS ran a series of analyses on core samples (Table 1). The data generated from the project will be combined with additional data to map and estimate shale gas resources in the province.

**Table 1. Analyses performed on core samples and the organization that performed the analyses as part of the shale gas resource evaluation project.**

| Analysis Type                                                         | Company/Analyst                                                                                   | References                         |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------|
| Adsorption isotherms                                                  | Schlumberger/TerraTek                                                                             | Beaton et al. (2010c), this report |
| Mercury porosimetry, helium pycnometry                                | Department of Physics, University of Alberta (D. Schmitt)                                         | Anderson et al. (2010a, b)         |
| Permeametry                                                           | Department of Earth and Atmospheric Sciences, University of Alberta (M. Gingras)                  | Anderson et al. (2010a, b)         |
| Rock Eval™/TOC                                                        | Geological Survey of Canada; Schlumberger/TerraTek                                                | Beaton et al. (2010c), this report |
| Organic petrography                                                   | Geological Survey of Canada (J. Reyes)                                                            | Beaton et al. (2010a, b)           |
| Petrographic analysis (thin section)                                  | Vancouver Petrographics                                                                           | Work in progress                   |
| Scanning electron microscope (SEM) with energy-dispersive X-ray (EDX) | Department of Earth and Atmospheric Sciences, University of Alberta (D-A. Rollings, G. Braybrook) | Anderson et al. (2010a, b)         |
| X-Ray diffraction (bulk and clay mineral)                             | SGS Minerals Services Ltd. (H. Zhou)                                                              | Anderson et al. (2010a, b)         |

## 2 Sample Location and Description

Figure 1 displays all core sample sites associated with the Duvernay and Muskwa formations. Table 2 and Appendix 1 list the locations of the sample sites.

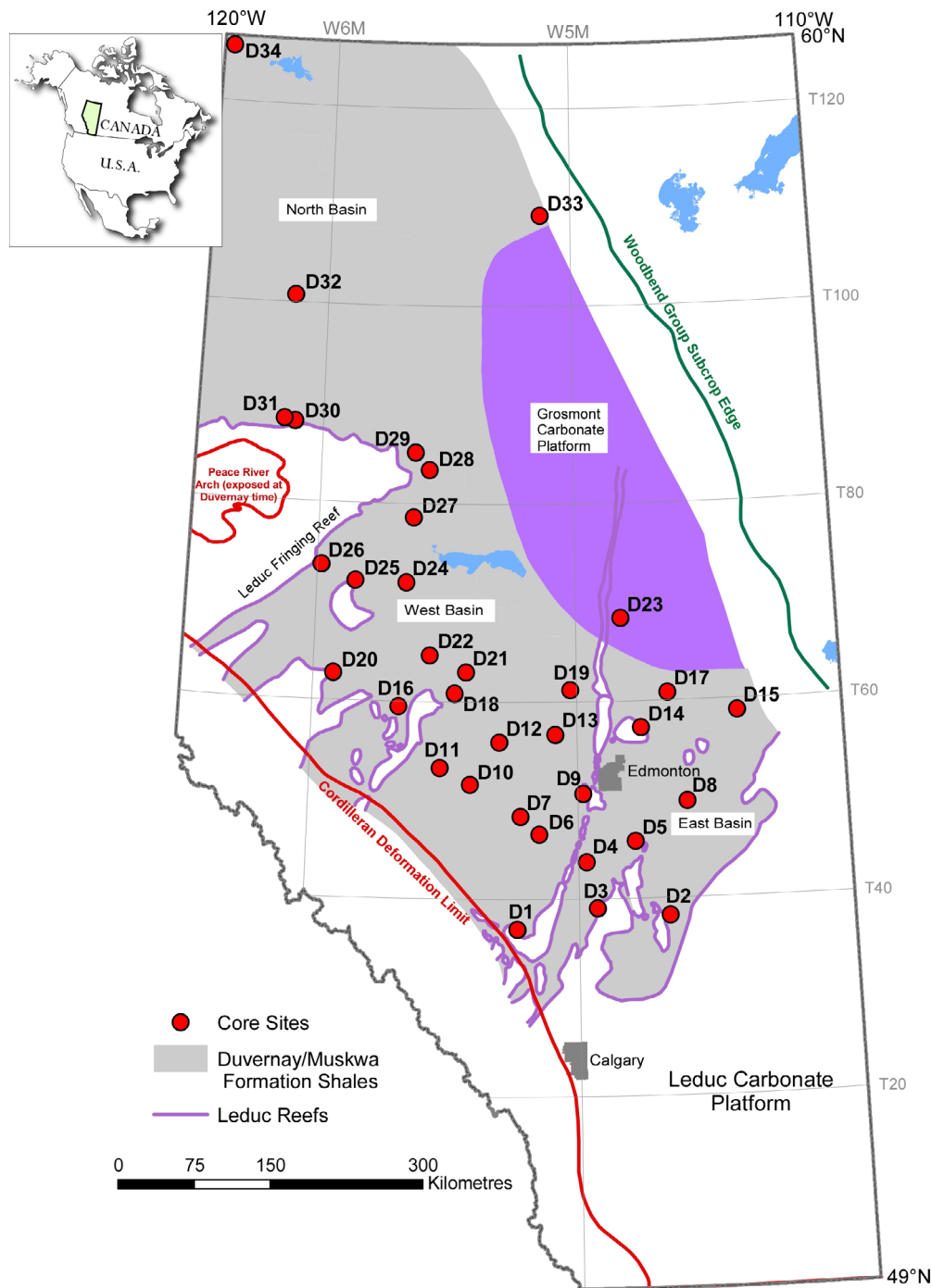


Figure 1. Core sites sampled for the Duvernay and Muskwa formations. See Table 2 and Appendix 1 for a list of all sites and Appendix 2 for the type of analyses run on the samples.

**Table 2. Core sample sites in the Duvernay and Muskwa formations. Figure 1 shows the site numbers.**

| Site No. | Location - UWI        | Well Name                            | Latitude<br>NAD 83 | Longitude<br>NAD 83 | Year<br>Drilled | No. of<br>Samples |
|----------|-----------------------|--------------------------------------|--------------------|---------------------|-----------------|-------------------|
| D1       | 100/06-14-037-07W5/00 | CANHUNTER CHEDDARVILLE 6-14-37-7     | 52.178681          | -114.895395         | 1988            | 5                 |
| D2       | 100/07-29-038-19W4/00 | FCPI ET AL A- 1 STETTLER 7-29-38-19  | 52.293665          | -112.680054         | 1973            | 3                 |
| D3       | 100/02-19-039-26W4/00 | RIPPER JOFFRE 2-19-39-26             | 52.364263          | -113.729463         | 1988            | 4                 |
| D4       | 100/02-08-044-27W4/00 | CANETIC RES FBANK 2-8-44-27          | 52.772473          | -113.882727         | 1955            | 8                 |
| D5       | 100/10-08-046-22W4/00 | IMP HB HAZELWOOD 10-8-46-22          | 52.954185          | -113.157432         | 1959            | 6                 |
| D6       | 100/02-06-047-04W5/00 | IMP CDN-SUP NORBUCK 2-6-47-4         | 53.020332          | -114.571521         | 1955            | 7                 |
| D7       | 100/14-29-048-06W5/00 | IMP CDN-SUP PEMBINA 14-29 BR- 48-6   | 53.176390          | -114.845842         | 1954            | 7                 |
| D8       | 100/11-11-050-17W4/00 | BEAVERHILL LAKE NO. 2 WELL           | 53.302221          | -112.380697         | 1947            | 7                 |
| D9       | 100/10-04-051-27W4/00 | FORGOTSON- BURK SGSPIKE 10-4-51-27   | 53.375694          | -113.919293         | 1964            | 5                 |
| D10      | 100/09-06-052-11W5/00 | IMPERIAL CYNTHIA NO. 9-6-52-11       | 53.463004          | -115.601615         | 1954            | 14                |
| D11      | 100/10-30-053-14W5/00 | HOME MOBIL PEERS 10-30-53-14         | 53.608763          | -116.049330         | 1964            | 14                |
| D12      | 100/05-17-056-08W5/00 | IMPERIAL PADDLE RIVER NO. 1          | 53.836758          | -115.164014         | 1947            | 2                 |
| D13      | 100/12-01-057-03W5/00 | TEXACO-MCCOLL MAJEAU LAKE #1         | 53.899127          | -114.322013         | 1948            | 3                 |
| D14      | 102/10-27-057-21W4/00 | ESSO REDWATER 10-27-57-21            | 53.957625          | -113.035417         | 1981            | 12                |
| D15      | 100/10-09-059-11W4/00 | SUN IOE LOTTIE 10-9-59-11            | 54.087511          | -111.587683         | 1963            | 5                 |
| D16      | 100/10-31-059-18W5/00 | TRILOGY KAYBOBS 10-31-59-18          | 54.146695          | -116.686430         | 1968            | 5                 |
| D17      | 100/09-09-061-18W4/00 | TEXEX ET AL LUCKY 9-9-61-18          | 54.262405          | -112.629101         | 1951            | 2                 |
| D18      | 100/15-11-061-13W5/00 | WESTGROWTH CARSON 15-11-61-13        | 54.265106          | -115.836890         | 1980            | 4                 |
| D19      | 100/10-21-061-01W5/00 | IMP WESTLOCK 10-21-61-1              | 54.292262          | -114.086469         | 1953            | 4                 |
| D20      | 100/04-11-063-25W5/00 | AVONDALE SIMON 4-11-63-25            | 54.429758          | -117.680962         | 1988            | 3                 |
| D21      | 100/10-13-063-12W5/00 | IMP VIRGINIA HILLS 10-13-63-12       | 54.452329          | -115.674185         | 1959            | 4                 |
| D22      | 100/10-05-065-15W5/00 | MARATHON VIRGINIA HILLS 10-5-65-15   | 54.599662          | -116.225665         | 1968            | 5                 |
| D23      | 100/04-33-068-22W4/00 | IMPERIAL DEEP CREEK NO. 4-33-68-22   | 54.923841          | -113.307416         | 1955            | 5                 |
| D24      | 100/11-18-072-17W5/00 | CEDAR GILWOOD 11-18-72-17            | 55.238223          | -116.607331         | 1956            | 2                 |
| D25      | 100/10-24-072-23W5/00 | ATLANTIC ETAL WABATANISK 10-24-72-23 | 55.252641          | -117.396100         | 1965            | 5                 |
| D26      | 100/16-04-074-26W5/00 | DEVON ARL 16B PUSKWASKAU 16-4-74-26  | 55.386647          | -117.930965         | 2002            | 8                 |
| D27      | 100/01-01-079-17W5/00 | GALLEON DAWSON 1-1-79-17             | 55.812641          | -116.513471         | 2001            | 2                 |
| D28      | 100/07-34-083-15W5/00 | TOTAL MURPHY SEAL 7-34-83-15         | 56.235578          | -116.276592         | 1986            | 3                 |
| D29      | 100/13-20-085-16W5/00 | CHEVRON IOE LBUFF 13-20-85-16        | 56.389314          | -116.500762         | 1972            | 4                 |
| D30      | 100/11-17-088-03W6/00 | PEX ET AL EUREKA 11-17-88-3          | 56.634242          | -118.443537         | 1983            | 4                 |
| D31      | 100/02-30-088-04W6/00 | TOTAL ATAPCO WORSLEY 2-30-88-4       | 56.656887          | -118.620914         | 1980            | 4                 |
| D32      | 100/06-11-101-04W6/00 | TEXEX ET AL KEG R 6-11-101-4         | 57.750185          | -118.537350         | 1957            | 2                 |
| D33      | 100/14-19-109-03W5/00 | IOD IOE T1 FOX LAKE 14-19-109-3      | 58.485680          | -114.495876         | 1968            | 6                 |
| D34      | 100/02-04-126-11W6/00 | ESSO KAKISA 2-4-126-11               | 59.913369          | -119.842205         | 1991            | 8                 |
|          |                       |                                      |                    |                     | Total samples   | 182               |

**Legend**

| Column Label    | Label Description                                            |
|-----------------|--------------------------------------------------------------|
| Site No.        | AGS site location number                                     |
| Location - UWI  | Unique well identifier                                       |
| Well Name       | Name assigned to well when drilling began                    |
| Latitude NAD83  | Well location - degrees latitude, North American Datum 1983  |
| Longitude NAD83 | Well location - degrees longitude, North American Datum 1983 |
| Year Drilled    | Year the well was drilled                                    |
| No. of Samples  | Number of samples taken from core                            |

### **3 Analytical Methods and Results**

A total of 182 core samples was selected for analysis. The analyses itemized in Table 1 were performed on selected samples, as indicated in Appendix 2.

Schlumberger/TerraTek performed an adsorption isotherm analysis, along with Rock Eval 6 and total organic carbon (TOC) analyses on selected samples. The Geological Survey of Canada carried out Rock Eval 6 and TOC analyses on the majority of samples. References for the methodology are Bustin and Nassichuk (2002) and Mavor and Nelson (1997) for isotherms, and Lafargue et al. (1996) for Rock Eval and TOC.

Appendices 3 and 4 contain the data. Adsorption isotherms indicate the gas storage capacity of the organic matter within a sample. Rock Eval and TOC indicate the current amount of hydrocarbon in a sample and the potential for in situ kerogen to generate hydrocarbon. Total organic carbon indicates total organic matter (suggestive of hydrocarbon potential). This dataset is useful in determining hydrocarbon potential of a sample.

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## Appendices

### Appendix 1 – Duvernay and Muskwa Formations Core Sample Location, Depth and Lithology

#### Legend

| Column Label          | Label Description                                   |
|-----------------------|-----------------------------------------------------|
| Sample No.            | AGS sample number                                   |
| Site No.              | AGS site location number                            |
| Location UWI          | Well location - unique well identifier              |
| Sample Depth (Metres) | Depth of core sample in metres (measured from core) |
| Lithology             | Brief lithological description of sample            |
| Formation/Group       | Geological formation or group at depth of sample    |

| Sample No. | Site No. | Location UWI          | Sample Depth<br>(Metres) | Lithology                | Formation/Group |
|------------|----------|-----------------------|--------------------------|--------------------------|-----------------|
| 8127       | D30      | 100/11-17-088-03W6/00 | 2317.5                   | shale                    | Muskwa          |
| 8128       | D30      | 100/11-17-088-03W6/00 | 2319.3                   | shale                    | Muskwa          |
| 8129       | D30      | 100/11-17-088-03W6/00 | 2324.4                   | shale                    | Muskwa          |
| 8130       | D30      | 100/11-17-088-03W6/00 | 2339.0                   | carbonate mudstone       | Beaverhill Lake |
| 8133       | D8       | 100/11-11-050-17W4/00 | 1135.1                   | shale                    | Ireton          |
| 8134       | D8       | 100/11-11-050-17W4/00 | 1163.1                   | shale                    | Ireton          |
| 8135       | D8       | 100/11-11-050-17W4/00 | 1182.6                   | shale                    | Duvernay        |
| 8136       | D8       | 100/11-11-050-17W4/00 | 1190.2                   | shale                    | Duvernay        |
| 8137       | D8       | 100/11-11-050-17W4/00 | 1204.3                   | shale                    | Duvernay        |
| 8138       | D8       | 100/11-11-050-17W4/00 | 1220.4                   | shale                    | Duvernay        |
| 8139       | D8       | 100/11-11-050-17W4/00 | 1270.7                   | carbonate mudstone       | Cooking Lake    |
| 8140       | D25      | 100/10-24-072-23W5/00 | 2821.2                   | shale                    | Duvernay        |
| 8141       | D25      | 100/10-24-072-23W5/00 | 2825.5                   | shale                    | Duvernay        |
| 8142       | D25      | 100/10-24-072-23W5/00 | 2832.2                   | shale                    | Duvernay        |
| 8143       | D25      | 100/10-24-072-23W5/00 | 2837.7                   | shale                    | Duvernay        |
| 8144       | D25      | 100/10-24-072-23W5/00 | 2844.1                   | shale                    | Beaverhill Lake |
| 8145       | D33      | 100/14-19-109-03W5/00 | 372.0                    | chalk                    | Ireton          |
| 8146       | D33      | 100/14-19-109-03W5/00 | 374.0                    | shale                    | Ireton          |
| 8147       | D33      | 100/14-19-109-03W5/00 | 410.0                    | shale                    | Ireton          |
| 8148       | D33      | 100/14-19-109-03W5/00 | 456.0                    | shale                    | Ireton          |
| 8149       | D33      | 100/14-19-109-03W5/00 | 503.0                    | shale                    | Ireton          |
| 8150       | D33      | 100/14-19-109-03W5/00 | 553.0                    | shale                    | Ireton          |
| 8451       | D23      | 100/04-33-068-22W4/00 | 1030.1                   | carbonate mudstone       | Duvernay        |
| 8452       | D23      | 100/04-33-068-22W4/00 | 1043.6                   | carbonate mudstone       | Duvernay        |
| 8453       | D23      | 100/04-33-068-22W4/00 | 1052.8                   | carbonate mudstone       | Duvernay        |
| 8454       | D23      | 100/04-33-068-22W4/00 | 1054.6                   | carbonate mudstone       | Duvernay        |
| 8455       | D23      | 100/04-33-068-22W4/00 | 1061.6                   | dolostone                | Cooking Lake    |
| 8456       | D12      | 100/05-17-056-08W5/00 | 2358.8                   | shale                    | Duvernay        |
| 8457       | D12      | 100/05-17-056-08W5/00 | 2386.9                   | shale                    | Duvernay        |
| 8458       | D15      | 100/10-09-059-11W4/00 | 774.3                    | shale                    | Duvernay        |
| 8459       | D15      | 100/10-09-059-11W4/00 | 786.1                    | carbonate mudstone       | Duvernay        |
| 8460       | D15      | 100/10-09-059-11W4/00 | 793.7                    | carbonate mudstone       | Duvernay        |
| 8461       | D15      | 100/10-09-059-11W4/00 | 797.7                    | carbonate mudstone       | Duvernay        |
| 8462       | D15      | 100/10-09-059-11W4/00 | 798.6                    | carbonate mudstone       | Duvernay        |
| 8463       | D14      | 102/10-27-057-21W4/00 | 1134.7                   | carbonate mudstone       | Duvernay        |
| 8464       | D14      | 102/10-27-057-21W4/00 | 1136.8                   | carbonate mudstone       | Duvernay        |
| 8465       | D14      | 102/10-27-057-21W4/00 | 1139.4                   | carbonate mudstone       | Duvernay        |
| 8466       | D14      | 102/10-27-057-21W4/00 | 1141.4                   | carbonate mudstone       | Duvernay        |
| 8467       | D14      | 102/10-27-057-21W4/00 | 1149.5                   | carbonate mudstone       | Duvernay        |
| 8468       | D14      | 102/10-27-057-21W4/00 | 1149.8                   | carbonate mudstone       | Duvernay        |
| 8469       | D14      | 102/10-27-057-21W4/00 | 1151.5                   | carbonate mudstone       | Duvernay        |
| 8470       | D14      | 102/10-27-057-21W4/00 | 1153.7                   | carbonate mudstone       | Duvernay        |
| 8471       | D14      | 102/10-27-057-21W4/00 | 1157.4                   | carbonate mudstone       | Duvernay        |
| 8472       | D14      | 102/10-27-057-21W4/00 | 1161.3                   | carbonate mudstone       | Duvernay        |
| 8473       | D14      | 102/10-27-057-21W4/00 | 1162.2                   | carbonate mudstone       | Duvernay        |
| 8474       | D14      | 102/10-27-057-21W4/00 | 1162.6                   | carbonate mudstone       | Duvernay        |
| 8476       | D12      | 100/05-17-056-08W5/00 | 2386.9                   | duplicate of sample 8457 | Duvernay        |
| 8479       | D21      | 100/10-13-063-12W5/00 | 2618.4                   | shale                    | Majeau Lake     |
| 8480       | D21      | 100/10-13-063-12W5/00 | 2621.9                   | shale                    | Majeau Lake     |
| 8481       | D21      | 100/10-13-063-12W5/00 | 2625.5                   | shale                    | Majeau Lake     |
| 8482       | D21      | 100/10-13-063-12W5/00 | 2632.6                   | carbonate mudstone       | Beaverhill Lake |
| 8483       | D9       | 100/10-04-051-27W4/00 | 1934.9                   | shale                    | Duvernay        |
| 8484       | D9       | 100/10-04-051-27W4/00 | 1938.2                   | shale                    | Duvernay        |
| 8485       | D9       | 100/10-04-051-27W4/00 | 1941.3                   | shale                    | Duvernay        |
| 8486       | D9       | 100/10-04-051-27W4/00 | 1944.3                   | shale                    | Duvernay        |
| 8487       | D9       | 100/10-04-051-27W4/00 | 1947.4                   | shale                    | Duvernay        |
| 8488       | D7       | 100/14-29-048-06W5/00 | 2638.0                   | carbonate mudstone       | Duvernay        |
| 8489       | D7       | 100/14-29-048-06W5/00 | 2643.2                   | carbonate mudstone       | Duvernay        |
| 8490       | D7       | 100/14-29-048-06W5/00 | 2648.7                   | shale                    | Duvernay        |
| 8491       | D7       | 100/14-29-048-06W5/00 | 2652.8                   | shale                    | Duvernay        |
| 8492       | D7       | 100/14-29-048-06W5/00 | 2655.7                   | shale                    | Duvernay        |
| 8493       | D7       | 100/14-29-048-06W5/00 | 2656.5                   | shale                    | Duvernay        |

