**Operator: Dow Corning Ltd**
**Installation: Barry Silicon-Based Manufacturing Installation**

**Permit Reference Number: BR9685IX**

## 2016 Annual Reporting for Dow Corning Ltd

Parameters, for which reports are required, in accordance with conditions of the permit, are listed within this report.

Form Number: Agency Form / BR9685IX / W1 / Form Dated 8th March 2010

**Quarterly Reporting of Emissions to Water (other than to Sewer) for the period from October 1 2016 to December 31 2016**

| Emission Point | Substance / Parameter | Emission Limit Value | Result [1] | Test Method [2] | Sample Date and Times [3] | Accreditation/ Certification [4] | Uncertainty [5] |
|---|---|---|---|---|---|---|---|
| W1 via M1 | Flow | 11 000 $m^3$/day | 8351 | Agreed(10) | 23/11/2016 | MCERT Approved | +/- 0.5% |
| W1 via M1 | Flow | 625 $m^3$/hour | 608 | Agreed(10) | 14/10/2016 | MCERT Approved | +/- 0.5% |
| W1 via M1 | pH | ≥ 6, ≤ 9 | 6.17<br>7.69 | To be agreed(11) | 10/12/2016<br>02/11/2016 | Under Review(11) | +/- 4% |
| W1 via M1 | Temperature | 40 °C [6] | 29.39 | RTD(12) | 08/10/2016 | MCERTS Equiv(12) | +/- 0.55 °C |
| W1 via M1 | Suspended solids | 30 mg/l | 36.90 | SCA Blue Book 105 | 15/10/2016 | Under Review | +/- 6mg/l |
| W1 via M1 | $BOD_5$ | 20 mg/l | 1.00 | SCA Blue Book 130 | 04/10/2016 | UKAS | +/- 21% |
| W1 via M1 | Copper | 0.1 mg/l | 0.08 | Inductively Coupled Plasma | 14/10/2016 | In house validated method | +/- 0.0096 mg/l |
| W1 via M1 | Zinc | 0.5 mg/l | 0.03 | Inductively Coupled Plasma | 15/10/2016 | In house validated method | +/- 0.02 mg/l |
| W1 via M1 | Hydrocarbon oil | No visible sheen | None | Visual Check | Q4 | N/A | N/A |
| W2 | pH | ≥ 6, ≤ 9 | 6.28<br>7.91 | pH probe | 21/11/2016<br>21/11/2016 | In house validated method | +/- 4% |
| W2 | Suspended solids | 30 mg/l | 19.20 | SCA Blue Book 105 | 22/11/2016 | Under Review | +/- 6mg/l |
| W2 | $BOD_5$ | 20 mg/l | 1.00 | SCA Blue Book 130 | 01/11/2016 | UKAS | +/- 21% |
| W2 | COD | 125 mg/l (13) | 16.00 | Offsite Analysis | 21/11/2016 | UKAS | Unknown |
| W2 | Copper | 0.15 mg/l [7] | 0.02 | Inductively Coupled Plasma | 21/11/2016 | In house validated method | +/- 0.0096 mg/l |
| W2 | Zinc | 0.25 mg/l [7] | 0.13 | Inductively Coupled Plasma | 21/11/2016 | In house validated method | +/- 0.02 mg/l |
| W2 | Hydrocarbon oil | No visible sheen | None | Visual Check | Q4 | N/A | N/A |

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.
[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with the Agency is used, then the appropriate identifier is given. In other cases the principal technique is stated, e.g. gas chromatography.
[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.
[4] The accreditation status of the equipment and/or the monitoring organisation, as appropriate, for the methods used for both sampling and analysis.
[5] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.
[6] Not more than 5% of measurements in the reporting period shall exceed the limit value.
[7] To be reported for each effluent transfer from W809 to W413.

