**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION 5 CHICAGO REGIONAL LABORATORY**

**536 SOUTH CLARK STREET**

**CHICAGO, ILLINOIS 60605**

**Date:** **3/22/2016**

**Subject:** **Review of Region 5 Data for L'Anse, Michigan Biomass Utility**

**To:** **Air Division, US EPA Region 5**
**77 West Jackson Boulevard**
**Chicago, IL 60605**

**From:** **Troy Strock, Chemist**
**US EPA Region 5 Chicago Regional Laboratory**

The data transmitted under this cover memo successfully passed CRL's data review procedures as documented in the current Quality Management Plan and applicable Standard Operating Procedures. In accordance with EPA's *Guidance on Environmental Data Verification and Data Validation* (Document EPA QA/G-8), CRL verified and validated the data but does not perform data quality assessment based on project plans.

This report was reviewed and the information provided herein accurately represents the analysis performed.

X _____

Please contact the analyst with any technical report issues, Robert Thompson at (312)-353-9078 for sample project concerns, and Sylvia Griffin at (312)-353-9073 with data transmittal questions. Thank you.

**Attached are Results for: L'Anse, Michigan Biomass Utility**

_____ / /

Data Management Coordinator and DateTransmitted

**Analyses included in this report:**

SVOA PAHs in solids by press. fluid extr. (SIM)

Environmental Protection Agency Region 5
# Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
Phone:(312)353-8370 Fax:(312)886-2591

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|---|---|---|
| Air Division, US EPA Region 5 | Project: L'Anse, Michigan Biomass Utility | |
| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## ANALYSIS CASE NARRATIVE

Analyst Phone number: 312.353.8362

### General Information

5 surface wipe samples were received by the Chicago Regional Laboratory (CRL) on 2/4/2016 for preparation and analysis of polycyclic aromatic hydrocarbons (PAHs) by CRL Standard Operating Procedure (SOP) MS026 V1. The procedures are based on SW-846 methods 3545A (pressurized fluid extraction) and 8270D (Semivolatile Organic Compounds by GC/MS). Pen and Ink change 5670 documents modifications to the SOP to accomodate testing of surface wipes for the analytes of interest, and pen and ink change MS026 Rev 1 PI07 was also relevant to this data set regarding reporting of perylene as a target analyte. Only measurements of target PAHs and associated neutral surrogates are presented in this report.

Holding times were met for preparation and analysis of all field samples.

### Sample Analysis and Results

Higher levels of PAHs were measured in laboratory sample IDs 1602022-01 and -02, while sample ID 1602022-03 had lower levels of PAHs, even though many of them were measured above the reporting limit (RL). These extracts required 10 to 100-fold dilutions to interpolate all target analyte concentration measurements. All measured PAH concentrations were below the RL in samples 1602022-04 and -05 except for anthracene in 1602022-04, which was measured just above the RL.

### Quality Controls

Please refer to the report for qualifiers added by analyte; the key at the end of the report contains descriptions of each data qualifier added and the expected impact on the data. All other quality controls not mentioned below met SOP criteria.

3 neutral surrogates were used for data evaluation: nitrobenzene-d5, 2-fluorobiphenyl, and terphenyl-d14. 2-methylnaphthalene-d10 and fluoranthene-d10 were also added to all field samples and QC samples, and this data is included in the report, but it is intended for the client's information purposes only. Of the surrogates used for data evaluation, nitrobenzene-d5 did not meet continuing calibration verification (CCV) acceptance criteria in one or both CCVs bracketing analysis of all field samples and QC sample B16C023-MRL1 (20 ng/wipe reporting limit check). The affected data is qualified appropriately. Recovery of nitrobenzene-d5 was also above

the upper acceptance limit in all field samples and batch QC samples, but sample data is only qualified if 2 or more surrogates are outside of control limits, so no qualifiers were added.

Also, dibenz(ah)anthracene did not meet the CCV acceptance criteria in one of the CCVs bracketing analysis of field samples 1602022-01, -02, -04, and -05. The affected data is qualified appropriately.

Standard additions were performed at 20 ng/wipe (B16C023-MRL1), 100 ng/wipe (B16C023-MRL2), and 500 ng/wipe (B16C023-BS1 and –BSD1) in order to evaluate performance by target analyte. Recovery of benzo(a)anthracene and benzo(b)fluoranthene was slightly above the upper acceptance limit in B16C023-MRL1, but recovery of these analytes was acceptable in the other QC samples. Concentrations of these chemicals were measured in the field samples at concentrations >100 ng/wipe where recovery was demonstrated to be acceptable (laboratory sample IDs 1602022-01, -02, and -03), or they were not found above the RL (laboratory sample IDs 1602022-04 and -05). Therefore, no target analytes are qualified in any field samples for high bias recovery in B16C023-MRL1.

Benzo(b)fluoranthene and benzo(k)fluoranthene met the SOP resolution criteria (>50%) in the CCV standards where they are at the same concentration, but in the field samples where they were at different relative concentration the resolution criteria was not met. Therefore, the concentrations of these two target analytes are qualified as estimated in the field samples where they were measured above the RL (in laboratory sample IDs 1602022-01, -02, and -03).