| Sample No. | Site No. | Location UWI          | Sample Depth<br>(Metres) | Lithology          | Formation/Group |
|------------|----------|-----------------------|--------------------------|--------------------|-----------------|
| 8494       | D7       | 100/14-29-048-06W5/00 | 2660.0                   | carbonate mudstone | Duvernay        |
| 8495       | D18      | 100/15-11-061-13W5/00 | 2542.8                   | shale              | Majeau Lake     |
| 8496       | D18      | 100/15-11-061-13W5/00 | 2545.1                   | shale              | Majeau Lake     |
| 8497       | D18      | 100/15-11-061-13W5/00 | 2549.7                   | carbonate mudstone | Majeau Lake     |
| 8498       | D18      | 100/15-11-061-13W5/00 | 2551.8                   | carbonate mudstone | Beaverhill Lake |
| 8499       | D32      | 100/06-11-101-04W6/00 | 1651.4                   | shale              | Muskwa          |
| 8500       | D32      | 100/06-11-101-04W6/00 | 1652.3                   | shale              | Muskwa          |
| 8978       | D3       | 100/02-19-039-26W4/00 | 2278.2                   | carbonate mudstone | Duvernay        |
| 8979       | D3       | 100/02-19-039-26W4/00 | 2280.4                   | carbonate mudstone | Duvernay        |
| 8980       | D3       | 100/02-19-039-26W4/00 | 2285.4                   | carbonate mudstone | Duvernay        |
| 8981       | D3       | 100/02-19-039-26W4/00 | 2290.5                   | carbonate mudstone | Duvernay        |
| 8982       | D2       | 100/07-29-038-19W4/00 | 1773.3                   | carbonate mudstone | Duvernay        |
| 8983       | D2       | 100/07-29-038-19W4/00 | 1775.9                   | shale              | Duvernay        |
| 8984       | D2       | 100/07-29-038-19W4/00 | 1786.1                   | carbonate mudstone | Duvernay        |
| 8985       | D27      | 100/01-01-079-17W5/00 | 2217.0                   | carbonate mudstone | Beaverhill Lake |
| 8986       | D27      | 100/01-01-079-17W5/00 | 2224.8                   | carbonate mudstone | Beaverhill Lake |
| 8987       | D29      | 100/13-20-085-16W5/00 | 1684.9                   | carbonate mudstone | Ireton          |
| 8988       | D29      | 100/13-20-085-16W5/00 | 1689.5                   | carbonate mudstone | Ireton          |
| 8989       | D29      | 100/13-20-085-16W5/00 | 1704.1                   | shale              | Duvernay        |
| 8990       | D28      | 100/07-34-083-15W5/00 | 1773.0                   | shale              | Ireton          |
| 8991       | D28      | 100/07-34-083-15W5/00 | 1777.7                   | shale              | Duvernay        |
| 8992       | D28      | 100/07-34-083-15W5/00 | 1781.2                   | gneiss             | PC              |
| 8993       | D29      | 100/13-20-085-16W5/00 | 1704.7                   | shale              | Duvernay        |
| 8994       | D31      | 100/02-30-088-04W6/00 | 2392.0                   | shale              | Ireton          |
| 8995       | D31      | 100/02-30-088-04W6/00 | 2401.2                   | shale              | Muskwa          |
| 8996       | D31      | 100/02-30-088-04W6/00 | 2405.2                   | shale              | Muskwa          |
| 8997       | D31      | 100/02-30-088-04W6/00 | 2413.4                   | carbonate mudstone | Muskwa          |
| 8998       | D4       | 100/02-08-044-27W4/00 | 2206.8                   | shale              | Ireton          |
| 8999       | D4       | 100/02-08-044-27W4/00 | 2231.4                   | shale              | Ireton          |
| 9000       | D4       | 100/02-08-044-27W4/00 | 2235.3                   | carbonate mudstone | Duvernay        |
| 9201       | D20      | 100/04-11-063-25W5/00 | 3578.5                   | carbonate mudstone | Beaverhill Lake |
| 9202       | D10      | 100/09-06-052-11W5/00 | 3013.9                   | shale              | Duvernay        |
| 9203       | D10      | 100/09-06-052-11W5/00 | 3015.2                   | shale              | Duvernay        |
| 9204       | D10      | 100/09-06-052-11W5/00 | 3015.7                   | shale              | Duvernay        |
| 9205       | D10      | 100/09-06-052-11W5/00 | 3016.3                   | shale              | Duvernay        |
| 9206       | D10      | 100/09-06-052-11W5/00 | 3017.1                   | shale              | Duvernay        |
| 9207       | D10      | 100/09-06-052-11W5/00 | 3018.3                   | shale              | Duvernay        |
| 9208       | D10      | 100/09-06-052-11W5/00 | 3018.7                   | shale              | Duvernay        |
| 9209       | D10      | 100/09-06-052-11W5/00 | 3019.3                   | shale              | Duvernay        |
| 9210       | D10      | 100/09-06-052-11W5/00 | 3020.1                   | shale              | Duvernay        |
| 9211       | D10      | 100/09-06-052-11W5/00 | 3020.9                   | shale              | Duvernay        |
| 9212       | D10      | 100/09-06-052-11W5/00 | 3021.8                   | carbonate mudstone | Duvernay        |
| 9213       | D10      | 100/09-06-052-11W5/00 | 3023.3                   | carbonate mudstone | Duvernay        |
| 9214       | D10      | 100/09-06-052-11W5/00 | 3024.7                   | carbonate mudstone | Duvernay        |
| 9215       | D10      | 100/09-06-052-11W5/00 | 3025.7                   | carbonate mudstone | Duvernay        |
| 9216       | D16      | 100/10-31-059-18W5/00 | 3196.7                   | carbonate mudstone | Beaverhill Lake |
| 9217       | D16      | 100/10-31-059-18W5/00 | 3201.6                   | carbonate mudstone | Swan Hills      |
| 9218       | D16      | 100/10-31-059-18W5/00 | 3205.3                   | carbonate mudstone | Swan Hills      |
| 9219       | D16      | 100/10-31-059-18W5/00 | 3210.5                   | carbonate mudstone | Swan Hills      |
| 9220       | D16      | 100/10-31-059-18W5/00 | 3216.4                   | carbonate mudstone | Swan Hills      |
| 9221       | D13      | 100/12-01-057-03W5/00 | 1823.8                   | carbonate mudstone | Duvernay        |
| 9222       | D13      | 100/12-01-057-03W5/00 | 1825.3                   | shale              | Duvernay        |
| 9223       | D13      | 100/12-01-057-03W5/00 | 1829.4                   | carbonate mudstone | Duvernay        |
| 9224       | D22      | 100/10-05-065-15W5/00 | 2747.8                   | shale              | Duvernay        |
| 9225       | D22      | 100/10-05-065-15W5/00 | 2749.6                   | shale              | Duvernay        |
| 9226       | D22      | 100/10-05-065-15W5/00 | 2752.0                   | shale              | Duvernay        |
| 9227       | D22      | 100/10-05-065-15W5/00 | 2757.7                   | shale              | Duvernay        |
| 9228       | D22      | 100/10-05-065-15W5/00 | 2760.9                   | shale              | Duvernay        |
| 9229       | D19      | 100/10-21-061-01W5/00 | 1461.5                   | carbonate mudstone | Duvernay        |
| 9230       | D19      | 100/10-21-061-01W5/00 | 1464.9                   | carbonate mudstone | Duvernay        |
| 9231       | D19      | 100/10-21-061-01W5/00 | 1469.4                   | carbonate mudstone | Duvernay        |
| 9232       | D19      | 100/10-21-061-01W5/00 | 1473.1                   | shale              | Duvernay        |

| Sample No. | Site No. | Location UWI          | Sample Depth<br>(Metres) | Lithology                                | Formation/Group |
|------------|----------|-----------------------|--------------------------|------------------------------------------|-----------------|
| 9233       | D17      | 100/09-09-061-18W4/00 | 897.3                    | carbonate mudstone                       | Duvernay        |
| 9234       | D17      | 100/09-09-061-18W4/00 | 957.7                    | carbonate mudstone                       | Duvernay        |
| 9235       | D1       | 100/06-14-037-07W5/00 | 3640.3                   | carbonate mudstone                       | Duvernay        |
| 9236       | D1       | 100/06-14-037-07W5/00 | 3642.6                   | carbonate mudstone                       | Duvernay        |
| 9237       | D1       | 100/06-14-037-07W5/00 | 3649.1                   | shale                                    | Duvernay        |
| 9238       | D1       | 100/06-14-037-07W5/00 | 3649.7                   | shale                                    | Duvernay        |
| 9239       | D1       | 100/06-14-037-07W5/00 | 3653.1                   | shale                                    | Duvernay        |
| 9240       | D24      | 100/11-18-072-17W5/00 | 2362.8                   | shale                                    | Duvernay        |
| 9241       | D24      | 100/11-18-072-17W5/00 | 2364.9                   | shale                                    | Duvernay        |
| 9242       | D4       | 100/02-08-044-27W4/00 | 2206.8                   | duplicate of sample 8998                 | Ireton          |
| 9243       | D11      | 100/10-30-053-14W5/00 | 3177.4                   | duplicate of sample 9389                 | Majeau Lake     |
| 9244       | D10      | 100/09-06-052-11W5/00 | 3015.7                   | duplicate of sample 9204                 | Duvernay        |
| 9245       | D24      | 100/11-18-072-17W5/00 | 2362.8                   | duplicate of sample 9240                 | Duvernay        |
| 9246       | D25      | 100/10-24-072-23W5/00 | 2757.7                   | duplicate of sample 9227                 | Duvernay        |
| 9261       | D25      | 100/10-24-072-23W5/00 | 2821.2 - 2832.2          | combined sample # 8140, 8142             | Duvernay        |
| 9262       | D21      | 100/10-13-063-12W5/00 | 2621.9 - 2625.5          | combined sample # 8480, 8481             | Majeau Lake     |
| 9263       | D11      | 100/10-30-053-14W5/00 | 3168.9 - 3169.8          | combined sample # 9387, 9388             | Majeau Lake     |
| 9264       | D10      | 100/09-06-052-11W5/00 | 3018.3 - 3020.1          | combined sample # 9207, 9208, 9209, 9210 | Duvernay        |
| 9265       | D26      | 100/16-04-074-26W5/00 | 2940 - 2941.8            | combined sample # 9351, 9352             | Duvernay        |
| 9266       | D32      | 100/06-11-101-04W6/00 | 1651.4 - 1652.3          | combined sample # 8499, 8500             | Muskwa          |
| 9267       | D24      | 100/11-18-072-17W5/00 | 2362.8 - 2364.9          | combined sample # 9240, 9241             | Duvernay        |
| 9268       | D19      | 100/10-21-061-01W5/00 | 1461.5 - 1464.8          | combined sample # 9229, 9230             | Duvernay        |
| 9351       | D26      | 100/16-04-074-26W5/00 | 2940.0                   | shale                                    | Duvernay        |
| 9352       | D26      | 100/16-04-074-26W5/00 | 2941.8                   | shale                                    | Duvernay        |
| 9353       | D26      | 100/16-04-074-26W5/00 | 2942.6                   | shale                                    | Duvernay        |
| 9354       | D26      | 100/16-04-074-26W5/00 | 2943.8                   | shale                                    | Majeau Lake     |
| 9355       | D26      | 100/16-04-074-26W5/00 | 2946.3                   | shale                                    | Beaverhill Lake |
| 9356       | D26      | 100/16-04-074-26W5/00 | 2948.3                   | shale                                    | Beaverhill Lake |
| 9357       | D26      | 100/16-04-074-26W5/00 | 2950.0                   | carbonate mudstone                       | Beaverhill Lake |
| 9358       | D26      | 100/16-04-074-26W5/00 | 2956.4                   | carbonate mudstone                       | Beaverhill Lake |
| 9359       | D6       | 100/02-06-047-04W5/00 | 2628.9                   | shale                                    | Duvernay        |
| 9360       | D6       | 100/02-06-047-04W5/00 | 2635.3                   | shale                                    | Duvernay        |
| 9361       | D6       | 100/02-06-047-04W5/00 | 2638.3                   | shale                                    | Duvernay        |
| 9362       | D6       | 100/02-06-047-04W5/00 | 2639.6                   | shale                                    | Duvernay        |
| 9363       | D6       | 100/02-06-047-04W5/00 | 2642.6                   | shale                                    | Duvernay        |
| 9364       | D6       | 100/02-06-047-04W5/00 | 2644.7                   | shale                                    | Duvernay        |
| 9365       | D6       | 100/02-06-047-04W5/00 | 2647.8                   | shale                                    | Duvernay        |
| 9366       | D34      | 100/02-04-126-11W6/00 | 1515.0                   | shale                                    | Muskwa          |
| 9367       | D34      | 100/02-04-126-11W6/00 | 1517.4                   | shale                                    | Muskwa          |
| 9368       | D34      | 100/02-04-126-11W6/00 | 1519.8                   | shale                                    | Muskwa          |
| 9369       | D34      | 100/02-04-126-11W6/00 | 1521.2                   | shale                                    | Muskwa          |
| 9370       | D34      | 100/02-04-126-11W6/00 | 1523.6                   | shale                                    | Muskwa          |
| 9371       | D34      | 100/02-04-126-11W6/00 | 1526.0                   | shale                                    | Muskwa          |
| 9372       | D34      | 100/02-04-126-11W6/00 | 1528.4                   | shale                                    | Muskwa          |
| 9373       | D34      | 100/02-04-126-11W6/00 | 1533.0                   | shale                                    | Muskwa          |
| 9374       | D4       | 100/02-08-044-27W4/00 | 2243.3                   | shale                                    | Duvernay        |
| 9375       | D4       | 100/02-08-044-27W4/00 | 2245.8                   | shale                                    | Duvernay        |
| 9376       | D4       | 100/02-08-044-27W4/00 | 2253.1                   | shale                                    | Duvernay        |
| 9377       | D4       | 100/02-08-044-27W4/00 | 2256.4                   | carbonate mudstone                       | Duvernay        |
| 9378       | D4       | 100/02-08-044-27W4/00 | 2274.7                   | carbonate mudstone                       | Cooking Lake    |
| 9379       | D5       | 100/10-08-046-22W4/00 | 1700.8                   | carbonate mudstone                       | Duvernay        |
| 9380       | D5       | 100/10-08-046-22W4/00 | 1708.6                   | carbonate mudstone                       | Duvernay        |
| 9381       | D5       | 100/10-08-046-22W4/00 | 1721.1                   | carbonate mudstone                       | Duvernay        |
| 9382       | D5       | 100/10-08-046-22W4/00 | 1722.1                   | carbonate mudstone                       | Duvernay        |
| 9383       | D5       | 100/10-08-046-22W4/00 | 1728.5                   | carbonate mudstone                       | Duvernay        |
| 9384       | D5       | 100/10-08-046-22W4/00 | 1741.2                   | carbonate mudstone                       | Cooking Lake    |
| 9385       | D11      | 100/10-30-053-14W5/00 | 3167.2                   | shale                                    | Majeau Lake     |
| 9386       | D11      | 100/10-30-053-14W5/00 | 3167.9                   | shale                                    | Majeau Lake     |
| 9387       | D11      | 100/10-30-053-14W5/00 | 3168.9                   | shale                                    | Majeau Lake     |
| 9388       | D11      | 100/10-30-053-14W5/00 | 3169.8                   | shale                                    | Majeau Lake     |
| 9389       | D11      | 100/10-30-053-14W5/00 | 3170.5                   | shale                                    | Majeau Lake     |
| 9390       | D11      | 100/10-30-053-14W5/00 | 3171.4                   | shale                                    | Majeau Lake     |

| Sample No. | Site No. | Location UWI          | Sample Depth<br>(Metres) | Lithology | Formation/Group |
|------------|----------|-----------------------|--------------------------|-----------|-----------------|
| 9391       | D11      | 100/10-30-053-14W5/00 | 3172.4                   | shale     | Majeau Lake     |
| 9392       | D11      | 100/10-30-053-14W5/00 | 3172.8                   | shale     | Majeau Lake     |
| 9393       | D11      | 100/10-30-053-14W5/00 | 3173.4                   | shale     | Majeau Lake     |
| 9394       | D11      | 100/10-30-053-14W5/00 | 3173.9                   | shale     | Majeau Lake     |
| 9395       | D11      | 100/10-30-053-14W5/00 | 3175.4                   | shale     | Majeau Lake     |
| 9396       | D11      | 100/10-30-053-14W5/00 | 3176.0                   | shale     | Majeau Lake     |
| 9397       | D11      | 100/10-30-053-14W5/00 | 3176.6                   | shale     | Majeau Lake     |
| 9398       | D11      | 100/10-30-053-14W5/00 | 3177.4                   | shale     | Majeau Lake     |
| 9399       | D20      | 100/04-11-063-25W5/00 | 3576.3                   | shale     | Ireton          |
| 9400       | D20      | 100/04-11-063-25W5/00 | 3576.8                   | shale     | Ireton          |