Dow Corning Notes:
(8) The result is the 95%ile reading for the reporting period to demonstrate compliance with the emission limit value stated, which is a 95%ile limit.
(9) Old note now removed (not applicable).
(10) Instrument and measurement technique has been reviewed under improvement item IP8. The final treated effluent Danfloss flow meter FT5098 has been MCERT approved. It has been agreed that from 1 October 2009 onwards that the dry flow rate discharge limit of 11,000 m3/day will apply and that reported flow data will relate purely to treated effluent with storm water flow (from W952 penstock valve) excluded from the totalised discharge from release point W1.
(11) Instrument and measurement technique has been reviewed under improvement item IP10. Existing pH meters will be replaced by MCERT certified pH meter upon failure. Current meters deemed satisfactory in the interim.
(12) Instrument and measurement technique was reviewed under Note 7 Table 2.2.5 and Agency responded. A New MCERT equivalent resistance thermometer was installed by Dow Corning in Q4 2007.
(13) No spot sample shall exceed the limit value by more than 50%. Limit is 125 mg/l so allowable spot sample result is 187.5 mg/l, result was below this.

Signed …  …… Date…30th January 2017……..

(authorised to sign as representative of Operator)

Form Number: Agency Form / BR9685IX / A2 / Form Dated 1st March 2010

**Quarterly Reporting of Emissions to Air for the period from October 1 2016 to December 31 2016**

| Emission Point | Substance / Parameter | Emission Limit Value | Result [1] | | Test Method [2] | Sample Date and Times [3] | Accreditation/ Certification [4] | Uncertainty [5] |
|---|---|---|---|---|---|---|---|---|
| A26 | Class B VOC's | No limit applies | 1.9554 | kg/hr | Gas chromatography | 25/10/2016 11:15 | In House Validated Method | 3.6% |
| A26 | Siloxanes | No limit applies (6) | 0.6698 | kg/hr | Gas chromatography | 25/10/2016 11:15 | In House Validated Method | 3.6% |
| A27 | Siloxanes | No limit applies (6) | 0.2361 | kg/hr | Gas chromatography | 25/10/2016 11:55 | In House Validated Method | 3.6% |
| A43 | Hydrogen chloride | 10mg/m$^3$ | 3.0605 | mg/m3 | Ion chromatography | 25/10/2016 12:20 | In House Validated Method | 3.6% |
| A44 | Hydrogen chloride | 10mg/m$^3$ | See note 8 | | Ion chromatography | N/A | In House Validated Method | 3.6% |
| A57 | Hydrogen chloride | 10mg/m3 | See note 11 | mg/m3 | Ion chromatography | N/A | In House Validated Method | 3.6% |
| A60 | Class B VOC's | 5000 kg/year(7,10) | 0.0341 | kg/hr | Gas chromatography | 25/10/2016 14:20 | In House Validated Method | 3.6% |
| | | | 150.9218 | kg | | - | | |
| A65 | Siloxanes | No limit applies (6) | 0.0138 | kg/hr | Gas chromatography | 25/10/2016 14:20 | In House Validated Method | 3.6% |
| A68 | Class B VOC's | 5000 kg/year(7, 10) | 0.0012 | kg/hr | Gas chromatography | 13/10/2016 08:48 | In House Validated Method | 3.6% |
| | | | 2803.7527 | kg | | - | | |
| A68 | Siloxanes | No limit applies (6) | 0.2400 | kg/hr | Gas chromatography | 13/10/2016 08:48 | In House Validated Method | 3.6% |
| A78 | Class A VOC's | No limit. Temperature (ºC) | 26.0391 | °C | RTD | 31/10/2016 12:33 | Internally Calibrated | 0.02% |
| A79 | Siloxanes | No limit applies (6) | 2.8655 | kg/hr | Gas chromatography | 25/10/2016 14:55 | In House Validated Method | 3.6% |
| A85 | Siloxanes | No limit applies (6) | See note 11 | kg/hr | Gas chromatography | N/A | In House Validated Method | 3.6% |

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.
[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with the Agency is used, then the appropriate identifier is given. In other cases the principal technique is stated, e.g. gas chromatography.
[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.
[4] The accreditation status of the equipment and/or the monitoring organisation, as appropriate, for the methods used for both sampling and analysis.

