Recurring Human Health Complaints: Didsbury Area

Technical Information Synthesis

August 2015

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Alberta Energy Regulator
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Executive Summary

The Alberta Energy Regulator (AER) has developed a new process for handling recurring multiyear stakeholder complaints involving human health concerns. Once the process is triggered, the AER assesses and re-evaluates recurrent complaints, identifies any technical gaps and risks, and determines potential AER actions. This new process for recurring human health complaints also supports coordination across different government agencies.

As part of this new process, the AER has completed a technical assessment of the recurring complaints from a resident in the Didsbury area. The assessment provides a detailed look at the complaints received by the AER, the AER's actions, area operator performance, and monitoring results.

There are two producing gas wells within 500 metres of the complainant's residence and both are tied in to a pipeline. Under normal operating conditions, routine flaring and venting does not occur. From 2012 to 2014, the AER conducted 28 inspections based on seven complaints. Eight noncompliances were found during these inspections.

Water well testing conducted under the jurisdiction of Alberta Environment and Parks (EP) shows all parameters tested are within the maximum acceptable concentrations of the *Guidelines for Canadian Drinking Water Quality* (Health Canada, 2014).

Operators are required to measure flare and vent volumes to determine conservation efficiency as it relates to effective and efficient use of the resource. Chemical analysis of air quality is not typically required unless triggered by hydrogen sulphide concentrations. Monitoring of ambient air quality at the resident's location by the Parkland Airshed Management Zone showed no exceedances of Alberta ambient air quality objectives.

Based on its technical assessment, the low level of development activity in the area, and the absence of any exceedances of air quality objectives and water quality guidelines by monitored parameters, the AER has concluded that there is not a sufficient technical basis to warrant further study at this location at this time.

The AER has also concluded, however, that there is a need for more information about air emissions generated during flaring in the initial stages of new development, specifically during flowback after hydraulic fracturing. The Didsbury area currently does not provide a sufficient sample size for a larger study of flaring emissions during flowback. The AER is working with Alberta Health, Alberta Health Services, and EP regarding a larger study in an area of Alberta better suited to examining flaring emissions during hydraulic fracturing flowback. The resident in Didsbury area with the recurrent complaints will be invited to participate in the study.

1 Background

The Alberta Energy Regulator's (AER's) mandate is to ensure the safe, efficient, orderly, and environmentally responsible development of Alberta's hydrocarbon resources over their entire life cycle. Ensuring that resource development is done in safe and environmentally responsible ways may suggest that the AER plays a leading role in matters concerning human health. Although the AER holds strong regard for human health concerns that are related to resource development, the AER is not the human health regulator in the province of Alberta: Alberta Health (AH) and Alberta Health Services (AHS) are Alberta's human health regulators. The AER supports those organizations when questions arise about the impact of energy resource development on individuals, or on environmental receptors to which individuals are exposed. If the AER or Alberta's human health regulators suspect that a resource development activity or facility is contributing to environmental conditions that affect human health, the AER collaborates with the health agencies to determine if the activity or facility is a source of the problem. The three organizations have separate but complementary mandates and expertise: the AER is the expert on responsible energy resource development and AH and AHS are the human health experts. If the resource development is confirmed as a source of or contributor to human health effects, the AER may use its regulatory authority to ensure the resource developer takes action to eliminate the risk to humans.

This document contains the AER's assessment of recurring complaints from a Didsbury area resident about oil and gas activity. Recurrent complaints are characterized as those arising from multiple complainants, over multiple years and are often complex involving multiple government agencies. The AER has recognized that recurrent human health complaints require a new process for managing complaints in order to accelerate solutions for stakeholders. To that end, the AER has developed a recurrent complaints process. This document is the outcome of that process being applied to the complaints from the Didsbury area and is provided for information to the resident, AH, and AHS.

2 Primary Concern

Since October 2012, a Didsbury area resident has made seven complaints to the AER[1] covering more than 60 issues related to oil and gas drilling activity in the vicinity of their residence. Some of the same issues have been raised multiple times (e.g., air and water contamination risk). The resident also expressed health concerns to AH and AHS.

[1] On June 17, 2013, the *Responsible Energy Development Act* was proclaimed, and the AER was created. Although events may have taken place under its predecessor, the Energy Resources Conservation Board, for simplicity, "the AER" will be used throughout.

3 Description of Area

Figures 1 and 2 show oil and gas drilling operations (wells and batteries) within 0.5 kilometres (km) and 2 km of the complainant's residence, as well as within 4 km (figure 1 only). Site numbers used in this report are from figure 1 (sites 17–19) or figure 2 (sites 01–16).

Both sour and sweet wells are indicated, as is the town of Didsbury. Four wells are within 0.5 km of the complainant's residence. Two of these are producing, one is suspended, and one is abandoned.

Five wells were licensed to and drilled by Angle Energy Inc. (Angle). The resident's complaints focused on these operations. All Angle licences were transferred to Bellatrix Exploration Ltd. on December 13, 2013.

Detailed information on the wells within 0.5 km of the resident are as follows.

- Site 01, W0449454/F46259, Bellatrix 16-16-031-02W5:
  - Drilled on December 10, 2012.
  - True vertical depth (TVD): 2391 metres (m).
  - Producing gas well, hydraulically fractured.
  - 386 metres from resident.
  - No **flaring**[2] or venting during normal operations; all produced gas and liquids tied into a pipeline.
  - Gas produced during an initial well test flared or incinerated.
- Site 02, W0447006, Bellatrix 13-15-031-02W5:
  - Drilled on July 28, 2012.
  - TVD: 2377 m.
  - Producing gas well, hydraulically fractured.
  - 460 m from residence.
  - Gas produced during initial well test flared or incinerated.
  - No flaring or venting during normal operations; all produced gas and liquids tied into a pipeline.
- Site 03, W0421448/F42296, Bellatrix 05-15-031-02W5:
  - Drilled on July 27, 2010.
  - TVD: 2394 m.
  - Suspended gas well, hydraulically fractured, no production since March 2014.

[2] Terms in bold are defined in the glossary.

  - 465 metres from residence.
  - Gas produced during an initial well test was flared or incinerated.
  - Between October 2010 and May 2013, gas was vented from a tank on this location (3.3 thousand cubic metres [10^3 m^3] per month). The gas had an approximate hydrogen sulphide (H_2S) concentration between 60 and 300 parts per million (ppm), but the H_2S was removed before venting.
  - Monitoring of the site on November 19, 2012, noted no readings for H_2S and sulphur dioxide (SO_2).
  - In June 2013, the production tank was removed and hydrocarbons were shipped via pipeline. Following the tank removal, the site had no flaring or venting during normal operations.
- Site 04, W0240207, Bonavista 12-15-031-02W5:
  - Drilled on August 29, 2000.
  - TVD: 2485 m.
  - Abandoned gas well, not hydraulically fractured.
  - 405 m from residence.
  - Abandoned downhole on September 3, 2000 (drilled and abandoned, never placed on production).
  - Site certified as reclaimed on January 28, 2008.

Two additional wells are producing within 600 m of the residence:

- Site 05, W0401352, Bellatrix 14-15-031-02W5:
  - Drilled on December 10, 2012.
  - TVD: 2467 m.
  - Producing gas well, hydraulically fractured.
  - 550 m from residence.
  - No flaring or venting during normal operations; produced gas and liquids tied into a pipeline.
  - Gas produced during an initial well test flared or incinerated.
- Site 06, W0398973/F40460, Bellatrix 14-15-031-02W5:
  - Drilled on September 18, 2008.
  - TVD: 2454 m.

- Producing oil well, hydraulically fractured.
- 572 m from residence.
- Gas produced during an initial well test was flared or incinerated.
- Between April 2011 and May 2013, gas vented from a production tank on this location averaged 2.7 10^3 m^3 per month.
- In June 2013, the production tank was removed and hydrocarbons were shipped via pipeline. Following the tank removal, the site had no flaring or venting during normal operations.

One well is producing within 700 m of the residence:

- Site 07, W0442180, Bonavista 04-22-031-02W5:
  - Drilled on February 13, 2012.
  - TVD: 2398 m.
  - Producing gas well, hydraulically fractured.
  - 625 m from residence.
  - Gas produced during an initial well test flared or incinerated.
  - No flaring or venting during normal operations; all produced gas and liquids tied into a pipeline.

All wells near the residence excluding one have been conserving since they came on production.

In 2014, there were three energy sites routinely venting or flaring during normal operations within 2 km of the residence: sites 08 (nonconserving), 09, and 10, which are about 1.7 km, 1.9 km, and 1.9 km west of the residence respectively.

When a facility is conserving, all operational flaring is minimized to maximize resource conservation. If flaring occurs, it is due to unforeseen operational circumstances and reported. This means that if production levels were the same, air emissions would be greater from a nonconserving facility than when they a conserving facility. Conserving facilities are required to do so based on an economic assessment set by the AER. Once a facility is conserving (i.e., tied in to a pipeline), it remains a conserving facility.

4 Complaint and Investigation History

A total of seven complaints were recorded from October 22, 2012, to December 30, 2014, and the AER conducted 28 inspections directly or indirectly in response to the complaints (see figure 3). Appendix 3 provides a detailed description of the complaint and response history.

Complaints Received since October 22, 2012, and AER Response

1) October 22, 2012

- Four inspections at site 02 were completed; **noncompliances** were found during two of the four inspections.
- The AER's air monitoring unit took readings at site 03 on November 19, 2012, and detected no measurable levels of H_2S or SO_2.

2) February 19, 2013

- Given the range and number of concerns from the resident, the inspector decided to inspect all wells and facilities within a 2 km radius of their residence.
- Eighteen inspections were completed; three sites had one noncompliance each (sites 01, 03, and 17). One follow-up inspection was conducted on May 2, 2013, at site 03 and one noncompliance was found.
- A second follow-up inspection was conducted on June 25, 2013, at site 03 and two noncompliances were found.
- The number of inspections conducted in response to this complaint was unusually high.

3) June 25, 2013

- An inspection at site 03 was not required since one had already been one done before the complaint was received.

4) November 6, 2013

- The complaint focused on water well concerns and included a request for testing. The resident was directed to EP (known at the time as Alberta Environment and Sustainable Resource Development).
- A site inspection was not required. Although many concerns were expressed, no ongoing operational concerns were identified at any location. The AER responded to the resident's concerns and requests for information.

5) January 7, 2014

- An inspection was done at site 18 and one noncompliance was found.

6) July 31, 2014

- A site inspection was not required. The AER was able to determine that the site (which was located more than 4 km from the residence) was compliant by reviewing the notification records in the AER Field Inspection System.

7) December 30, 2014

- Site inspections were not required. Three inspections had been conducted or started in the area (one at site 05 and two at site 19) before the complaint was received.

5 Summary of Inspections that Found Noncompliances

The AER uses a risk assessment process to predetermine the level of risk associated with not complying with an AER requirement. Risk is determined as high or low across four categories: health and safety, environmental impacts, resources conservation, and stakeholder confidence in the regulatory process.

The predetermined risk rating then determines the response process for a noncompliance, as detailed in *Directive 019: Compliance Assurance*. A table of noncompliant events and the associated risk rating of AER requirements is available on the AER website, www.aer.ca, under Compliance Assurance Program > Compliance & Enforcement.

5.1 Year 2012

Location: Site 02, W0447006, Bellatrix 13-15-031-02W5 (about 0.35 km from the residence)

October 23, 2012

One low-risk noncompliance found: a drilling sump was not properly fenced. This was resolved by the licensee.

November 1, 2012

Two high-risk noncompliances found:

- Sump located in porous/course soil; containment did not appear to be impermeable. Angle submitted information to the AER that indicated that the sump construction met requirements.
- Contaminated materials, or materials possessing the potential to leach, stored directly on the ground. The inspector found evidence of what appeared to be hydrocarbon contamination in the drilling waste sumps. Angle sampled the sumps and found hydrocarbon contamination. Angle removed the hydrocarbon-contaminated drilling waste and soil for proper disposal. Sampling was conducted after removal of the contaminated materials and an action plan to prevent recurrence was provided to the AER.

5.2 Year 2013

Location: Site 03, W0421448, Bellatrix 05-15-031-02W5 (about 0.43 km from the residence)

February 22, 2013

One low-risk noncompliance found: failure to notify the appropriate field centre of flaring, incinerating, or venting events. Angle did not submit notification that a flaring event would extend past 72 hours. No follow-up was required as this noncompliance had occurred in the past and the operation was completed.

May 2, 2013

One low-risk noncompliance found: facility not maintained in a clean condition. Minor oil staining found under pipe rack. Angle confirmed that the staining was cleaned up and disposed of.

June 25, 2013

Two low-risk noncompliances found:

- Facility not maintained in a clean condition. Pipe racks had been removed and staining was present where they had been placed. Angle cleaned up the staining and reclaimed the lease.
- Produced water was not being measured as required; Angle later installed a meter.

Location: Site 17, W0234614, Bonavista 12-21-031-02W5 (about 2 km from the residence)

March 1, 2013

One low-risk noncompliance found: all outlets were not bull-plugged or blind-flanged with needle valves as required and the flow line was not disconnected and plugged on a suspended well. Bonavista corrected the issue by disconnecting the flow line and properly flanging connections.

Location: Site 01, W0449454, Angle 16-16-031-02W5 (about 0.37 km from the residence)

March 11, 2013

One high-risk noncompliance found: exposed flame from an incinerator. The complainant provided a photograph showing an exposed flame from an **incineration** operation that Angle confirmed was its operation. No corrective action could be taken as the operation was already over. Angle provided an action plan to prevent recurrence.

5.3 Year 2014

Location: Site 18, W0460737, Bellatrix 03-26-031-02W5 (about 3 km from the residence)

January 7, 2014

One low-risk noncompliance found: Failure to submit a notification that a flaring event would extend past 72 hours as required. Bellatrix completed the notification after the event and provided evidence that it had met the qualifications to exceed 72 hours of flaring.

6 Industry Performance Monitoring

The AER requires licensees to

- measure or estimate flared, incinerated, and vented gas (*Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting* and *Directive 017: Measurement Requirements for Oil and Gas Operations*);
- maintain a log of flaring, incineration and venting events (*Directive 060*); and,
- report monthly volumetric amounts (*Directive 007: Volumetric and Infrastructure Requirements*).

Directive 060 requires that conserving sites operate at a minimum conservation efficiency of 90 per cent. Conservation efficiencies, as well as flaring and venting volumes, for all sites within 2 km of the residence are illustrated in figure 4, 5, 6, and 7. Typical conservation efficiency in Alberta is 95 per cent. These figures do not include data from initial well testing operations.

For well test flaring, no specific monitoring is required unless the H_2S concentration is greater than five per cent. If the H_2S concentration is greater than one per cent, **dispersion modelling** is required to verify that the resulting concentrations of SO_2 are expected to comply with Alberta ambient air quality objectives (AAAQO). For all flaring, incinerating, and venting, performance requirements in *Directive 060* must be met. In this case, the majority of the complaints from the resident were received after flaring or venting had occurred. Therefore, inspections of the operation and equipment could not be completed. Wells near the residence are primarily sweet (0 per cent H_2S), with the exception of one well with H_2S concentrations of up to 300 parts per million (0.03 per cent).

Well tests typically last between three and 30 days with intermittent flaring. *Directive 060* requires well test flaring be limited to 72 hours unless an AER extension approval is granted. Some of the wells in this area required an extension past the 72-hour limit. During a typical well test operation, production from the well is directed to a vessel where liquids are separated and sent to tanks (sealed tanks if H_2S is present). Gas is then directed to a flare or incinerator. Produced liquids are primarily hydraulic fracturing fluids and additives, along with hydrocarbons and water from the formation. Liquids are then recycled, reused, or shipped for appropriate disposal, as required by *Directive 058: Oilfield Waste Management Facility*

Approvals—Notification and Amendment Procedures. Gases sent for flaring or incineration are primarily formation hydrocarbon gas and any gases that may have been used for hydraulic fracturing (nitrogen is common but on some of the wells in this area propane was used as a base fracturing fluid).

7 Ambient Environmental Monitoring

7.1 Ambient Air Quality Monitoring

Intensive ambient air quality monitoring was conducted in 2013 by the Parkland Airshed Management Zone (a nonprofit, multistakeholder organization) at the residence, located 4 km west and 0.5 km south of Didsbury on Highway 582. The Didsbury west monitoring station recorded more than 750 hours of data from June 5 to July 10, 2013, and operated 95.4–99.8 per cent of the time. Parameters measured included external temperature, relative humidity, solar radiation, wind speed, and wind direction. The station was audited during monitoring and extensive quality assurance and control was conducted. For the full air monitoring report, see appendix 7.

The following substances were monitored:

- sulphur dioxide,
- total reduced sulphur,
- nitrogen dioxide,
- nitrogen oxide,
- nitrogen oxides,
- ozone,
- total hydrocarbons,
- methane, and
- particulate matter smaller than 2.5 micrometres.

No exceedances of AAAQO were observed.

In fall 2013, the AER offered to support further monitoring. The offer, however, was declined by the resident.

7.2 Water Well Monitoring

The resident’s water well concerns were referred to Alberta Environment and Parks (EP) since it fell under EP’s purview at the time. Sampling was conducted on March 20, 2014, for general chemistry,

anions and nutrients, bacteria, total metals, volatile organic compounds, and hydrocarbons, including polycyclic aromatic hydrocarbons.

The results were shared with the resident.

The results were compared to

- *Guidelines for Canadian Drinking Water Quality* (Health Canada, 2014) for maximum allowable concentration and aesthetics,[3] and
- *Environmental Quality Guidelines for Alberta Surface Waters* (Government of Alberta, 2014).

Two exceedances of drinking water guidelines were reported:

- iron: 1.12 milligrams per litre (mg/L) compared to an aesthetic guideline of 0.3 mg/L. The maximum allowable concentration for drinking water quality was not exceeded.
- sodium: 370 mg/L compared to an aesthetic guideline of 200 mg/L. The maximum allowable concentration for drinking water quality was not exceeded.

These numbers represent common and typical water quality parameters found in wells and exceedances of aesthetic guidelines were not flagged as a concern by the AER.

For further detail, see appendix 4 (Results of Water Chemistry Analysis) and appendix 5 (ALS Environmental Analytical Report), which were provided by EP to the AER in January 2015.

In response to questions posed by AH and AHS based on the water well complaints from the resident, Alberta Geological Survey (part of the AER) presented the following:

- locations of wells and springs in the vicinity of the residence;
- a description of the site geology, in particular bedrock geology;
- the depth to the water table; and
- the depth of oil and gas wells.

Within 500 m of the residence, there are two springs and four water wells with an average depth of 44 to 59 m. Depth to the water table is between 6 to 18 m. Depth of the oil and gas wells is 2369 to 2490 m. Based on the vertical separation, communication between the oil and gas wells and the water wells is highly improbable. Additionally, fractures resulting from hydraulic fracturing do not extend as far vertically as they do horizontally. This is an inherent property of rock geomechanics and further reduces the probability of communication with a water well as a result of hydraulic fracturing at these depths.