Internal standard responses were above the upper acceptance limit in the ending CCV standards analyzed with both sequences included in this data package. All internal standards met the SOP criteria in the opening CCVs in both sequences, and all target analytes and surrogates met the CCV criteria in these injections as well (except dibenz(ah)anthracene as noted above). The same problem was not observed for any corresponding field samples, so no additional data qualifiers were added.

In field samples 1602022-01, -02, and -03, indeno(123-cd)pyrene did not meet the ion ratio criteria specified in the SOP for the qualifier ion to quantitation ion (±30% of the ratio in the midpoint initial calibration standard) . Dibenz(ah)anthracene coelutes close to indeno(123-cd)pyrene and also produces a response for the indeno(123-cd)pyrene qualifier ion, thereby enhancing its response in the standard used to estimate what the qualifier ion ratio should be. In the field samples, the concentration of dibenz(ah)anthracene is low relative to that of indeno(123-cd)pyrene, so the qualifier ion response is not the same as in a calibration standard with both indeno(123-cd)pyrene and dibenz(ah)anthracene in it. In the analyst's opinion, qualitative identification of indeno(123-cd)pyrene is reasonable in the field samples (i.e., similar in the calibration standards and field samples) in spite of not meeting the ion ratio criteria in the SOP which is complicated slightly by a coelution, so no additional data qualifiers were added.

Environmental Protection Agency Region 5
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536 South Clark Street, Chicago, IL 60605
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|---|---|---|
| Air Division, US EPA Region 5 | Project: L'Anse, Michigan Biomass Utility | |
| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| L-1P | 1602022-01 | Wipe | Feb-01-16 14:00 | Feb-04-16 09:45 |
| L-2P | 1602022-02 | Wipe | Feb-01-16 14:15 | Feb-04-16 09:45 |
| L-3P | 1602022-03 | Wipe | Feb-01-16 15:35 | Feb-04-16 09:45 |
| L-4P | 1602022-04 | Wipe | Feb-01-16 15:55 | Feb-04-16 09:45 |
| L-5P | 1602022-05 | Wipe | Feb-01-16 16:20 | Feb-04-16 09:45 |

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| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## Semivolatiles by GC/MS, EPA 8270D (modified)
## US EPA Region 5 Chicago Regional Laboratory

**L-1P (1602022-01) Wipe Sampled: Feb-01-16 14:00 Received: Feb-04-16 09:45**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **385** | | | 100 | ng/Wipe | 1 | B16C023 | Feb-12-16 | Mar-03-16 |
| **2-Methylnaphthalene** | **430** | | | 100 | " | " | " | " | " |
| **1-Methylnaphthalene** | **115** | | | 100 | " | " | " | " | " |
| **Acenaphthylene** | **497** | | | 20.0 | " | " | " | " | " |
| **Acenaphthene** | **475** | | | 100 | " | " | " | " | " |
| **Fluorene** | **3310** | | | 1000 | " | 10 | " | " | Mar-10-16 |
| **Phenanthrene** | **23100** | | | 10000 | " | 100 | " | " | Mar-10-16 |
| **Anthracene** | **8420** | | | 200 | " | 10 | " | " | Mar-10-16 |
| **Fluoranthene** | **44600** | | | 10000 | " | 100 | " | " | Mar-10-16 |
| **Pyrene** | **23000** | | | 10000 | " | " | " | " | " |
| **Benzo (a) anthracene** | **4290** | | | 200 | " | 10 | " | " | Mar-10-16 |
| **Chrysene** | **13000** | | | 2000 | " | 100 | " | " | Mar-10-16 |
| **Benzo(b)fluoranthene** | **9690** | J | | 200 | " | 10 | " | " | Mar-10-16 |
| **Benzo(k)fluoranthene** | **4090** | J | | 200 | " | " | " | " | " |
| **Benzo (e) pyrene** | **4180** | | | 200 | " | " | " | " | " |
| **Benzo(a)pyrene** | **2690** | | | 200 | " | " | " | " | " |
| **Perylene** | **349** | | | 20.0 | " | 1 | " | " | Mar-03-16 |
| **Indeno(1,2,3-cd)pyrene** | **1990** | | | 200 | " | 10 | " | " | Mar-10-16 |
| **Dibenz(a,h)anthracene** | **476** | (CCV), J | | 20.0 | " | 1 | " | " | Mar-03-16 |
| **Benzo(g,h,i)perylene** | **1890** | | | 200 | " | 10 | " | " | Mar-10-16 |

| Surogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|
| *Surrogate: Nitrobenzene-d5* | 270 | (CCV), J | *108%* | *50-94.9* | " | " | *Mar-03-16* |
| *Surrogate: 2-Fluorobiphenyl* | 185 | | *74.2%* | *48.1-108* | " | " | " |
| *Surrogate: Terphenyl-d14* | 231 | | *92.3%* | *59.4-127* | " | " | " |
| *Surrogate: 2-Methylnaphthalene-d10* | 209 | | *83.5%* | *45.5-117* | " | " | " |
| *Surrogate: Fluoranthene-d10* | 280 | | *112%* | *70.8-122* | " | " | " |