## Appendix 2 – Duvernay and Muskwa Formations Core Samples Analyzed

### Legend

Y = Sample data presented in this report

x = Sample data presented in other Alberta Geological Survey reports, see Table 1 for details.

z = Data are being analyzed and will be distributed in a future report

  Analyses presented in this report

| Column Label                 | Label Description                                                                                                                                                                                                                                |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample No.                   | AGS sample number                                                                                                                                                                                                                                |
| Site No.                     | Site location number                                                                                                                                                                                                                             |
| Rock Eval™ TOC               | Rock Eval™ pyrolysis is used to identify the type and maturity of organic matter and to detect petroleum potential in sediments. Total Organic Carbon is a measure of the amount of organic carbon in the sediment, measured in weight per cent. |
| XRD-Bulk                     | X-Ray diffraction analysis of whole-rock mineralogy                                                                                                                                                                                              |
| XRD-Clay                     | X-Ray diffraction analysis of clay mineralogy                                                                                                                                                                                                    |
| Organic Pet.                 | Petrographic imaging and description of organic macerals                                                                                                                                                                                         |
| Thin Section                 | Thin section of sample                                                                                                                                                                                                                           |
| Adsorption Isotherm          | Gas adsorption analysis to determine gas-holding capacity of sample                                                                                                                                                                              |
| SEM                          | Scanning Electron Microscope                                                                                                                                                                                                                     |
| Mini-perm                    | Analysis to determine permeability                                                                                                                                                                                                               |
| Porosimetry                  | Analysis to determine pore throat size                                                                                                                                                                                                           |
| Pycnometry                   | Analysis to determine grain density                                                                                                                                                                                                              |
| Texture with Clay Mineralogy | Determination of sand, silt and clay size distribution in weight per cent with clay mineralogy on clay separates.                                                                                                                                |

| Sample No. | Site No. | Rock Eval™<br>TOC | XRD-Bulk | XRD-Clay | Organic<br>Pet. | Thin<br>Section | Adsorption<br>Isotherm | SEM | Mini-perm | Porosimetry | Pycnometry | Texture with<br>Clay Mineralogy |
|------------|----------|-------------------|----------|----------|-----------------|-----------------|------------------------|-----|-----------|-------------|------------|---------------------------------|
| 8127       | D30      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8128       | D30      | Y                 |          |          |                 | z               |                        |     |           |             |            |                                 |
| 8129       | D30      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8130       | D30      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8133       | D8       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8134       | D8       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8135       | D8       | Y                 | x        |          |                 |                 |                        |     |           |             |            |                                 |
| 8136       | D8       | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8137       | D8       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8138       | D8       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8139       | D8       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8140       | D25      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8141       | D25      | Y                 |          |          |                 |                 |                        |     |           |             |            | z                               |
| 8142       | D25      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8143       | D25      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8144       | D25      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8145       | D33      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8146       | D33      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8147       | D33      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8148       | D33      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8149       | D33      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8150       | D33      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8451       | D23      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8452       | D23      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8453       | D23      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8454       | D23      | Y                 |          |          | z               | z               |                        |     |           |             |            |                                 |
| 8455       | D23      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8456       | D12      | Y                 | x        |          | z               |                 |                        |     |           |             |            |                                 |
| 8457       | D12      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8458       | D15      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8459       | D15      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8460       | D15      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8461       | D15      | Y                 | x        |          | z               | z               |                        |     |           |             |            |                                 |
| 8462       | D15      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8463       | D14      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8464       | D14      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8465       | D14      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8466       | D14      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8467       | D14      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8468       | D14      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8469       | D14      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8470       | D14      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8471       | D14      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8472       | D14      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8473       | D14      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8474       | D14      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8476       | D12      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8479       | D21      | Y                 |          |          |                 |                 |                        | x   |           | x           | x          |                                 |
| 8480       | D21      | Y                 | x        |          |                 |                 |                        |     |           |             |            |                                 |
| 8481       | D21      | Y                 |          |          | z               | z               |                        |     |           |             |            |                                 |
| 8482       | D21      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8483       | D9       | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8484       | D9       | Y                 |          |          |                 |                 |                        |     |           |             |            | z                               |
| 8485       | D9       | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8486       | D9       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8487       | D9       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8488       | D7       |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8489       | D7       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8490       | D7       | Y                 |          |          | z               |                 |                        |     |           |             |            | z                               |
| 8491       | D7       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8492       | D7       | Y                 |          |          | z               | z               |                        |     |           |             |            |                                 |
| 8493       | D7       | Y                 |          |          |                 |                 |                        |     |           | z           | x          |                                 |
| 8494       | D7       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8495       | D18      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8496       | D18      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8497       | D18      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8498       | D18      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8499       | D32      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8500       | D32      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8978       | D3       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8979       | D3       | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8980       | D3       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8981       | D3       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8982       | D2       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8983       | D2       | Y                 |          |          | z               |                 |                        |     |           |             |            | z                               |
| 8984       | D2       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8985       | D27      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8986       | D27      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8987       | D29      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8988       | D29      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8989       | D29      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8990       | D28      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8991       | D28      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8992       | D28      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8993       | D29      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8994       | D31      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 8995       | D31      | Y                 |          |          |                 | z               | Y                      |     |           | x           | x          |                                 |
| 8996       | D31      | Y                 | x        | x        |                 |                 |                        |     |           |             |            |                                 |
| 8997       | D31      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 8998       | D4       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |

| Sample No. | Site No. | Rock Eval™<br>TOC | XRD-Bulk | XRD-Clay | Organic<br>Pet. | Thin<br>Section | Adsorption<br>Isotherm | SEM | Mini-perm | Porosimetry | Pycnometry | Texture with<br>Clay Mineralogy |
|------------|----------|-------------------|----------|----------|-----------------|-----------------|------------------------|-----|-----------|-------------|------------|---------------------------------|
| 8999       | D4       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9000       | D4       | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9201       | D20      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9202       | D10      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9203       | D10      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9204       | D10      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9205       | D10      | Y                 | x        | x        |                 |                 |                        |     |           |             |            |                                 |
| 9206       | D10      | Y                 |          |          |                 |                 |                        |     |           |             |            | z                               |
| 9207       | D10      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9208       | D10      | Y                 |          |          |                 |                 |                        | x   | x         | z           | x          |                                 |
| 9209       | D10      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9210       | D10      | Y                 |          |          |                 | z               |                        |     |           |             |            |                                 |
| 9211       | D10      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9212       | D10      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9213       | D10      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9214       | D10      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9215       | D10      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9216       | D16      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9217       | D16      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9218       | D16      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9219       | D16      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9220       | D16      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9221       | D13      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9222       | D13      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9223       | D13      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9224       | D22      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9225       | D22      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9226       | D22      | Y                 |          |          |                 | z               |                        |     |           |             |            |                                 |
| 9227       | D22      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9228       | D22      | Y                 | x        | x        | z               |                 |                        |     |           | z           | x          |                                 |
| 9229       | D19      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9230       | D19      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9231       | D19      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9232       | D19      | Y                 |          |          | z               |                 |                        | x   |           |             |            |                                 |
| 9233       | D17      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9234       | D17      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9235       | D1       | Y                 | x        | x        |                 |                 |                        |     |           |             |            |                                 |
| 9236       | D1       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9237       | D1       | Y                 |          |          | z               |                 |                        |     | x         |             |            |                                 |
| 9238       | D1       | Y                 |          |          |                 | z               |                        | x   |           | x           | x          |                                 |
| 9239       | D1       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9240       | D24      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9241       | D24      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9242       | D4       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9243       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9244       | D10      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9245       | D24      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9246       | D25      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9261       | D25      | Y                 |          |          |                 |                 | Y                      |     |           |             |            |                                 |
| 9262       | D21      | Y                 |          |          |                 |                 | Y                      |     |           |             |            |                                 |
| 9263       | D11      | Y                 |          |          |                 |                 | Y                      |     |           |             |            |                                 |
| 9264       | D10      | Y                 |          |          |                 |                 | Y                      |     |           |             |            |                                 |
| 9265       | D26      | Y                 |          |          |                 |                 | Y                      |     |           |             |            |                                 |
| 9266       | D32      |                   | x        | x        |                 |                 |                        |     |           |             |            |                                 |
| 9267       | D24      |                   | x        | x        |                 |                 |                        |     |           |             |            |                                 |
| 9268       | D19      |                   | x        | x        |                 |                 |                        |     |           |             |            |                                 |
| 9351       | D26      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9352       | D26      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9353       | D26      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9354       | D26      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9355       | D26      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9356       | D26      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9357       | D26      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9358       | D26      |                   |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9359       | D6       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9360       | D6       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9361       | D6       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9362       | D6       | Y                 | x        | x        | z               | z               |                        |     |           |             |            |                                 |
| 9363       | D6       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9364       | D6       | Y                 |          |          |                 |                 | Y                      |     |           |             |            |                                 |
| 9365       | D6       | Y                 |          |          |                 |                 |                        | x   | x         | z           | x          |                                 |
| 9366       | D34      | Y                 |          |          |                 |                 |                        |     |           |             |            | z                               |
| 9367       | D34      | Y                 |          |          |                 | z               |                        |     |           |             |            |                                 |
| 9368       | D34      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9369       | D34      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9370       | D34      | Y                 |          |          |                 |                 |                        | x   |           | x           | x          |                                 |
| 9371       | D34      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9372       | D34      | Y                 | x        | x        |                 |                 |                        |     |           |             |            |                                 |
| 9373       | D34      | Y                 |          |          |                 |                 | Y                      |     |           |             |            |                                 |
| 9374       | D4       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9375       | D4       | Y                 | x        | x        |                 |                 |                        |     |           |             |            |                                 |
| 9376       | D4       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9377       | D4       | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9378       | D4       | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9379       | D5       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9380       | D5       | Y                 | x        | x        |                 |                 | Y                      |     |           |             |            |                                 |
| 9381       | D5       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9382       | D5       | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9383       | D5       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9384       | D5       | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |

| Sample No. | Site No. | Rock Eval™<br>TOC | XRD-Bulk | XRD-Clay | Organic<br>Pet. | Thin<br>Section | Adsorption<br>Isotherm | SEM | Mini-perm | Porosimetry | Pycnometry | Texture with<br>Clay Mineralogy |
|------------|----------|-------------------|----------|----------|-----------------|-----------------|------------------------|-----|-----------|-------------|------------|---------------------------------|
| 9385       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9386       | D11      | Y                 | x        | x        |                 |                 |                        | x   | x         | z           | x          |                                 |
| 9387       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9388       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9389       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9390       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9391       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9392       | D11      | Y                 |          |          |                 | z               |                        |     |           |             |            |                                 |
| 9393       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9394       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9395       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9396       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9397       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9398       | D11      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |
| 9399       | D20      | Y                 |          |          | z               |                 |                        |     |           |             |            |                                 |
| 9400       | D20      | Y                 |          |          |                 |                 |                        |     |           |             |            |                                 |

## Appendix 3a – Duvernay and Muskwa Formations Adsorption Isotherm Summary and Point Data

### Legend

| Column Label                  | Label Description                                                         |
|-------------------------------|---------------------------------------------------------------------------|
| Sample No.                    | AGS sample number                                                         |
| Site No.                      | AGS sample location number                                                |
| Depth (Metres)                | Sample depth in metres (measured from core)                               |
| TOC wt. %                     | Total organic carbon in weight per cent                                   |
| Analysis Temperature Celsius  | Temperature in degrees Celsius                                            |
| As Received Moisture wt. %    | Sample moisture content in weight per cent                                |
| PL Raw Basis MPa              | Pressure - Langmuir pressure raw basis in megapascals                     |
| VL Raw Basis scc/g            | Volume - Langmuir volume raw basis in standard cubic centimetres per gram |
| PL Raw Basis psia             | Pressure - Langmuir pressure raw basis in pounds per square inch absolute |
| VL Raw Basis scf/ton          | Volume - Langmuir volume raw basis in standard cubic feet per ton         |
| Point No.                     | Individual measurement                                                    |
| Pressure Raw Basis MPa        | Pressure raw basis in megapascals                                         |
| Gas Content Raw Basis scc/g   | Gas content in standard cubic centimetres per gram                        |
| Pressure Raw Basis psia       | Pressure raw basis in pounds per square inch absolute                     |
| Gas Content Raw Basis scf/ton | Gas content in standard cubic feet per ton                                |

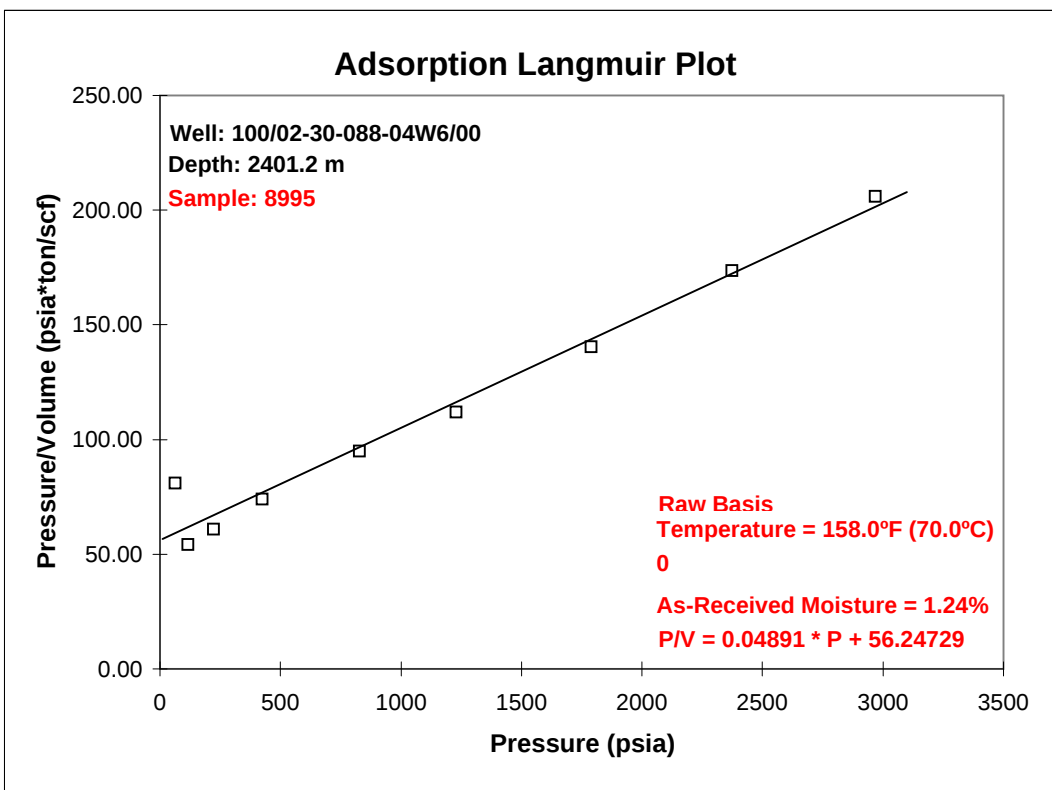
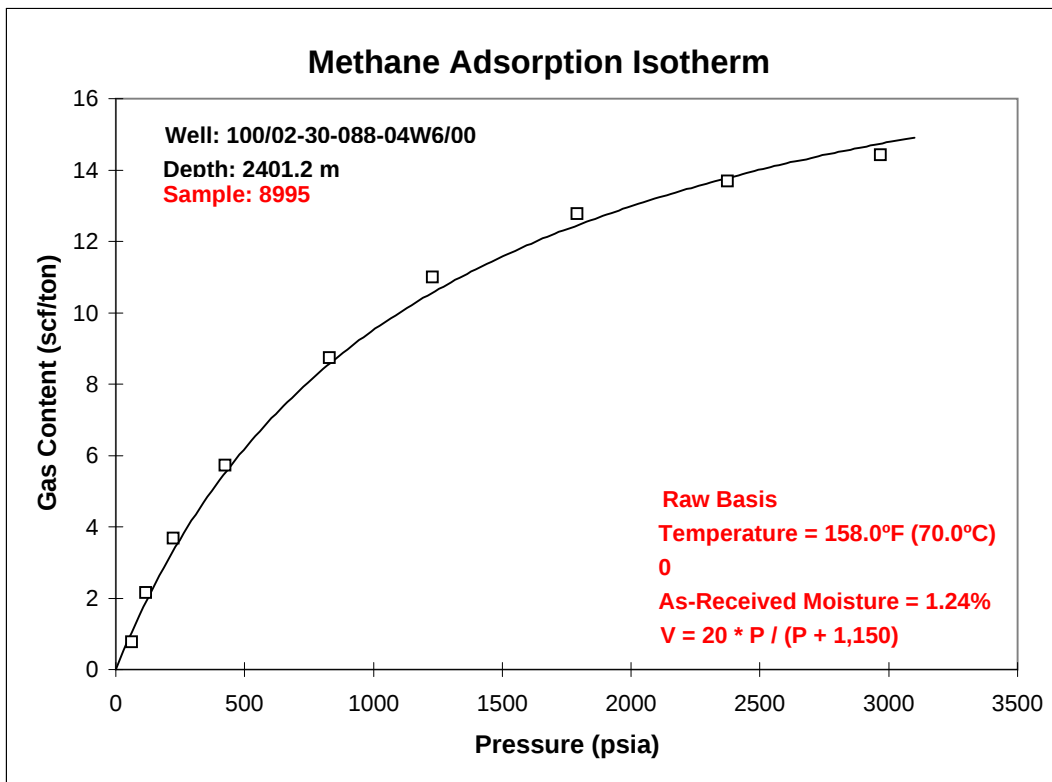
| Sample No. | Site No. | Depth (Metres)  | TOC wt. % | Analysis Temperature Celsius | As Received Moisture wt. % | PL Raw Basis MPa | VL Raw Basis scc/g | PL Raw Basis psia | VL Raw Basis scf/ton |
|------------|----------|-----------------|-----------|------------------------------|----------------------------|------------------|--------------------|-------------------|----------------------|
| 8995       | D31      | 2401.2          | 1.11      | 70                           | 1.24                       | 7.93             | 0.60               | 1,150.1           | 20.4                 |
| 9261       | D25      | 2821.2 - 2832.2 | 4.03      | 85                           | 0.26                       | 9.08             | 0.80               | 1,316.5           | 25.3                 |
| 9262       | D21      | 2621.9 - 2625.5 | 1.73      | 67                           | 0.55                       | 7.73             | 0.60               | 1,120.6           | 18.6                 |
| 9263       | D11      | 3168.8 - 3169.7 | 0.45      | 80                           | 0.61                       | 7.76             | 0.20               | 1,125.5           | 6.6                  |
| 9264       | D10      | 3018.3 - 3020.1 | 1.36      | 82                           | 0.20                       | 8.71             | 0.50               | 1262.90           | 17.3                 |
| 9265       | D26      | 2940 - 2941.8   | 2.84      | 72                           | 0.92                       | 8.62             | 0.70               | 1,249.9           | 22.8                 |
| 9364       | D6       | 2644.7          | 1.29      | 72                           | 0.26                       | 7.25             | 0.40               | 1,051.7           | 14.3                 |
| 9373       | D34      | 1533            | 2.34      | 67                           | 1.72                       | 4.60             | 0.60               | 666.9             | 19.3                 |
| 9380       | D5       | 1708.5          | 0.59      | 51                           | 1.12                       | 3.43             | 0.40               | 497.2             | 11.9                 |