[3] Guidelines for aesthetics cover parameters such as taste, odour, and colour that affect people's preference for the water, but do not have any health impacts.

See appendix 6 (Summary of Findings: Didsbury Area Water Concern) for the complete presentation by the Alberta Geological Survey.

8 Provincial Context

The Didsbury area is similar to many others in Alberta, in the nature and level of energy activity. In the last year, activity levels have dropped from the previous five to six years. The types of wells, facilities and equipment are also similar to many other areas of the province. Most wells and facilities in this area are conserving gas, but do have sources of venting such as hydrocarbon production tanks and instrumentation.

Well density in Alberta varies. However, the well density in the Didsbury area is similar to other areas in Alberta.

Within a 4 km radius of the complainant's residence, there are four other residences that have three to four wells within 500 m.

From January 2012 to May 2015, within the 4 km radius of the complainant's residence, the AER responded to seven complaints from the resident, as well as one other complaint about a small oil spill on a road approach, later determined to be from a road crew and not oil and gas related.

During the same time period and within a 20 km radius of the residence, Angle drilled 49 wells. Four complaints were received about its activities, three from the resident. The one complaint not from the resident was about a pipeline Angle had constructed.

The township where the complainant resides was examined from a provincial perspective using a number of different parameters for the period of 2009–2013. (As of this writing, the last full year of data available was 2013). The following observations were made from this examination:

Complaints (2009–2013): The number of complaints received from the Didsbury area is low compared to the rest of the province.

Spills (2009–2013): The number of spills is low compared to other areas.

Flaring (2013): Flare and vent volumes are low compared to other areas.

Unsatisfactory inspections (2010–2013): The number of unsatisfactory inspections is typical or below average.

9 Conclusion

This assessment was done to determine if further study should be carried out with respect to the recurrent complaints from the Didsbury area resident.

The resident is concerned about hydraulic fracturing near their residence and, more broadly, in the province of Alberta, as well as the potential effects on environmental health and human health.

There are two producing wells within 500 m of the residence and both are tied in to a pipeline. Under normal operating conditions, **routine flaring** and venting does not occur. From 2012 to 2014, 28 inspections were conducted based on seven complaints. Eight noncompliances, mostly unrelated to emissions, were found.

Water well testing showed that all parameters tested are within the health-related drinking water guidelines.

Operators are required to measure flare and vent volumes to determine conservation efficiency as it is an indicator of effective and efficient use of the energy resource. Compositional air analysis is not typically required unless triggered by H_2S concentrations. The development in this area is sweet and not sour and hence H_2S has not been a concern. Ambient air quality was monitored and did not exceed AAAQO.

The trend observed in this location is similar to other areas of the province. Flaring and venting are typically highest as development activity increases in an area and new wells are completed and tested. As infrastructure increases, AER requirements dictate that many of the wells and facilities must be tied in to pipelines to increase conservation, thus decreasing flaring and venting.

Based on the AER's technical assessment, the low level of development activity, and the absence of any exceedances of air quality criteria and health-related drinking water guidelines by monitored parameters, the AER concludes that there is not a sufficient technical basis to warrant further study at this location at this time.

The AER has also concluded, however, that there is a need for more information about air emissions generated during nonroutine flaring in the initial stages of new development, specifically during **hydraulic fracturing flowback**. The Didsbury area currently does not provide a sufficient sample size for a larger study of flaring emissions during flowback.

The AER has started discussions with AH and AHS about the need for, and scope of, a larger study with adequate statistical power in an area of Alberta more technically suited to examining this issue. As a result, the AER will be pursuing this study through strategic discussions with provincial agencies, including AH, AHS, and EP. This resident in the Didsbury area will be invited to participate in the study.

Appendix 1 Figures

R. 02

R. 01W.5M.

Twp. 31

15-28-031-02W5
16-28-031-02W5
16-29-031-02W5
12-26-031-02W5
08-29-031-02W5
06-29-031-02W5
06-29-031-02W5
07-27-031-02W5
Site 18
13-26-031-02W5
03-26-031-02W5
Site 19
15-22-031-02W5
15-22-031-02W5
Site 17
10-21-031-02W5
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3 Surface Locations
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Didsbury
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11-04-031-02W5
11-04-031-02W5
05-03-031-02W5
06-03-031-02W5
07-03-031-02W5
05-03-031-02-W5

Alberta Energy Regulator

Legend

- Surface Locations
- Sour well (>= 10 mol / kmol)*
- Sweet well (< 10 mol / kmol)
- Unknown H2S
- Buffer - 4km
- Buffer - 2km
- Buffer - 500 m
- Battery
- Existing facilities
- Town of Didsbury
- Subject property
- Roads and highways

Publication Date: June 05, 2015
Data Date: June 05, 2015
Projection: 10TM AEP Forest
Datum: GCS NAD83
0 0.5 1 km
1:11,800
N

The AER does not warrant the accuracy or completeness of the information contained in this map and is not responsible for any errors or omissions in its content and accepts no liability for the use of this information.

Figure 1. Map of area within 4 km of residence

* 10 mol/kmol = 10 000 ppm

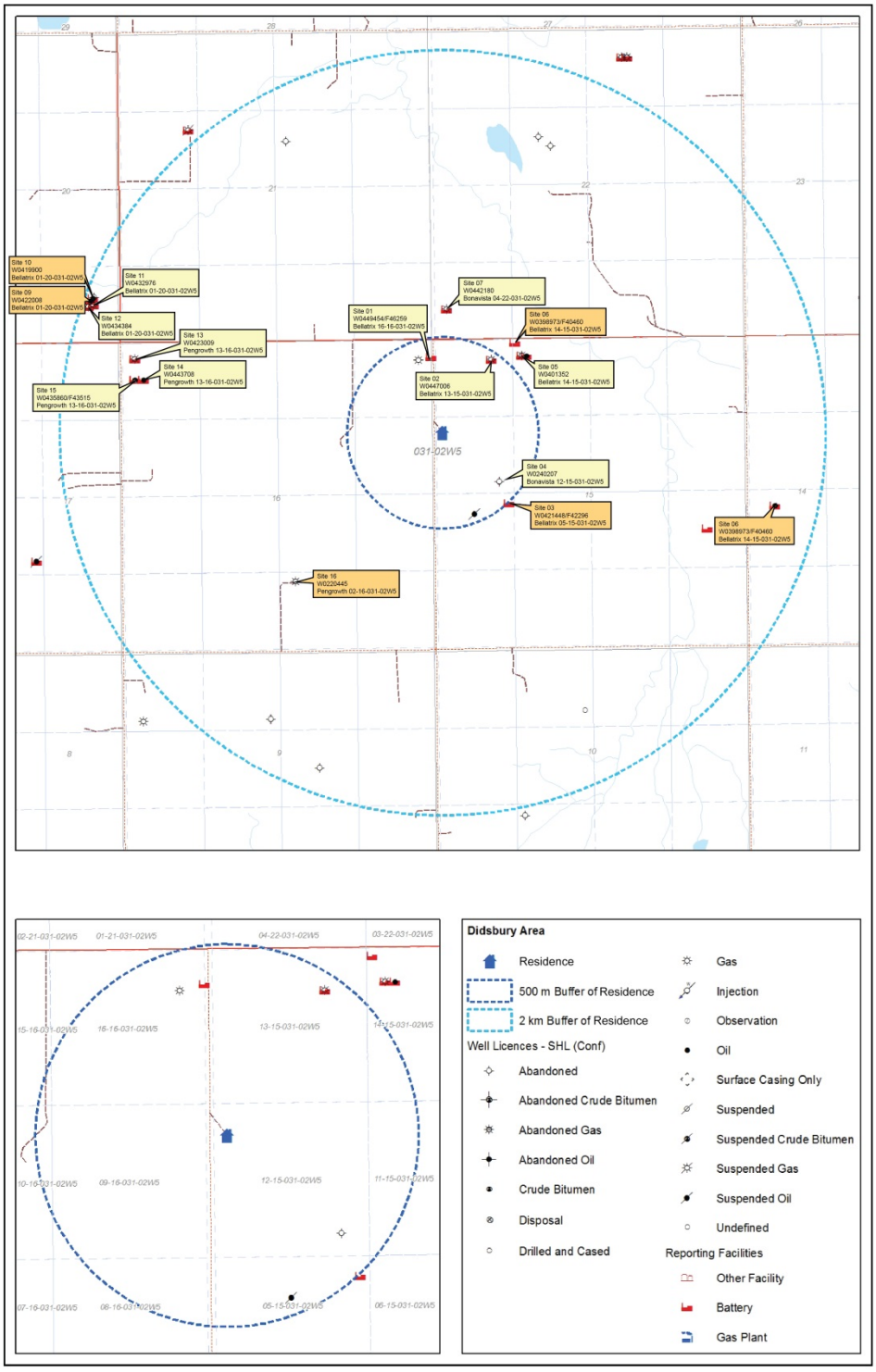

Figure 2. Sites within 2 km of residence that have a history of flaring or venting*

* All the Bellatrix sites were transferred from Angle Energy on December 13, 2013.

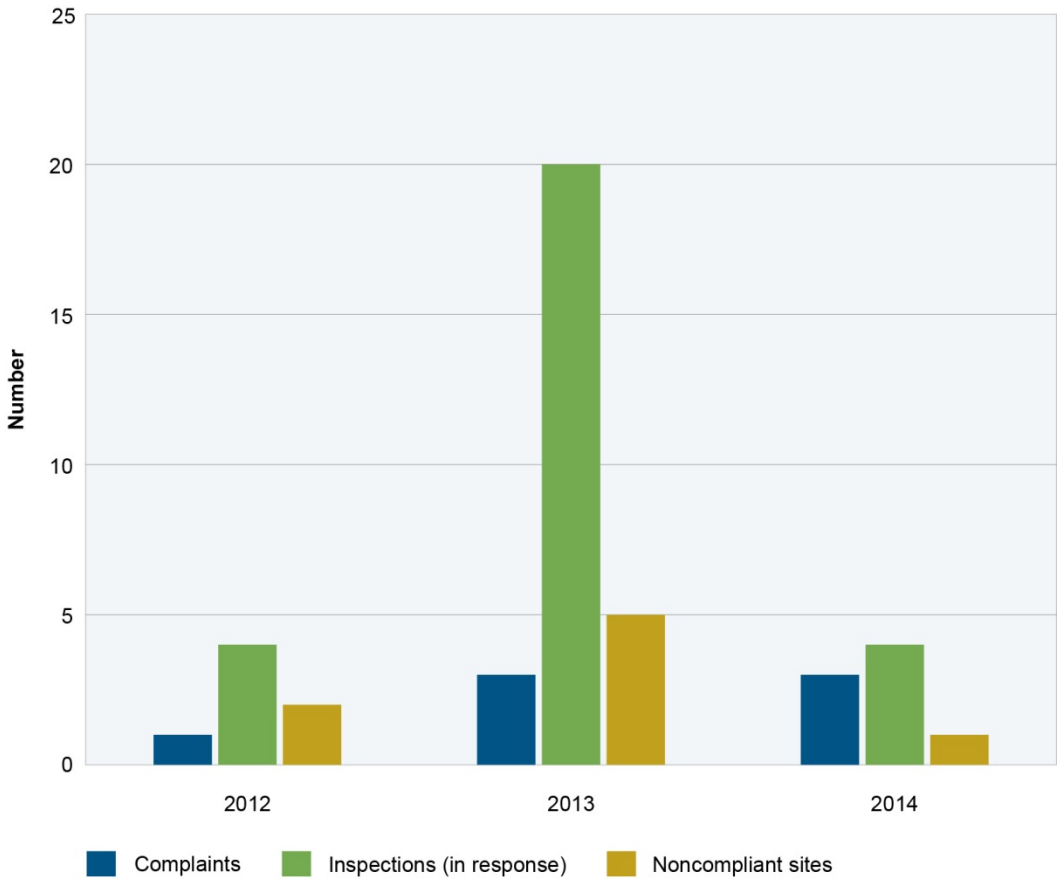

Figure 3. Summary of complaints, resulting inspections, and noncompliances*

* Even if only one low-risk noncompliance is found at a site, the AER describes the site as noncompliant.