[5] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.
[6] Emission limit to be agreed following completion of IP14. This was deferred for consideration with IP25. No limit applies.
[7] Emission limit agreed following completion of IP4 (5000 kg/year).

Dow Corning Notes:
(8) A44 is now decommissioned (vent is released via A43).
(9) Releases modelled as part of IP16. Agency agreed that releases do not require abatement and that limit no longer applies. Instead the vent temperature will be recorded on form A2 quarterly to ensure vent condenser performance does not deteriorate. A new temperature transmitter was installed in 2009 to give continuous temperature monitoring with operator alarm for elevated condenser outlet temperature to trigger condenser cleaning operations. Result recorded is the maximum temperature value obtained during the reporting period.

Operator Comments – Jan 2017

Note 10 – For A60 and A68 Class B VOCs a cumulative figure has been added at the request of NRW. A quarterly value is calculated based on actual vent data for that quarter and the process on-line time. This is totalised for the annual value.

Note 11 – A57 and A85 were unable to be sampled this quarter due to safety concerns regarding the taking of the sample. Work is scheduled to be carried out on both these sample points to ensure the samples can be taken during the next quarter.

Signed …  …… Date…30th January 2017……..

(authorised to sign as representative of Operator)

Form Number: Agency Form / BR9685IX / A1 / Form Dated 1st March 2006

**Annual Reporting of Emissions to Air for the period from January 1 2016 to December 31 2016**

| Emission Point | Substance / Parameter | Emission Limit Value | Result [1] | Test Method [2] | Sample Date and Times [3] | Accreditation/ Certification [4] | Uncertainty [5] |
|---|---|---|---|---|---|---|---|
| A12, A33, A34, A40(10) | Chloromethane | 60 000kg/year | 21,847 kg | US EPA Method 18 | continuous | In House GC | A12 = 4%<br>A33 = 24%<br>A34 = 3%<br>A40 = 3.6% |
| A12, A33, A34, A40(10) | Chloromethane | 1000kg/day | 700 kg/day | US EPA Method 18 | Continuous | In House GC | A12 = 4%<br>A33 = 24%<br>A34 = 3%<br>A40 = 3.6% |
| A12, A33, A34, A40(10) | Chloromethane | 250kg/hour | 29.17 kg/hr | US EPA Method 18 | Continuous | In House GC | A12 = 4%<br>A33 = 24%<br>A34 = 3%<br>A40 = 3.6% |
| A33 | Methanol | 60kg/hour | 39.04 kg/hr | US EPA Method 18 | Continuous | In House GC | 42% |
| A34 | Methanol | 60kg/hour | 139.18 k/hr | US EPA Method 18 | Continuous | In House GC | 1% |
| A12 | Methane [6] | No limit applies | 0 | US EPA Method 18 | Continuous | In House GC | 1% |
| A12 | Non-methane hydrocarbons [6] | No limit applies | 0 | US EPA Method 18 | Continuous | In House GC | 2% |
| A40 | Silanes [6] | No limit applies | - | Gas chromatography | n/a | In House validated Method | 3.6% |
| A40 | Silanes [7] | No limit applies | - | Gas chromatography | n/a | In House validated Method | 3.6% |
| A41 | Particulates | 10 $mg/m^3$ | 1.2 $mg/m^3$ | BS EN 13284 | 4/5 March 2016 | UKAS & MCERTS | +/- 0.9 |
| A41 | Carbon monoxide | 50$mg/m^3$ | 5.4 $mg/m^3$ | ISO 12039 | 4/5 March 2016 | In House validated Method | 13% |
| A41 | Oxides of nitrogen as $NO_2$ | 100$mg/m^3$ | 12.2 $mg/m^3$ | ISO 10849 | 4/5 March 2016 | In House validated Method | 11% |
| A41 | Dioxins and furans | 0.1 $ng/m^3$ | 0.02 $ng/m^3$ | BS EN 1948 | 4/5 March 2016 | UKAS & MCERTS | +/- 0.003 |
| A48 | Oxides of nitrogen as $NO_2$ | No limit applies | 105.6 $mg/m^3$ | ISO 10849 | 4 October 2016 | In House validated Method | 11% |
| A48 | Carbon monoxide | No limit applies | 6.9 $mg/m^3$ | ISO 12039 | 4 October 2016 | In House validated Method | 13% |
| A50 | Oxides of nitrogen as $NO_2$ | 200 $mg/m^3$ | 46.7 $mg/m^3$ | ISO 10849 | 13 Dec 2016 | In House validated Method | 11% |