#### Adsorption Isotherm Point Data

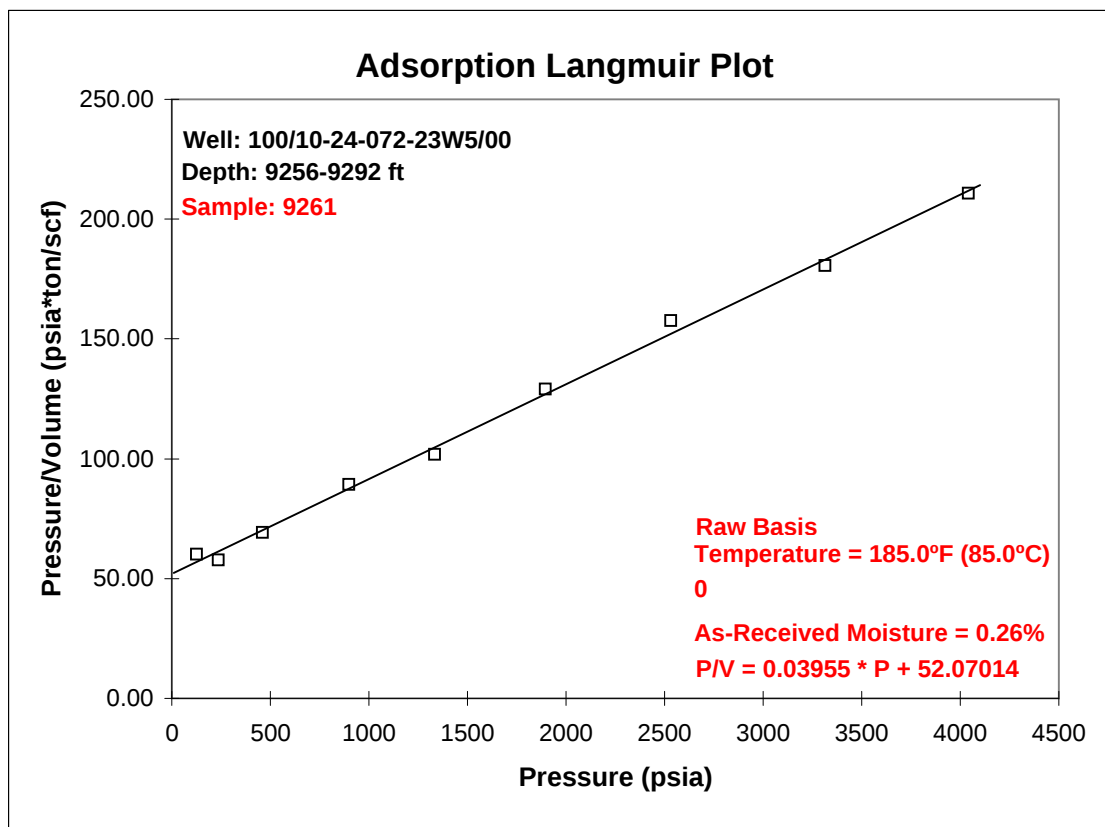
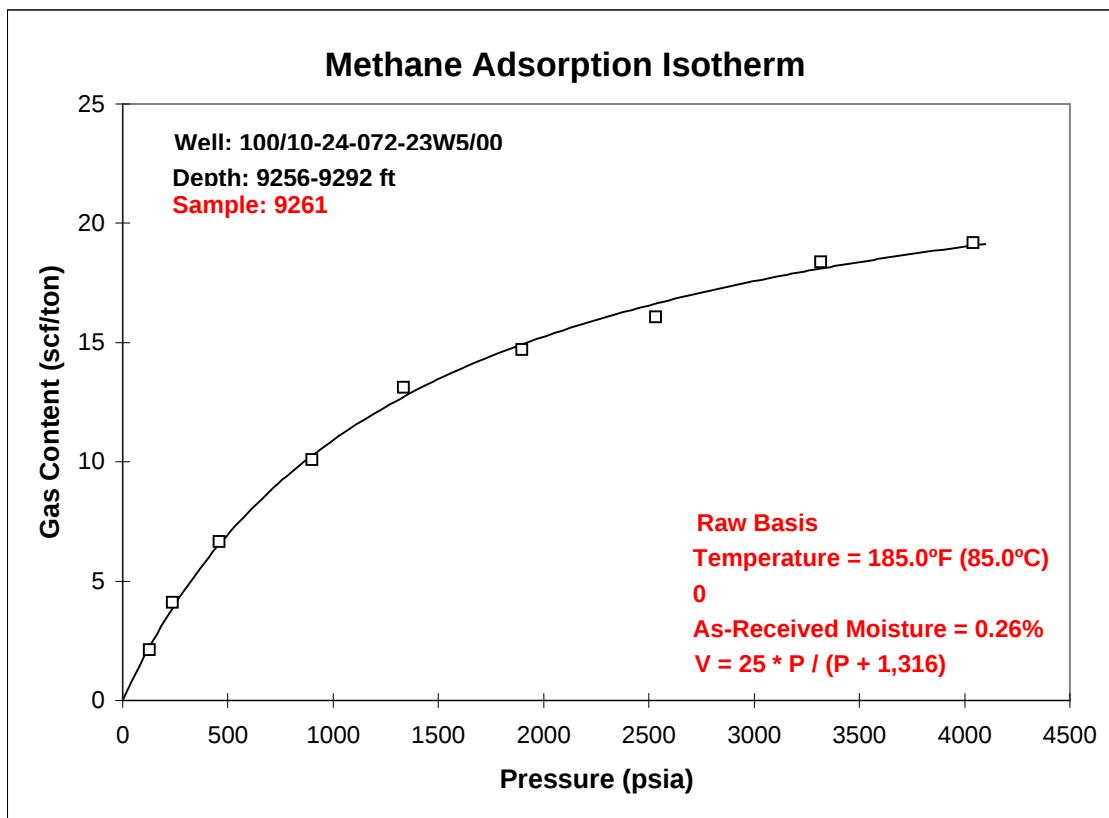
| Sample No. | Point No. | Pressure Raw Basis MPa | Gas Content Raw Basis scc/g | Pressure Raw Basis psia | Gas Content Raw Basis scf/ton |
|------------|-----------|------------------------|-----------------------------|-------------------------|-------------------------------|
| 8995       | 1         | 0.43                   | 0.02                        | 63                      | 0.8                           |
|            | 2         | 0.80                   | 0.07                        | 116                     | 2.2                           |
|            | 3         | 1.54                   | 0.12                        | 224                     | 3.7                           |
|            | 4         | 2.92                   | 0.18                        | 424                     | 5.7                           |
|            | 5         | 5.72                   | 0.27                        | 829                     | 8.7                           |
|            | 6         | 8.48                   | 0.34                        | 1,230                   | 11.0                          |
|            | 7         | 12.35                  | 0.40                        | 1,791                   | 12.7                          |
|            | 8         | 16.37                  | 0.43                        | 2,374                   | 13.7                          |
|            | 9         | 20.46                  | 0.45                        | 2,968                   | 14.4                          |
| 9261       | 1         | 0.88                   | 0.07                        | 128                     | 2.1                           |
|            | 2         | 1.63                   | 0.13                        | 236                     | 4.1                           |
|            | 3         | 3.17                   | 0.21                        | 460                     | 6.7                           |
|            | 4         | 6.21                   | 0.32                        | 900                     | 10.1                          |
|            | 5         | 9.20                   | 0.41                        | 1,335                   | 13.1                          |
|            | 6         | 13.08                  | 0.46                        | 1,897                   | 14.7                          |
|            | 7         | 17.46                  | 0.50                        | 2,533                   | 16.1                          |
|            | 8         | 22.86                  | 0.57                        | 3,316                   | 18.4                          |
|            | 9         | 27.86                  | 0.60                        | 4,041                   | 19.2                          |
| 9262       | 1         | 0.86                   | 0.06                        | 125                     | 1.8                           |
|            | 2         | 1.62                   | 0.11                        | 235                     | 3.4                           |
|            | 3         | 3.19                   | 0.17                        | 462                     | 5.4                           |
|            | 4         | 6.34                   | 0.27                        | 919                     | 8.6                           |
|            | 5         | 9.20                   | 0.31                        | 1,335                   | 9.9                           |
|            | 6         | 13.12                  | 0.37                        | 1,903                   | 11.8                          |
|            | 7         | 17.29                  | 0.42                        | 2,508                   | 13.3                          |
|            | 8         | 22.54                  | 0.43                        | 3,269                   | 13.8                          |
|            | 9         | 27.66                  | 0.45                        | 4,012                   | 14.3                          |
| 9263       | 1         | 0.79                   | 0.02                        | 114                     | 0.5                           |
|            | 2         | 1.50                   | 0.04                        | 217                     | 1.3                           |
|            | 3         | 2.94                   | 0.06                        | 426                     | 2.0                           |
|            | 4         | 5.78                   | 0.09                        | 838                     | 2.8                           |
|            | 5         | 8.71                   | 0.11                        | 1,263                   | 3.5                           |
|            | 6         | 12.66                  | 0.13                        | 1,836                   | 4.1                           |
|            | 7         | 16.85                  | 0.15                        | 2,444                   | 4.7                           |
|            | 8         | 21.23                  | 0.16                        | 3,079                   | 5.0                           |
|            | 9         | 27.13                  | 0.16                        | 3,935                   | 5.0                           |
| 9264       | 1         | 0.77                   | 0.04                        | 112                     | 1.4                           |
|            | 2         | 1.49                   | 0.09                        | 216                     | 2.8                           |
|            | 3         | 2.93                   | 0.13                        | 425                     | 4.3                           |
|            | 4         | 5.76                   | 0.20                        | 836                     | 6.5                           |
|            | 5         | 8.71                   | 0.27                        | 1,263                   | 8.7                           |
|            | 6         | 12.71                  | 0.32                        | 1,844                   | 10.4                          |

| Sample No.  | Point No. | Pressure<br>Raw Basis<br>MPa | Gas<br>Content<br>Raw Basis<br>scf/g | Pressure<br>Raw Basis<br>psia | Gas Content<br>Raw Basis<br>scf/ton |
|-------------|-----------|------------------------------|--------------------------------------|-------------------------------|-------------------------------------|
|             | 7         | 16.91                        | 0.35                                 | 2,452                         | 11.2                                |
|             | 8         | 21.23                        | 0.38                                 | 3,079                         | 12.1                                |
|             | 9         | 27.06                        | 0.42                                 | 3,925                         | 13.3                                |
| <b>9265</b> | 1         | 0.81                         | 0.05                                 | 118                           | 1.7                                 |
|             | 2         | 1.54                         | 0.11                                 | 224                           | 3.4                                 |
|             | 3         | 2.96                         | 0.20                                 | 430                           | 6.3                                 |
|             | 4         | 5.81                         | 0.30                                 | 843                           | 9.6                                 |
|             | 5         | 8.63                         | 0.37                                 | 1,251                         | 12.0                                |
|             | 6         | 12.45                        | 0.42                                 | 1,805                         | 13.6                                |
|             | 7         | 16.73                        | 0.48                                 | 2,426                         | 15.5                                |
|             | 8         | 21.69                        | 0.51                                 | 3,146                         | 16.2                                |
|             | 9         | 26.23                        | 0.52                                 | 3,805                         | 16.8                                |
| <b>9364</b> | 1         | 0.81                         | 0.05                                 | 118                           | 1.5                                 |
|             | 2         | 1.55                         | 0.08                                 | 225                           | 2.5                                 |
|             | 3         | 2.96                         | 0.13                                 | 430                           | 4.3                                 |
|             | 4         | 5.80                         | 0.21                                 | 841                           | 6.6                                 |
|             | 5         | 8.65                         | 0.24                                 | 1,254                         | 7.7                                 |
|             | 6         | 12.47                        | 0.29                                 | 1,808                         | 9.2                                 |
|             | 7         | 16.77                        | 0.30                                 | 2,432                         | 9.7                                 |
|             | 8         | 21.75                        | 0.33                                 | 3,154                         | 10.6                                |
|             | 9         | 26.19                        | 0.36                                 | 3,798                         | 11.6                                |
| <b>9373</b> | 1         | 0.44                         | 0.05                                 | 64                            | 1.6                                 |
|             | 2         | 0.84                         | 0.09                                 | 122                           | 2.8                                 |
|             | 3         | 1.52                         | 0.16                                 | 220                           | 5.0                                 |
|             | 4         | 2.59                         | 0.23                                 | 376                           | 7.3                                 |
|             | 5         | 3.65                         | 0.28                                 | 530                           | 9.0                                 |
|             | 6         | 5.80                         | 0.34                                 | 841                           | 10.9                                |
|             | 7         | 8.54                         | 0.38                                 | 1,238                         | 12.3                                |
|             | 8         | 11.25                        | 0.44                                 | 1,632                         | 14.0                                |
|             | 9         | 15.24                        | 0.46                                 | 2,210                         | 14.6                                |
| <b>9380</b> | 1         | 0.43                         | 0.03                                 | 63                            | 1.0                                 |
|             | 2         | 0.83                         | 0.08                                 | 120                           | 2.5                                 |
|             | 3         | 1.49                         | 0.13                                 | 216                           | 4.2                                 |
|             | 4         | 2.56                         | 0.16                                 | 371                           | 5.1                                 |
|             | 5         | 3.62                         | 0.20                                 | 525                           | 6.4                                 |
|             | 6         | 5.72                         | 0.24                                 | 830                           | 7.6                                 |
|             | 7         | 8.42                         | 0.27                                 | 1,221                         | 8.5                                 |
|             | 8         | 11.14                        | 0.29                                 | 1,616                         | 9.2                                 |
|             | 9         | 15.00                        | 0.30                                 | 2,176                         | 9.6                                 |