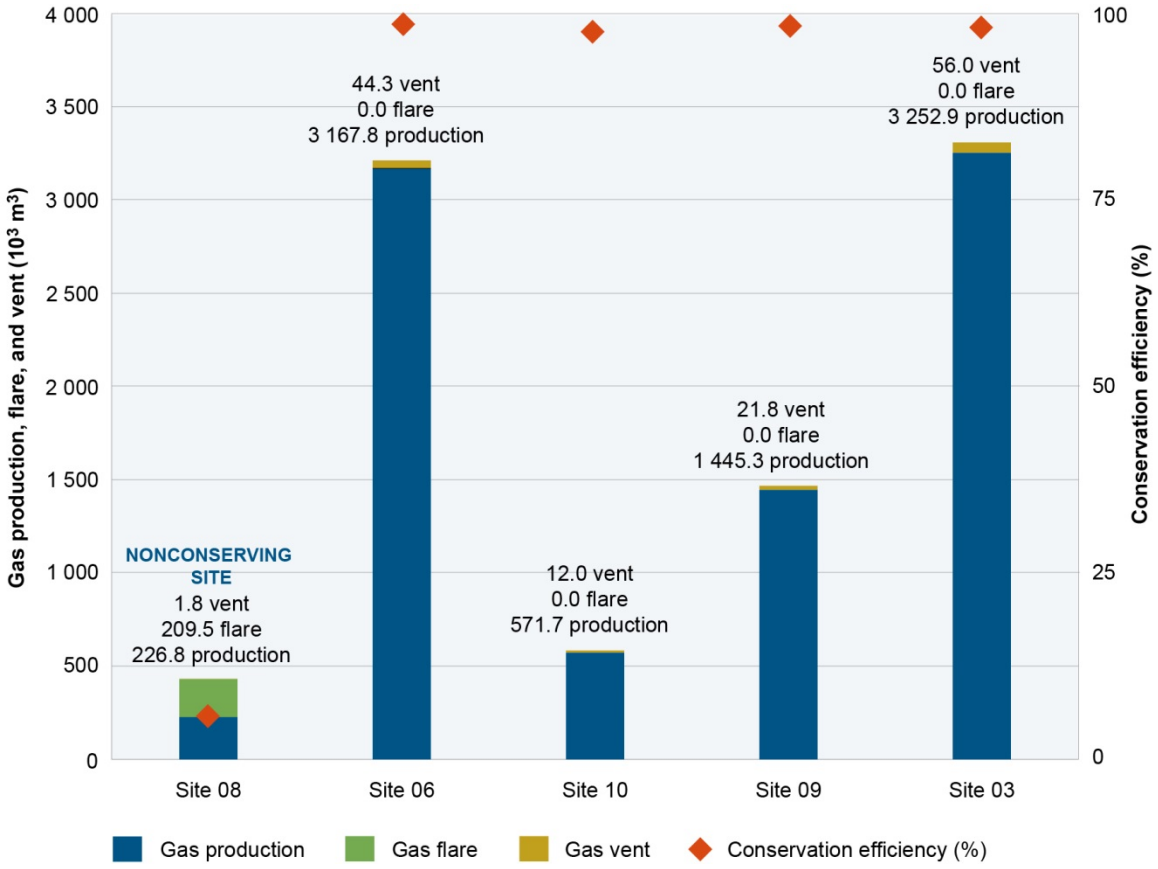

Figure 4. Gas production, flare, vent, and conservation efficiency, 2011

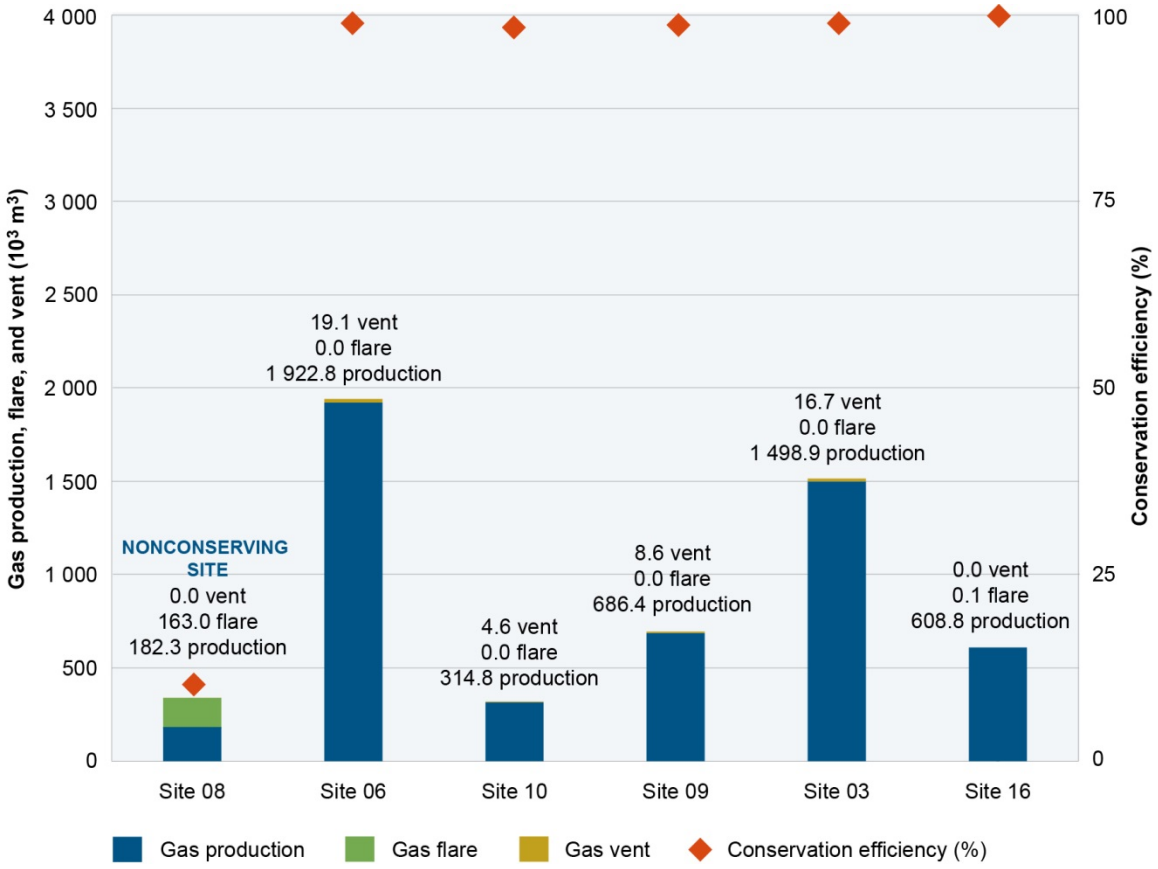

Figure 5. Gas production, flare, vent, and conservation efficiency, 2012

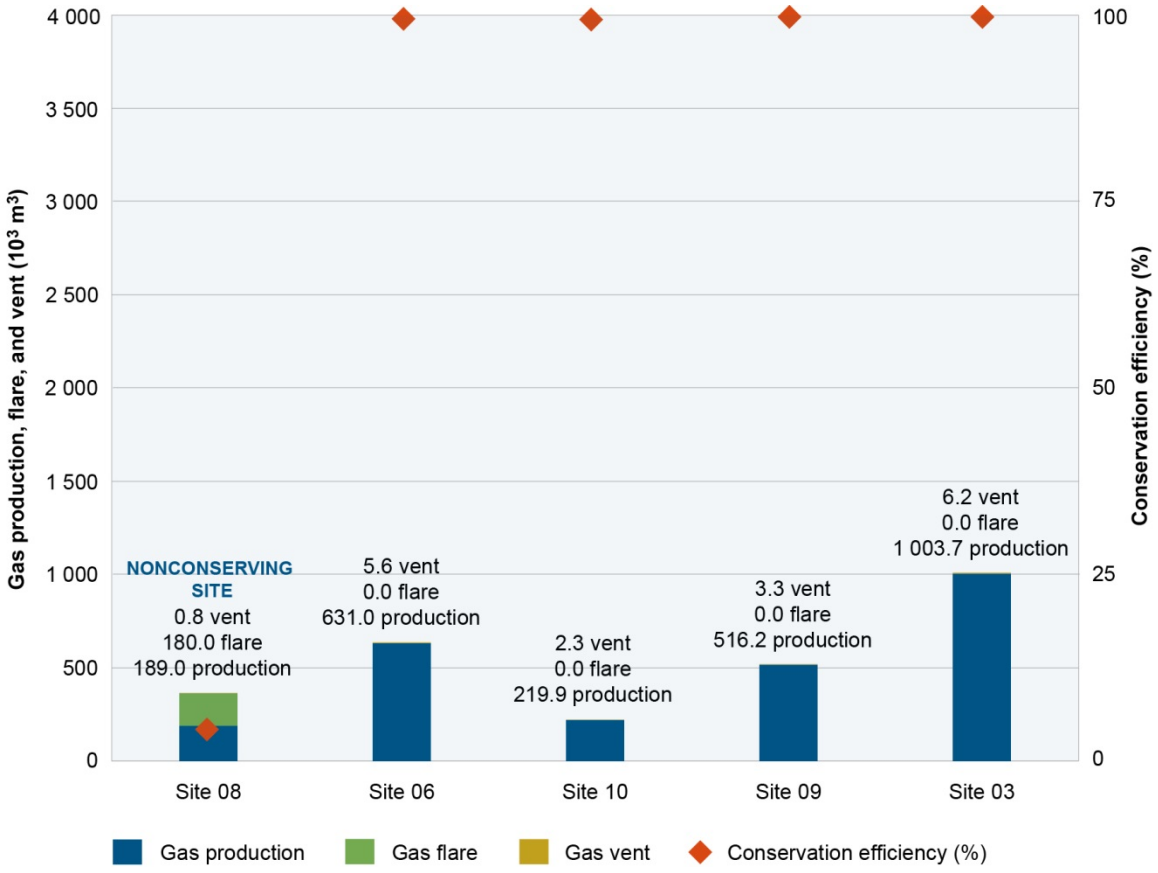

Figure 6. Gas production, flare, vent, and conservation efficiency, 2013

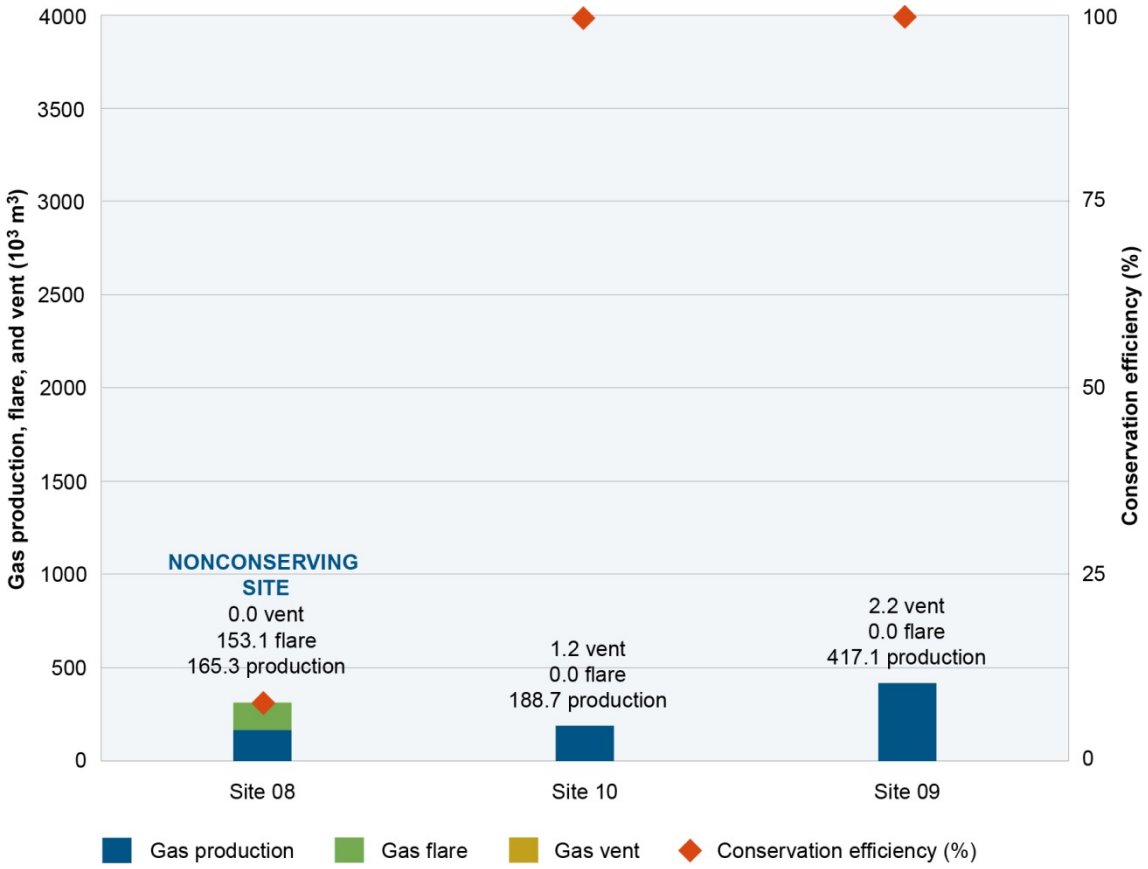

Figure 7. Gas production, flare, vent, and conservation efficiency, 2014

Appendix 2 Glossary

Dispersion modelling

Modelling how a plume of emissions moves through the air and the concentrations of compounds that might in the air after dispersion.

Flaring

The igniting of natural gas at the end of a flare stack—a long metal tube within which the gas ascends and is burned in the atmosphere at the top.

Hydraulic fracturing flowback

Flowback is the mixture of fluid that is collected after the hydraulic fracturing process, before production begins. Fluid is carried to the surface and separated from the gas, which is often vented or flared to the atmosphere.

Incineration

The mixing and combusting of waste gas streams, air, and fuel in an enclosed chamber.

Noncompliance (also known as noncompliant event)

A noncompliance event is when a company or licensee does not follow AER requirements. Education, prevention, and enforcement activities are used to ensure compliance with AER requirements.

Directive 019: Compliance Assurance specifically focuses on the prevention and enforcement aspects of compliance assurance and applies to all AER requirements and processes.

The AER uses a risk assessment process to predetermine the level of inherent risk associated with a noncompliance with each AER requirement. Each noncompliant event has an associated low- or high-risk rating based on the results of the risk assessment process for each AER requirement.

Routine flaring

Continuous or intermittent flaring that occurs on a regular bas due to normal operations.

Appendix 3 Complaint and Response History

Resident Complaint History Summary

Purpose: Information only

Intended Recipient: AER staff requiring background

Background

Inventory and history of well drilling within 1 km of the complainant's residence:

- Seven wells are located within 1 km of the residence (1 abandoned, 1 suspended, 5 active).
- They are approximately 400–600 m from the residence.
- They were drilled on the following dates:
  - August 29, 2000
  - September 18, 2008
  - October 09, 2008
  - July 27, 2010
  - February 13, 2012
  - July 28, 2012
  - December 10, 2012
- Five of the seven wells were licensed to and drilled by Angle Energy. The resident's concerns almost entirely centred around Angle's operations.
- All Angle licences were transferred to Bellatrix Exploration on December 13, 2013, and the resident's concerns have continued, focusing now on Bellatrix.

Site 01, W0449454/F46259, Bellatrix 16-16-031-02W5:

- Drilled on December 10, 2012.
- True vertical depth (TVD): 2391 m.
- Hydraulically fractured.
- 386 m from residence.
- Producing gas well.

- During normal operations, this site does not have flaring or venting; all produced gas and liquids are tied into a pipeline.
- During the initial well test, the gas produced was flared or incinerated.

Site 02, W0447006, Bellatrix 13-15-031-02W5:

- Drilled on July 28, 2012.
- TVD: 2377 m.
- Hydraulically fractured.
- 460 m from residence.
- Producing gas well.
- During normal operations this site does not have flaring or venting; all produced gas and liquids are tied into a pipeline.
- During the initial well test the gas produced was flared or incinerated.

Site 03, W0421448/F42296, Bellatrix 05-15-031-02W5:

- Drilled on July 27, 2010.
- TVD: 2394 m.
- Hydraulically fractured.
- 465 m from residence.
- Suspended; no production reported since March 2014.
- Between October 2010 and May 2013, there was gas vented from a hydrocarbon production tank on this location. On average 3.3 10^3 m^3 was vented per month during this time. The gas had an approximate H_2S concentration between 60–300 ppm, but was sweetened by an H_2S scrubbing agent prior to being vented.
- AER air monitoring unit conducted an inspection of the site on November 19, 2012, and noted no detectable levels of H_2S and SO_2.
- In June 2013, the production tank was removed and the hydrocarbons were shipped via pipeline. Following this the site did not have any flaring or venting during normal operations.
- During the initial well test, the gas produced was flared or incinerated.

Site 04, W0240207, Bonavista 12-15-031-02W5:

- Drilled on August 29, 2000.
- TVD: 2485 m.
- Not hydraulically fractured.
- 405 m distance from residence.
- Abandoned (drilled and abandoned; was never produced).

November 12, 2012, complaint response:

Although the resident indicated that they had been impacted since 2010, we only first received a complaint in October 2012, which was regarding drilling waste disposal at a well site near their residence.

- The Red Deer Field Centre (RDFC) conducted inspections and found a drilling sump was likely contaminated with hydrocarbons. Sampling was requested and contamination was confirmed by the licensee.
- A notice of noncompliance was issued for the contamination and the licensee was required to adequately clean up and dispose of the waste, as well as sample after the cleanup, all of which was completed.
- The resident was kept informed of the AER's findings and actions.

Following the initial complaint, the resident continued to call or e-mail to discuss issues and AER requirements with an inspector.

- February 15: RDFC provided the resident with information on how to retrieve AER information and records.
- February 13: The AER leader for alternative dispute resolution (ADR) contacted the resident, but determined that ADR was not appropriate. The resident would not agree to keep the process confidential or without prejudice. Information on how to submit an objection to new and prior development was provided.

February 19, 2013, complaint response:

The resident then submitted a detailed list of concerns on February 19, 2013, that the RDFC entered as a complaint. The concerns were about oil and gas operations near their residence and historical events that dated back to August 2010, including that the licensee did not follow AER well testing requirements (duration, notifications and emissions) and *Directive 060* flaring and venting requirements, as well as concerns about future development and the impact that Angle Energy has had on their life.

- Following the receipt of these concerns, the RDFC provided a detailed written reply to the resident responding to the questions on February 25.

February 26: The resident e-mailed three times with more concerns/statements similar to above, but also including the following:

a) they would bring their concerns to other organizations, stakeholders, and regulators;

b) the licensee and regulator are not cooperating to provide public documents;

c) they are not being properly notified and informed;

d) poor housekeeping at a nearby site;

e) health concerns (specifically that their daughter has a tumor);

f) animal health concerns relating to deaths of animals on their farm;

g) full disclosure of cumulative emissions in the vicinity of their home;

h) impacts on groundwater;

i) water well testing;

j) traffic safety;

k) a request that the AER facilitate site meetings;

l) a request to review third-party flaring studies; and

m) a request to speak to an emissions expert with the AER.

- February 26: Law staff provided information to the resident on how to properly request information, and submit an objection to energy activity.
- February 28–March 11: The RDFC conducted site inspections of wells and facilities within 2 km of the complainant's residence.
- February 22 and March 11: The RDFC conducted investigations of two historical well test operations that were identified – a notice of noncompliance for not providing notification to the AER and one for having an exposed flame from an incinerator were issued.
- Concerns about past consultation on facilities were referred to the Applications Audit Group for its review.
- Two investigations were conducted on historical well test operations that the resident had concerns about. One resulted in a low-risk noncompliance being found and the other a high-risk noncompliance. These operations occurred in the past and therefore no suspension or action was needed.

- Sixteen other inspections and investigations were conducted, covering every site within 2 km of the complainant's residence. One low-risk noncompliance was found. There were no indicators that groundwater contamination was likely, and no noncompliances with venting requirements were found.
- Flaring and venting data for the area was compiled and reviewed.
- Technical Operations reviewed records and provided advice to the RDFC staff.
- The RDFC explained the results of the inspections and investigations to the resident on March 4, as well as the following:
  - Discussed the resident's concerns.
  - Educated the resident specific to her concerns regarding flaring/incinerating emissions.
  - Informed the resident that operational concerns should be made when they are occurring or as soon as possible, not after they are complete.
  - Advised the resident to continue to use their healthcare provider for health concerns and involve AHS if wanted.
  - Informed the resident that if they have concerns about animal health, they should involve a veterinarian and, if they desired, Alberta Agriculture.

  The resident seemed overall satisfied with the response and follow-up, but still had concerns that AER requirements are not adequate.

March 4: The resident e-mailed with concerns about historical venting, odours, and notification with respect to a well site near their residence.

- The RDFC requested and reviewed records of operations at the well site, but a noncompliance was not evident. Because the issues occurred in the past, the RDFC was unable to confirm any noncompliance.

March 6: The resident e-mailed with concerns about historical off-lease odours from a well site near their residence and questions about a historical flaring operation.

- The RDFC spoke with the licensee regarding the odour concerns and informed the resident on March 7 of the licensee's actions and procedures to prevent future odours.

March 7: The resident e-mailed twice with concerns about combustion efficiency of an incinerator and concerns about a historical flaring operation that occurred near their residence.

March 8: The resident e-mailed requesting to speak to an AER professional to address their concerns about flaring efficiencies.

- March 12: The RDFC called and discussed the resident's previous concerns and the RDFC inspections and investigation results.

March 14: The resident e-mailed stating they were not satisfied with the RDFC's response. The resident e-mailed a second time on March 14 stating that their flaring and venting concerns had not been fully addressed.

- An AER air emissions expert contacted the complainant on March 14 to answer their questions.
- March 18: The RDFC spoke to the resident regarding their concerns. Venting, notification, consultation, depth of groundwater, hydraulic fracturing, and water well issues were discussed. The resident was instructed to call EP for any water well issues.
- The RDFC committed to the resident that a site near their residence would be reinspected in the spring to ensure that all oil staining was cleaned up. This action was completed.

June 25, 2013, complaint response:

The resident e-mailed with concerns about oil staining on a nearby well site that they had previously complained about, stating that it had not been cleaned up.

- An RDFC inspector had inspected the same site the morning just prior to the complaint. It was confirmed that the original staining was cleaned up, but the licensee had removed pipe racks, which revealed more staining.
- The inspector had already issued a noncompliance for the oil staining.
- The resident was advised of the AER's findings.

June 26 and 27: The resident responded with two more e-mails claiming that cleanup of the oil staining had never occurred and forwarded on other issues regarding the site that they were dealing with with the licensee.

- The RDFC requested the licensee provide proof that it had conducted the cleanup, which they did.
- The findings were provided to the resident.

June 27: The resident responded with one more e-mail stating that they were not satisfied with the AER's response and the information that we provided. They wanted the records demonstrating that cleanup had occurred provided to them.

- July 3: The RDFC responded to the resident with information on how to properly request and obtain records from the AER.
- AER Community Relations and Inspection staff met with the resident at their residence to discuss their concerns and the actions taken by the AER.

November 6, 2013, complaint response:

The resident called with concerns relating to historical operations on multiple wells near their residence and requesting that the AER test their water well. The resident followed up with an e-mail on November 7. They were concerned about historical operations that had occurred near their residence, what hydraulic fracturing fluids were used, well testing/flaring operations, noise, venting, odours, drilling operations/procedures, and water well contamination, and requested records and tour reports.

- The RDFC offered to call and respond to their questions. The resident refused and insisted on a written response so that it could be used as evidence in a case.
- The RDFC responded to the resident's request to have their water well tested on November 6 and 8, providing information that they must contact EP as it was their jurisdiction. An EP contact was provided.
- The RDFC provided a written response to their questions on November 18.

November 9 and 14: The resident e-mailed concerns to AER Public Affairs staff with concerns about obtaining "frac" fluid disclosure reports for historical operations that occurred near their residence.

- AER Public Affairs staff replied to the resident, referring them back to the RDFC.

November 12: The resident requested further information on wells near their residence.

- The RDFC provided the information.

November 13 and 14: The resident e-mailed questions regarding *Directive 059* requirements and reports that they had received from an information request to the AER.

- The RDFC responded to the questions.

November 14: The resident e-mailed further concerns to Public Affairs that the RDFC was unable to provide them with the information they wanted.

- The RDFC responded to the resident on November 15 regarding her concerns and providing information on how to properly request AER records.

November 15: The resident e-mailed further concerns regarding the records that they had requested and received from the AER.

November 18: The resident requested to meet with RDFC staff so that we could provide technical expertise and information reports.

- The RDFC declined the meeting requested but offered to continue to provide information.

November 18: The resident e-mailed Law staff and the RDFC reiterating many of the concerns expressed in previous complaints.

November 18: The resident e-mailed further concerns that they were not satisfied with the response from the RDFC and asked further questions relating to historical hydraulic fracturing and well abandonment.

- The RDFC responded on November 20, answering the questions.

November 20: The resident e-mailed the RDFC asking for historical public notification packages relating to wells near their residence and indicating it had not been properly done.

- The RDFC was able to provide some of the requested information on November 21, but advised the resident that they must go through the proper information request process to obtain the remainder.
- The RDFC referred the resident's notification concerns to the Applications Audit Team for their review.

November 24: The resident e-mailed the RDFC asking questions regarding a historical hydraulic fracturing operation.

- The RDFC provided the resident with answers to their questions on November 25.

November 25: The resident e-mailed a request to the RDFC asking for tour reports of wells that were historically drilled near their residence to be released to the resident.

- The RDFC responded to this request on November 26 telling the resident that they must request tour reports using the proper channels. Information on how to request information was once again provided.