| Emission Point | Substance / Parameter | Emission Limit Value | Result [1] | Test Method [2] | Sample Date and Times [3] | Accreditation/ Certification [4] | Uncertainty [5] |
|---|---|---|---|---|---|---|---|
| A50 | Carbon monoxide | 200mg/m$^3$ | 3.0 mg/m$^3$ | ISO 12039 | 13 Dec 2016 | In House validated Method | 13% |
| A26 | Class B VOC's [9] | No limit applies | 1.47 kg/hr | BS EN 13649 | Annual average | In House validated Method | 3.6% |
| A60 | Class B VOC's [9] | 5,000 kg/yr (11) | 150.9218 | BS EN 13649 | Annual total release | In House validated Method | 3.6% |
| A68 | Class B VOC's [9] | 5,000 kg/yr (11) | 2803.7527 | BS EN 13649 | Annual total release | In House validated Method | 3.6% |
| A26 | Siloxanes [9] | An agreed limit (12) | 0.638 kg/hr | Gas chromatography | Annual average | In House validated Method | 3.6% |
| A65 | Siloxanes [9] | An agreed limit (12) | 0.186 kg/hr | Gas chromatography | Annual average | In House validated Method | 3.6% |
| A68 | Siloxanes [9] | An agreed limit (12) | 1.562 kg/hr | Gas chromatography | Annual average | In House validated Method | 3.6% |
| A79 | Siloxanes [9] | An agreed limit (12) | 1.344 kg/hr | Gas chromatography | Annual average | In House validated Method | 3.6% |

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.
[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with the Agency is used, then the appropriate identifier is given. In other cases the principal technique is stated, e.g. gas chromatography.
[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.
[4] The accreditation status of the equipment and/or the monitoring organisation, as appropriate, for the methods used for both sampling and analysis.
[5] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.
[6] Maximum kg/h obtained during the reporting period.
[7] Total release during the reporting period.
[8] Reporting only required if phosphonitrile production during reporting year.
[9] Average of quarterly reported values in reporting year.
[10] Based on an agreed emission factor
[11] Emission limit agreed following completion of IP4
[12] Emission limit to be agreed following completion of IP14. This has been deferred for consideration with IP25. No limit was agreed.

Dow Corning Notes:
(13) There is no routine monitoring frequency required for A40 apart from the requirements listed in Table 2.10.1 under 'other requirements' and a method for such testing has not yet been agreed with the Agency. Dow Corning has agreed with the Agency to use previously agreed IPC emission factors for silane releases from A40 for PI reporting purposes, as described in IPC improvement item 8.21. Under Improvement item IP3 the Environment Agency agreed to remove the requirement for silane monitoring at A41 when the ERU is not available for periods greater than 6 hrs.
(14) This is no longer made in W307.

Signed …  …… Date…30th January 2017……..