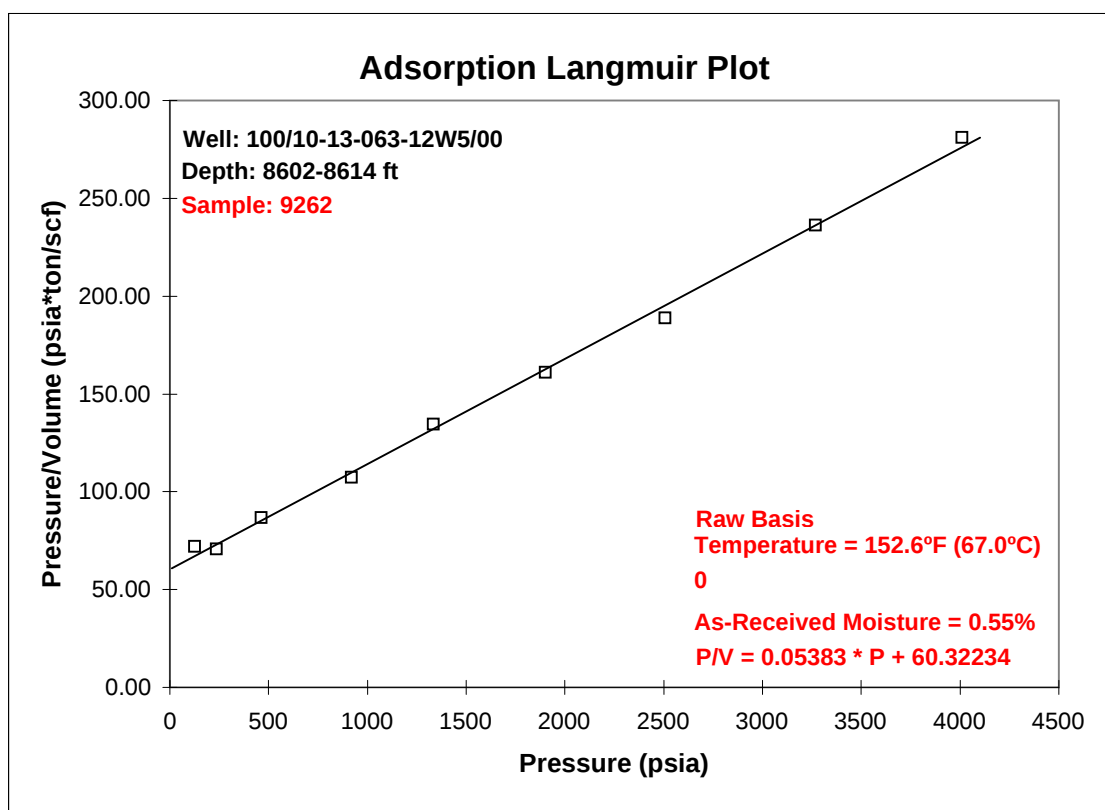
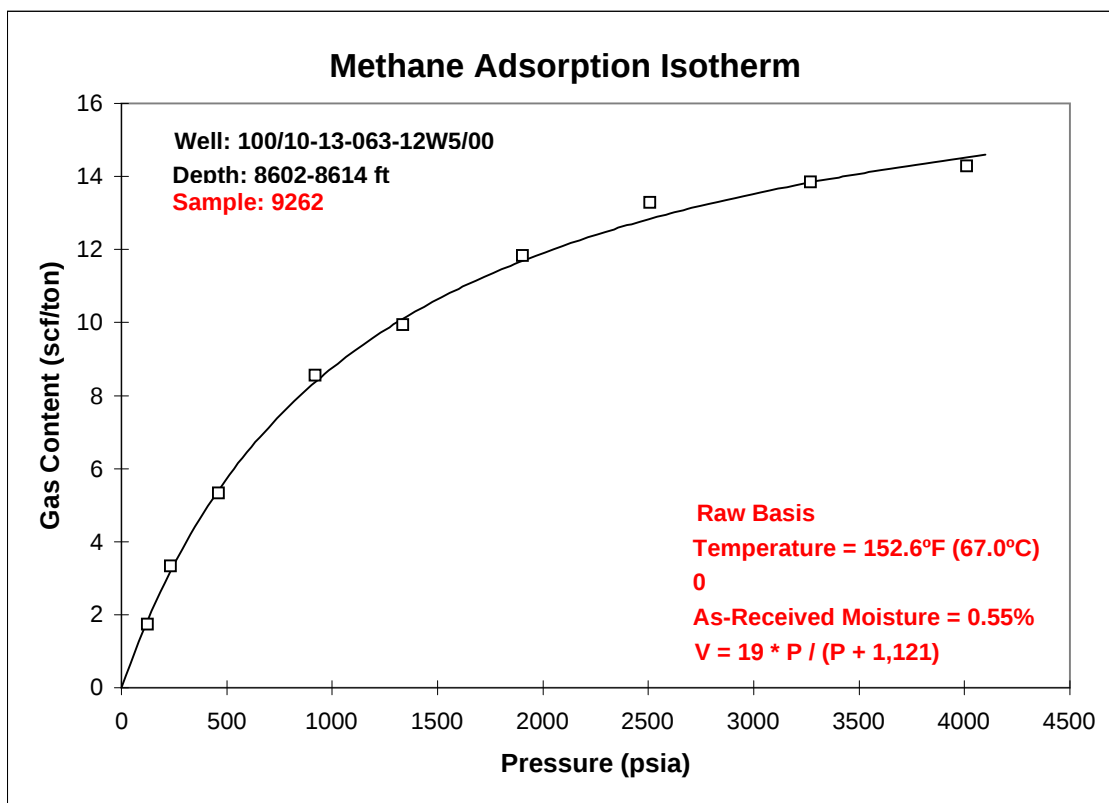
### **Appendix 3b – Duvernay and Muskwa Formations Adsorption Isotherm Graphs**



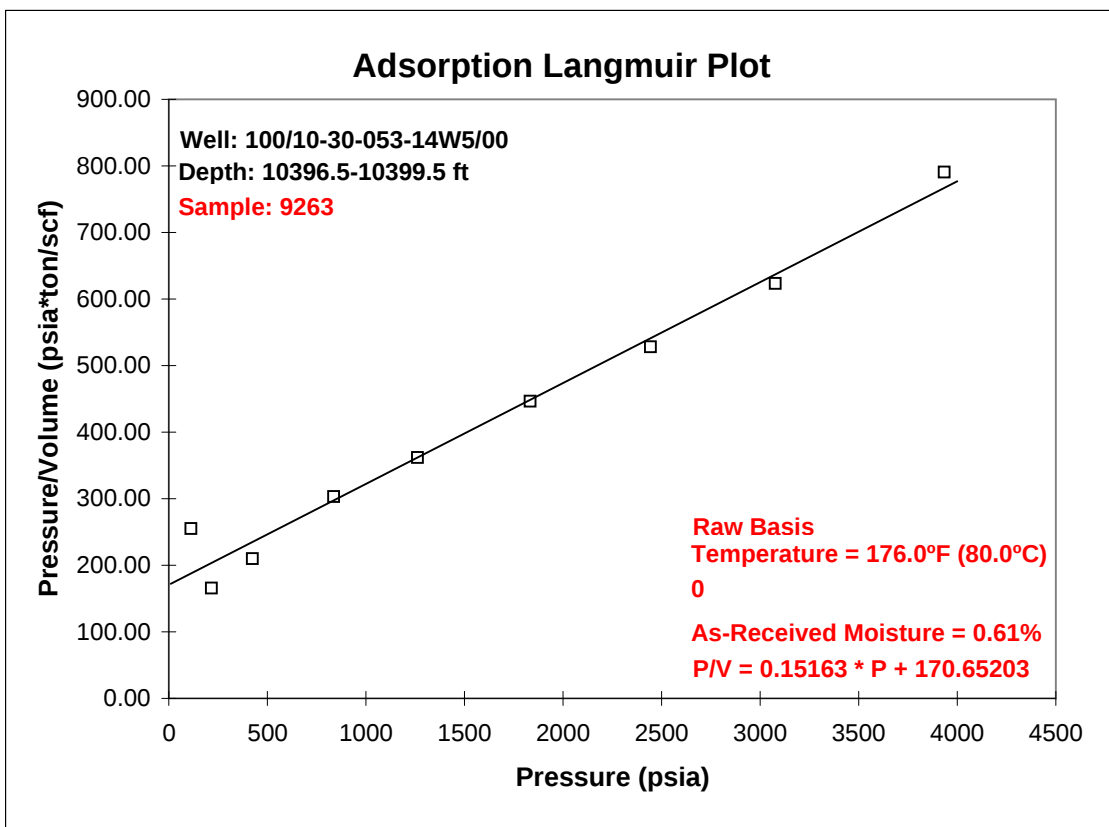
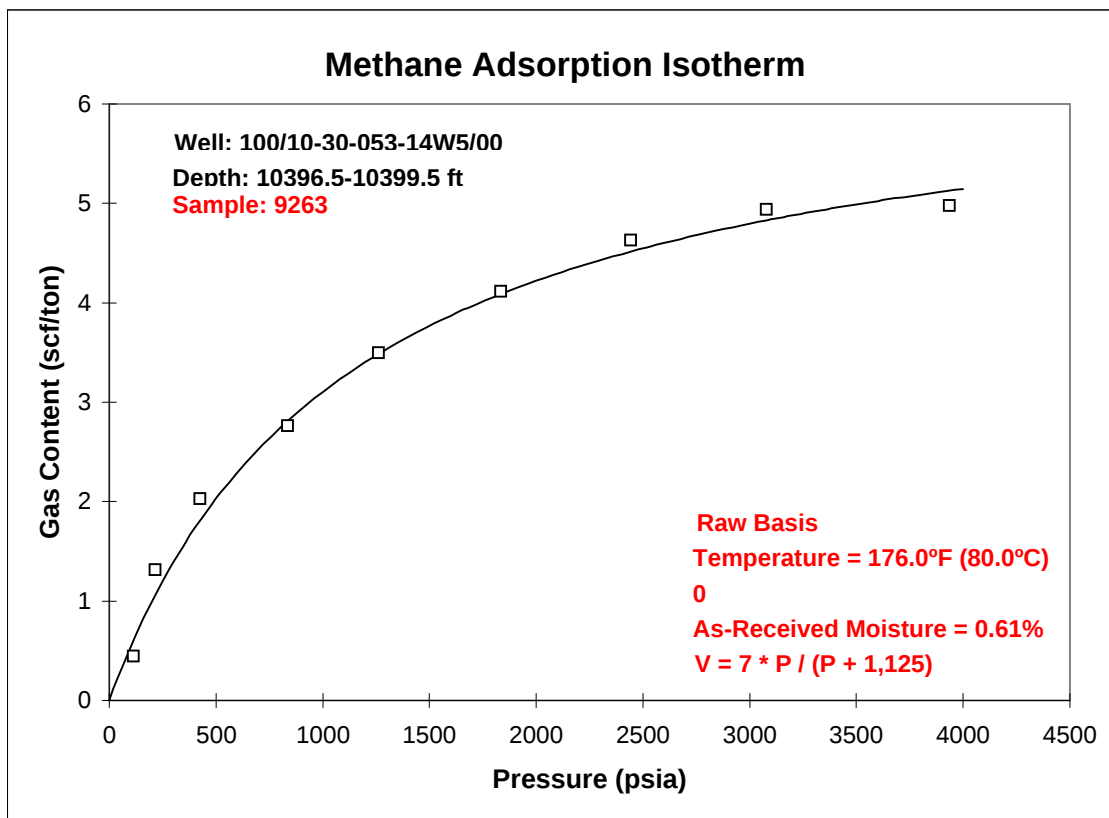
SI Unit graphs not available



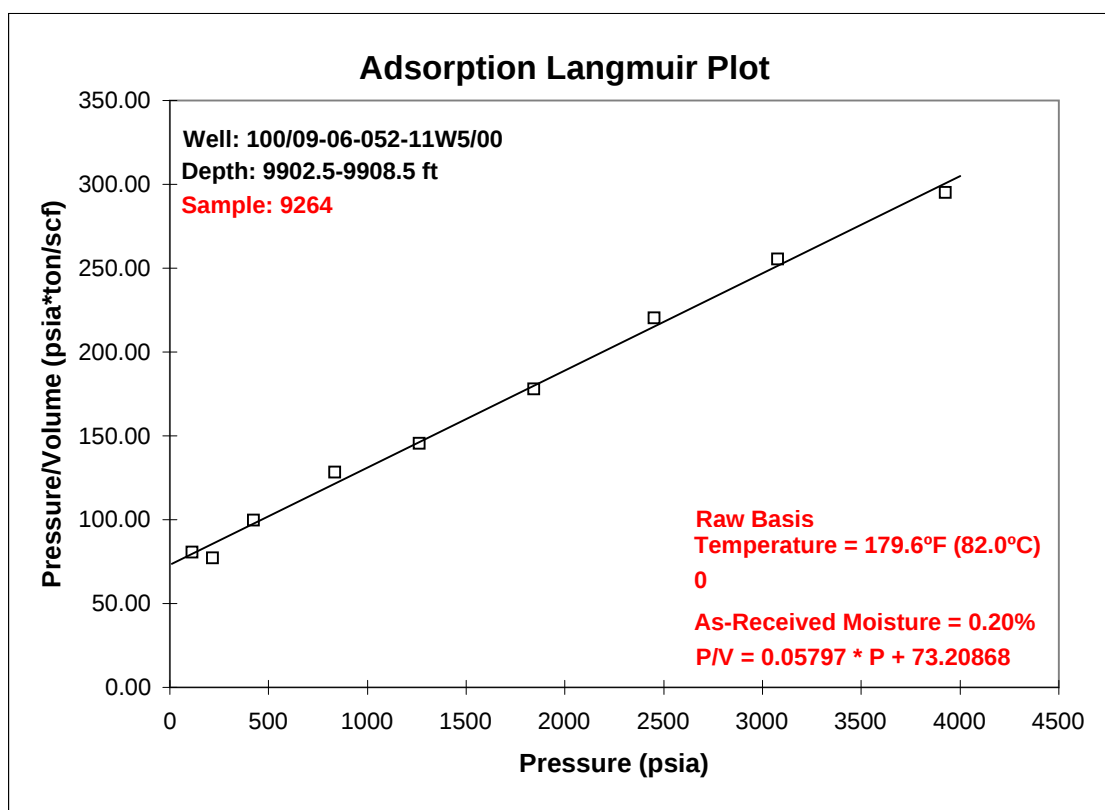
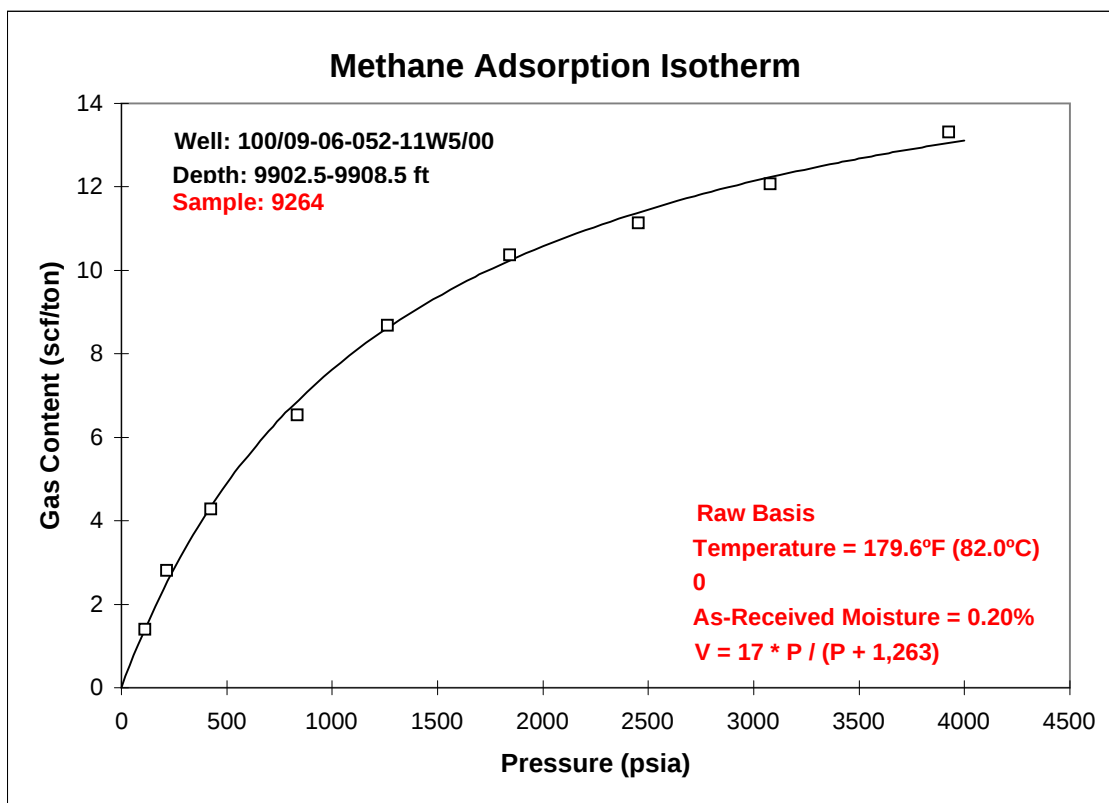
SI Unit graphs not available