December 19, 2013, meeting summary:

A meeting was held to provide information, answer questions, and set expectations going forwards. AER staff from the RDFC, AER Stakeholder and Government Relations Group, Technical Operations Group, as well as an air emissions expert and the resident attended.

The resident provided the following agenda items that were addressed: venting, surface casing vent flow, measuring and reporting venting, routine vs. temporary venting, flaring and conversion efficiencies, incineration of fracture fluid returns, compressor stations, compressor emissions, using sour gas as fuel in compressors, H_2S scrubbers (process and outcomes), general equipment overview (essentially how fluids are handled from the well head to pipeline), and a review of site photos.

The AER provided the following agenda items that were addressed: high-level summary of *Directive 056* audits by the Facilities Applications Audit Group and use of AER resources.

January 7, 2014 complaint response:

The resident called and was concerned that a well test flaring operation approximately 3 km from her residence had exceeded the 72-hour testing limit.

- The RDFC responded by conducting an inspection of the operation. It was found that the licensee had provided the needed initial flaring notification to the AER, but had failed to provide the notification to the AER that it was going to exceed the 72-hour limit.
- The licensee was issued a noncompliance for failure to notify the AER as required.
- The RDFC requested proof that the licensee was meeting the required exceptions to flare past the 72-hour limit; the licensee was able to satisfy this requirement.
- The resident was called back and the findings were explained.

July 31, 2014, complaint response:

The resident e-mailed with a concern that a well approximately 4 km from their residence was not properly protected from wellhead strikes.

- The RDFC reviewed the type of well at this location and determined that there is no requirement for any structure to prevent wellhead strikes.
- The RDFC responded back to the resident explaining the findings.

December 30, 2014, complaint response:

The resident called with concerns that they had not been properly notified of a well test flaring operation approximately 2.1 km from their residence.

- The RDFC reviewed and found that the flaring operation was 2.1 km from the residence; the required notification distance for this type of well is 1.5 km. Therefore, the licensee was in compliance.
- The RDFC spoke with the licensee and found that because the resident is known to have concerns with energy development, it had provided a good-neighbour notification to the resident prior to the operations occurring.
- The resident was informed of the RDFC findings but was not satisfied. They e-mailed further concerns on December 31 explaining their dissatisfaction.
- Prior to the operations occurring at this well, the licensee had advised the RDFC that it would be working near this concerned resident and that the resident would be provided information on the licensee’s activities in the area.
- The RDFC has inspected the drilling, well test flaring, and hydraulic fracturing operations at this well and found all to be in compliance at the time of inspection.

Complaint and AER Inspection History

1) Complaint received October 22, 2012
    - In response four inspections were completed; two found noncompliances
2) Complaint received February 19, 2013
    - In response 18 inspections were completed; three found noncompliances
3) Complaint received June 25, 2013
    - Site inspection was not required to respond
4) Complaint received November 6, 2013
    - Site inspection was not required to respond
5) Complaint received January 7, 2014
    - One inspection was completed and one noncompliance found
6) Complaint received July 31, 2014
    - Site inspection was not required to respond
7) Complaint received December 30, 2014
    - At the time, a site inspection was not required to respond as three inspections had been conducted or started in the area prior to the complaint being received

The total number of inspections conducted in direct or indirect response to the resident's complaints is 28.

Appendix 4 Results of Water Chemistry Analysis

Project		
Report To	JORDAN KING, AL	JORDAN KING, ALBERTA ENVIRONMENT~CAL
ALS File No.	L1434701	L1434701
Date Received	20-Mar-14 14:30	20-Mar-14 14:30
Date	02-Apr-14	02-Apr-14

RESULTS OF ANALYSIS

	DRUMHELLER	DRUMHELLER
Sample ID	WELL JK	WELL JK
Date Sampled	20-MAR-14	20-MAR-14
Time Sampled	11:58	11:58
ALS Sample ID	L1434701-1	L1434701-1
Matrix	Water	Water

Physical Tests	Value	Unit	Canadian Drinking water Guidelines (MAC) in mg/L	Canadian Drinking water Guidelines (AO) in mg/L	Water quality guidelines for protection of agricultural water uses mg/L
Turbidity	8.30	NTU	none	1 NTU (see note)	none
Anions and Nutrients					
Alkalinity, Total (as CaCO3)	720	mg/L	none	none	none
Bicarbonate (HCO3)	860	mg/L	none	none	none
Carbonate (CO3)	9.0	mg/L	none	none	none
Chloride (Cl)	1.76	mg/L	none	250	100 to 700 mg/L
Conductivity (EC)	1560	uS/cm	none	none	none
Fluoride (F)	0.84	mg/L	1.5 mg/L	none	1 mg/L irrigation 1 to 2 mg/L livestock
Hardness (as CaCO3)	39.1	mg/L	none	none	none
Hydroxide (OH)	<5.0	mg/L	none	none	none
Ion Balance	92.8	%	none	none	none
Nitrate and Nitrite (as N)	0.154	mg/L	10 mg/L	none	100 mg/L livestock
Nitrate (as N)	0.089	mg/L	45 mg/L	none	none
Nitrite (as N)	0.065	mg/L	3 mg/L	none	10 mg/L livestock
pH	8.33	pH	6.5-8.5	none	none
TDS (Calculated)	1000	mg/L	none	500	500 to 3500 mg/L irrigation 3000 mg/L livestock
Sulfate (SO4)	180	mg/L	none	500	none
Sulphide	0.0096	mg/L	none	0.05	none

Physical Tests	Value	Unit	Canadian Drinking water Guidelines (MAC) in mg/L	Canadian Drinking water Guidelines (AO) in mg/L	Water quality guidelines for protection of agricultural water uses mg/L
Bacteriological Tests					
E. coli	<1	CFU/100mL		0	
Coliform Bacteria - Fecal	<1	CFU/100mL		0	
Iron Bacteria	9000	CFU/mL			
Sulfur Reducing Bacteria	<200	CFU/mL			
Coliform Bacteria - Total	<1	CFU/100mL			
Total Metals					
Aluminum (Al)-Total	0.0188	mg/L	none	0.1 to 0.2	5
Antimony (Sb)-Total	<0.00010	mg/L	0.006 mg/L	none	
Arsenic (As)-Total	0.00021	mg/L	0.01 mg/L	none	
Barium (Ba)-Total	0.0299	mg/L	1 mg/L	none	
Beryllium (Be)-Total	<0.00050	mg/L	none	none	
Boron (B)-Total	0.177	mg/L	5 mg/L	none	
Cadmium (Cd)-Total	0.000974	mg/L	0.005 mg/L	none	
Calcium (Ca)-Total	9.47	mg/L	none	none	
Chromium (Cr)-Total	<0.00010	mg/L	0.05	none	
Cobalt (Co)-Total	<0.00010	mg/L	none	none	
Copper (Cu)-Total	0.00162	mg/L	none	1.0 mg/L	
Iron (Fe)-Total	1.12	mg/L	none	0.3 mg/L	
Lead (Pb)-Total	0.00106	mg/L	0.01 mg/L	none	
Lithium (Li)-Total	0.0856	mg/L	none	none	
Magnesium (Mg)-Total	3.76	mg/L	none	none	
Manganese (Mn)-Total	0.0154	mg/L	none	0.05	
Mercury (Hg)-Total	<0.000050	mg/L	0.001 mg/L	none	
Molybdenum (Mo)-Total	0.00574	mg/L	none	none	
Nickel (Ni)-Total	0.00025	mg/L	none	none	
Potassium (K)-Total	2.47	mg/L	none	none	
Selenium (Se)-Total	<0.00010	mg/L	0.05 mg/L	none	
Silver (Ag)-Total	0.000012	mg/L	none	none	
Sodium (Na)-Total	370	mg/L	none	200 mg/L	
Thallium (Tl)-Total	<0.000050	mg/L	none	none	
Tin (Sn)-Total	<0.00010	mg/L	none	none	
Titanium (Ti)-Total	0.00035	mg/L	none	none	
Uranium (U)-Total	0.000064	mg/L	0.02 mg/L	none	
Vanadium (V)-Total	0.00017	mg/L	none	none	
Zinc (Zn)-Total	0.0621	mg/L	none	5 mg/L	

Physical Tests	Value	Unit	Canadian Drinking water Guidelines (MAC) in mg/L	Canadian Drinking water Guidelines (AO) in mg/L	Water quality guidelines for protection of agricultural water uses mg/L
Sulfur Compounds					
Sulphide (as H2S)	0.0102	mg/L	none	500 mg/L	
Volatile Organic Compounds					
Benzene	<0.00050	mg/L	0.005 mg/L		
Bromobenzene	<0.0010	mg/L			
Bromochloromethane	<0.0010	mg/L			
Bromodichloromethane	<0.0010	mg/L			
Bromoform	<0.0010	mg/L			
Bromomethane	<0.010	mg/L			
Butane, Dissolved	<10	ug/L			
n-Butylbenzene	<0.0010	mg/L			
sec-Butylbenzene	<0.0010	mg/L			
tert-Butylbenzene	<0.0010	mg/L			
Carbon tetrachloride	<0.0010	mg/L	0.002 mg/L		
Chlorobenzene	<0.0010	mg/L			
Dibromochloromethane	<0.0010	mg/L			
Chloroethane	<0.010	mg/L			
Chloroform	<0.0010	mg/L			
Chloromethane	<0.010	mg/L			
2-Chlorotoluene	<0.0010	mg/L			
4-Chlorotoluene	<0.0010	mg/L			
1,2-Dibromo-3-chloropropane	<0.0010	mg/L			
1,2-Dibromoethane	<0.0010	mg/L			
Dibromomethane	<0.0010	mg/L			
1,2-Dichlorobenzene	<0.0010	mg/L			
1,3-Dichlorobenzene	<0.0010	mg/L			
1,4-Dichlorobenzene	<0.0010	mg/L			
Dichlorodifluoromethane	<0.0010	mg/L			
1,1-Dichloroethane	<0.0010	mg/L			
1,2-Dichloroethane	<0.0010	mg/L			
1,1-Dichloroethene	<0.0010	mg/L			
cis-1,2-Dichloroethene	<0.0010	mg/L			
trans-1,2-Dichloroethene	<0.0010	mg/L			
Methylene chloride	<0.0010	mg/L			
1,2-Dichloropropane	<0.0010	mg/L			
1,3-Dichloropropane	<0.0010	mg/L			

Physical Tests	Value	Unit	Canadian Drinking water Guidelines (MAC) in mg/L	Canadian Drinking water Guidelines (AO) in mg/L	Water quality guidelines for protection of agricultural water uses mg/L
2,2-Dichloropropane	<0.0010	mg/L			
1,1-Dichloropropene	<0.0010	mg/L			
cis-1,3-Dichloropropene	<0.0010	mg/L			
trans-1,3-Dichloropropene	<0.0010	mg/L			
Ethane, Dissolved	<5.0	ug/L			
Ethene, Dissolved	<5.0	ug/L			
Ethylbenzene	<0.00050	mg/L			
Hexachlorobutadiene	<0.0010	mg/L			
Isopropylbenzene	<0.0010	mg/L			
p-Isopropyltoluene	<0.0010	mg/L			
Methane, Dissolved	<5.0	ug/L			
Pentane, Dissolved	<10	ug/L			
Propane, Dissolved	<10	ug/L			
Propene, Dissolved	<10	ug/L			
n-Propylbenzene	<0.0010	mg/L			
Styrene	<0.0010	mg/L			
1,1,1,2-Tetrachloroethane	<0.0010	mg/L			
1,1,2,2-Tetrachloroethane	<0.0050	mg/L			
Tetrachloroethene	<0.0010	mg/L			
Toluene	<0.00050	mg/L			
1,2,3-Trichlorobenzene	<0.0010	mg/L			
1,2,4-Trichlorobenzene	<0.0010	mg/L			
1,1,1-Trichloroethane	<0.0010	mg/L			
1,1,2-Trichloroethane	<0.0010	mg/L			
Trichloroethene	<0.0010	mg/L			
Trichlorofluoromethane	<0.0010	mg/L			
1,2,3-Trichloropropane	<0.0020	mg/L			
1,2,4-Trimethylbenzene	<0.0010	mg/L			
1,3,5-Trimethylbenzene	<0.0010	mg/L			
Vinyl chloride	<0.00050	mg/L			
o-xylene	<0.00050	mg/L			
m+p-Xylene	<0.00050	mg/L			
m+p-Xylenes	<0.0010	mg/L			
Xylenes	<0.00071	mg/L			
F1(C6-C10)	<0.10	mg/L			
F1-BTEX	<0.10	mg/L			
Surrogate: 4-Bromofluorobenzene	99.1	%			
Surrogate: 3,4-Dichlorotoluene	103.7	%			

Physical Tests	Value	Unit	Canadian Drinking water Guidelines (MAC) in mg/L	Canadian Drinking water Guidelines (AO) in mg/L	Water quality guidelines for protection of agricultural water uses mg/L
Surrogate: 1,4-Difluorobenzene	99.4	%			
Hydrocarbons					
TEH (C11-C30)	<0.25	mg/L			
F2 (C10-C16)	<0.25	mg/L			
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	<0.000050	mg/L			
Acridine	<0.000050	mg/L			
Anthracene	<0.000010	mg/L			
Benzo(a)anthracene	<0.000015	mg/L			
Benzo(a)pyrene	<0.000010	mg/L	0.00001		
Benzo(b&j)fluoranthene	<0.000050	mg/L			
Benzo(g,h,i)perylene	<0.000020	mg/L			
Benzo(k)fluoranthene	<0.000050	mg/L			
Chrysene	<0.000050	mg/L			
Dibenzo(a,h)anthracene	<0.000050	mg/L			
Fluoranthene	<0.000020	mg/L			
Fluorene	<0.000050	mg/L			
Indeno(1,2,3-cd)pyrene	<0.000050	mg/L			
Naphthalene	<0.000050	mg/L			
Phenanthrene	<0.000050	mg/L			
Pyrene	<0.000020	mg/L			
Quinoline	<0.000050	mg/L			
Surrogate: d10-Acenaphthene	100.1	%			
Surrogate: d12-Chrysene	88.4	%			
Surrogate: d10-Phenanthrene	102.1	%			
B(A)P Total Potency Equivalent	<0.000039	mg/L			

Project	
Report To	JORDAN KING, ALBERTA ENVIRONMENT~CAL
ALS File No.	L1434701
Date Received	20-Mar-14 14:30
Date	02-Apr-14

DETECTION LIMITS

	DRUMHELLER
Sample ID	WELL JK
Date Sampled	20-MAR-14
Time Sampled	11:58
ALS Sample ID	L1434701-1
Matrix	Water
Physical Tests	
Turbidity	0.10
Anions and Nutrients	
Alkalinity, Total (as CaCO3)	5.0
Bicarbonate (HCO3)	5.0
Carbonate (CO3)	5.0
Chloride (Cl)	0.10
Conductivity (EC)	3.0
Fluoride (F)	0.10
Hardness (as CaCO3)	-
Hydroxide (OH)	5.0
Ion Balance	-
Nitrate and Nitrite (as N)	0.071
Nitrate (as N)	0.050
Nitrite (as N)	0.050
pH	0.10
TDS (Calculated)	-
Sulfate (SO4)	0.50
Sulphide	0.0020
Bacteriological Tests	
E. coli	1
Coliform Bacteria - Fecal	1
Iron Bacteria	25
Sulfur Reducing Bacteria	200
Coliform Bacteria - Total	1
Total Metals	
Aluminum (Al)-Total	0.0030
Antimony (Sb)-Total	0.00010
Arsenic (As)-Total	0.00010
Barium (Ba)-Total	0.000050
Beryllium (Be)-Total	0.00050
Boron (B)-Total	0.010
Cadmium (Cd)-Total	0.000010
Calcium (Ca)-Total	0.10
Chromium (Cr)-Total	0.00010
Cobalt (Co)-Total	0.00010
Copper (Cu)-Total	0.00010
Iron (Fe)-Total	0.030
Lead (Pb)-Total	0.000050
Lithium (Li)-Total	0.0050
Magnesium (Mg)-Total	0.10
Manganese (Mn)-Total	0.0050

Mercury (Hg)-Total	0.000050
Molybdenum (Mo)-Total	0.000050
Nickel (Ni)-Total	0.00010
Potassium (K)-Total	0.50
Selenium (Se)-Total	0.00010
Silver (Ag)-Total	0.000010
Sodium (Na)-Total	1.0
Thallium (Tl)-Total	0.000050
Tin (Sn)-Total	0.00010
Titanium (Ti)-Total	0.00030
Uranium (U)-Total	0.000010
Vanadium (V)-Total	0.00010
Zinc (Zn)-Total	0.0050

Sulfur Compounds

Sulphide (as H2S)	0.0020

Volatile Organic Compounds

Benzene	0.0010
Bromobenzene	0.0010
Bromochloromethane	0.0010
Bromodichloromethane	0.0010
Bromoform	0.0010
Bromomethane	0.010
Butane, Dissolved	10
n-Butylbenzene	0.0010
sec-Butylbenzene	0.0010
tert-Butylbenzene	0.0010
Carbon tetrachloride	0.0010
Chlorobenzene	0.0010
Dibromochloromethane	0.0010
Chloroethane	0.010
Chloroform	0.0010
Chloromethane	0.010
2-Chlorotoluene	0.0010
4-Chlorotoluene	0.0010
1,2-Dibromo-3-chloropropane	0.0010
1,2-Dibromoethane	0.0010
Dibromomethane	0.0010
1,2-Dichlorobenzene	0.0010
1,3-Dichlorobenzene	0.0010
1,4-Dichlorobenzene	0.0010
Dichlorodifluoromethane	0.0010
1,1-Dichloroethane	0.0010
1,2-Dichloroethane	0.0010
1,1-Dichloroethene	0.0010
cis-1,2-Dichloroethene	0.0010
trans-1,2-Dichloroethene	0.0010
Methylene chloride	0.0010
1,2-Dichloropropane	0.0010
1,3-Dichloropropane	0.0010
2,2-Dichloropropane	0.0010
1,1-Dichloropropene	0.0010
cis-1,3-Dichloropropene	0.0010
trans-1,3-Dichloropropene	0.0010
Ethane, Dissolved	5.0
Ethene, Dissolved	5.0
Ethylbenzene	0.0010
Hexachlorobutadiene	0.0010

Isopropylbenzene	0.0010
p-Isopropyltoluene	0.0010
Methane, Dissolved	5.0
Pentane, Dissolved	10
Propane, Dissolved	10
Propene, Dissolved	10
n-Propylbenzene	0.0010
Styrene	0.0010
1,1,1,2-Tetrachloroethane	0.0010
1,1,2,2-Tetrachloroethane	0.0050
Tetrachloroethene	0.0010
Toluene	0.0010
1,2,3-Trichlorobenzene	0.0010
1,2,4-Trichlorobenzene	0.0010
1,1,1-Trichloroethane	0.0010
1,1,2-Trichloroethane	0.0010
Trichloroethene	0.0010
Trichlorofluoromethane	0.0010
1,2,3-Trichloropropane	0.0020
1,2,4-Trimethylbenzene	0.0010
1,3,5-Trimethylbenzene	0.0010
Vinyl chloride	0.00050
o-xylene	0.00050
m+p-Xylene	0.00050
m+p-Xylenes	0.0010
Xylenes	0.00071
F1(C6-C10)	0.10
F1-BTEX	0.10
Surrogate: 4-Bromofluorobenzene	-
Surrogate: 3,4-Dichlorotoluene	-
Surrogate: 1,4-Difluorobenzene	-