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| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## Semivolatiles by GC/MS, EPA 8270D (modified)
## US EPA Region 5 Chicago Regional Laboratory

**L-2P (1602022-02) Wipe Sampled: Feb-01-16 14:15 Received: Feb-04-16 09:45**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **582** | | | 100 | ng/Wipe | 1 | B16C023 | Feb-12-16 | Mar-03-16 |
| **2-Methylnaphthalene** | **840** | | | 100 | " | " | " | " | " |
| **1-Methylnaphthalene** | **183** | | | 100 | " | " | " | " | " |
| **Acenaphthylene** | **871** | | | 20.0 | " | " | " | " | " |
| **Acenaphthene** | **824** | | | 100 | " | " | " | " | " |
| **Fluorene** | **7870** | | | 1000 | " | 10 | " | " | Mar-11-16 |
| **Phenanthrene** | **57400** | | | 10000 | " | 100 | " | " | Mar-11-16 |
| **Anthracene** | **19900** | | | 2000 | " | " | " | " | " |
| **Fluoranthene** | **82400** | | | 10000 | " | " | " | " | " |
| **Pyrene** | **38800** | | | 10000 | " | " | " | " | " |
| **Benzo (a) anthracene** | **6990** | | | 200 | " | 10 | " | " | Mar-11-16 |
| **Chrysene** | **21000** | | | 2000 | " | 100 | " | " | Mar-11-16 |
| **Benzo(b)fluoranthene** | **13900** | J | | 2000 | " | " | " | " | " |
| **Benzo(k)fluoranthene** | **6500** | J | | 200 | " | 10 | " | " | Mar-11-16 |
| **Benzo (e) pyrene** | **6520** | | | 200 | " | " | " | " | " |
| **Benzo(a)pyrene** | **4480** | | | 200 | " | " | " | " | " |
| **Perylene** | **555** | | | 20.0 | " | 1 | " | " | Mar-03-16 |
| **Indeno(1,2,3-cd)pyrene** | **3250** | | | 200 | " | 10 | " | " | Mar-11-16 |
| **Dibenz(a,h)anthracene** | **763** | (CCV), J | | 20.0 | " | 1 | " | " | Mar-03-16 |
| **Benzo(g,h,i)perylene** | **3090** | | | 200 | " | 10 | " | " | Mar-11-16 |

| Surogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|
| *Surrogate: Nitrobenzene-d5* | 292 | (CCV), J | *117%* | *50-94.9* | " | " | *Mar-03-16* |
| *Surrogate: 2-Fluorobiphenyl* | 183 | | *73.2%* | *48.1-108* | " | " | " |
| *Surrogate: Terphenyl-d14* | 243 | | *97.0%* | *59.4-127* | " | " | " |
| *Surrogate: 2-Methylnaphthalene-d10* | 211 | | *84.2%* | *45.5-117* | " | " | " |
| *Surrogate: Fluoranthene-d10* | 300 | | *120%* | *70.8-122* | " | " | " |

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| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
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## Semivolatiles by GC/MS, EPA 8270D (modified)
## US EPA Region 5 Chicago Regional Laboratory

**L-3P (1602022-03) Wipe Sampled: Feb-01-16 15:35 Received: Feb-04-16 09:45**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **U** | | | 100 | ng/Wipe | 1 | B16C023 | Feb-12-16 | Mar-10-16 |
| **2-Methylnaphthalene** | **U** | | | 100 | " | " | " | " | " |
| **1-Methylnaphthalene** | **U** | | | 100 | " | " | " | " | " |
| **Acenaphthylene** | **48.8** | | | 20.0 | " | " | " | " | " |
| **Acenaphthene** | **U** | | | 100 | " | " | " | " | " |
| **Fluorene** | **352** | | | 100 | " | " | " | " | " |
| **Phenanthrene** | **1860** | | | 1000 | " | 10 | " | " | Mar-10-16 |
| **Anthracene** | **1050** | | | 200 | " | " | " | " | " |
| **Fluoranthene** | **3350** | | | 1000 | " | " | " | " | " |
| **Pyrene** | **1880** | | | 1000 | " | " | " | " | " |
| **Benzo (a) anthracene** | **387** | | | 20.0 | " | 1 | " | " | Mar-10-16 |
| **Chrysene** | **976** | | | 20.0 | " | " | " | " | " |
| **Benzo(b)fluoranthene** | **807** | J | | 20.0 | " | " | " | " | " |
| **Benzo(k)fluoranthene** | **309** | J | | 20.0 | " | " | " | " | " |
| **Benzo (e) pyrene** | **357** | | | 20.0 | " | " | " | " | " |
| **Benzo(a)pyrene** | **290** | | | 20.0 | " | " | " | " | " |
| **Perylene** | **46.5** | | | 20.0 | " | " | " | " | " |
| **Indeno(1,2,3-cd)pyrene** | **198** | | | 20.0 | " | " | " | " | " |
| **Dibenz(a,h)anthracene** | **49.0** | | | 20.0 | " | " | " | " | " |
| **Benzo(g,h,i)perylene** | **194** | | | 20.0 | " | " | " | " | " |

| Surogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|
| *Surrogate: Nitrobenzene-d5* | 292 | (CCV), J | *117%* | *50-94.9* | " | " | " |
| *Surrogate: 2-Fluorobiphenyl* | 179 | | *71.8%* | *48.1-108* | " | " | " |
| *Surrogate: Terphenyl-d14* | 245 | | *98.0%* | *59.4-127* | " | " | " |
| *Surrogate: 2-Methylnaphthalene-d10* | 194 | | *77.6%* | *45.5-117* | " | " | " |
| *Surrogate: Fluoranthene-d10* | 239 | | *95.4%* | *70.8-122* | " | " | " |

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| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## Semivolatiles by GC/MS, EPA 8270D (modified)
## US EPA Region 5 Chicago Regional Laboratory

**L-4P (1602022-04) Wipe Sampled: Feb-01-16 15:55 Received: Feb-04-16 09:45**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **U** | | | 100 | ng/Wipe | 1 | B16C023 | Feb-12-16 | Mar-03-16 |
| **2-Methylnaphthalene** | **U** | | | 100 | " | " | " | " | " |
| **1-Methylnaphthalene** | **U** | | | 100 | " | " | " | " | " |
| **Acenaphthylene** | **U** | | | 20.0 | " | " | " | " | " |
| **Acenaphthene** | **U** | | | 100 | " | " | " | " | " |
| **Fluorene** | **U** | | | 100 | " | " | " | " | " |
| **Phenanthrene** | **U** | | | 100 | " | " | " | " | " |
| **Anthracene** | **20.6** | | | 20.0 | " | " | " | " | " |
| **Fluoranthene** | **U** | | | 100 | " | " | " | " | " |
| **Pyrene** | **U** | | | 100 | " | " | " | " | " |
| **Benzo (a) anthracene** | **U** | | | 20.0 | " | " | " | " | " |
| **Chrysene** | **U** | | | 20.0 | " | " | " | " | " |
| **Benzo(b)fluoranthene** | **U** | | | 20.0 | " | " | " | " | " |
| **Benzo(k)fluoranthene** | **U** | | | 20.0 | " | " | " | " | " |
| **Benzo (e) pyrene** | **U** | | | 20.0 | " | " | " | " | " |
| **Benzo(a)pyrene** | **U** | | | 20.0 | " | " | " | " | " |
| **Perylene** | **U** | | | 20.0 | " | " | " | " | " |
| **Indeno(1,2,3-cd)pyrene** | **U** | | | 20.0 | " | " | " | " | " |
| **Dibenz(a,h)anthracene** | **U** | (CCV), J | | 20.0 | " | " | " | " | " |
| **Benzo(g,h,i)perylene** | **U** | | | 20.0 | " | " | " | " | " |

| Surogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|
| *Surrogate: Nitrobenzene-d5* | 286 | (CCV), J | *114%* | *50-94.9* | " | " | " |
| *Surrogate: 2-Fluorobiphenyl* | 177 | | *70.9%* | *48.1-108* | " | " | " |
| *Surrogate: Terphenyl-d14* | 234 | | *93.8%* | *59.4-127* | " | " | " |
| *Surrogate: 2-Methylnaphthalene-d10* | 197 | | *78.9%* | *45.5-117* | " | " | " |
| *Surrogate: Fluoranthene-d10* | 258 | | *103%* | *70.8-122* | " | " | " |

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## Semivolatiles by GC/MS, EPA 8270D (modified)
## US EPA Region 5 Chicago Regional Laboratory

**L-5P (1602022-05) Wipe Sampled: Feb-01-16 16:20 Received: Feb-04-16 09:45**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **U** | | | 100 | ng/Wipe | 1 | B16C023 | Feb-12-16 | Mar-03-16 |
| **2-Methylnaphthalene** | **U** | | | 100 | " | " | " | " | " |
| **1-Methylnaphthalene** | **U** | | | 100 | " | " | " | " | " |
| **Acenaphthylene** | **U** | | | 20.0 | " | " | " | " | " |
| **Acenaphthene** | **U** | | | 100 | " | " | " | " | " |
| **Fluorene** | **U** | | | 100 | " | " | " | " | " |
| **Phenanthrene** | **U** | | | 100 | " | " | " | " | " |
| **Anthracene** | **U** | | | 20.0 | " | " | " | " | " |
| **Fluoranthene** | **U** | | | 100 | " | " | " | " | " |
| **Pyrene** | **U** | | | 100 | " | " | " | " | " |
| **Benzo (a) anthracene** | **U** | | | 20.0 | " | " | " | " | " |
| **Chrysene** | **U** | | | 20.0 | " | " | " | " | " |
| **Benzo(b)fluoranthene** | **U** | | | 20.0 | " | " | " | " | " |
| **Benzo(k)fluoranthene** | **U** | | | 20.0 | " | " | " | " | " |
| **Benzo (e) pyrene** | **U** | | | 20.0 | " | " | " | " | " |
| **Benzo(a)pyrene** | **U** | | | 20.0 | " | " | " | " | " |
| **Perylene** | **U** | | | 20.0 | " | " | " | " | " |
| **Indeno(1,2,3-cd)pyrene** | **U** | | | 20.0 | " | " | " | " | " |
| **Dibenz(a,h)anthracene** | **U** | (CCV), J | | 20.0 | " | " | " | " | " |
| **Benzo(g,h,i)perylene** | **U** | | | 20.0 | " | " | " | " | " |

| Surogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|---|---|---|---|---|---|---|---|
| *Surrogate: Nitrobenzene-d5* | 296 | (CCV), J | *118%* | *50-94.9* | " | " | " |
| *Surrogate: 2-Fluorobiphenyl* | 186 | | *74.5%* | *48.1-108* | " | " | " |
| *Surrogate: Terphenyl-d14* | 240 | | *95.8%* | *59.4-127* | " | " | " |
| *Surrogate: 2-Methylnaphthalene-d10* | 213 | | *85.1%* | *45.5-117* | " | " | " |
| *Surrogate: Fluoranthene-d10* | 265 | | *106%* | *70.8-122* | " | " | " |

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## Semivolatiles by GC/MS, EPA 8270D (modified) - Quality Control
## US EPA Region 5 Chicago Regional Laboratory

### Batch B16C023 - Solvent Extraction

**Blank (B16C023-BLK1)** **Prepared: Feb-12-16 Analyzed: Mar-02-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **U** | | | 100 | ng/Wipe | | | | | | |
| **2-Methylnaphthalene** | **U** | | | 100 | " | | | | | | |
| **1-Methylnaphthalene** | **U** | | | 100 | " | | | | | | |
| **Acenaphthylene** | **U** | | | 20.0 | " | | | | | | |
| **Acenaphthene** | **U** | | | 100 | " | | | | | | |
| **Fluorene** | **U** | | | 100 | " | | | | | | |
| **Phenanthrene** | **U** | | | 100 | " | | | | | | |
| **Anthracene** | **U** | | | 20.0 | " | | | | | | |
| **Fluoranthene** | **U** | | | 100 | " | | | | | | |
| **Pyrene** | **U** | | | 100 | " | | | | | | |
| **Benzo (a) anthracene** | **U** | | | 20.0 | " | | | | | | |
| **Chrysene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo(b)fluoranthene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo(k)fluoranthene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo (e) pyrene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo(a)pyrene** | **U** | | | 20.0 | " | | | | | | |
| **Perylene** | **U** | | | 20.0 | " | | | | | | |
| **Indeno(1,2,3-cd)pyrene** | **U** | | | 20.0 | " | | | | | | |
| **Dibenz(a,h)anthracene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo(g,h,i)perylene** | **U** | | | 20.0 | " | | | | | | |
| *Surrogate: Nitrobenzene-d5* | *254* | | | | " | *250.0* | | *102%* | *50-94.9* | | |
| *Surrogate: 2-Fluorobiphenyl* | *187* | | | | " | *250.0* | | *74.7%* | *48.1-108* | | |
| *Surrogate: Terphenyl-d14* | *230* | | | | " | *250.0* | | *92.1%* | *59.4-127* | | |
| *Surrogate: 2-Methylnaphthalene-d10* | *199* | | | | " | *250.0* | | *79.5%* | *45.5-117* | | |
| *Surrogate: Fluoranthene-d10* | *246* | | | | " | *250.0* | | *98.2%* | *70.8-122* | | |

**Blank (B16C023-BLK2)** **Prepared: Feb-12-16 Analyzed: Mar-02-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **U** | | | 100 | ng/Wipe | | | | | | |
| **2-Methylnaphthalene** | **U** | | | 100 | " | | | | | | |
| **1-Methylnaphthalene** | **U** | | | 100 | " | | | | | | |
| **Acenaphthylene** | **U** | | | 20.0 | " | | | | | | |

Environmental Protection Agency Region 5
# Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
Phone:(312)353-8370 Fax:(312)886-2591

| | | |
|---|---|---|
| Air Division, US EPA Region 5 | Project: L'Anse, Michigan Biomass Utility | |
| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## Semivolatiles by GC/MS, EPA 8270D (modified) - Quality Control
## US EPA Region 5 Chicago Regional Laboratory