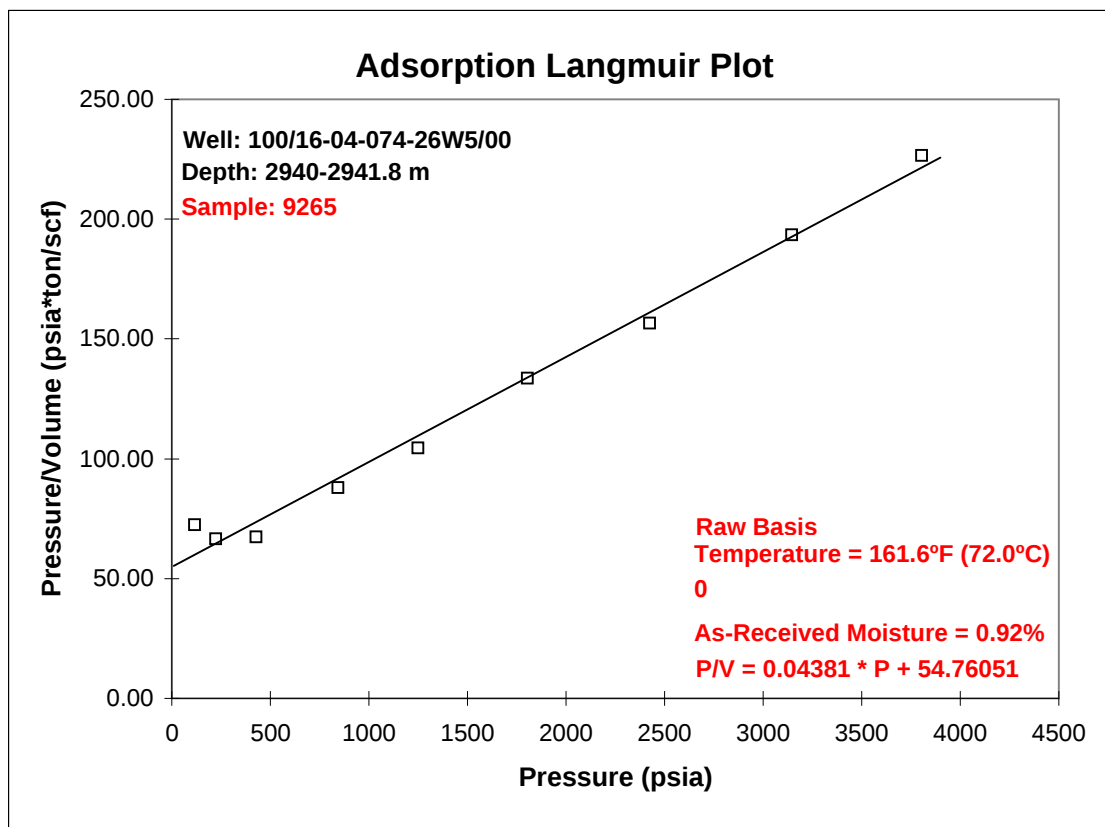
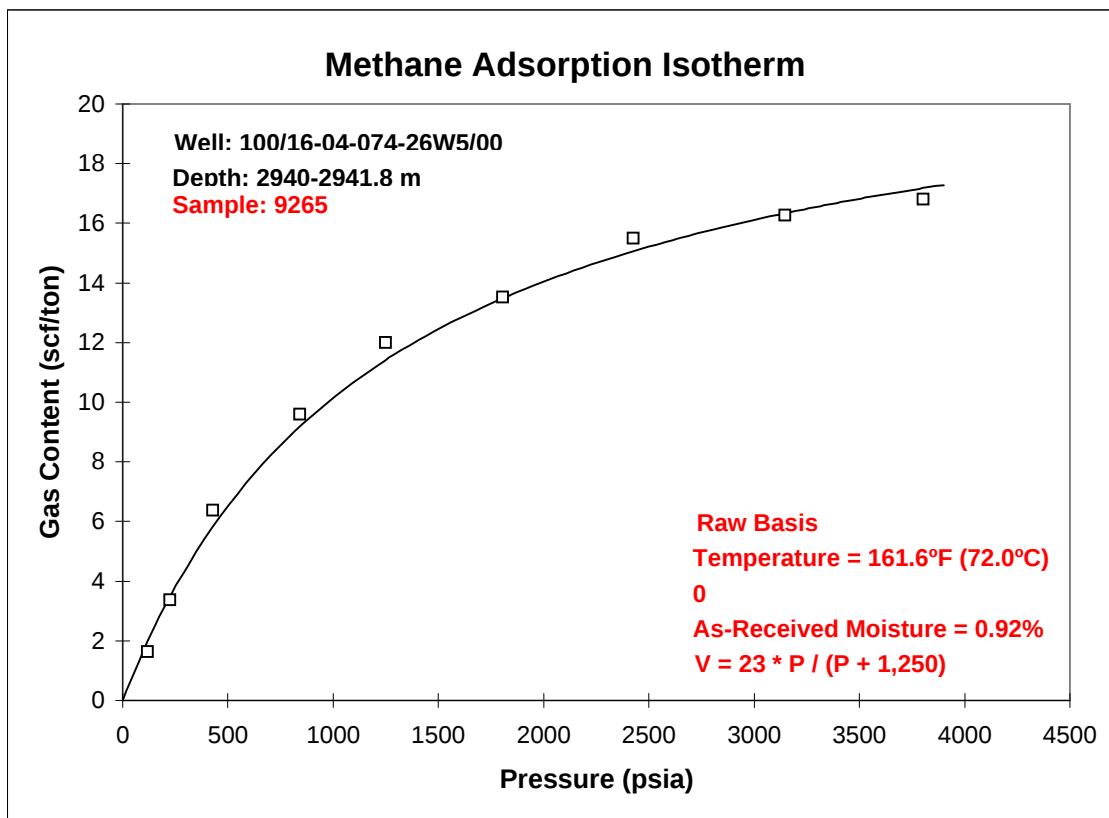
SI Unit graphs not available



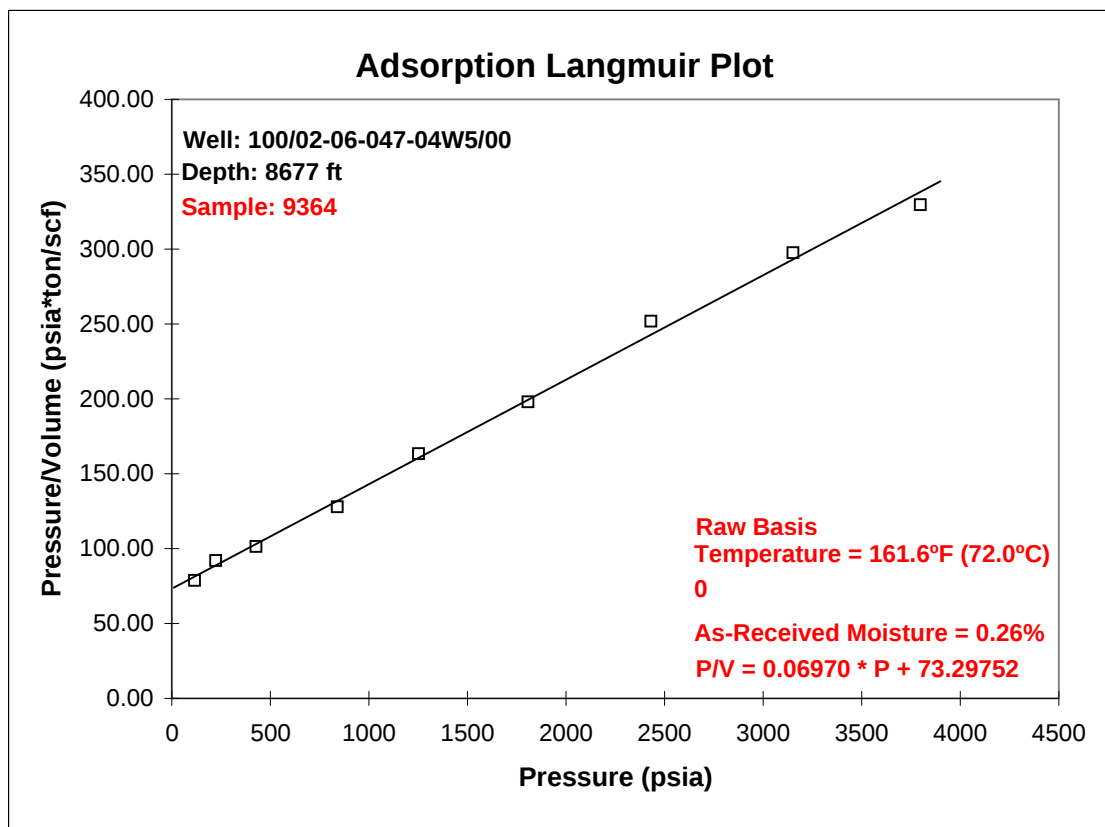
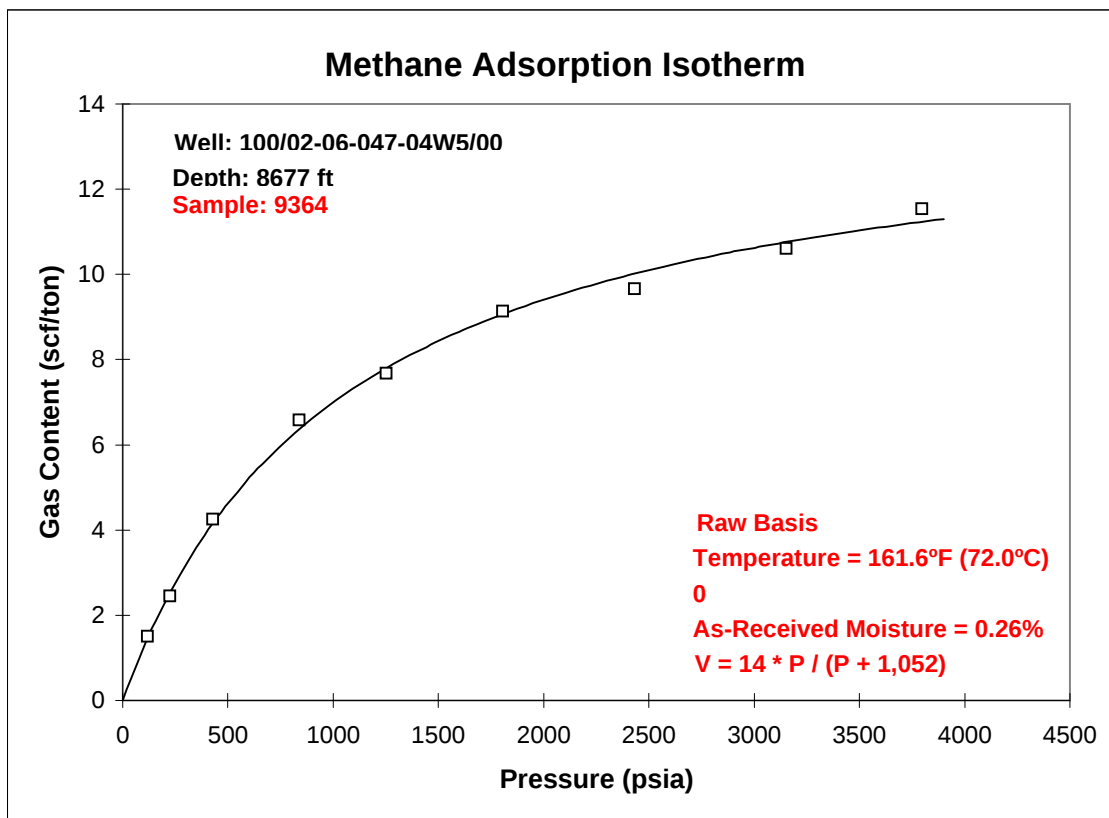
SI Unit graphs not available



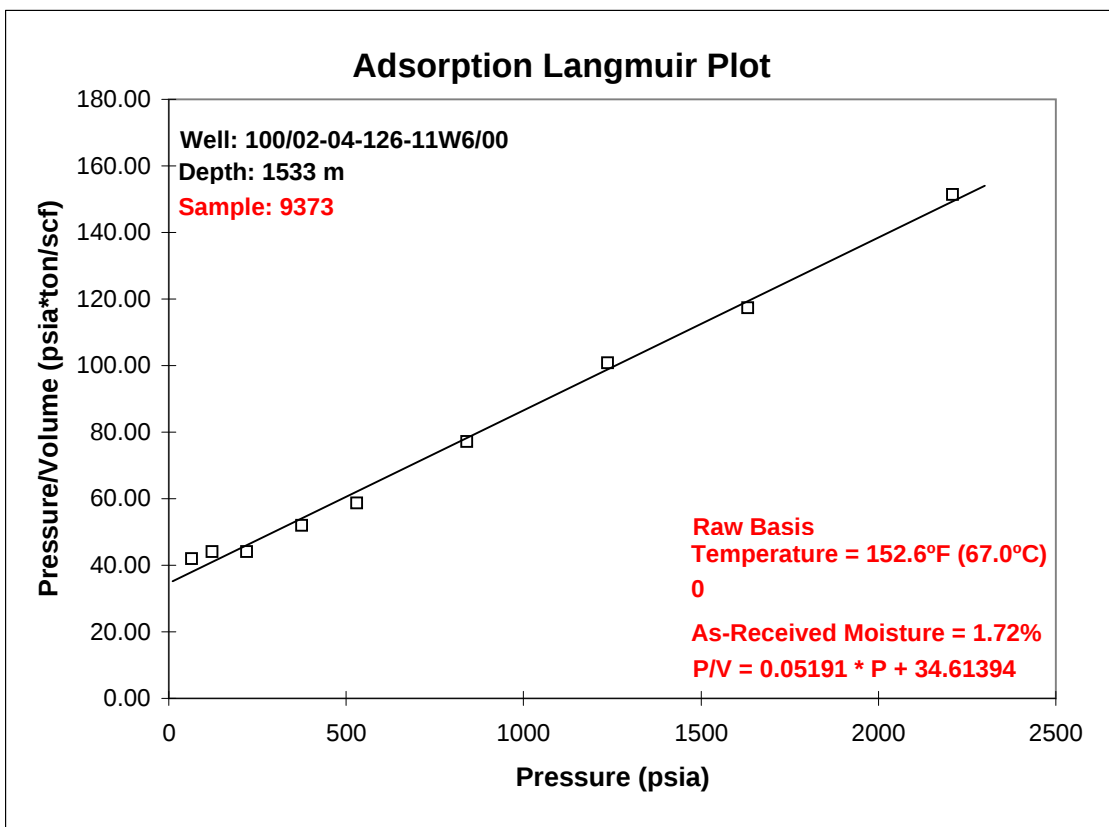
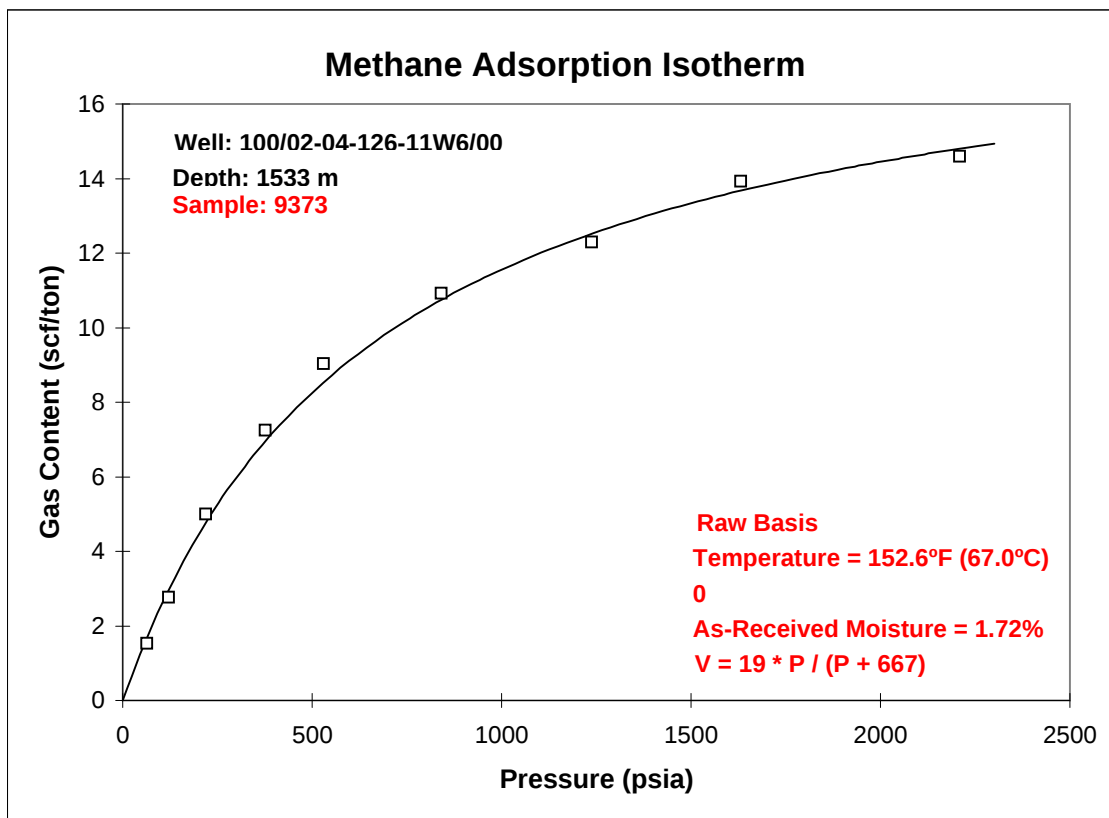
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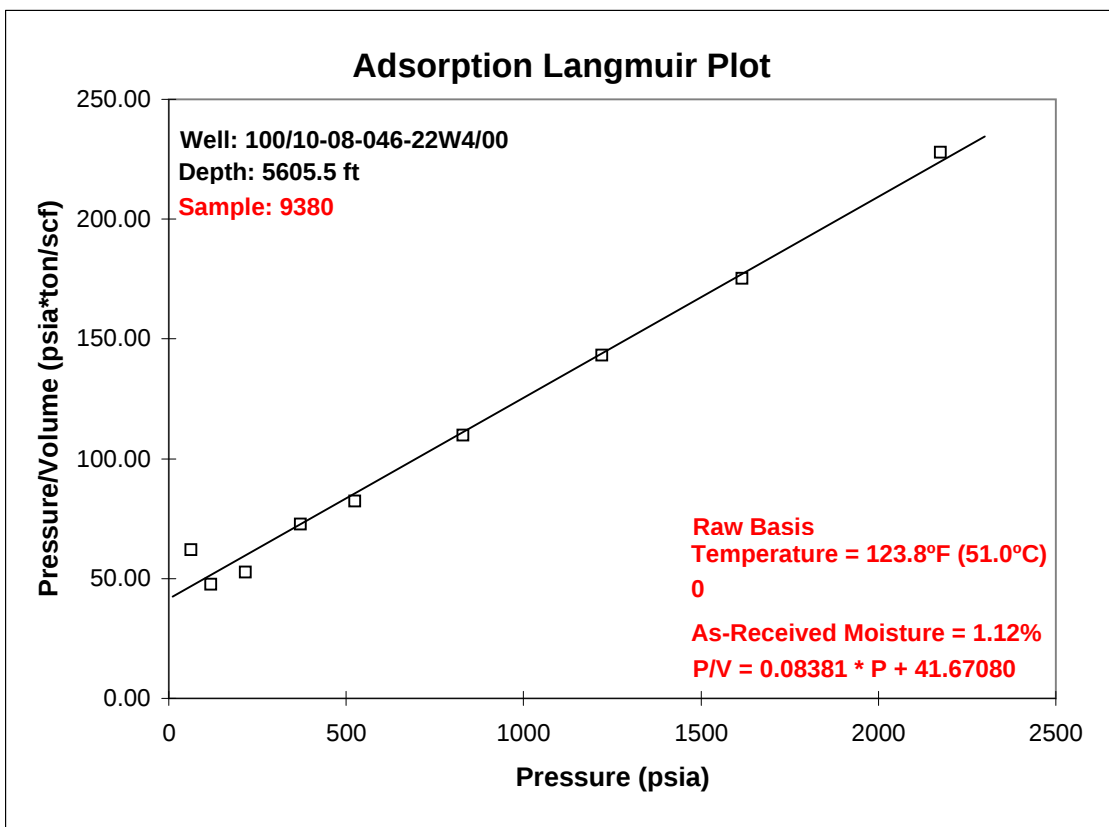
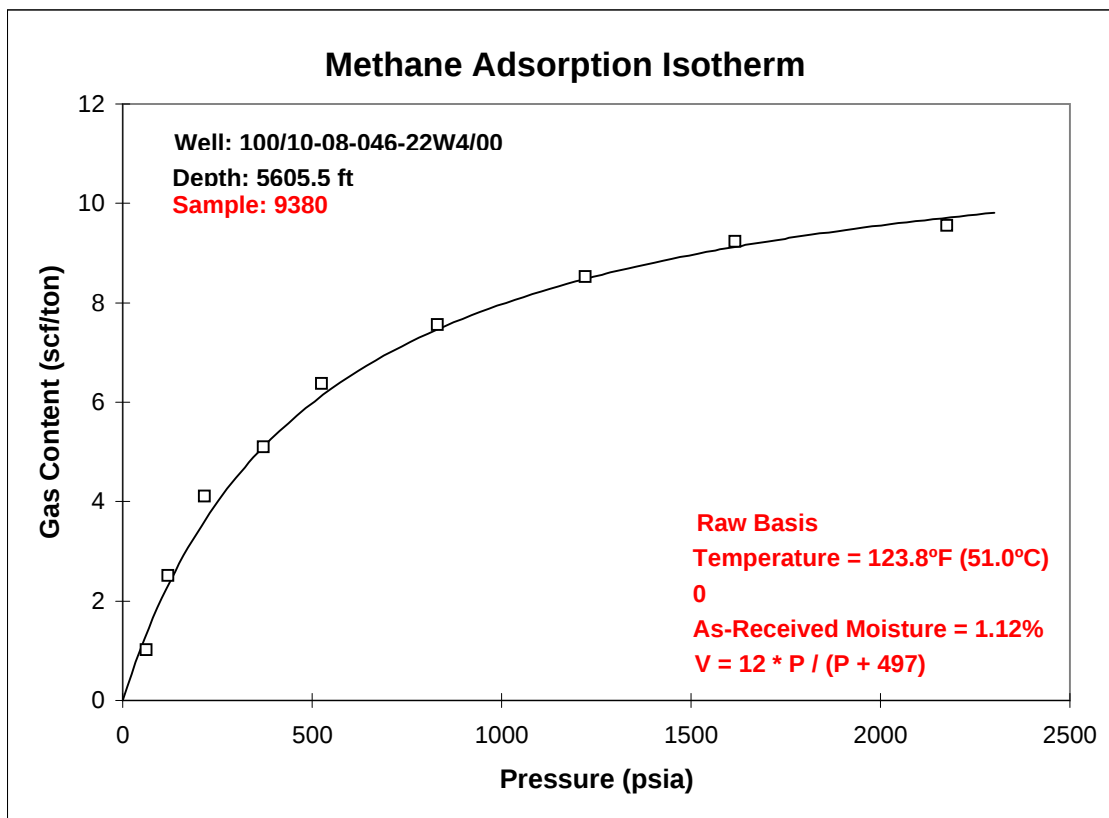
SI Unit graphs not available