Hydrocarbons

TEH (C11-C30)	0.25
F2 (C10-C16)	0.25

Polycyclic Aromatic Hydrocarbons

Acenaphthene	0.000050
Acridine	0.000050
Anthracene	0.000010
Benzo(a)anthracene	0.000015
Benzo(a)pyrene	0.000010
Benzo(b&j)fluoranthene	0.000050
Benzo(g,h,i)perylene	0.000020
Benzo(k)fluoranthene	0.000050
Chrysene	0.000050
Dibenzo(a,h)anthracene	0.000050
Fluoranthene	0.000020
Fluorene	0.000050
Indeno(1,2,3-cd)pyrene	0.000050
Naphthalene	0.000050
Phenanthrene	0.000050
Pyrene	0.000020
Quinoline	0.000050
Surrogate: d10-Acenaphthene	-
Surrogate: d12-Chrysene	-
Surrogate: d10-Phenanthrene	-
B(A)P Total Potency Equivalent	0.000039

Project
Report To
ALS File No.
Date Received
Date

UNITS

Sample ID
Date Sampled
Time Sampled
ALS Sample ID
Matrix

Physical Tests
Turbidity

Anions and Nutrients
Alkalinity, Total (as CaCO3)
Bicarbonate (HCO3)
Carbonate (CO3)
Chloride (Cl)
Conductivity (EC)
Fluoride (F)
Hardness (as CaCO3)
Hydroxide (OH)
Ion Balance
Nitrate and Nitrite (as N)
Nitrate (as N)
Nitrite (as N)
pH
TDS (Calculated)
Sulfate (SO4)
Sulphide

Bacteriological Tests
E. coli
Coliform Bacteria - Fecal
Iron Bacteria
Sulfur Reducing Bacteria
Coliform Bacteria - Total

Total Metals
Aluminum (Al)-Total
Antimony (Sb)-Total
Arsenic (As)-Total
Barium (Ba)-Total
Beryllium (Be)-Total
Boron (B)-Total
Cadmium (Cd)-Total
Calcium (Ca)-Total
Chromium (Cr)-Total
Cobalt (Co)-Total
Copper (Cu)-Total
Iron (Fe)-Total
Lead (Pb)-Total
Lithium (Li)-Total
Magnesium (Mg)-Total
Manganese (Mn)-Total

Mercury (Hg)-Total
Molybdenum (Mo)-Total
Nickel (Ni)-Total
Potassium (K)-Total
Selenium (Se)-Total
Silver (Ag)-Total
Sodium (Na)-Total
Thallium (Tl)-Total
Tin (Sn)-Total
Titanium (Ti)-Total
Uranium (U)-Total
Vanadium (V)-Total
Zinc (Zn)-Total

Sulfur Compounds
Sulphide (as H2S)

Volatile Organic Compounds
Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
Butane, Dissolved
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Carbon tetrachloride
Chlorobenzene
Dibromochloromethane
Chloroethane
Chloroform
Chloromethane
2-Chlorotoluene
4-Chlorotoluene
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
Dibromomethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
Methylene chloride
1,2-Dichloropropane
1,3-Dichloropropane
2,2-Dichloropropane
1,1-Dichloropropene
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethane, Dissolved
Ethene, Dissolved
Ethylbenzene
Hexachlorobutadiene

Isopropylbenzene
p-Isopropyltoluene
Methane, Dissolved
Pentane, Dissolved
Propane, Dissolved
Propene, Dissolved
n-Propylbenzene
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Vinyl chloride
o-xylene
m+p-Xylene
m+p-Xylenes
Xylenes
F1(C6-C10)
F1-BTEX
Surrogate: 4-Bromofluorobenzene
Surrogate: 3,4-Dichlorotoluene
Surrogate: 1,4-Difluorobenzene

Hydrocarbons
TEH (C11-C30)
F2 (C10-C16)

Polycyclic Aromatic Hydrocarbons
Acenaphthene
Acridine
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b&j)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene
Quinoline
Surrogate: d10-Acenaphthene
Surrogate: d12-Chrysene
Surrogate: d10-Phenanthrene
B(A)P Total Potency Equivalent

Project
Report To JORDAN KING, ALBERTA ENVIRONMENT~CAL
ALS File No. L1434701
Date Received 20-Mar-14 14:30
Date 02-Apr-14

REPLICATE RESULTS

Sample ID	Matrix	ALS ID	Analyte	Replicate 1	Replicate 2	Units	RPD	RPD Limit	Diff	Diff Limit	Qualifier
Bacteriological Tests											
L1434701-1	Water	WG1853080-2	Iron Bacteria	9000	9000	CFU/mL	0.0	50	-	-	-
Volatile Organic Compounds											
L1434701-1	Water	WG1848280-3	Butane, Dissolved	<10	<10	ug/L	N/A	50	-	-	RPD-NA
L1434701-1	Water	WG1848280-3	Ethane, Dissolved	<5.0	<5.0	ug/L	N/A	50	-	-	RPD-NA
L1434701-1	Water	WG1848280-3	Ethene, Dissolved	<5.0	<5.0	ug/L	N/A	50	-	-	RPD-NA
L1434701-1	Water	WG1848280-3	Methane, Dissolved	<5.0	<5.0	ug/L	N/A	50	-	-	RPD-NA
L1434701-1	Water	WG1848280-3	Pentane, Dissolved	<10	<10	ug/L	N/A	50	-	-	RPD-NA
L1434701-1	Water	WG1848280-3	Propane, Dissolved	<10	<10	ug/L	N/A	50	-	-	RPD-NA
L1434701-1	Water	WG1848280-3	Propene, Dissolved	<10	<10	ug/L	N/A	50	-	-	RPD-NA
Hydrocarbons											
L1434701-1	Water	WG1849481-6	TEH (C11-C30)	<0.25	<0.25	mg/L	N/A	30	-	-	RPD-NA
L1434701-1	Water	WG1849481-6	F2 (C10-C16)	<0.25	<0.25	mg/L	N/A	30	-	-	RPD-NA
Bacteriological Tests											
L1434701-1	Water	WG1853080-2	Sulfur Reducing Bacteria	<200	<200	CFU/mL	N/A	50	-	-	RPD-NA

Project
Report To JORDAN KING, ALBERTA ENVIRONMENT~CAL
ALS File No. L1434701
Date Received 20-Mar-14 14:30
Date 02-Apr-14