(authorised to sign as representative of Operator)

Form Number: Agency Form / BR9685IX / A3 / Form Dated 1st March 2006

**Annual Reporting of Emissions to Air for the period from January 1 2016 to December 31 2016**

| Emission Point | Substance / Parameter | Emission Limit Value | Result [1] Mg/m$^3$ | Test Method [2] | Sample Date and Times [3] | Accreditation/ Certification [4] | Uncertainty [5] |
|---|---|---|---|---|---|---|---|
| A41 | Hydrogen chloride | 15mg/m$^3$ | 1.50758 | US EPA Method 26 | 11/1/16 10:30-11:30 | UKAS & MCERTS | ±36% |
| | | | 3.395 | US EPA Method 26 | 1/2/16 12:54-13:54 | UKAS & MCERTS | ±36% |
| | | | 2.22604 | US EPA Method 26 | 3/3/16 09:25-10:25 | UKAS & MCERTS | ±36% |
| | | | 1.93193 | US EPA Method 26 | 5/4/16 10:50-1150 | UKAS & MCERTS | ±36% |
| | | | 2.14419 | US EPA Method 26 | 3/5/16 11:38-12:38 | UKAS & MCERTS | ±36% |
| | | | 8.4735 | US EPA Method 26 | 6/6/16 12:25-13:25 | UKAS & MCERTS | ±36% |
| | | | 3.23982 | US EPA Method 26 | 5/7/16 09:50-10:50 | UKAS & MCERTS | ±36% |
| | | | 2.03314 | US EPA Method 26 | 9/8/16 09:35-10:35 | UKAS & MCERTS | ±36% |
| | | | 3.14 | US EPA Method 26 | 6/9/16 09:35-10:35 | UKAS & MCERTS | ±36% |
| | | | 2.12626446 | US EPA Method 26 | 4/10/16 10:26-11:26 | UKAS & MCERTS | ±36% |
| | | | 3.62491017 | US EPA Method 26 | 7/11/16 10:15-11:15 | UKAS & MCERTS | ±36% |
| | | | 1.86116744 | US EPA Method 26 | 13/12/16 11:35-12:35 | UKAS & MCERTS | ±36% |

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[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with the Agency is used, then the appropriate identifier is given. In other cases the principal technique is stated, e.g. gas chromatography.
[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.
[4] The accreditation status of the equipment and/or the monitoring organisation, as appropriate, for the methods used for both sampling and analysis.
[5] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Dow Corning Notes:

Signed …  …… Date…30th January 2017……..

(authorised to sign as representative of Operator)

Form Number: Agency Form / BR9685IX / A4 / Form Dated 1st March 2006

**Annual Reporting of Emissions to Air for the period from January 1 2016 to December 31 2016**

| Emission Point | Substance / Parameter | Emission Limit Value | Result [1] Mg/m$^3$ | Test Method [2] | Sample Date and Times [3] | Accreditation/ Certification [4] | Uncertainty [5] |
|---|---|---|---|---|---|---|---|
| A41 | Chlorine | 15mg/m$^3$ | 1.258 | US EPA Method 26 | 11/1/16 11:45-12:45 | UKAS & MCERTS | ±36% |
| | | | 2.65 | US EPA Method 26 | 1/2/16 14:10-15:10 | UKAS & MCERTS | ±36% |
| | | | 2.01 | US EPA Method 26 | 3/3/16 10:45-11:45 | UKAS & MCERTS | ±36% |
| | | | 1.307 | US EPA Method 26 | 5/4/16 12:05-13:05 | UKAS & MCERTS | ±36% |
| | | | 2.167 | US EPA Method 26 | 3/5/16 12:55-13:55 | UKAS & MCERTS | ±36% |
| | | | 9.065 | US EPA Method 26 | 6/6/16 13:38-14:38 | UKAS & MCERTS | ±36% |
| | | | 0.996 | US EPA Method 26 | 5/7/16 11:20-12:20 | UKAS & MCERTS | ±36% |
| | | | 1.742 | US EPA Method 26 | 9/8/16 10:50-11:50 | UKAS & MCERTS | ±36% |
| | | | 3.397 | US EPA Method 26 | 6/9/16 10:50-11:50 | UKAS & MCERTS | ±36% |
| | | | 2.843 | US EPA Method 26 | 4/10/16 11:35-12:35 | UKAS & MCERTS | ±36% |
| | | | 3.47 | US EPA Method 26 | 7/11/16 11:30-12:30 | UKAS & MCERTS | ±36% |
| | | | 2.265 | US EPA Method 26 | 13/12/16 12:50-13:50 | UKAS & MCERTS | ±36% |

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.
[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with the Agency is used, then the appropriate identifier is given. In other cases the principal technique is stated, e.g. gas chromatography.
[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.
[4] The accreditation status of the equipment and/or the monitoring organisation, as appropriate, for the methods used for both sampling and analysis.
[5] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed …  …… Date…30th January 2017……..