### Batch B16C023 - Solvent Extraction

**Blank (B16C023-BLK2)** **Prepared: Feb-12-16 Analyzed: Mar-02-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acenaphthene** | **U** | | | 100 | ng/Wipe | | | | | | |
| **Fluorene** | **U** | | | 100 | " | | | | | | |
| **Phenanthrene** | **U** | | | 100 | " | | | | | | |
| **Anthracene** | **U** | | | 20.0 | " | | | | | | |
| **Fluoranthene** | **U** | | | 100 | " | | | | | | |
| **Pyrene** | **U** | | | 100 | " | | | | | | |
| **Benzo (a) anthracene** | **U** | | | 20.0 | " | | | | | | |
| **Chrysene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo(b)fluoranthene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo(k)fluoranthene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo (e) pyrene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo(a)pyrene** | **U** | | | 20.0 | " | | | | | | |
| **Perylene** | **U** | | | 20.0 | " | | | | | | |
| **Indeno(1,2,3-cd)pyrene** | **U** | | | 20.0 | " | | | | | | |
| **Dibenz(a,h)anthracene** | **U** | | | 20.0 | " | | | | | | |
| **Benzo(g,h,i)perylene** | **U** | | | 20.0 | " | | | | | | |
| *Surrogate: Nitrobenzene-d5* | *276* | | | | " | *250.0* | | *110%* | *50-94.9* | | |
| *Surrogate: 2-Fluorobiphenyl* | *186* | | | | " | *250.0* | | *74.2%* | *48.1-108* | | |
| *Surrogate: Terphenyl-d14* | *244* | | | | " | *250.0* | | *97.6%* | *59.4-127* | | |
| *Surrogate: 2-Methylnaphthalene-d10* | *199* | | | | " | *250.0* | | *79.4%* | *45.5-117* | | |
| *Surrogate: Fluoranthene-d10* | *252* | | | | " | *250.0* | | *101%* | *70.8-122* | | |

**LCS (B16C023-BS1)** **Prepared: Feb-12-16 Analyzed: Mar-02-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **356** | | | 100 | ng/Wipe | 500.0 | | 71.2% | 43.1-108 | | |
| **2-Methylnaphthalene** | **402** | | | 100 | " | 500.0 | | 80.4% | 45.5-117 | | |
| **1-Methylnaphthalene** | **406** | | | 100 | " | 500.0 | | 81.2% | 45.5-117 | | |
| **Acenaphthylene** | **443** | | | 20.0 | " | 500.0 | | 88.6% | 52.7-117 | | |
| **Acenaphthene** | **397** | | | 100 | " | 500.0 | | 79.4% | 51.7-116 | | |
| **Fluorene** | **453** | | | 100 | " | 500.0 | | 90.6% | 57.9-120 | | |
| **Phenanthrene** | **395** | | | 100 | " | 500.0 | | 79.0% | 68.1-114 | | |
| **Anthracene** | **468** | | | 20.0 | " | 500.0 | | 93.7% | 69.7-116 | | |

Environmental Protection Agency Region 5
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| | | |
|---|---|---|
| Air Division, US EPA Region 5 | Project: L'Anse, Michigan Biomass Utility | |
| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## Semivolatiles by GC/MS, EPA 8270D (modified) - Quality Control
## US EPA Region 5 Chicago Regional Laboratory

### Batch B16C023 - Solvent Extraction

**LCS (B16C023-BS1)** **Prepared: Feb-12-16 Analyzed: Mar-02-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fluoranthene** | **480** | | | 100 | ng/Wipe | 500.0 | | 96.1% | 70.8-122 | | |
| **Pyrene** | **443** | | | 100 | " | 500.0 | | 88.6% | 71.8-117 | | |
| **Benzo (a) anthracene** | **553** | | | 20.0 | " | 500.0 | | 111% | 67.6-115 | | |
| **Chrysene** | **412** | | | 20.0 | " | 500.0 | | 82.4% | 68.5-117 | | |
| **Benzo(b)fluoranthene** | **526** | | | 20.0 | " | 500.0 | | 105% | 68.9-128 | | |
| **Benzo(k)fluoranthene** | **474** | | | 20.0 | " | 500.0 | | 94.8% | 62.8-135 | | |
| **Benzo (e) pyrene** | **466** | | | 20.0 | " | 500.0 | | 93.2% | 68.9-133 | | |
| **Benzo(a)pyrene** | **511** | | | 20.0 | " | 500.0 | | 102% | 68.9-133 | | |
| **Perylene** | **400** | | | 20.0 | " | 500.0 | | 80.0% | 68.9-133 | | |
| **Indeno(1,2,3-cd)pyrene** | **508** | | | 20.0 | " | 500.0 | | 102% | 70-129 | | |
| **Dibenz(a,h)anthracene** | **537** | | | 20.0 | " | 500.0 | | 107% | 69.1-131 | | |
| **Benzo(g,h,i)perylene** | **455** | | | 20.0 | " | 500.0 | | 91.0% | 53.9-139 | | |
| *Surrogate: Nitrobenzene-d5* | *263* | | | | " | *250.0* | | *105%* | *50-94.9* | | |
| *Surrogate: 2-Fluorobiphenyl* | *186* | | | | " | *250.0* | | *74.4%* | *48.1-108* | | |
| *Surrogate: Terphenyl-d14* | *254* | | | | " | *250.0* | | *102%* | *59.4-127* | | |
| *Surrogate: 2-Methylnaphthalene-d10* | *199* | | | | " | *250.0* | | *79.7%* | *45.5-117* | | |
| *Surrogate: Fluoranthene-d10* | *251* | | | | " | *250.0* | | *100%* | *70.8-122* | | |