QUALITY CONTROL RESULTS

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Physical Tests										
Water	LCS	Turbidity	WG1847672-2		98.5		NTU	98.5	85-115	
Water	MB	Turbidity	WG1847672-1		<0.10	<0.1	NTU	-	0.1	
Anions and Nutrients										
Water	LCS	Alkalinity, Total (as CaCO3)	WG1848475-1		103		mg/L	102.6	85-115	
Water	LCS	Conductivity (EC)	WG1848475-1		98.4		uS/cm	98.4	90-110	
Water	LCS	pH	WG1848475-1		7.04		pH	7.04	6.9-7.1	
Water	LCS	Alkalinity, Total (as CaCO3)	WG1848475-3		98.3		mg/L	98.3	85-115	
Water	LCS	Conductivity (EC)	WG1848475-3		98.6		uS/cm	98.6	90-110	
Water	LCS	pH	WG1848475-3		7.04		pH	7.04	6.9-7.1	
Water	LCS	Chloride (Cl)	WG1850085-2		101	100	mg/L	101.0	90-110	
Water	LCS	Fluoride (F)	WG1850085-2		0.997	1.00	mg/L	99.7	90-110	
Water	LCS	Nitrate (as N)	WG1850085-2		2.52	2.50	mg/L	100.9	90-110	
Water	LCS	Nitrite (as N)	WG1850085-2		0.511	0.500	mg/L	102.1	90-110	
Water	LCS	Sulfate (SO4)	WG1850085-2		103	100	mg/L	102.5	90-110	
Water	LCS	Sulphide	WG1850505-2	0.075	102		mg/L	102.0	70-130	
Water	LCS	Sulphide	WG1850505-3	0.025	94.0		mg/L	94.0	70-130	
Water	MB	Chloride (Cl)	WG1850085-1		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Fluoride (F)	WG1850085-1		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Nitrate (as N)	WG1850085-1		<0.050	<0.05	mg/L	-	0.05	
Water	MB	Nitrite (as N)	WG1850085-1		<0.050	<0.05	mg/L	-	0.05	
Water	MB	Sulfate (SO4)	WG1850085-1		<0.50	<0.5	mg/L	-	0.5	
Water	MB	Sulphide	WG1850505-1		<0.0020	<0.002	mg/L	-	0.002	
Water	MS	Chloride (Cl)	WG1850085-4	Anonymous	102	103	mg/L	99.1	75-125	
Water	MS	Fluoride (F)	WG1850085-4	Anonymous	1.04	1.00	mg/L	104.4	75-125	
Water	MS	Nitrate (as N)	WG1850085-4	Anonymous	2.49	2.50	mg/L	99.4	75-125	
Water	MS	Nitrite (as N)	WG1850085-4	Anonymous	0.486	0.500	mg/L	97.1	75-125	
Water	MS	Sulfate (SO4)	WG1850085-4	Anonymous	119	120	mg/L	98.7	75-125	
Water	MS	Sulphide	WG1850505-5	Anonymous	93.8		mg/L	93.8	65-135	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Bacteriological Tests										
Water	MB	Coliform Bacteria - Fecal	WG1848078-1		<1	<1	CFU/100mL	-	1	
Water	MB	E. coli	WG1848083-1		<1	<1	CFU/100mL	-	1	
Water	MB	Coliform Bacteria - Total	WG1848083-1		<1	<1	CFU/100mL	-	1	
Water	MB	Iron Bacteria	WG1853080-1		<25	<25	CFU/mL	-	25	
Water	MB	Sulfur Reducing Bacteria	WG1853080-1		<200	<200	CFU/mL	-	200	
Total Metals										
Water	CRM	Mercury (Hg)-Total	WG1847586-2	LCS-TOT	0.000089	0.000100	mg/L	88.9	85-115	
Water	CRM	Calcium (Ca)-Total	WG1848416-2	TMRM	49.4	50.0	mg/L	98.8	80-120	
Water	CRM	Iron (Fe)-Total	WG1848416-2	TMRM	0.982	1.00	mg/L	98.2	80-120	
Water	CRM	Magnesium (Mg)-Total	WG1848416-2	TMRM	52.4	50.0	mg/L	104.8	80-120	
Water	CRM	Manganese (Mn)-Total	WG1848416-2	TMRM	0.249	0.250	mg/L	99.5	80-120	
Water	CRM	Potassium (K)-Total	WG1848416-2	TMRM	52.2	50.0	mg/L	104.5	80-120	
Water	CRM	Sodium (Na)-Total	WG1848416-2	TMRM	45.8	50.0	mg/L	91.5	80-120	
Water	CRM	Calcium (Ca)-Total	WG1850185-7	TMRM	49.4	50.0	mg/L	98.8	80-120	
Water	CRM	Iron (Fe)-Total	WG1850185-7	TMRM	0.980	1.00	mg/L	98.0	80-120	
Water	CRM	Magnesium (Mg)-Total	WG1850185-7	TMRM	50.5	50.0	mg/L	101.1	80-120	
Water	CRM	Manganese (Mn)-Total	WG1850185-7	TMRM	0.244	0.250	mg/L	97.5	80-120	
Water	CRM	Potassium (K)-Total	WG1850185-7	TMRM	49.9	50.0	mg/L	99.7	80-120	
Water	CRM	Sodium (Na)-Total	WG1850185-7	TMRM	49.5	50.0	mg/L	99.0	80-120	
Water	CRM	Aluminum (Al)-Total	WG1850359-2	TMRM	1.82	2.00	mg/L	91.0	80-120	
Water	CRM	Antimony (Sb)-Total	WG1850359-2	TMRM	0.918	1.00	mg/L	91.8	80-120	
Water	CRM	Arsenic (As)-Total	WG1850359-2	TMRM	0.911	1.00	mg/L	91.1	80-120	
Water	CRM	Barium (Ba)-Total	WG1850359-2	TMRM	0.242	0.250	mg/L	96.8	80-120	
Water	CRM	Beryllium (Be)-Total	WG1850359-2	TMRM	0.0902	0.100	mg/L	90.2	80-120	
Water	CRM	Boron (B)-Total	WG1850359-2	TMRM	0.936	1.00	mg/L	93.6	80-120	
Water	CRM	Cadmium (Cd)-Total	WG1850359-2	TMRM	0.0898	0.100	mg/L	89.8	80-120	
Water	CRM	Calcium (Ca)-Total	WG1850359-2	TMRM	49.7	50.0	mg/L	99.4	80-120	
Water	CRM	Chromium (Cr)-Total	WG1850359-2	TMRM	0.235	0.250	mg/L	94.2	80-120	
Water	CRM	Cobalt (Co)-Total	WG1850359-2	TMRM	0.231	0.250	mg/L	92.5	80-120	
Water	CRM	Copper (Cu)-Total	WG1850359-2	TMRM	0.217	0.250	mg/L	86.8	80-120	
Water	CRM	Iron (Fe)-Total	WG1850359-2	TMRM	0.992	1.00	mg/L	99.2	80-120	
Water	CRM	Lead (Pb)-Total	WG1850359-2	TMRM	0.479	0.500	mg/L	95.7	80-120	
Water	CRM	Lithium (Li)-Total	WG1850359-2	TMRM	0.237	0.250	mg/L	94.7	80-120	
Water	CRM	Magnesium (Mg)-Total	WG1850359-2	TMRM	51.2	50.0	mg/L	102.4	80-120	
Water	CRM	Manganese (Mn)-Total	WG1850359-2	TMRM	0.247	0.250	mg/L	98.7	80-120	
Water	CRM	Molybdenum (Mo)-Total	WG1850359-2	TMRM	0.236	0.250	mg/L	94.5	80-120	
Water	CRM	Nickel (Ni)-Total	WG1850359-2	TMRM	0.463	0.500	mg/L	92.6	80-120	
Water	CRM	Potassium (K)-Total	WG1850359-2	TMRM	50.3	50.0	mg/L	100.7	80-120	
Water	CRM	Selenium (Se)-Total	WG1850359-2	TMRM	0.915	1.00	mg/L	91.5	80-120	
Water	CRM	Silver (Ag)-Total	WG1850359-2	TMRM	0.0939	0.100	mg/L	93.9	80-120	
Water	CRM	Sodium (Na)-Total	WG1850359-2	TMRM	50.6	50.0	mg/L	101.2	80-120	
Water	CRM	Thallium (Tl)-Total	WG1850359-2	TMRM	0.929	1.00	mg/L	92.9	80-120	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Water	CRM	Tin (Sn)-Total	WG1850359-2	TMRM	0.467	0.500	mg/L	93.3	80-120	
Water	CRM	Titanium (Ti)-Total	WG1850359-2	TMRM	0.240	0.250	mg/L	95.9	80-120	
Water	CRM	Uranium (U)-Total	WG1850359-2	TMRM	0.00485	0.00500	mg/L	97.0	80-120	
Water	CRM	Vanadium (V)-Total	WG1850359-2	TMRM	0.480	0.500	mg/L	95.9	80-120	
Water	CRM	Zinc (Zn)-Total	WG1850359-2	TMRM	0.452	0.500	mg/L	90.3	80-120	
Water	CRM	Aluminum (Al)-Total	WG1850359-6	TMRM	1.93	2.00	mg/L	96.3	80-120	
Water	CRM	Antimony (Sb)-Total	WG1850359-6	TMRM	1.01	1.00	mg/L	100.8	80-120	
Water	CRM	Arsenic (As)-Total	WG1850359-6	TMRM	0.984	1.00	mg/L	98.4	80-120	
Water	CRM	Barium (Ba)-Total	WG1850359-6	TMRM	0.239	0.250	mg/L	95.6	80-120	
Water	CRM	Beryllium (Be)-Total	WG1850359-6	TMRM	0.0966	0.100	mg/L	96.6	80-120	
Water	CRM	Boron (B)-Total	WG1850359-6	TMRM	0.957	1.00	mg/L	95.7	80-120	
Water	CRM	Cadmium (Cd)-Total	WG1850359-6	TMRM	0.0961	0.100	mg/L	96.1	80-120	
Water	CRM	Calcium (Ca)-Total	WG1850359-6	TMRM	49.7	50.0	mg/L	99.4	80-120	
Water	CRM	Chromium (Cr)-Total	WG1850359-6	TMRM	0.251	0.250	mg/L	100.3	80-120	
Water	CRM	Cobalt (Co)-Total	WG1850359-6	TMRM	0.246	0.250	mg/L	98.3	80-120	
Water	CRM	Copper (Cu)-Total	WG1850359-6	TMRM	0.226	0.250	mg/L	90.4	80-120	
Water	CRM	Iron (Fe)-Total	WG1850359-6	TMRM	0.997	1.00	mg/L	99.7	80-120	
Water	CRM	Lead (Pb)-Total	WG1850359-6	TMRM	0.502	0.500	mg/L	100.4	80-120	
Water	CRM	Lithium (Li)-Total	WG1850359-6	TMRM	0.246	0.250	mg/L	98.3	80-120	
Water	CRM	Magnesium (Mg)-Total	WG1850359-6	TMRM	51.0	50.0	mg/L	102.1	80-120	
Water	CRM	Manganese (Mn)-Total	WG1850359-6	TMRM	0.245	0.250	mg/L	98.2	80-120	
Water	CRM	Molybdenum (Mo)-Total	WG1850359-6	TMRM	0.247	0.250	mg/L	98.9	80-120	
Water	CRM	Nickel (Ni)-Total	WG1850359-6	TMRM	0.500	0.500	mg/L	100.0	80-120	
Water	CRM	Potassium (K)-Total	WG1850359-6	TMRM	50.6	50.0	mg/L	101.1	80-120	
Water	CRM	Selenium (Se)-Total	WG1850359-6	TMRM	1.01	1.00	mg/L	101.0	80-120	
Water	CRM	Silver (Ag)-Total	WG1850359-6	TMRM	0.102	0.100	mg/L	101.7	80-120	
Water	CRM	Sodium (Na)-Total	WG1850359-6	TMRM	50.3	50.0	mg/L	100.5	80-120	
Water	CRM	Thallium (Tl)-Total	WG1850359-6	TMRM	1.00	1.00	mg/L	100.3	80-120	
Water	CRM	Tin (Sn)-Total	WG1850359-6	TMRM	0.492	0.500	mg/L	98.4	80-120	
Water	CRM	Titanium (Ti)-Total	WG1850359-6	TMRM	0.240	0.250	mg/L	95.9	80-120	
Water	CRM	Uranium (U)-Total	WG1850359-6	TMRM	0.00499	0.00500	mg/L	99.9	80-120	
Water	CRM	Vanadium (V)-Total	WG1850359-6	TMRM	0.512	0.500	mg/L	102.4	80-120	
Water	CRM	Zinc (Zn)-Total	WG1850359-6	TMRM	0.480	0.500	mg/L	95.9	80-120	
Water	MB	Mercury (Hg)-Total	WG1847586-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Calcium (Ca)-Total	WG1848416-1		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Iron (Fe)-Total	WG1848416-1		<0.030	<0.03	mg/L	-	0.03	
Water	MB	Magnesium (Mg)-Total	WG1848416-1		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Manganese (Mn)-Total	WG1848416-1		<0.0050	<0.005	mg/L	-	0.005	
Water	MB	Potassium (K)-Total	WG1848416-1		<0.50	<0.5	mg/L	-	0.5	
Water	MB	Sodium (Na)-Total	WG1848416-1		<1.0	<1	mg/L	-	1	
Water	MB	Calcium (Ca)-Total	WG1850185-1		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Iron (Fe)-Total	WG1850185-1		<0.030	<0.03	mg/L	-	0.03	
Water	MB	Magnesium (Mg)-Total	WG1850185-1		<0.10	<0.1	mg/L	-	0.1	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Water	MB	Manganese (Mn)-Total	WG1850185-1		<0.0050	<0.005	mg/L	-	0.005	
Water	MB	Potassium (K)-Total	WG1850185-1		<0.50	<0.5	mg/L	-	0.5	
Water	MB	Sodium (Na)-Total	WG1850185-1		<1.0	<1	mg/L	-	1	
Water	MB	Aluminum (Al)-Total	WG1850359-1		<0.0030	<0.003	mg/L	-	0.003	
Water	MB	Antimony (Sb)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Arsenic (As)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Barium (Ba)-Total	WG1850359-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Beryllium (Be)-Total	WG1850359-1		<0.00050	<0.0005	mg/L	-	0.0005	
Water	MB	Boron (B)-Total	WG1850359-1		<0.010	<0.01	mg/L	-	0.01	
Water	MB	Cadmium (Cd)-Total	WG1850359-1		<0.000010	<0.00001	mg/L	-	0.00001	
Water	MB	Calcium (Ca)-Total	WG1850359-1		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Chromium (Cr)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Cobalt (Co)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Copper (Cu)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Iron (Fe)-Total	WG1850359-1		<0.030	<0.03	mg/L	-	0.03	
Water	MB	Lead (Pb)-Total	WG1850359-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Lithium (Li)-Total	WG1850359-1		<0.0050	<0.005	mg/L	-	0.005	
Water	MB	Magnesium (Mg)-Total	WG1850359-1		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Manganese (Mn)-Total	WG1850359-1		<0.0050	<0.005	mg/L	-	0.005	
Water	MB	Molybdenum (Mo)-Total	WG1850359-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Nickel (Ni)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Potassium (K)-Total	WG1850359-1		<0.50	<0.5	mg/L	-	0.5	
Water	MB	Selenium (Se)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Silver (Ag)-Total	WG1850359-1		<0.000010	<0.00001	mg/L	-	0.00001	
Water	MB	Sodium (Na)-Total	WG1850359-1		<1.0	<1	mg/L	-	1	
Water	MB	Thallium (Tl)-Total	WG1850359-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Tin (Sn)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Titanium (Ti)-Total	WG1850359-1		<0.00030	<0.0003	mg/L	-	0.0003	
Water	MB	Uranium (U)-Total	WG1850359-1		<0.000010	<0.00001	mg/L	-	0.00001	
Water	MB	Vanadium (V)-Total	WG1850359-1		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Zinc (Zn)-Total	WG1850359-1		<0.0050	<0.005	mg/L	-	0.005	
Water	MB	Aluminum (Al)-Total	WG1850359-5		<0.0030	<0.003	mg/L	-	0.003	
Water	MB	Antimony (Sb)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Arsenic (As)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Barium (Ba)-Total	WG1850359-5		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Beryllium (Be)-Total	WG1850359-5		<0.00050	<0.0005	mg/L	-	0.0005	
Water	MB	Boron (B)-Total	WG1850359-5		<0.010	<0.01	mg/L	-	0.01	
Water	MB	Cadmium (Cd)-Total	WG1850359-5		<0.000010	<0.00001	mg/L	-	0.00001	
Water	MB	Calcium (Ca)-Total	WG1850359-5		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Chromium (Cr)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Cobalt (Co)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Copper (Cu)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Iron (Fe)-Total	WG1850359-5		<0.030	<0.03	mg/L	-	0.03	
Water	MB	Lead (Pb)-Total	WG1850359-5		<0.000050	<0.00005	mg/L	-	0.00005	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Water	MB	Lithium (Li)-Total	WG1850359-5		<0.0050	<0.005	mg/L	-	0.005	
Water	MB	Magnesium (Mg)-Total	WG1850359-5		<0.10	<0.1	mg/L	-	0.1	
Water	MB	Manganese (Mn)-Total	WG1850359-5		<0.0050	<0.005	mg/L	-	0.005	
Water	MB	Molybdenum (Mo)-Total	WG1850359-5		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Nickel (Ni)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Potassium (K)-Total	WG1850359-5		<0.50	<0.5	mg/L	-	0.5	
Water	MB	Selenium (Se)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Silver (Ag)-Total	WG1850359-5		<0.000010	<0.00001	mg/L	-	0.00001	
Water	MB	Sodium (Na)-Total	WG1850359-5		<1.0	<1	mg/L	-	1	
Water	MB	Thallium (Tl)-Total	WG1850359-5		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Tin (Sn)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Titanium (Ti)-Total	WG1850359-5		<0.00030	<0.0003	mg/L	-	0.0003	
Water	MB	Uranium (U)-Total	WG1850359-5		<0.000010	<0.00001	mg/L	-	0.00001	
Water	MB	Vanadium (V)-Total	WG1850359-5		<0.00010	<0.0001	mg/L	-	0.0001	
Water	MB	Zinc (Zn)-Total	WG1850359-5		<0.0050	<0.005	mg/L	-	0.005	
Water	MS	Calcium (Ca)-Total	WG1850359-4	Anonymous	549	549	mg/L	99.9	70-130	
Water	MS	Iron (Fe)-Total	WG1850359-4	Anonymous	491	500	mg/L	98.1	70-130	
Water	MS	Magnesium (Mg)-Total	WG1850359-4	Anonymous	537	525	mg/L	102.4	70-130	
Water	MS	Sodium (Na)-Total	WG1850359-4	Anonymous	598	604	mg/L	98.8	70-130	
Water	MS	Calcium (Ca)-Total	WG1850359-8	Anonymous	529	533	mg/L	99.2	70-130	
Water	MS	Iron (Fe)-Total	WG1850359-8	Anonymous	487	500	mg/L	97.4	70-130	
Water	MS	Magnesium (Mg)-Total	WG1850359-8	Anonymous	528	515	mg/L	102.4	70-130	
Water	MS	Sodium (Na)-Total	WG1850359-8	Anonymous	589	595	mg/L	98.7	70-130	
Volatile Organic Compounds										
Water	LCS	Benzene	WG1849752-3		93.6		mg/L	93.6	70-130	
Water	LCS	Bromobenzene	WG1849752-3		96.4		mg/L	96.4	70-130	
Water	LCS	Bromochloromethane	WG1849752-3		94.1		mg/L	94.1	70-130	
Water	LCS	Bromodichloromethane	WG1849752-3		91.9		mg/L	91.9	70-130	
Water	LCS	Bromoform	WG1849752-3		94.8		mg/L	94.8	70-130	
Water	LCS	Bromomethane	WG1849752-3		101		mg/L	100.6	60-140	
Water	LCS	n-Butylbenzene	WG1849752-3		97.6		mg/L	97.6	70-130	
Water	LCS	sec-Butylbenzene	WG1849752-3		98.7		mg/L	98.7	70-130	
Water	LCS	tert-Butylbenzene	WG1849752-3		97.8		mg/L	97.8	70-130	
Water	LCS	Carbon tetrachloride	WG1849752-3		75.8		mg/L	75.8	70-130	
Water	LCS	Chlorobenzene	WG1849752-3		96.9		mg/L	96.9	70-130	
Water	LCS	Dibromochloromethane	WG1849752-3		89.9		mg/L	89.9	70-130	
Water	LCS	Chloroethane	WG1849752-3		98.5		mg/L	98.5	60-140	
Water	LCS	Chloroform	WG1849752-3		95.9		mg/L	95.9	70-130	
Water	LCS	Chloromethane	WG1849752-3		121		mg/L	120.7	60-140	
Water	LCS	2-Chlorotoluene	WG1849752-3		99.0		mg/L	99.0	70-130	
Water	LCS	4-Chlorotoluene	WG1849752-3		98.6		mg/L	98.6	70-130	
Water	LCS	1,2-Dibromo-3-chloropropane	WG1849752-3		91.7		mg/L	91.7	70-130	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Water	LCS	1,2-Dibromoethane	WG1849752-3		84.5		mg/L	84.5	70-130	
Water	LCS	Dibromomethane	WG1849752-3		90.6		mg/L	90.6	70-130	
Water	LCS	1,2-Dichlorobenzene	WG1849752-3		96.3		mg/L	96.3	70-130	
Water	LCS	1,3-Dichlorobenzene	WG1849752-3		96.4		mg/L	96.4	70-130	
Water	LCS	1,4-Dichlorobenzene	WG1849752-3		98.0		mg/L	98.0	70-130	
Water	LCS	Dichlorodifluoromethane	WG1849752-3		129		mg/L	129.4	60-140	
Water	LCS	1,1-Dichloroethane	WG1849752-3		92.1		mg/L	92.1	70-130	
Water	LCS	1,2-Dichloroethane	WG1849752-3		93.5		mg/L	93.5	70-130	
Water	LCS	1,1-Dichloroethene	WG1849752-3		107		mg/L	107.1	70-130	
Water	LCS	cis-1,2-Dichloroethene	WG1849752-3		95.6		mg/L	95.6	70-130	
Water	LCS	trans-1,2-Dichloroethene	WG1849752-3		97.8		mg/L	97.8	70-130	
Water	LCS	Methylene chloride	WG1849752-3		103		mg/L	103.2	60-140	
Water	LCS	1,2-Dichloropropane	WG1849752-3		92.8		mg/L	92.8	70-130	
Water	LCS	1,3-Dichloropropane	WG1849752-3		92.6		mg/L	92.6	70-130	
Water	LCS	2,2-Dichloropropane	WG1849752-3		71.1		mg/L	71.1	70-130	
Water	LCS	1,1-Dichloropropene	WG1849752-3		96.3		mg/L	96.3	70-130	
Water	LCS	cis-1,3-Dichloropropene	WG1849752-3		90.6		mg/L	90.6	70-130	
Water	LCS	trans-1,3-Dichloropropene	WG1849752-3		87.2		mg/L	87.2	70-130	
Water	LCS	Ethylbenzene	WG1849752-3		96.6		mg/L	96.6	70-130	
Water	LCS	Hexachlorobutadiene	WG1849752-3		89.8		mg/L	89.8	70-130	
Water	LCS	Isopropylbenzene	WG1849752-3		96.7		mg/L	96.7	70-130	
Water	LCS	p-Isopropyltoluene	WG1849752-3		98.8		mg/L	98.8	50-150	
Water	LCS	n-Propylbenzene	WG1849752-3		97.9		mg/L	97.9	70-130	
Water	LCS	Styrene	WG1849752-3		97.0		mg/L	97.0	70-130	
Water	LCS	1,1,1,2-Tetrachloroethane	WG1849752-3		94.1		mg/L	94.1	70-130	
Water	LCS	1,1,2,2-Tetrachloroethane	WG1849752-3		99.0		mg/L	99.0	70-130	
Water	LCS	Tetrachloroethene	WG1849752-3		94.7		mg/L	94.7	70-130	
Water	LCS	Toluene	WG1849752-3		93.8		mg/L	93.8	70-130	
Water	LCS	1,2,3-Trichlorobenzene	WG1849752-3		89.4		mg/L	89.4	70-130	
Water	LCS	1,2,4-Trichlorobenzene	WG1849752-3		94.6		mg/L	94.6	70-130	
Water	LCS	1,1,1-Trichloroethane	WG1849752-3		91.2		mg/L	91.2	70-130	
Water	LCS	1,1,2-Trichloroethane	WG1849752-3		94.6		mg/L	94.6	70-130	
Water	LCS	Trichloroethene	WG1849752-3		99.7		mg/L	99.7	70-130	
Water	LCS	Trichlorofluoromethane	WG1849752-3		99.7		mg/L	99.7	60-140	
Water	LCS	1,2,3-Trichloropropane	WG1849752-3		98.1		mg/L	98.1	70-130	
Water	LCS	1,2,4-Trimethylbenzene	WG1849752-3		96.1		mg/L	96.1	70-130	
Water	LCS	1,3,5-Trimethylbenzene	WG1849752-3		97.4		mg/L	97.4	70-130	
Water	LCS	Vinyl chloride	WG1849752-3		118		mg/L	117.6	60-140	
Water	LCS	o-Xylene	WG1849752-3		96.8		mg/L	96.8	70-130	
Water	LCS	m+p-Xylenes	WG1849752-3		97.9		mg/L	97.9	70-130	
Water	LCS	Benzene	WG1853095-2		101		mg/L	101.2	70-130	
Water	LCS	Ethylbenzene	WG1853095-2		91.3		mg/L	91.3	70-130	
Water	LCS	Toluene	WG1853095-2		102		mg/L	101.8	70-130	
Water	LCS	o-xylene	WG1853095-2		99.8		mg/L	99.8	70-130	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Water	LCS	m+p-Xylene	WG1853095-2		92.4		mg/L	92.4	70-130	
Water	LCS	Xylenes	WG1853095-2		96.1		mg/L	96.1	70-130	
Water	LCS	F1(C6-C10)	WG1853095-2		103		mg/L	103.4	70-130	
Water	MB	Butane, Dissolved	WG1848280-2		<10	<10	ug/L	-	10	
Water	MB	Ethane, Dissolved	WG1848280-2		<5.0	<5	ug/L	-	5	
Water	MB	Ethene, Dissolved	WG1848280-2		<5.0	<5	ug/L	-	5	
Water	MB	Methane, Dissolved	WG1848280-2		<5.0	<5	ug/L	-	5	
Water	MB	Pentane, Dissolved	WG1848280-2		<10	<10	ug/L	-	10	
Water	MB	Propane, Dissolved	WG1848280-2		<10	<10	ug/L	-	10	
Water	MB	Propene, Dissolved	WG1848280-2		<10	<10	ug/L	-	10	
Water	MB	Benzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Bromobenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Bromochloromethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Bromodichloromethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Bromoform	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Bromomethane	WG1849752-1		<0.010	<0.01	mg/L	-	0.01	
Water	MB	n-Butylbenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	sec-Butylbenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	tert-Butylbenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Carbon tetrachloride	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Chlorobenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Dibromochloromethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Chloroethane	WG1849752-1		<0.010	<0.01	mg/L	-	0.01	
Water	MB	Chloroform	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Chloromethane	WG1849752-1		<0.010	<0.01	mg/L	-	0.01	
Water	MB	2-Chlorotoluene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	4-Chlorotoluene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,2-Dibromo-3-chloropropane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,2-Dibromoethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Dibromomethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,2-Dichlorobenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,3-Dichlorobenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,4-Dichlorobenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Dichlorodifluoromethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,1-Dichloroethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,2-Dichloroethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,1-Dichloroethene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	cis-1,2-Dichloroethene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	trans-1,2-Dichloroethene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Methylene chloride	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,2-Dichloropropane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,3-Dichloropropane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	2,2-Dichloropropane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Water	MB	1,1-Dichloropropene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	cis-1,3-Dichloropropene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	trans-1,3-Dichloropropene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Ethylbenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Hexachlorobutadiene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Isopropylbenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	p-Isopropyltoluene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	n-Propylbenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Styrene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,1,1,2-Tetrachloroethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,1,2,2-Tetrachloroethane	WG1849752-1		<0.0050	<0.005	mg/L	-	0.005	
Water	MB	Tetrachloroethene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Toluene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,2,3-Trichlorobenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,2,4-Trichlorobenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,1,1-Trichloroethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,1,2-Trichloroethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Trichloroethene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Trichlorofluoromethane	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,2,3-Trichloropropane	WG1849752-1		<0.0020	<0.002	mg/L	-	0.002	
Water	MB	1,2,4-Trimethylbenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	1,3,5-Trimethylbenzene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Vinyl chloride	WG1849752-1		<0.00050	<0.0005	mg/L	-	0.0005	
Water	MB	o-Xylene	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	m+p-Xylenes	WG1849752-1		<0.0010	<0.001	mg/L	-	0.001	
Water	MB	Benzene	WG1853095-1		<0.00050	<0.0005	mg/L	-	0.0005	
Water	MB	Ethylbenzene	WG1853095-1		<0.00050	<0.0005	mg/L	-	0.0005	
Water	MB	Toluene	WG1853095-1		<0.00050	<0.0005	mg/L	-	0.0005	
Water	MB	o-xylene	WG1853095-1		<0.00050	<0.0005	mg/L	-	0.0005	
Water	MB	m+p-Xylene	WG1853095-1		<0.00050	<0.0005	mg/L	-	0.0005	
Water	MB	Xylenes	WG1853095-1		<0.00071	<0.00071	mg/L	-	0.00071	
Water	MB	F1(C6-C10)	WG1853095-1		<0.10	<0.1	mg/L	-	0.1	
Hydrocarbons										
Water	LCS	TEH (C11-C30)	WG1849481-5		98.7		mg/L	98.7	70-130	
Water	LCS	F2 (C10-C16)	WG1849481-5		98.7		mg/L	98.7	65-135	
Water	MB	TEH (C11-C30)	WG1849481-1		<0.25	<0.25	mg/L	-	0.25	
Water	MB	F2 (C10-C16)	WG1849481-1		<0.25	<0.25	mg/L	-	0.25	
Water	MB	TEH (C11-C30)	WG1849481-4		<0.25	<0.25	mg/L	-	0.25	
Water	MB	F2 (C10-C16)	WG1849481-4		<0.25	<0.25	mg/L	-	0.25	
Water	MS	F2 (C10-C16)	WG1849481-3	Anonymous	87.9		mg/L	87.9	50-150	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Polycyclic Aromatic Hydrocarbons										
Water	LCS	Acenaphthene	WG1848504-2		110		mg/L	109.5	60-130	
Water	LCS	Acridine	WG1848504-2		111		mg/L	110.7	60-130	
Water	LCS	Anthracene	WG1848504-2		110		mg/L	109.7	60-130	
Water	LCS	Benzo(a)anthracene	WG1848504-2		105		mg/L	104.5	60-130	
Water	LCS	Benzo(a)pyrene	WG1848504-2		98.2		mg/L	98.2	60-130	
Water	LCS	Benzo(b&j)fluoranthene	WG1848504-2		101		mg/L	101.0	60-130	
Water	LCS	Benzo(g,h,i)perylene	WG1848504-2		106		mg/L	106.4	60-130	
Water	LCS	Benzo(k)fluoranthene	WG1848504-2		98.8		mg/L	98.8	60-130	
Water	LCS	Chrysene	WG1848504-2		103		mg/L	103.3	60-130	
Water	LCS	Dibenzo(a,h)anthracene	WG1848504-2		103		mg/L	103.3	60-130	
Water	LCS	Fluoranthene	WG1848504-2		104		mg/L	103.8	60-130	
Water	LCS	Fluorene	WG1848504-2		108		mg/L	108.4	60-130	
Water	LCS	Indeno(1,2,3-cd)pyrene	WG1848504-2		98.3		mg/L	98.3	60-130	
Water	LCS	Naphthalene	WG1848504-2		106		mg/L	105.5	50-130	
Water	LCS	Phenanthrene	WG1848504-2		107		mg/L	107.4	60-130	
Water	LCS	Pyrene	WG1848504-2		115		mg/L	114.6	60-130	
Water	LCS	Quinoline	WG1848504-2		107		mg/L	106.9	60-130	
Water	LCS	Acenaphthene	WG1848504-3		91.4		mg/L	91.4	60-130	
Water	LCS	Acridine	WG1848504-3		97.6		mg/L	97.6	60-130	
Water	LCS	Anthracene	WG1848504-3		93.3		mg/L	93.3	60-130	
Water	LCS	Benzo(a)anthracene	WG1848504-3		99.3		mg/L	99.3	60-130	
Water	LCS	Benzo(a)pyrene	WG1848504-3		97.9		mg/L	97.9	60-130	
Water	LCS	Benzo(b&j)fluoranthene	WG1848504-3		101		mg/L	100.7	60-130	
Water	LCS	Benzo(g,h,i)perylene	WG1848504-3		103		mg/L	103.3	60-130	
Water	LCS	Benzo(k)fluoranthene	WG1848504-3		96.7		mg/L	96.7	60-130	
Water	LCS	Chrysene	WG1848504-3		97.4		mg/L	97.4	60-130	
Water	LCS	Dibenzo(a,h)anthracene	WG1848504-3		100		mg/L	100.0	60-130	
Water	LCS	Fluoranthene	WG1848504-3		93.8		mg/L	93.8	60-130	
Water	LCS	Fluorene	WG1848504-3		92.9		mg/L	92.9	60-130	
Water	LCS	Indeno(1,2,3-cd)pyrene	WG1848504-3		104		mg/L	104.1	60-130	
Water	LCS	Naphthalene	WG1848504-3		87.9		mg/L	87.9	50-130	
Water	LCS	Phenanthrene	WG1848504-3		93.8		mg/L	93.8	60-130	
Water	LCS	Pyrene	WG1848504-3		102		mg/L	101.7	60-130	
Water	LCS	Quinoline	WG1848504-3		91.4		mg/L	91.4	60-130	
Water	MB	Acenaphthene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Acridine	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Anthracene	WG1848504-1		<0.000010	<0.00001	mg/L	-	0.00001	
Water	MB	Benzo(a)anthracene	WG1848504-1		<0.000015	<0.000015	mg/L	-	0.000015	
Water	MB	Benzo(a)pyrene	WG1848504-1		<0.000010	<0.00001	mg/L	-	0.00001	
Water	MB	Benzo(b&j)fluoranthene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Benzo(g,h,i)perylene	WG1848504-1		<0.000020	<0.00002	mg/L	-	0.00002	
Water	MB	Benzo(k)fluoranthene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	