(authorised to sign as representative of Operator)

Form Number: Agency Form / BR9685IX / A5 / Form Dated 1st March 2006

**Annual Reporting of Emissions to Air for the period from January 1 2016 to December 31 2016**

**There weren't any transfers of Spent bed into W348 TCS spend bed tank and therefore no potential for associated chloromethane releases in 2016**

| Emission Point | Substance / Parameter | Emission Limit Value | Result [1] | Test Method [2] | Sample Date and Times [3] | Accreditation/ Certification [4] | Uncertainty [5] |
|---|---|---|---|---|---|---|---|
| A57 | Chloromethane | 2kg/h | N/A | | | | |
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[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.
[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with the Agency is used, then the appropriate identifier is given. In other cases the principal technique is stated, e.g. gas chromatography.
[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.
[4] The accreditation status of the equipment and/or the monitoring organisation, as appropriate, for the methods used for both sampling and analysis.
[5] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Dow Corning Notes:

Signed …  …… Date…30th January 2017……..

(authorised to sign as representative of Operator)

**Reporting of Energy Usage for the year 2016**

| Energy Source | Energy Usage Quantity | Primary Energy (MWh) | $CO_2$ Produced (tonnes) |
|---|---|---|---|
| Steam (tonnes) | 741,276.0 | 592,343.6 | 112,514.5 |
| Electricity *(kWh) | 164,979,470.0 | 369,137.0 | 67,884.0 |
| Natural Gas (kWh) | 104,223,569.0 | 104,223.6 | 19,797.1 |
| Gas Oil | 0 | 0 | 0 |
| TOTAL | | 1,065,704.1 | 200,195.5 |
| | | | |
| | | | |
| | | | |
| | | | |

| Trends in Energy Usage Year | Parameter | | |
|---|---|---|---|
| Year | Primary Energy usage | $CO_2$ produced | |
| 2008 | 1,101,571 | 207,755 | |
| 2009 | 1,066,743 | 183,110 | |
| 2010 | 1,018,415 | 191,869 | |
| 2011 | 1,040,640 | 195,636 | |
| 2012 | 1,044,862 | 197,154 | |
| 2013 | 1,039,643 | 196,913 | |
| 2014 | 1,080,683 | 204,686 | |
| 2015 | 1,060,647 | 200,560 | |
| **2016** | **1,065,704.1** | **200,195.5** | |

* Conversion factor for delivered electricity to primary energy = 2.4

Electricity includes 129,037 MWh @46.8 % generation efficiency from CHP operated by Cofely Energy Services Limited and 35,943 MWh @41.7% generation efficiency from National Grid equivalent to 275,686 + 86,263 MWh of primary energy .

Note that approximately 160,158 tonnes Carbon Dioxide from Primary energy to generate the steam and electricity is also reported by CHP

Energy chart with time included

Signed …  …… Date…30th January 2017……..

(authorised to sign as representative of Operator)