**LCS Dup (B16C023-BSD1)** **Prepared: Feb-12-16 Analyzed: Mar-02-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **358** | | | 100 | ng/Wipe | 500.0 | | 71.6% | 43.1-108 | 0.580 | 30.2 |
| **2-Methylnaphthalene** | **401** | | | 100 | " | 500.0 | | 80.3% | 45.5-117 | 0.182 | 36.4 |
| **1-Methylnaphthalene** | **393** | | | 100 | " | 500.0 | | 78.5% | 45.5-117 | 3.33 | 36.4 |
| **Acenaphthylene** | **436** | | | 20.0 | " | 500.0 | | 87.2% | 52.7-117 | 1.53 | 30 |
| **Acenaphthene** | **395** | | | 100 | " | 500.0 | | 79.0% | 51.7-116 | 0.508 | 30 |
| **Fluorene** | **446** | | | 100 | " | 500.0 | | 89.1% | 57.9-120 | 1.69 | 30 |
| **Phenanthrene** | **384** | | | 100 | " | 500.0 | | 76.8% | 68.1-114 | 2.78 | 30 |
| **Anthracene** | **458** | | | 20.0 | " | 500.0 | | 91.7% | 69.7-116 | 2.12 | 30 |
| **Fluoranthene** | **463** | | | 100 | " | 500.0 | | 92.7% | 70.8-122 | 3.65 | 30 |
| **Pyrene** | **414** | | | 100 | " | 500.0 | | 82.9% | 71.8-117 | 6.73 | 30 |
| **Benzo (a) anthracene** | **527** | | | 20.0 | " | 500.0 | | 105% | 67.6-115 | 4.89 | 30 |
| **Chrysene** | **386** | | | 20.0 | " | 500.0 | | 77.1% | 68.5-117 | 6.61 | 30 |

Environmental Protection Agency Region 5
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| | | |
|---|---|---|
| Air Division, US EPA Region 5 | Project: L'Anse, Michigan Biomass Utility | |
| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## Semivolatiles by GC/MS, EPA 8270D (modified) - Quality Control
## US EPA Region 5 Chicago Regional Laboratory

### Batch B16C023 - Solvent Extraction

**LCS Dup (B16C023-BSD1)** **Prepared: Feb-12-16 Analyzed: Mar-02-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Benzo(b)fluoranthene** | **511** | | | 20.0 | ng/Wipe | 500.0 | | 102% | 68.9-128 | 2.87 | 30 |
| **Benzo(k)fluoranthene** | **456** | | | 20.0 | " | 500.0 | | 91.2% | 62.8-135 | 3.90 | 30 |
| **Benzo (e) pyrene** | **451** | | | 20.0 | " | 500.0 | | 90.2% | 68.9-133 | 3.31 | 30 |
| **Benzo(a)pyrene** | **505** | | | 20.0 | " | 500.0 | | 101% | 68.9-133 | 1.16 | 30 |
| **Perylene** | **383** | | | 20.0 | " | 500.0 | | 76.6% | 68.9-133 | 4.37 | 30 |
| **Indeno(1,2,3-cd)pyrene** | **498** | | | 20.0 | " | 500.0 | | 99.7% | 70-129 | 1.92 | 30 |
| **Dibenz(a,h)anthracene** | **530** | | | 20.0 | " | 500.0 | | 106% | 69.1-131 | 1.45 | 30 |
| **Benzo(g,h,i)perylene** | **448** | | | 20.0 | " | 500.0 | | 89.5% | 53.9-139 | 1.65 | 30 |
| *Surrogate: Nitrobenzene-d5* | *279* | | | | " | *250.0* | | *112%* | *50-94.9* | | |
| *Surrogate: 2-Fluorobiphenyl* | *183* | | | | " | *250.0* | | *73.1%* | *48.1-108* | | |
| *Surrogate: Terphenyl-d14* | *226* | | | | " | *250.0* | | *90.5%* | *59.4-127* | | |
| *Surrogate: 2-Methylnaphthalene-d10* | *200* | | | | " | *250.0* | | *79.9%* | *45.5-117* | | |
| *Surrogate: Fluoranthene-d10* | *244* | | | | " | *250.0* | | *97.6%* | *70.8-122* | | |