Matrix	QC Type	Analyte	QC Spl. No.	Reference	Result	Target	Units	%	Limits	Qualifier
Water	MB	Chrysene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Dibenzo(a,h)anthracene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Fluoranthene	WG1848504-1		<0.000020	<0.00002	mg/L	-	0.00002	
Water	MB	Fluorene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Indeno(1,2,3-cd)pyrene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Naphthalene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Phenanthrene	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	
Water	MB	Pyrene	WG1848504-1		<0.000020	<0.00002	mg/L	-	0.00002	
Water	MB	Quinoline	WG1848504-1		<0.000050	<0.00005	mg/L	-	0.00005	

Project	
Report To	JORDAN KING, ALBERTA ENVIRONMENT~CAL
ALS File No.	L1434701
Date Received	20-Mar-14 14:30
Date	02-Apr-14

Hold Time Exceedances

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

QUALIFIER	DESCRIPTION
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L1434701-1	DRUMHELLER WELL JK	WSMT	Water sample(s) for total mercury analysis was not submitted in glass container with HCl preservative. Results may be biased low.

Appendix 5 ALS Environmental Analytical Report

ALBERTA ENVIRONMENT
ATTN: JORDAN KING
2 FL DEERFOOT SQ 2938 11 ST NE
CALGARY AB T2E 7L7

Date Received: 20-MAR-14
Report Date: 02-APR-14 15:18 (MT)
Version: FINAL

Client Phone: 403-899-5249

Certificate of Analysis

Lab Work Order #: L1434701

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Monica Gibson
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1434701-1 DRUMHELLER WELL JK							
Sampled By: JK on 20-MAR-14 @ 11:58							
Matrix: WATER							
BTEX, F1 (C6-C10),F2 (>C10-C16)							
BTEX and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	01-APR-14	01-APR-14	R2814874
Toluene	<0.00050		0.00050	mg/L	01-APR-14	01-APR-14	R2814874
Ethylbenzene	<0.00050		0.00050	mg/L	01-APR-14	01-APR-14	R2814874
o-xylene	<0.00050		0.00050	mg/L	01-APR-14	01-APR-14	R2814874
m+p-Xylene	<0.00050		0.00050	mg/L	01-APR-14	01-APR-14	R2814874
Xylenes	<0.00071		0.00071	mg/L	01-APR-14	01-APR-14	R2814874
F1(C6-C10)	<0.10		0.10	mg/L	01-APR-14	01-APR-14	R2814874
F1-BTEX	<0.10		0.10	mg/L	01-APR-14	01-APR-14	R2814874
F2							
F2 (C10-C16)	<0.25		0.25	mg/L	24-MAR-14	25-MAR-14	R2810682
Total CCME Metals							
Total Mercury in Water by CVAFS							
Mercury (Hg)-Total	<0.000050		0.000050	mg/L		21-MAR-14	R2808433
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0188		0.0030	mg/L		31-MAR-14	R2811607
Antimony (Sb)-Total	<0.00010		0.00010	mg/L		31-MAR-14	R2811607
Arsenic (As)-Total	0.00021		0.00010	mg/L		31-MAR-14	R2811607
Barium (Ba)-Total	0.0299		0.000050	mg/L		31-MAR-14	R2811607
Beryllium (Be)-Total	<0.00050		0.00050	mg/L		31-MAR-14	R2811607
Boron (B)-Total	0.177		0.010	mg/L		31-MAR-14	R2811607
Cadmium (Cd)-Total	0.000974		0.000010	mg/L		31-MAR-14	R2811607
Chromium (Cr)-Total	<0.00010		0.00010	mg/L		31-MAR-14	R2811607
Cobalt (Co)-Total	<0.00010		0.00010	mg/L		31-MAR-14	R2811607
Copper (Cu)-Total	0.00162		0.00010	mg/L		31-MAR-14	R2811607
Lead (Pb)-Total	0.00106		0.000050	mg/L		31-MAR-14	R2811607
Lithium (Li)-Total	0.0856		0.0050	mg/L		31-MAR-14	R2811607
Molybdenum (Mo)-Total	0.00574		0.000050	mg/L		31-MAR-14	R2811607
Nickel (Ni)-Total	0.00025		0.00010	mg/L		31-MAR-14	R2811607
Selenium (Se)-Total	<0.00010		0.00010	mg/L		31-MAR-14	R2811607
Silver (Ag)-Total	0.000012		0.000010	mg/L		31-MAR-14	R2811607
Thallium (Tl)-Total	<0.000050		0.000050	mg/L		31-MAR-14	R2811607
Tin (Sn)-Total	<0.00010		0.00010	mg/L		31-MAR-14	R2811607
Titanium (Ti)-Total	0.00035		0.00030	mg/L		31-MAR-14	R2811607
Uranium (U)-Total	0.000064		0.000010	mg/L		31-MAR-14	R2811607
Vanadium (V)-Total	0.00017		0.00010	mg/L		31-MAR-14	R2811607
Zinc (Zn)-Total	0.0621		0.0050	mg/L		31-MAR-14	R2811607
Total Metals in Water by ICPOES							
Calcium (Ca)-Total	9.47		0.10	mg/L		28-MAR-14	R2811445
Iron (Fe)-Total	1.12		0.030	mg/L		28-MAR-14	R2811445
Magnesium (Mg)-Total	3.76		0.10	mg/L		28-MAR-14	R2811445
Manganese (Mn)-Total	0.0154		0.0050	mg/L		28-MAR-14	R2811445
Potassium (K)-Total	2.47		0.50	mg/L		28-MAR-14	R2811445
Sodium (Na)-Total	370		1.0	mg/L		28-MAR-14	R2811445
Miscellaneous Parameters							
Coliform Bacteria - Fecal	<1		1	CFU/100mL		21-MAR-14	R2808869
Iron Bacteria	9000		25	CFU/mL		21-MAR-14	R2814834
Sulfur Reducing Bacteria	<200		200	CFU/mL		21-MAR-14	R2814834
Sulphide	0.0096		0.0020	mg/L		27-MAR-14	R2811751
Sulphide (as H2S)	0.0102		0.0020	mg/L		28-MAR-14	
TEH (C11-C30)	<0.25		0.25	mg/L	24-MAR-14	25-MAR-14	R2810682

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1434701-1 DRUMHELLER WELL JK							
Sampled By: JK on 20-MAR-14 @ 11:58							
Matrix: WATER							
TC and EC by Membrane Filtration							
Coliform Bacteria - Total	<1		1	CFU/100mL		21-MAR-14	R2808873
E. coli	<1		1	CFU/100mL		21-MAR-14	R2808873
Alkanes and Alkenes by Headspace/FID							
Methane, Dissolved	<5.0		5.0	ug/L	14-MAR-26	25-MAR-14	R2810750
Ethane, Dissolved	<5.0		5.0	ug/L	14-MAR-26	25-MAR-14	R2810750
Propane, Dissolved	<10		10	ug/L	14-MAR-26	25-MAR-14	R2810750
Butane, Dissolved	<10		10	ug/L	14-MAR-26	25-MAR-14	R2810750
Pentane, Dissolved	<10		10	ug/L	14-MAR-26	25-MAR-14	R2810750
Ethene, Dissolved	<5.0		5.0	ug/L	14-MAR-26	25-MAR-14	R2810750
Propene, Dissolved	<10		10	ug/L	14-MAR-26	25-MAR-14	R2810750
EPA 8260 Volatile Organics							
Dichlorodifluoromethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Chloromethane	<0.010		0.010	mg/L	22-MAR-14	22-MAR-14	R2810980
Vinyl chloride	<0.00050		0.00050	mg/L	22-MAR-14	22-MAR-14	R2810980
Bromomethane	<0.010		0.010	mg/L	22-MAR-14	22-MAR-14	R2810980
Chloroethane	<0.010		0.010	mg/L	22-MAR-14	22-MAR-14	R2810980
Trichlorofluoromethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,1-Dichloroethene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Methylene chloride	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
trans-1,2-Dichloroethene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,1-Dichloroethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
2,2-Dichloropropane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
cis-1,2-Dichloroethene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Chloroform	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Bromochloromethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,2-Dichloroethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,1,1-Trichloroethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,1-Dichloropropene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Carbon tetrachloride	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Benzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Trichloroethene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,2-Dichloropropane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Bromodichloromethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Dibromomethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
cis-1,3-Dichloropropene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
trans-1,3-Dichloropropene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Toluene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,1,2-Trichloroethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,3-Dichloropropane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Tetrachloroethene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Dibromochloromethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,2-Dibromoethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Chlorobenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Ethylbenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,1,1,2-Tetrachloroethane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
m+p-Xylenes	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
o-Xylene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Styrene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Bromoform	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Isopropylbenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,1,2,2-Tetrachloroethane	<0.0050		0.0050	mg/L	22-MAR-14	22-MAR-14	R2810980

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1434701-1 DRUMHELLER WELL JK							
Sampled By: JK on 20-MAR-14 @ 11:58							
Matrix: WATER							
EPA 8260 Volatile Organics							
1,2,3-Trichloropropane	<0.0020		0.0020	mg/L	22-MAR-14	22-MAR-14	R2810980
n-Propylbenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Bromobenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,3,5-Trimethylbenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
2-Chlorotoluene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
4-Chlorotoluene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
tert-Butylbenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,2,4-Trimethylbenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
sec-Butylbenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
p-Isopropyltoluene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,3-Dichlorobenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,4-Dichlorobenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
n-Butylbenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,2-Dichlorobenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,2-Dibromo-3-chloropropane	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,2,4-Trichlorobenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Hexachlorobutadiene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
1,2,3-Trichlorobenzene	<0.0010		0.0010	mg/L	22-MAR-14	22-MAR-14	R2810980
Surrogate: 1,4-Difluorobenzene	99.4		70-130	%	22-MAR-14	22-MAR-14	R2810980
Surrogate: 4-Bromofluorobenzene	99.1		70-130	%	22-MAR-14	22-MAR-14	R2810980
Surrogate: 3,4-Dichlorotoluene	103.7		70-130	%	22-MAR-14	22-MAR-14	R2810980
CCME PAHs							
Naphthalene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Quinoline	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Acenaphthene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Fluorene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Phenanthrene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Anthracene	<0.000010		0.000010	mg/L	25-MAR-14	25-MAR-14	R2809595
Acridine	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Fluoranthene	<0.000020		0.000020	mg/L	25-MAR-14	25-MAR-14	R2809595
Pyrene	<0.000020		0.000020	mg/L	25-MAR-14	25-MAR-14	R2809595
Benzo(a)anthracene	<0.000015		0.000015	mg/L	25-MAR-14	25-MAR-14	R2809595
Chrysene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Benzo(b&j)fluoranthene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Benzo(k)fluoranthene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Benzo(a)pyrene	<0.000010		0.000010	mg/L	25-MAR-14	25-MAR-14	R2809595
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	25-MAR-14	25-MAR-14	R2809595
Indeno(1,2,3-cd)pyrene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
Dibenzo(a,h)anthracene	<0.000050		0.000050	mg/L	25-MAR-14	25-MAR-14	R2809595
B(A)P Total Potency Equivalent	<0.000039		0.000039	mg/L	25-MAR-14	25-MAR-14	R2809595
Surrogate: d10-Acenaphthene	100.1		60-130	%	25-MAR-14	25-MAR-14	R2809595
Surrogate: d10-Phenanthrene	102.1		60-130	%	25-MAR-14	25-MAR-14	R2809595
Surrogate: d12-Chrysene	88.4		60-130	%	25-MAR-14	25-MAR-14	R2809595
Routine Potable Water							
Chloride (Cl)							
Chloride (Cl)	1.76		0.10	mg/L		21-MAR-14	R2811330
Fluoride							
Fluoride (F)	0.84		0.10	mg/L		21-MAR-14	R2811330
Ion Balance Calculation							
Ion Balance	92.8			%		31-MAR-14	
TDS (Calculated)	1000			mg/L		31-MAR-14	
Hardness (as CaCO3)	39.1			mg/L		31-MAR-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1434701-1 DRUMHELLER WELL JK							
Sampled By: JK on 20-MAR-14 @ 11:58							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.154		0.071	mg/L		27-MAR-14	
Nitrate-N							
Nitrate (as N)	0.089		0.050	mg/L		21-MAR-14	R2811330
Nitrite-N							
Nitrite (as N)	0.065		0.050	mg/L		21-MAR-14	R2811330
Sulfate (SO4)							
Sulfate (SO4)	180		0.50	mg/L		21-MAR-14	R2811330
Turbidity							
Turbidity	8.30		0.10	NTU		21-MAR-14	R2808521
pH, Conductivity and Total Alkalinity							
pH	8.33		0.10	pH		21-MAR-14	R2809553
Conductivity (EC)	1560		3.0	uS/cm		21-MAR-14	R2809553
Bicarbonate (HCO3)	860		5.0	mg/L		21-MAR-14	R2809553
Carbonate (CO3)	9.0		5.0	mg/L		21-MAR-14	R2809553
Hydroxide (OH)	<5.0		5.0	mg/L		21-MAR-14	R2809553
Alkalinity, Total (as CaCO3)	720		5.0	mg/L		21-MAR-14	R2809553

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Numbe	Client ID	Qualifier	Description
L1434701-1	DRUMHELLER WELL JK	WSMT	Water sample(s) for total mercury analysis was not submitted in glass container with HCl preservative. Results may be biased low.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTX,F1-CL	Water	BTEX and F1 (C6-C10)	EPA 5030/8015& 8260-P&T GC-MS/FID
C1/C5-HS-FID-WT	Water	Alkanes and Alkenes by Headspace/FID	EPA REGION 1, NATATTEN.WPD, REV. 1
Water samples are collected in headspace vials containing perservative. A volume of water is withdrawn from the un-capped vial. After shaking & equilibration, the vial headspace is analyzed for target gases by GC/FID. The concentration of the gas in water is proprtional to the partial pressure of the gas above the liquid & is calculated using Henry's Law.			
CL-CL	Water	Chloride (Cl)	APHA 4110 B-Ion Chromatography
Inorganic Anions by ion chromatography (IC) in water and aqueaous extracts of soils.			
F-IC-CL	Water	Fluoride	APHA 4110 B-Ion Chromatography
F2-CL	Water	F2	EPA 3510/8000-GC-FID
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222B MF
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
HG-TOT-CVAFS-CL	Water	Total Mercury in Water by CVAFS	EPA 1631E
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
IB-BART-SQ-CL	Water	Iron Bacteria, Semi-quantitative	BART TEST KIT
Iron Related Bacteria- IRB BART Method (Semi-Quantitative): A small amount of sample is transferred to a vial (anaerobic chamber). Approximate IRB populations (colony forming units /mL) are determined by observing the reaction within the chamber over a period of 9 days. This method is applicable to both iron-oxidizing and iron-reducing bacteria.			
IONBALANCE-CL	Water	Ion Balance Calculation	APHA 1030E
MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
MET-TOT-ICP-CL	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion using a hotblock (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NO2-CL	Water	Nitrite-N	APHA 4110 B-Ion Chromatography
NO3-IC-CL	Water	Nitrate-N	APHA 4110 B-Ion Chromatography
PAH-CCME-CL	Water	CCME PAHs	EPA 3510/8270-GC/MS
PH/EC/ALK-CL	Water	pH, Conductivity and Total Alkalinity	APHA 4500H,2510,2320
All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed) pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode. Alkalinity measurement is based on the sample's capacity to neutralize acid Conductivity measurement is based on the sample's capacity to convey an electric current			
SO4-CL	Water	Sulfate (SO4)	APHA 4110 B-Ion Chromatography
SRB-BART-SQ-CL	Water	Sulphate Reducing Bacteria, Semi-quantit	BART TEST KIT