SI Unit graphs not available



SI Unit graphs not available



SI Unit graphs not available

## Appendix 4 – Duvernay and Muskwa Formations Rock Eval™ SIX TOC

### Legend

| Column Label   | Label Description                                                                                                                                                                     |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample No.     | AGS sample number                                                                                                                                                                     |
| Site No.       | AGS site location number                                                                                                                                                              |
| Qty g          | Sample weight in grams                                                                                                                                                                |
| S1             | Amount of free hydrocarbons (in milligrams of hydrocarbon per gram of rock), rounded to two digits                                                                                    |
| S2             | Amount of hydrocarbons generated (in milligrams of hydrocarbon per gram of rock) through thermal cracking, rounded to two digits                                                      |
| PI             | Production index, $S1/(S1+S2)$ , calculation is computer generated and based on five decimal points for S1 and S2. The computer then calculates PI and rounds the data to two digits. |
| S3             | Milligrams CO <sub>2</sub> per gram of rock                                                                                                                                           |
| Max T Celsius  | Rock Eval II - adjusted temperature of maximum hydrocarbon generation calculated from Peak T                                                                                          |
| Peak T Celsius | Temperature of maximum hydrocarbon generation from Rock Eval SIX                                                                                                                      |
| TOC wt. %      | Total organic carbon in weight per cent                                                                                                                                               |
| HI             | Hydrogen index - $(100 * S2)/TOC$ , rounded to a whole number                                                                                                                         |
| OI             | Oxygen index - $(100 * S3)/TOC$ , rounded to a whole number                                                                                                                           |
| MINC wt. %     | Mineral carbon in weight per cent                                                                                                                                                     |

| Sample No. | Site No. | Qty<br>g | S1<br>mg/g | S2<br>mg/g | PI   | S3   | Max T<br>Celsius | Peak T<br>Celsius | TOC<br>wt. % | HI  | OI   | MINC<br>wt. % |
|------------|----------|----------|------------|------------|------|------|------------------|-------------------|--------------|-----|------|---------------|
| 8127       | D30      | 70.3     | 2.37       | 16.66      | 0.12 | 0.25 | 437              | 476               | 4.08         | 408 | 6    | 1.0           |
| 8128       | D30      | 70.8     | 1.99       | 18.05      | 0.10 | 0.20 | 436              | 475               | 4.07         | 443 | 5    | 0.5           |
| 8129       | D30      | 70.2     | 0.47       | 4.73       | 0.09 | 0.26 | 442              | 481               | 1.15         | 411 | 23   | 0.5           |
| 8130       | D30      | 70.8     | 0.03       | 0.16       | 0.14 | 0.35 | 429              | 468               | 0.20         | 80  | 175  | 2.8           |
| 8133       | D30      | 70.5     | 0.06       | 0.43       | 0.12 | 0.85 | 437              | 476               | 0.48         | 90  | 177  | 3.4           |
| 8134       | D30      | 70.6     | 0.08       | 0.61       | 0.11 | 0.41 | 437              | 476               | 0.35         | 174 | 117  | 10.2          |
| 8135       | D30      | 70.4     | 0.06       | 0.64       | 0.09 | 0.52 | 434              | 473               | 0.38         | 168 | 137  | 9.8           |
| 8136       | D30      | 70.1     | 1.77       | 26.07      | 0.06 | 1.84 | 423              | 462               | 5.22         | 499 | 35   | 5.5           |
| 8137       | D30      | 70.9     | 0.38       | 5.45       | 0.07 | 1.26 | 437              | 476               | 1.56         | 349 | 81   | 2.3           |
| 8138       | D30      | 70.4     | 0.09       | 0.63       | 0.12 | 1.04 | 430              | 469               | 0.36         | 175 | 289  | 4.3           |
| 8139       | D30      | 70.1     | 0.01       | 0.29       | 0.05 | 0.27 | 433              | 472               | 0.16         | 181 | 169  | 12.0          |
| 8140       | D25      | 70.2     | 2.96       | 11.59      | 0.20 | 0.39 | 444              | 483               | 3.66         | 317 | 11   | 3.6           |
| 8141       | D25      | 70.3     | 0.79       | 3.01       | 0.21 | 0.44 | 445              | 484               | 1.09         | 276 | 40   | 1.9           |
| 8142       | D25      | 70.6     | 2.48       | 12.52      | 0.17 | 0.41 | 443              | 482               | 3.75         | 334 | 11   | 4.2           |
| 8143       | D25      | 70.5     | 0.03       | 0.11       | 0.24 | 0.48 | 428              | 467               | 0.21         | 52  | 229  | 6.6           |
| 8144       | D25      | 70.7     | 0.04       | 0.09       | 0.31 | 0.28 | 318              | 357               | 0.09         | 100 | 311  | 8.5           |
| 8145       | D33      | 71.0     | 0.03       | 0.10       | 0.22 | 6.29 | 447              | 486               | 0.27         | 37  | 2330 | 5.6           |
| 8147       | D33      | 70.4     | 0.10       | 0.28       | 0.25 | 0.32 | 421              | 460               | 0.31         | 90  | 103  | 2.1           |
| 8149       | D33      | 70.2     | 0.25       | 2.63       | 0.09 | 0.59 | 428              | 467               | 0.96         | 274 | 61   | 1.9           |
| 8451       | D23      | 70.6     | 0.12       | 2.67       | 0.04 | 0.62 | 433              | 472               | 0.64         | 417 | 97   | 10.2          |
| 8452       | D23      | 69.9     | 0.04       | 0.93       | 0.04 | 0.43 | 435              | 474               | 0.24         | 388 | 179  | 10.9          |
| 8453       | D23      | 70.8     | 0.15       | 2.05       | 0.07 | 0.99 | 430              | 469               | 0.63         | 325 | 157  | 6.4           |
| 8454       | D23      | 70.2     | 1.82       | 39.50      | 0.04 | 1.11 | 422              | 461               | 5.80         | 681 | 19   | 8.5           |
| 8455       | D23      | 70.3     | 0.18       | 1.12       | 0.14 | 0.53 | 432              | 471               | 1.24         | 90  | 43   | 10.7          |
| 8456       | D12      | 70.4     | 2.09       | 6.43       | 0.25 | 0.32 | 447              | 486               | 3.04         | 212 | 11   | 1.6           |
| 8457       | D12      | 70.0     | 1.03       | 3.80       | 0.21 | 0.40 | 453              | 492               | 1.89         | 201 | 21   | 0.7           |
| 8458       | D15      | 70.5     | 0.09       | 0.20       | 0.32 | 0.64 | 422              | 461               | 0.27         | 74  | 237  | 7.3           |
| 8459       | D15      | 70.0     | 0.19       | 1.34       | 0.12 | 0.79 | 437              | 476               | 0.44         | 305 | 180  | 8.3           |
| 8460       | D15      | 70.3     | 0.11       | 0.96       | 0.10 | 0.65 | 436              | 475               | 0.51         | 188 | 127  | 9.1           |
| 8461       | D15      | 70.8     | 0.39       | 5.99       | 0.06 | 0.90 | 427              | 466               | 1.58         | 379 | 57   | 9.3           |
| 8462       | D15      | 70.4     | 0.21       | 2.51       | 0.08 | 0.82 | 435              | 474               | 0.71         | 354 | 115  | 7.5           |
| 8463       | D14      | 70.0     | 0.97       | 14.12      | 0.06 | 1.25 | 419              | 458               | 3.03         | 466 | 41   | 7.2           |
| 8464       | D14      | 70.9     | 0.69       | 22.15      | 0.03 | 1.66 | 420              | 459               | 4.57         | 485 | 36   | 6.5           |
| 8465       | D14      | 70.3     | 0.61       | 13.85      | 0.04 | 1.13 | 419              | 458               | 2.95         | 469 | 38   | 7.5           |
| 8466       | D14      | 70.3     | 0.78       | 19.99      | 0.04 | 1.66 | 420              | 459               | 4.11         | 486 | 40   | 6.0           |
| 8467       | D14      | 70.4     | 1.65       | 40.77      | 0.04 | 2.59 | 419              | 458               | 7.68         | 531 | 34   | 5.2           |
| 8468       | D14      | 70.5     | 1.77       | 39.28      | 0.04 | 2.33 | 419              | 458               | 7.74         | 507 | 30   | 5.2           |
| 8469       | D14      | 70.9     | 1.80       | 42.38      | 0.04 | 2.56 | 419              | 458               | 8.14         | 521 | 31   | 5.0           |
| 8470       | D14      | 70.0     | 1.89       | 45.09      | 0.04 | 2.99 | 416              | 455               | 8.63         | 522 | 35   | 5.0           |
| 8471       | D14      | 70.2     | 1.01       | 24.91      | 0.04 | 1.90 | 416              | 455               | 5.03         | 495 | 38   | 4.9           |
| 8472       | D14      | 70.4     | 1.35       | 32.93      | 0.04 | 2.33 | 413              | 452               | 6.57         | 501 | 35   | 4.6           |
| 8473       | D14      | 70.9     | 0.59       | 11.75      | 0.05 | 1.13 | 428              | 467               | 2.54         | 463 | 44   | 4.6           |
| 8474       | D14      | 70.6     | 1.86       | 46.21      | 0.04 | 2.91 | 422              | 461               | 9.07         | 509 | 32   | 3.0           |
| 8476       | D12      | 70.4     | 0.32       | 0.97       | 0.25 | 0.47 | 448              | 487               | 0.65         | 149 | 72   | 3.0           |
| 8479       | D21      | 70.8     | 0.19       | 1.23       | 0.13 | 0.32 | 443              | 482               | 0.73         | 168 | 44   | 1.8           |
| 8480       | D21      | 70.3     | 0.52       | 3.73       | 0.12 | 0.42 | 444              | 483               | 1.50         | 249 | 28   | 1.6           |
| 8481       | D21      | 70.2     | 1.16       | 8.11       | 0.12 | 0.35 | 444              | 483               | 2.60         | 312 | 13   | 2.6           |
| 8482       | D21      | 70.7     | 1.06       | 12.73      | 0.08 | 0.33 | 447              | 486               | 2.72         | 468 | 12   | 6.7           |
| 8483       | D9       | 70.4     | 7.16       | 36.21      | 0.16 | 0.61 | 445              | 484               | 11.13        | 325 | 5    | 2.7           |
| 8484       | D9       | 70.1     | 1.76       | 5.35       | 0.25 | 0.29 | 441              | 480               | 1.60         | 334 | 18   | 7.8           |