**MRL Check (B16C023-MRL1)** **Prepared: Feb-12-16 Analyzed: Mar-10-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acenaphthylene** | **22.5** | | | 20.0 | ng/Wipe | 20.00 | | 112% | 52.7-117 | | |
| **Anthracene** | **18.9** | | | 20.0 | " | 20.00 | | 94.4% | 69.7-116 | | |
| **Benzo (a) anthracene** | **24.2** | | | 20.0 | " | 20.00 | | 121% | 67.6-115 | | |
| **Chrysene** | **16.7** | | | 20.0 | " | 20.00 | | 83.7% | 68.5-117 | | |
| **Benzo(b)fluoranthene** | **26.1** | | | 20.0 | " | 20.00 | | 130% | 68.9-128 | | |
| **Benzo(k)fluoranthene** | **21.7** | | | 20.0 | " | 20.00 | | 108% | 62.8-135 | | |
| **Benzo (e) pyrene** | **19.3** | | | 20.0 | " | 20.00 | | 96.6% | 68.9-133 | | |
| **Benzo(a)pyrene** | **19.4** | | | 20.0 | " | 20.00 | | 97.1% | 68.9-133 | | |
| **Perylene** | **15.9** | | | 20.0 | " | 20.00 | | 79.4% | 68.9-133 | | |
| **Indeno(1,2,3-cd)pyrene** | **23.4** | | | 20.0 | " | 20.00 | | 117% | 70-129 | | |
| **Dibenz(a,h)anthracene** | **22.5** | | | 20.0 | " | 20.00 | | 113% | 69.1-131 | | |
| **Benzo(g,h,i)perylene** | **18.8** | | | 20.0 | " | 20.00 | | 94.2% | 53.9-139 | | |
| *Surrogate: Nitrobenzene-d5* | *281* | (CCV), J | | | " | *250.0* | | *112%* | *50-94.9* | | |
| *Surrogate: 2-Fluorobiphenyl* | *188* | | | | " | *250.0* | | *75.2%* | *48.1-108* | | |
| *Surrogate: Terphenyl-d14* | *249* | | | | " | *250.0* | | *99.4%* | *59.4-127* | | |
| *Surrogate: 2-Methylnaphthalene-d10* | *199* | | | | " | *250.0* | | *79.4%* | *45.5-117* | | |

Environmental Protection Agency Region 5
# Chicago Regional Laboratory

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| | | |
|---|---|---|
| Air Division, US EPA Region 5 | Project: L'Anse, Michigan Biomass Utility | |
| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## Semivolatiles by GC/MS, EPA 8270D (modified) - Quality Control
## US EPA Region 5 Chicago Regional Laboratory

### Batch B16C023 - Solvent Extraction

**MRL Check (B16C023-MRL1)** **Prepared: Feb-12-16 Analyzed: Mar-10-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Surrogate: Fluoranthene-d10* | *244* | | | | *ng/Wipe* | *250.0* | | *97.7%* | *70.8-122* | | |

**MRL Check (B16C023-MRL2)** **Prepared: Feb-12-16 Analyzed: Mar-02-16**

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | **84.4** | | | 100 | ng/Wipe | 100.0 | | 84.4% | 43.1-108 | | |
| **2-Methylnaphthalene** | **90.0** | | | 100 | " | 100.0 | | 90.0% | 45.5-117 | | |
| **1-Methylnaphthalene** | **86.6** | | | 100 | " | 100.0 | | 86.6% | 45.5-117 | | |
| **Acenaphthene** | **81.6** | | | 100 | " | 100.0 | | 81.6% | 51.7-116 | | |
| **Fluorene** | **94.1** | | | 100 | " | 100.0 | | 94.1% | 57.9-120 | | |
| **Phenanthrene** | **83.4** | | | 100 | " | 100.0 | | 83.4% | 68.1-114 | | |
| **Fluoranthene** | **97.7** | | | 100 | " | 100.0 | | 97.7% | 70.8-122 | | |
| **Pyrene** | **91.2** | | | 100 | " | 100.0 | | 91.2% | 71.8-117 | | |
| *Surrogate: Nitrobenzene-d5* | *284* | | | | " | *250.0* | | *114%* | *50-94.9* | | |
| *Surrogate: 2-Fluorobiphenyl* | *192* | | | | " | *250.0* | | *77.0%* | *48.1-108* | | |
| *Surrogate: Terphenyl-d14* | *245* | | | | " | *250.0* | | *97.9%* | *59.4-127* | | |
| *Surrogate: 2-Methylnaphthalene-d10* | *210* | | | | " | *250.0* | | *83.8%* | *45.5-117* | | |
| *Surrogate: Fluoranthene-d10* | *251* | | | | " | *250.0* | | *100%* | *70.8-122* | | |

**Environmental Protection Agency Region 5**

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| | | |
|---|---|---|
| Air Division, US EPA Region 5 | Project: L'Anse, Michigan Biomass Utility | |
| 77 West Jackson Boulevard | Project Number: [none] | **Reported:** |
| Chicago IL, 60605 | Project Manager: Molly Smith | Mar-22-16 13:23 |

## Notes and Definitions

| | |
|---|---|
| J | The identification of the analyte is acceptable; the reported value is an estimate. |
| (CCV) | Continuing calibration verification criteria not met for this analyte |
| U | Not Detected |
| NR | Not Reported |