Form Number: Agency Form / BR9685IX / R1 / Form Dated 1st March 2006

**Reporting of Waste Disposal and Recovery for the year 2016**

| Waste Description | Route | Disposal Tonnes | Recovery Tonnes |
|---|---|---|---|
| 1) Hazardous Wastes | | | |
| **Acetyl Chloride** | Incineration | 50 | |
| **ClSi - DPR liquid gas (8-6149)** | Incineration | 646.01 | 176.84 |
| **Cuprous chloride** | Incineration | 6.006 | |
| **Cuprous chloride** | Water Treatment | 289.4545 | |
| **Haz DPR** | Recycling | | 14073.34 |
| **Mixed Incineration** | Incineration | 738.27725 | |
| **SiH Siloxane & Isoparaffin 8-6856 (tanker - W922)** | Incineration | 330.96 | |
| **Siloxane Hydrocarbons 8-6818 (tanker)** | Fuel blending | | 182.78 |
| **Solvent siloxane** | Fuel blending | | 1286.704 |
| **Spent Bed** | Recover | | 9086.99 |
| **Spent Sulphuric acid** | Recover | | 7423.45 |
| **Toluene/Glycol** | Fuel blending | | 66.994 |
| **Contaminated PPE (Tonnes)** | Energy Recovery | | 40.9 |
| **Interceptor pit cleanout** | Incineration | 44.20825 | |
| **Contaminated timber** | Incineration | 1.34 | |
| | | | |
| **Total Hazardous waste** | | **2106.256** | **32337.998** |
| | | | |
| | | | |
| **2) Non-Hazardous Wastes** | | | |
| **Alumina RAR Catalyst** | Landfill | 229.55 | |
| **Aluminium cans** | Recycling | | 26.01 |
| **Biosludge from SWWT** | Water Treatment | 2057.79 | |
| **Calcium filtercake** | Landfill | 3617.64 | |

| Trends in Waste Disposal and Recovery Year | Parameter | | |
|---|---|---|---|
| | Named Waste | Total Waste | |
| 2006 | All Wastes | 44865 Tonnes | |
| 2007 | All Wastes | 57243 Tonnes | |
| 2008 | All Wastes | 60900 Tonnes | |
| 2009 | All Wastes | 37182 Tonnes | |
| 2010 | All Wastes | 52749 Tonnes | |
| 2011 | All wastes | 45659.791 Tonnes | |
| 2012 | All wastes | 53694.0 Tonnes | |
| 2013 | All wastes | 50454.257Tonnes | |
| 2014 | All wastes | 41004.423 tonnes | |
| 2015 | All wastes | 44431.497 tonnes | |
| 2016 | All wastes | 50306.351 tonnes | |

| Waste Description | Route | Disposal Tonnes | Recovery Tonnes |
|---|---|---|---|
| **Calcium Slurry** | Water Treatment | 1155.04 | |
| **Cardboard** | Recycling | | 193.42 |
| **Filter Cartridge material** | Landfill | 25.06 | |
| **Food waste for composting** | Composted | | 2.5 |
| **General Waste** | Energy recovery | 299.11 | |
| **Glass** | Recycling | | 6.88 |
| **Gypsum** | Recycling | | 2.62 |
| **Lagging** | Landfill | 56.28 | |
| **Non Haz White DPR (Q8-6717)** | Landfill | 6243.437 | |
| **Paint Tins** | Landfill | 8.7 | |
| **Paper** | Recycling | | 7.95 |
| **Plastic** | Recycling | | 73.86 |
| **RG6000 Gum** | Recover | | 72 |
| **Rubber** | Energy Recovery | | 281.94 |
| **Scrap metal** | Recycling | | 294.55 |
| **Shot Blast** | Landfill | 77.58 | |
| **Silicon Metal** | Recycling | | 56.6 |
| **WEEE** | Recycling | | 7.82 |
| **Wood** | Recycling | | 381.34 |
| **Empty drums (tonnes)** | Recycling | | 157.762 |
| **Empty IBC (tonnes)** | Recycling | | 165.76 |
| **E tank cleanout waste** | Landfill | 343.55 | |
| **Spent catalyst** | Recovery | | 17.3482 |
| | | | |
| | | | |
| **Total Non Hazardous waste** | | **14113.737** | **1748.3602** |
| | | | |
| **TOTAL WASTE** | | **16219.993** | **34086.3582** |
| | | | |

| Trends in Waste Disposal and Recovery Year | Parameter | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

OPERATOR COMMENTS:

- Increase in shipping of Haz DPR due to having outlets and trying the clear the landfill area.
- Decreased requirement for incineration of Acetyl chloride, sulphuric acid and contaminated HCl.
- Biosludge from SWWT - this stream has previously been returned to the PWWT process, but has been found to cause process upsets.
- Decreased production of Non Haz DPR due to process reliability.
- Unable to send food waste for composting for much of 2016
- Scrap metal decrease in 2016 due to W709 demolition being completed during 2015

Signed …  …… Date…30th January 2017……..