| Sample No. | Site No. | Qty<br>g | S1<br>mg/g | S2<br>mg/g | PI   | S3   | Max T<br>Celsius | Peak T<br>Celsius | TOC<br>wt. % | HI  | OI  | MINC<br>wt. % |
|------------|----------|----------|------------|------------|------|------|------------------|-------------------|--------------|-----|-----|---------------|
| 8485       | D9       | 70.0     | 2.61       | 10.64      | 0.20 | 0.38 | 446              | 485               | 3.84         | 277 | 10  | 4.5           |
| 8486       | D9       | 70.4     | 0.69       | 0.93       | 0.43 | 0.46 | 429              | 468               | 0.43         | 216 | 107 | 3.7           |
| 8487       | D9       | 70.1     | 0.38       | 0.30       | 0.56 | 0.48 | 293              | 332               | 0.27         | 111 | 178 | 2.4           |
| 8489       | D7       | 70.7     | 0.18       | 0.91       | 0.17 | 0.44 | 443              | 482               | 0.42         | 217 | 105 | 7.8           |
| 8490       | D7       | 70.4     | 4.37       | 11.64      | 0.27 | 0.41 | 446              | 485               | 5.10         | 228 | 8   | 3.0           |
| 8491       | D7       | 70.5     | 1.67       | 4.90       | 0.25 | 0.41 | 446              | 485               | 2.11         | 232 | 19  | 4.0           |
| 8492       | D7       | 70.0     | 4.09       | 15.13      | 0.21 | 0.39 | 447              | 486               | 5.82         | 260 | 7   | 3.2           |
| 8493       | D7       | 70.0     | 2.42       | 7.34       | 0.25 | 0.16 | 448              | 487               | 2.95         | 249 | 5   | 4.5           |
| 8494       | D7       | 70.2     | 0.14       | 0.58       | 0.20 | 0.46 | 440              | 479               | 0.39         | 149 | 118 | 5.4           |
| 8495       | D18      | 70.3     | 0.48       | 1.00       | 0.33 | 0.33 | 446              | 485               | 0.62         | 161 | 53  | 1.0           |
| 8496       | D18      | 70.4     | 0.21       | 0.37       | 0.36 | 0.16 | 440              | 479               | 0.34         | 109 | 47  | 1.0           |
| 8497       | D18      | 70.3     | 0.65       | 2.91       | 0.18 | 0.25 | 448              | 487               | 1.17         | 249 | 21  | 4.5           |
| 8498       | D18      | 70.7     | 0.08       | 0.21       | 0.29 | 0.18 | 436              | 475               | 0.16         | 131 | 113 | 11.4          |
| 8499       | D32      | 70.9     | 3.68       | 7.85       | 0.32 | 0.25 | 445              | 484               | 3.44         | 228 | 7   | 1.0           |
| 8500       | D32      | 70.6     | 2.23       | 5.16       | 0.30 | 0.26 | 447              | 486               | 2.16         | 239 | 12  | 3.4           |
| 8978       | D3       | 70.5     | 0.43       | 1.57       | 0.22 | 0.09 | 453              | 493               | 0.86         | 183 | 10  | 10.6          |
| 8979       | D3       | 70.1     | 1.22       | 3.89       | 0.24 | 0.27 | 445              | 485               | 1.98         | 196 | 14  | 9.3           |
| 8980       | D3       | 70.5     | 0.18       | 0.34       | 0.35 | 0.21 | 421              | 461               | 0.33         | 103 | 64  | 10.7          |
| 8981       | D3       | 70.4     | 0.18       | 0.28       | 0.39 | 0.17 | 446              | 486               | 0.23         | 122 | 74  | 11.0          |
| 8982       | D2       | 70.7     | 0.19       | 0.87       | 0.18 | 0.25 | 440              | 480               | 0.26         | 335 | 96  | 10.9          |
| 8983       | D2       | 70.8     | 3.91       | 56.68      | 0.06 | 1.37 | 431              | 471               | 9.74         | 582 | 14  | 6.6           |
| 8984       | D2       | 70.5     | 0.08       | 0.19       | 0.31 | 0.26 | 436              | 476               | 0.11         | 173 | 236 | 11.2          |
| 8985       | D27      | 70.5     | 0.06       | 0.32       | 0.16 | 0.53 | 430              | 470               | 0.29         | 110 | 183 | 6.2           |
| 8986       | D27      | 70.9     | 0.04       | 0.43       | 0.09 | 0.64 | 433              | 473               | 0.36         | 119 | 178 | 4.7           |
| 8988       | D29      | 70.2     | 0.07       | 0.31       | 0.18 | 0.76 | 422              | 462               | 0.34         | 91  | 224 | 4.7           |
| 8989       | D29      | 70.8     | 0.16       | 2.22       | 0.07 | 0.64 | 432              | 472               | 1.10         | 202 | 58  | 0.7           |
| 8990       | D28      | 71.0     | 0.08       | 0.43       | 0.15 | 0.64 | 424              | 464               | 0.40         | 108 | 160 | 2.5           |
| 8991       | D28      | 70.5     | 0.21       | 1.34       | 0.14 | 0.54 | 429              | 469               | 0.69         | 194 | 78  | 0.9           |
| 8993       | D29      | 69.8     | 0.48       | 5.02       | 0.09 | 0.68 | 428              | 468               | 1.75         | 287 | 39  | 0.5           |
| 8994       | D31      | 70.9     | 0.21       | 1.42       | 0.13 | 0.25 | 436              | 476               | 0.65         | 218 | 38  | 0.4           |
| 8995       | D31      | 70.3     | 0.38       | 2.89       | 0.12 | 0.28 | 439              | 479               | 0.92         | 314 | 30  | 0.6           |
| 8996       | D31      | 70.3     | 0.63       | 6.34       | 0.09 | 0.30 | 437              | 477               | 1.77         | 358 | 17  | 2.4           |
| 8997       | D31      | 70.4     | 1.61       | 38.98      | 0.04 | 0.48 | 433              | 473               | 7.54         | 517 | 6   | 0.3           |
| 8998       | D4       | 70.6     | 0.07       | 0.13       | 0.36 | 0.42 | 430              | 470               | 0.10         | 130 | 420 | 4.0           |
| 8999       | D4       | 71.1     | 0.59       | 1.06       | 0.36 | 0.40 | 442              | 482               | 0.58         | 183 | 69  | 2.1           |
| 9000       | D4       | 70.6     | 0.88       | 1.01       | 0.47 | 0.29 | 438              | 478               | 0.36         | 281 | 81  | 9.2           |
| 9201       | D20      | 70.6     | 0.01       | 0.09       | 0.08 | 0.07 | 435              | 475               | 0.08         | 112 | 88  | 10.5          |
| 9202       | D10      | 71.0     | 2.36       | 3.52       | 0.40 | 0.39 | 454              | 494               | 3.28         | 107 | 12  | 3.6           |
| 9203       | D10      | 70.7     | 0.10       | 0.12       | 0.46 | 0.00 | 432              | 472               | 0.14         | 86  | 0   | 9.8           |
| 9204       | D10      | 70.8     | 0.90       | 1.09       | 0.45 | 0.28 | 436              | 476               | 1.01         | 108 | 28  | 2.9           |
| 9205       | D10      | 70.4     | 1.42       | 1.68       | 0.46 | 0.25 | 447              | 487               | 1.78         | 94  | 14  | 5.8           |
| 9206       | D10      | 70.9     | 1.47       | 2.12       | 0.41 | 0.32 | 456              | 496               | 2.31         | 92  | 14  | 5.9           |
| 9207       | D10      | 70.0     | 0.99       | 1.98       | 0.33 | 0.46 | 454              | 494               | 1.71         | 116 | 27  | 4.3           |
| 9208       | D10      | 70.5     | 1.00       | 1.85       | 0.35 | 0.42 | 454              | 494               | 1.76         | 105 | 24  | 6.6           |
| 9209       | D10      | 70.7     | 0.98       | 1.76       | 0.36 | 0.40 | 450              | 490               | 1.70         | 104 | 24  | 6.0           |
| 9210       | D10      | 70.0     | 0.95       | 1.64       | 0.37 | 0.30 | 453              | 493               | 1.47         | 112 | 20  | 7.4           |
| 9211       | D10      | 70.8     | 1.17       | 2.15       | 0.35 | 0.37 | 454              | 494               | 2.00         | 108 | 19  | 6.6           |
| 9212       | D10      | 70.7     | 0.12       | 0.16       | 0.43 | 0.19 | 433              | 473               | 0.19         | 84  | 100 | 10.6          |
| 9214       | D10      | 70.1     | 0.06       | 0.09       | 0.39 | 0.33 | 441              | 481               | 0.11         | 82  | 300 | 9.7           |
| 9216       | D16      | 70.8     | 0.73       | 1.11       | 0.40 | 0.33 | 457              | 497               | 1.49         | 74  | 22  | 6.8           |

| Sample No. | Site No. | Qty<br>g | S1<br>mg/g | S2<br>mg/g | PI   | S3   | Max T<br>Celsius | Peak T<br>Celsius | TOC<br>wt. % | HI  | OI  | MINC<br>wt. % |
|------------|----------|----------|------------|------------|------|------|------------------|-------------------|--------------|-----|-----|---------------|
| 9218       | D16      | 70.1     | 0.02       | 0.04       | 0.30 | 0.17 | 415              | 455               | 0.06         | 67  | 283 | 11.0          |
| 9220       | D16      | 70.1     | 0.01       | 0.04       | 0.27 | 0.22 | 423              | 463               | 0.10         | 40  | 220 | 11.2          |
| 9221       | D13      | 70.2     | 0.36       | 1.58       | 0.19 | 0.58 | 431              | 471               | 0.60         | 263 | 97  | 5.8           |
| 9222       | D13      | 70.5     | 2.72       | 39.54      | 0.06 | 1.08 | 424              | 464               | 7.05         | 561 | 15  | 4.5           |
| 9223       | D13      | 70.5     | 0.24       | 3.01       | 0.07 | 0.55 | 434              | 474               | 0.79         | 381 | 70  | 8.4           |
| 9224       | D22      | 70.5     | 0.97       | 2.37       | 0.29 | 0.64 | 443              | 483               | 1.06         | 224 | 60  | 5.6           |
| 9225       | D22      | 70.9     | 1.26       | 2.76       | 0.31 | 0.34 | 444              | 484               | 1.29         | 214 | 26  | 2.2           |
| 9226       | D22      | 70.5     | 0.83       | 1.67       | 0.33 | 0.28 | 447              | 487               | 0.88         | 190 | 32  | 2.0           |
| 9227       | D22      | 70.2     | 0.38       | 0.43       | 0.47 | 0.35 | 440              | 480               | 0.32         | 134 | 109 | 2.3           |
| 9228       | D22      | 70.7     | 1.28       | 2.62       | 0.33 | 0.46 | 444              | 483               | 1.92         | 136 | 24  | 7.0           |
| 9229       | D19      | 70.5     | 0.14       | 1.17       | 0.11 | 0.69 | 436              | 475               | 0.42         | 279 | 164 | 9.0           |
| 9230       | D19      | 70.8     | 0.13       | 1.12       | 0.10 | 0.77 | 435              | 474               | 0.43         | 260 | 179 | 8.2           |
| 9231       | D19      | 70.7     | 0.05       | 0.56       | 0.08 | 0.91 | 429              | 469               | 0.46         | 122 | 198 | 3.5           |
| 9232       | D19      | 70.6     | 1.59       | 37.69      | 0.04 | 1.93 | 417              | 457               | 7.00         | 538 | 28  | 6.2           |
| 9233       | D17      | 70.4     | 0.18       | 0.31       | 0.36 | 0.52 | 430              | 470               | 0.26         | 119 | 200 | 8.1           |
| 9234       | D17      | 70.4     | 0.07       | 0.68       | 0.09 | 0.35 | 438              | 478               | 0.25         | 272 | 140 | 10.9          |
| 9235       | D1       | 70.7     | 0.25       | 0.20       | 0.56 | 0.25 | 448              | 488               | 0.51         | 39  | 49  | 10.9          |
| 9236       | D1       | 70.6     | 0.33       | 0.29       | 0.54 | 0.21 | 450              | 490               | 0.50         | 58  | 42  | 11.5          |
| 9237       | D1       | 70.4     | 1.22       | 1.24       | 0.50 | 0.31 | 471              | 511               | 2.55         | 49  | 12  | 6.7           |
| 9238       | D1       | 70.6     | 0.07       | 0.10       | 0.40 | 0.19 | 453              | 493               | 0.20         | 50  | 95  | 9.1           |
| 9239       | D1       | 70.5     | 0.76       | 1.76       | 0.30 | 0.28 | 479              | 519               | 3.59         | 49  | 8   | 6.0           |
| 9240       | D24      | 70.3     | 2.10       | 22.38      | 0.09 | 0.80 | 429              | 469               | 5.11         | 438 | 16  | 0.3           |
| 9241       | D24      | 70.1     | 3.76       | 37.91      | 0.09 | 0.78 | 432              | 472               | 7.02         | 540 | 11  | 6.7           |
| 9242       | D4       | 70.6     | 0.10       | 0.18       | 0.36 | 0.41 | 435              | 475               | 0.17         | 106 | 241 | 3.6           |
| 9243       | D11      | 70.7     | 0.27       | 0.28       | 0.49 | 0.44 | 295              | 335               | 0.38         | 74  | 116 | 1.9           |
| 9244       | D10      | 70.1     | 0.96       | 1.16       | 0.45 | 0.41 | 435              | 475               | 1.05         | 110 | 39  | 2.8           |
| 9245       | D24      | 70.8     | 1.98       | 22.46      | 0.08 | 0.68 | 431              | 471               | 5.17         | 434 | 13  | 0.4           |
| 9246       | D25      | 69.9     | 0.27       | 0.36       | 0.43 | 0.44 | 435              | 475               | 0.34         | 106 | 129 | 2.7           |
| 9351       | D26      | 70.2     | 1.67       | 8.05       | 0.17 | 0.19 | 445              | 485               | 3.59         | 224 | 5   | 0.6           |
| 9352       | D26      | 71.1     | 0.70       | 3.93       | 0.15 | 0.20 | 450              | 490               | 1.11         | 354 | 18  | 1.4           |
| 9353       | D26      | 70.4     | 0.36       | 1.46       | 0.20 | 0.36 | 447              | 487               | 0.67         | 218 | 54  | 5.0           |
| 9354       | D26      | 70.7     | 0.72       | 2.66       | 0.21 | 0.21 | 446              | 486               | 1.17         | 227 | 18  | 4.1           |
| 9355       | D26      | 70.1     | 0.93       | 3.08       | 0.23 | 0.17 | 449              | 489               | 1.04         | 296 | 16  | 3.4           |
| 9356       | D26      | 70.5     | 1.24       | 5.31       | 0.19 | 0.28 | 443              | 483               | 2.31         | 230 | 12  | 3.5           |
| 9357       | D26      | 70.5     | 0.04       | 0.16       | 0.18 | 0.35 | 435              | 475               | 0.17         | 94  | 206 | 6.1           |
| 9359       | D6       | 70.5     | 0.03       | 0.07       | 0.32 | 0.06 | 413              | 453               | 0.10         | 70  | 60  | 10.9          |
| 9360       | D6       | 70.8     | 0.22       | 0.35       | 0.39 | 0.19 | 334              | 374               | 0.40         | 88  | 48  | 4.8           |
| 9361       | D6       | 70.5     | 1.07       | 1.03       | 0.51 | 0.40 | 457              | 497               | 2.25         | 46  | 18  | 6.1           |
| 9362       | D6       | 70.2     | 1.93       | 2.34       | 0.45 | 0.42 | 470              | 510               | 4.85         | 48  | 9   | 4.9           |
| 9363       | D6       | 70.6     | 0.95       | 1.32       | 0.42 | 0.29 | 459              | 499               | 2.52         | 52  | 12  | 2.4           |
| 9364       | D6       | 70.2     | 2.64       | 2.26       | 0.54 | 0.34 | 472              | 512               | 4.30         | 53  | 8   | 5.2           |
| 9365       | D6       | 70.2     | 0.29       | 0.38       | 0.44 | 0.34 | 458              | 498               | 0.76         | 50  | 45  | 8.4           |
| 9366       | D34      | 70.3     | 0.28       | 0.44       | 0.39 | 0.15 | 456              | 496               | 0.70         | 63  | 21  | 0.3           |
| 9367       | D34      | 70.5     | 0.44       | 0.74       | 0.37 | 0.11 | 454              | 494               | 1.01         | 73  | 11  | 0.4           |
| 9368       | D34      | 69.9     | 0.69       | 1.08       | 0.39 | 0.15 | 454              | 494               | 1.54         | 70  | 10  | 0.3           |
| 9369       | D34      | 70.3     | 0.56       | 1.01       | 0.36 | 0.06 | 460              | 500               | 1.44         | 70  | 4   | 0.3           |
| 9370       | D34      | 69.9     | 0.69       | 1.24       | 0.36 | 0.11 | 457              | 497               | 1.52         | 82  | 7   | 0.3           |
| 9371       | D34      | 70.2     | 0.36       | 0.80       | 0.31 | 0.10 | 459              | 499               | 1.08         | 74  | 9   | 0.3           |
| 9372       | D34      | 70.3     | 0.55       | 1.13       | 0.33 | 0.12 | 456              | 496               | 1.49         | 76  | 8   | 0.4           |
| 9373       | D34      | 70.7     | 1.13       | 2.74       | 0.29 | 0.11 | 468              | 508               | 3.81         | 72  | 3   | 0.4           |

| Sample No. | Site No. | Qty<br>g | S1<br>mg/g | S2<br>mg/g | PI   | S3   | Max T<br>Celsius | Peak T<br>Celsius | TOC<br>wt. % | HI  | OI  | MINC<br>wt. % |
|------------|----------|----------|------------|------------|------|------|------------------|-------------------|--------------|-----|-----|---------------|
| 9374       | D4       | 70.2     | 3.73       | 14.10      | 0.21 | 0.18 | 441              | 481               | 5.03         | 280 | 4   | 5.8           |
| 9375       | D4       | 70.6     | 1.46       | 5.01       | 0.23 | 0.37 | 439              | 479               | 1.76         | 285 | 21  | 1.2           |
| 9376       | D4       | 70.4     | 0.29       | 0.30       | 0.49 | 0.23 | 436              | 476               | 0.20         | 150 | 115 | 10.0          |
| 9377       | D4       | 70.3     | 2.72       | 27.13      | 0.09 | 0.65 | 443              | 483               | 7.50         | 362 | 9   | 0.8           |
| 9378       | D4       | 70.9     | 0.39       | 0.93       | 0.29 | 0.22 | 436              | 476               | 0.31         | 300 | 71  | 11.7          |
| 9379       | D5       | 70.3     | 0.02       | 0.11       | 0.17 | 0.24 | 432              | 472               | 0.09         | 122 | 267 | 11.1          |
| 9380       | D5       | 70.2     | 0.15       | 1.40       | 0.10 | 0.83 | 437              | 477               | 0.58         | 241 | 143 | 5.1           |
| 9381       | D5       | 70.3     | 0.02       | 0.30       | 0.07 | 0.25 | 444              | 484               | 0.12         | 250 | 208 | 11.3          |
| 9382       | D5       | 70.5     | 1.30       | 23.59      | 0.05 | 0.64 | 439              | 479               | 3.71         | 636 | 17  | 7.7           |
| 9383       | D5       | 70.6     | 0.05       | 0.33       | 0.13 | 0.27 | 441              | 481               | 0.14         | 236 | 193 | 12.0          |
| 9384       | D5       | 70.4     | 0.02       | 0.17       | 0.12 | 0.29 | 442              | 482               | 0.07         | 243 | 414 | 11.8          |
| 9385       | D11      | 70.3     | 0.15       | 0.18       | 0.45 | 0.42 | 465              | 505               | 0.43         | 42  | 98  | 3.2           |
| 9386       | D11      | 70.6     | 0.32       | 0.40       | 0.44 | 0.48 | 300              | 340               | 0.55         | 73  | 87  | 3.1           |
| 9387       | D11      | 70.5     | 0.11       | 0.15       | 0.43 | 0.09 | 473              | 513               | 0.41         | 37  | 22  | 2.0           |
| 9388       | D11      | 70.8     | 0.07       | 0.10       | 0.41 | 0.46 | 467              | 507               | 0.18         | 56  | 256 | 2.3           |
| 9389       | D11      | 70.7     | 0.26       | 0.31       | 0.46 | 0.50 | 297              | 337               | 0.42         | 74  | 119 | 2.0           |
| 9390       | D11      | 70.7     | 0.21       | 0.28       | 0.42 | 0.50 | 299              | 339               | 0.48         | 58  | 104 | 2.3           |
| 9391       | D11      | 69.9     | 0.13       | 0.18       | 0.43 | 0.49 | 298              | 338               | 0.36         | 50  | 136 | 2.6           |
| 9392       | D11      | 70.4     | 0.16       | 0.23       | 0.41 | 0.41 | 461              | 501               | 0.58         | 40  | 71  | 4.0           |
| 9393       | D11      | 70.1     | 0.12       | 0.17       | 0.40 | 0.87 | 426              | 466               | 0.34         | 50  | 256 | 2.3           |
| 9394       | D11      | 70.4     | 0.19       | 0.25       | 0.44 | 0.38 | 299              | 339               | 0.34         | 74  | 112 | 2.1           |
| 9395       | D11      | 70.7     | 0.28       | 0.31       | 0.48 | 0.43 | 296              | 336               | 0.54         | 57  | 80  | 1.5           |
| 9396       | D11      | 69.8     | 0.28       | 0.34       | 0.46 | 0.35 | 467              | 507               | 0.75         | 45  | 47  | 1.0           |
| 9397       | D11      | 70.5     | 0.17       | 0.23       | 0.43 | 0.43 | 306              | 346               | 0.35         | 66  | 123 | 1.5           |
| 9398       | D11      | 70.8     | 0.25       | 0.27       | 0.47 | 0.33 | 297              | 337               | 0.48         | 56  | 69  | 1.4           |
| 9399       | D20      | 70.9     | 0.38       | 0.87       | 0.31 | 0.22 | 464              | 504               | 1.77         | 49  | 12  | 1.8           |
| 9400       | D20      | 70.6     | 0.35       | 0.74       | 0.32 | 0.18 | 466              | 506               | 1.69         | 44  | 11  | 1.2           |