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Form Number: Agency Form / BR9685IX / WU1 / Form Dated 1st March 2006

**Reporting of Water Usage for the year 2016**

| Water Source | Usage ($m^3$) | Specific Usage ($m^3/t$) |
|---|---|---|
| | | |
| Towns water | 276,011 | |
| Bigliss well water | 993,693 | |
| Cadoxton river water | 442,702 | |
| | | |
| | | |
| **TOTAL WATER USAGE** | 1,712,406 | |
| | | |
| | | |
| | | |

| Trends in Water Usage | | | | | |
|---|---|---|---|---|---|
| Year | Parameter | | | | |
| | Towns water | Bigliss well water | Cadoxton river water | Total water usage | Water per unit output |
| 2009 | 121,193 | 821,102 | 899,394 | 1,851,689 | Report on PI1 |
| 2010 | 237,014 | 986,518 | 748,770 | 1,972,302 | Report on PI1 |
| 2011 | 273,504 | 932737 | 925,974 | 2,132,215 | Report on PI1 |
| 2012 | 187,886 | 826,251 | 1,058,541 | 2,072,658 | Report on PI1 |
| 2013 | 230,623 | 933,912 | 899,926 | 2,064,461 | Report on PI1 |
| 2014 | 230,189 | 768,111 | 551,771 | 1,550,071 | Report on PI1 |
| 2015 | 244,473 | 785,203 | 564,798 | 1,594,474 | Report on PI1 |
| 2016 | 276,011 | 993,693 | 442,702 | 1,712,406 | Report on PI1 |

Operator's comments :
Towns water and Biglis water data obtained from invoices.
River water is measured.
The Biglis water consumption includes the supply to the CHP

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**Reporting of Performance Indicators for the period 2016**

| Annual Production/Treatment | | |
|---|---|---|
| Polydimethylsiloxane | | tonnes |

**Environmental Performance Indicators**

| Parameter | Annual Average | Units |
|---|---|---|
| Water use | | $m^3$/tonne |
| Energy use | | MWh/tonne |
| Waste | | Kg/tonne |
| Carbon dioxide | | Tonne/tonne |
| | | |
| | | |
| | | |
| | | |
| | | |

| Trends in Environmental Performance Year | Parameter | | | | | |
|---|---|---|---|---|---|---|
| | Water | Energy | Waste | $CO_2$ | W955 NaOH | W955 Nat. gas |
| | $m^3$/t | MWh/t | kg/t | t/t | $m^3$/t | MJ/t |
| 2009 | | | | | N/A | N/A |
| 2010 | | | | | N/A | N/A |
| 2011 | | | | | N/A | N/A |
| 2012 | | | | | N/A | N/A |
| 2013 | | | | | N/A | N/A |
| 2014 | | | | | N/A | N/A |
| 2015 | | | | | n/a | n/a |
| 2016 | | | | | N/A | N/A |

Operator's comments:

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Form Number: Agency Form / BR9685IX / ERU1 / Form Dated 1st March 2006

**Annual Reporting of Energy Recovery Unit Availability for the period from January 1 2016 to December 31 2016**

| Process | Parameter | Month | Result [1], % |
|---|---|---|---|
| Energy Recovery Unit W949 | Availability | January | 80.81 |
| | | February | 87.26 |
| | | March | 85.08 |
| | | April | 85.42 |
| | | May | 92.65 |
| | | June | 80.00 |
| | | July | 37.76 |
| | | August | 34.77 |
| | | September | 57.20 |
| | | October | 73.42 |
| | | November | 56.94 |
| | | December | 69.26 |
| | | **Reporting year total** | **70.05** |

[1] Based on the availability to process 100% of W714 FBR vent.

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