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Sulfate-Reducing Bacteria SRB BART Method (Semi-Quantitative):			
A small amount of sample is transferred to a vial (anaerobic chamber) that contains ferrous iron. If SRB activity is present sulfate is reduced to hydrogen sulphide, which reacts with the ferrous iron to form black iron sulfide. The formation of this product is observed over 9 days to determine the approximate SRB population (colony forming units /ml). Operators using the SRB-BART method for the detection of deep-seated SRB infestations associated with wells and distribution systems may find it advantageous to have observations continued to the 15th day. This is because some SRB do not exhibit reaction patterns until other bacteria have already grown within the tester. In water pipelines and biofouling water wells the time lags can be delayed until days 11 to 15.			
SULPHIDE-ED	Water	Sulphide	APHA 4500 -S E-Auto-Colorimetry
SULPHIDE>H2S-ED	Water	Sulphide as Hydrogen Sulphide	Calculation from Sulphide
TC-EC-MF-CL	Water	TC and EC by Membrane Filtration	APHA 9222 I
Coliform Bacteria in Water by Membrane Filtration: Total Coliforms and E.coli. This analysis is carried out using procedures adapted from APHA Method 9222 I "Simultaneous Detection of Total Coliform and E.coli by Fluorogen/Chromogen Membrane Filter Procedure". A known sample volume is filtered through a 0.45 micron membrane filter. The test involves a 24 hour incubation of the filter on MI agar. This method is used for non-turbid water with a low background bacteria level.			
TEH-ADD-CL	Water	TEH (C11-C30)	EPA 3510/8000-GC-FID
TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer
A strong light beam is sent through a transparent tube containing the sample. Light that is reflected at 90 degrees to the axis by suspended particles is detected by the photocell. The electrical response is proportional to the sample turbidity.			
VOC-8260-CL	Water	EPA 8260 Volatile Organics	SW 846 8260-GC-MS
Volatile compounds are purged from the sample matrix with an inert gas, adsorbed onto a sorbent trap, and then desorbed into a capillary gas chromatograph equipped with a mass selective detector. Target compound concentrations are measured using mass spectrometry detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: ALBERTA ENVIRONMENT
2 FL DEERFOOT SQ 2938 11 ST NE
CALGARY AB T2E 7L7
Contact: JORDAN KING

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-CL	**Water**							
Batch R2814874								
WG1853095-2 LCS								
Benzene			101.2		%		70-130	02-APR-14
Toluene			101.8		%		70-130	02-APR-14
Ethylbenzene			91.3		%		70-130	02-APR-14
o-xylene			99.8		%		70-130	02-APR-14
m+p-Xylene			92.4		%		70-130	02-APR-14
Xylenes			96.1		%		70-130	02-APR-14
F1(C6-C10)			103.4		%		70-130	02-APR-14
WG1853095-1 MB								
Benzene			<0.00050		mg/L		0.0005	01-APR-14
Toluene			<0.00050		mg/L		0.0005	01-APR-14
Ethylbenzene			<0.00050		mg/L		0.0005	01-APR-14
o-xylene			<0.00050		mg/L		0.0005	01-APR-14
m+p-Xylene			<0.00050		mg/L		0.0005	01-APR-14
Xylenes			<0.00071		mg/L		0.00071	01-APR-14
F1(C6-C10)			<0.10		mg/L		0.1	01-APR-14
C1/C5-HS-FID-WT	**Water**							
Batch R2810750								
WG1848280-1 CVS								
Methane, Dissolved			103.0		%		70-130	25-MAR-14
Ethane, Dissolved			98.1		%		70-130	25-MAR-14
Propane, Dissolved			98.3		%		70-130	25-MAR-14
Ethene, Dissolved			101.4		%		70-130	25-MAR-14
Propene, Dissolved			99.8		%		70-130	25-MAR-14
WG1848280-3 DUP		**L1434701-1**						
Methane, Dissolved		<5.0	<5.0	RPD-NA	ug/L	N/A	50	25-MAR-14
Ethane, Dissolved		<5.0	<5.0	RPD-NA	ug/L	N/A	50	25-MAR-14
Propane, Dissolved		<10	<10	RPD-NA	ug/L	N/A	50	25-MAR-14
Butane, Dissolved		<10	<10	RPD-NA	ug/L	N/A	50	25-MAR-14
Pentane, Dissolved		<10	<10	RPD-NA	ug/L	N/A	50	25-MAR-14
Ethene, Dissolved		<5.0	<5.0	RPD-NA	ug/L	N/A	50	25-MAR-14
Propene, Dissolved		<10	<10	RPD-NA	ug/L	N/A	50	25-MAR-14
WG1848280-2 MB								
Methane, Dissolved			<5.0		ug/L		5	25-MAR-14
Ethane, Dissolved			<5.0		ug/L		5	25-MAR-14
Propane, Dissolved			<10		ug/L		10	25-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C1/C5-HS-FID-WT	**Water**							
Batch R2810750								
WG1848280-2 MB								
Butane, Dissolved			<10		ug/L		10	25-MAR-14
Pentane, Dissolved			<10		ug/L		10	25-MAR-14
Ethene, Dissolved			<5.0		ug/L		5	25-MAR-14
Propene, Dissolved			<10		ug/L		10	25-MAR-14
CL-CL	**Water**							
Batch R2811330								
WG1850085-2 LCS								
Chloride (Cl)			101.0		%		90-110	21-MAR-14
WG1850085-1 MB								
Chloride (Cl)			<0.10		mg/L		0.1	21-MAR-14
WG1850085-4 MS		**L1434769-1**						
Chloride (Cl)			99.1		%		75-125	21-MAR-14
F-IC-CL	**Water**							
Batch R2811330								
WG1850085-2 LCS								
Fluoride (F)			99.7		%		90-110	21-MAR-14
WG1850085-1 MB								
Fluoride (F)			<0.10		mg/L		0.1	21-MAR-14
WG1850085-4 MS		**L1434769-1**						
Fluoride (F)			104.4		%		75-125	21-MAR-14
F2-CL	**Water**							
Batch R2810682								
WG1849481-6 DUP		**L1434701-1**						
F2 (C10-C16)		<0.25	<0.25	RPD-NA	mg/L	N/A	30	25-MAR-14
WG1849481-5 LCS								
F2 (C10-C16)			98.7		%		65-135	25-MAR-14
WG1849481-1 MB								
F2 (C10-C16)			<0.25		mg/L		0.25	24-MAR-14
WG1849481-4 MB								
F2 (C10-C16)			<0.25		mg/L		0.25	24-MAR-14
WG1849481-3 MS		**L1434045-1**						
F2 (C10-C16)			87.9		%		50-150	24-MAR-14
FCC-MF-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FCC-MF-CL	**Water**							
Batch R2808869								
WG1848078-1 MB								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	21-MAR-14
HG-TOT-CVAFS-CL	**Water**							
Batch R2808433								
WG1847586-2 CRM		**LCS-TOT**						
Mercury (Hg)-Total			88.9		%		85-115	21-MAR-14
WG1847586-1 MB								
Mercury (Hg)-Total			<0.000050		mg/L		0.00005	21-MAR-14
IB-BART-SQ-CL	**Water**							
Batch R2814834								
WG1853080-2 DUP		**L1434701-1**						
Iron Bacteria		9000	9000		CFU/mL	0.0	50	21-MAR-14
WG1853080-1 MB								
Iron Bacteria			<25		CFU/mL		25	21-MAR-14
MET-T-CCMS-CL	**Water**							
Batch R2811607								
WG1850359-2 CRM		**TMRM**						
Aluminum (Al)-Total			91.0		%		80-120	27-MAR-14
Antimony (Sb)-Total			91.8		%		80-120	27-MAR-14
Arsenic (As)-Total			91.1		%		80-120	27-MAR-14
Barium (Ba)-Total			96.8		%		80-120	27-MAR-14
Beryllium (Be)-Total			90.2		%		80-120	27-MAR-14
Boron (B)-Total			93.6		%		80-120	27-MAR-14
Cadmium (Cd)-Total			89.8		%		80-120	27-MAR-14
Chromium (Cr)-Total			94.2		%		80-120	27-MAR-14
Cobalt (Co)-Total			92.5		%		80-120	27-MAR-14
Copper (Cu)-Total			86.8		%		80-120	27-MAR-14
Lead (Pb)-Total			95.7		%		80-120	27-MAR-14
Lithium (Li)-Total			94.7		%		80-120	27-MAR-14
Molybdenum (Mo)-Total			94.5		%		80-120	27-MAR-14
Nickel (Ni)-Total			92.6		%		80-120	27-MAR-14
Selenium (Se)-Total			91.5		%		80-120	27-MAR-14
Silver (Ag)-Total			93.9		%		80-120	27-MAR-14
Thallium (Tl)-Total			92.9		%		80-120	27-MAR-14
Tin (Sn)-Total			93.3		%		80-120	27-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL	**Water**							
Batch R2811607								
WG1850359-2 CRM		**TMRM**						
Titanium (Ti)-Total			95.9		%		80-120	27-MAR-14
Uranium (U)-Total			97.0		%		80-120	27-MAR-14
Vanadium (V)-Total			95.9		%		80-120	27-MAR-14
Zinc (Zn)-Total			90.3		%		80-120	27-MAR-14
WG1850359-6 CRM		**TMRM**						
Aluminum (Al)-Total			96.3		%		80-120	27-MAR-14
Antimony (Sb)-Total			100.8		%		80-120	27-MAR-14
Arsenic (As)-Total			98.4		%		80-120	27-MAR-14
Barium (Ba)-Total			95.6		%		80-120	27-MAR-14
Beryllium (Be)-Total			96.6		%		80-120	27-MAR-14
Boron (B)-Total			95.7		%		80-120	27-MAR-14
Cadmium (Cd)-Total			96.1		%		80-120	27-MAR-14
Chromium (Cr)-Total			100.3		%		80-120	27-MAR-14
Cobalt (Co)-Total			98.3		%		80-120	27-MAR-14
Copper (Cu)-Total			90.4		%		80-120	27-MAR-14
Lead (Pb)-Total			100.4		%		80-120	27-MAR-14
Lithium (Li)-Total			98.3		%		80-120	27-MAR-14
Molybdenum (Mo)-Total			98.9		%		80-120	27-MAR-14
Nickel (Ni)-Total			100.0		%		80-120	27-MAR-14
Selenium (Se)-Total			101.0		%		80-120	27-MAR-14
Silver (Ag)-Total			101.7		%		80-120	27-MAR-14
Thallium (Tl)-Total			100.3		%		80-120	27-MAR-14
Tin (Sn)-Total			98.4		%		80-120	27-MAR-14
Titanium (Ti)-Total			95.9		%		80-120	27-MAR-14
Uranium (U)-Total			99.9		%		80-120	27-MAR-14
Vanadium (V)-Total			102.4		%		80-120	27-MAR-14
Zinc (Zn)-Total			95.9		%		80-120	27-MAR-14
WG1850359-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-MAR-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	27-MAR-14
Beryllium (Be)-Total			<0.00050		mg/L		0.0005	27-MAR-14
Boron (B)-Total			<0.010		mg/L		0.01	27-MAR-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	27-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL	**Water**							
Batch R2811607								
WG1850359-1 MB								
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-MAR-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	27-MAR-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-MAR-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	27-MAR-14
Thallium (Tl)-Total			<0.000050		mg/L		0.00005	27-MAR-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-MAR-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-MAR-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	27-MAR-14
Zinc (Zn)-Total			<0.0050		mg/L		0.005	27-MAR-14
WG1850359-5 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-APR-14
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-APR-14
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-APR-14
Barium (Ba)-Total			<0.000050		mg/L		0.00005	01-APR-14
Beryllium (Be)-Total			<0.00050		mg/L		0.0005	01-APR-14
Boron (B)-Total			<0.010		mg/L		0.01	01-APR-14
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	01-APR-14
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-APR-14
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-APR-14
Copper (Cu)-Total			<0.00010		mg/L		0.0001	01-APR-14
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-APR-14
Lithium (Li)-Total			<0.0050		mg/L		0.005	01-APR-14
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-APR-14
Nickel (Ni)-Total			<0.00010		mg/L		0.0001	01-APR-14
Selenium (Se)-Total			<0.00010		mg/L		0.0001	01-APR-14
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-APR-14
Thallium (Tl)-Total			<0.000050		mg/L		0.00005	01-APR-14
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-APR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL	**Water**							
Batch R2811607								
WG1850359-5 MB								
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-APR-14
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-APR-14
Vanadium (V)-Total			<0.00010		mg/L		0.0001	01-APR-14
Zinc (Zn)-Total			<0.0050		mg/L		0.005	01-APR-14
MET-TOT-ICP-CL	**Water**							
Batch R2810200								
WG1848416-2 CRM		**TMRM**						
Calcium (Ca)-Total			98.8		%		80-120	24-MAR-14
Iron (Fe)-Total			98.2		%		80-120	24-MAR-14
Magnesium (Mg)-Total			104.8		%		80-120	24-MAR-14
Manganese (Mn)-Total			99.5		%		80-120	24-MAR-14
Potassium (K)-Total			104.5		%		80-120	24-MAR-14
Sodium (Na)-Total			91.5		%		80-120	24-MAR-14
WG1848416-1 MB								
Calcium (Ca)-Total			<0.10		mg/L		0.1	24-MAR-14
Iron (Fe)-Total			<0.030		mg/L		0.03	24-MAR-14
Magnesium (Mg)-Total			<0.10		mg/L		0.1	24-MAR-14
Manganese (Mn)-Total			<0.0050		mg/L		0.005	24-MAR-14
Potassium (K)-Total			<0.50		mg/L		0.5	24-MAR-14
Sodium (Na)-Total			<1.0		mg/L		1	24-MAR-14
Batch R2811445								
WG1850185-7 CRM		**TMRM**						
Calcium (Ca)-Total			98.8		%		80-120	27-MAR-14
Iron (Fe)-Total			98.0		%		80-120	27-MAR-14
Magnesium (Mg)-Total			101.1		%		80-120	27-MAR-14
Manganese (Mn)-Total			97.5		%		80-120	27-MAR-14
Potassium (K)-Total			99.7		%		80-120	27-MAR-14
Sodium (Na)-Total			99.0		%		80-120	27-MAR-14
WG1850359-2 CRM		**TMRM**						
Calcium (Ca)-Total			99.4		%		80-120	28-MAR-14
Iron (Fe)-Total			99.2		%		80-120	28-MAR-14
Magnesium (Mg)-Total			102.4		%		80-120	28-MAR-14
Manganese (Mn)-Total			98.7		%		80-120	28-MAR-14
Potassium (K)-Total			100.7		%		80-120	28-MAR-14
Sodium (Na)-Total			101.2		%		80-120	28-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TOT-ICP-CL	**Water**							
Batch R2811445								
WG1850359-6 CRM		**TMRM**						
Calcium (Ca)-Total			99.4		%		80-120	28-MAR-14
Iron (Fe)-Total			99.7		%		80-120	28-MAR-14
Magnesium (Mg)-Total			102.1		%		80-120	28-MAR-14
Manganese (Mn)-Total			98.2		%		80-120	28-MAR-14
Potassium (K)-Total			101.1		%		80-120	28-MAR-14
Sodium (Na)-Total			100.5		%		80-120	28-MAR-14
WG1850185-1 MB								
Calcium (Ca)-Total			<0.10		mg/L		0.1	27-MAR-14
Iron (Fe)-Total			<0.030		mg/L		0.03	27-MAR-14
Magnesium (Mg)-Total			<0.10		mg/L		0.1	27-MAR-14
Manganese (Mn)-Total			<0.0050		mg/L		0.005	27-MAR-14
Potassium (K)-Total			<0.50		mg/L		0.5	27-MAR-14
Sodium (Na)-Total			<1.0		mg/L		1	27-MAR-14
WG1850359-1 MB								
Calcium (Ca)-Total			<0.10		mg/L		0.1	28-MAR-14
Iron (Fe)-Total			<0.030		mg/L		0.03	28-MAR-14
Magnesium (Mg)-Total			<0.10		mg/L		0.1	28-MAR-14
Manganese (Mn)-Total			<0.0050		mg/L		0.005	28-MAR-14
Potassium (K)-Total			<0.50		mg/L		0.5	28-MAR-14
Sodium (Na)-Total			<1.0		mg/L		1	28-MAR-14
WG1850359-5 MB								
Calcium (Ca)-Total			<0.10		mg/L		0.1	28-MAR-14
Iron (Fe)-Total			<0.030		mg/L		0.03	28-MAR-14
Magnesium (Mg)-Total			<0.10		mg/L		0.1	28-MAR-14
Manganese (Mn)-Total			<0.0050		mg/L		0.005	28-MAR-14
Potassium (K)-Total			<0.50		mg/L		0.5	28-MAR-14
Sodium (Na)-Total			<1.0		mg/L		1	28-MAR-14
WG1850359-4 MS		**L1436002-1**						
Calcium (Ca)-Total			99.9		%		70-130	28-MAR-14
Iron (Fe)-Total			98.1		%		70-130	28-MAR-14
Magnesium (Mg)-Total			102.4		%		70-130	28-MAR-14
Sodium (Na)-Total			98.8		%		70-130	28-MAR-14
WG1850359-8 MS		**L1436686-1**						
Calcium (Ca)-Total			99.2		%		70-130	28-MAR-14
Iron (Fe)-Total			97.4		%		70-130	28-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TOT-ICP-CL	**Water**							
Batch R2811445								
WG1850359-8 MS		**L1436686-1**						
Magnesium (Mg)-Total			102.4		%		70-130	28-MAR-14
Sodium (Na)-Total			98.7		%		70-130	28-MAR-14
NO2-CL	**Water**							
Batch R2811330								
WG1850085-2 LCS								
Nitrite (as N)			102.1		%		90-110	21-MAR-14
WG1850085-1 MB								
Nitrite (as N)			<0.050		mg/L		0.05	21-MAR-14
WG1850085-4 MS		**L1434769-1**						
Nitrite (as N)			97.1		%		75-125	21-MAR-14
NO3-IC-CL	**Water**							
Batch R2811330								
WG1850085-2 LCS								
Nitrate (as N)			100.9		%		90-110	21-MAR-14
WG1850085-1 MB								
Nitrate (as N)			<0.050		mg/L		0.05	21-MAR-14
WG1850085-4 MS		**L1434769-1**						
Nitrate (as N)			99.4		%		75-125	21-MAR-14
PAH-CCME-CL	**Water**							
Batch R2809595								
WG1848504-2 LCS								
Naphthalene			105.5		%		50-130	21-MAR-14
Quinoline			106.9		%		60-130	21-MAR-14
Acenaphthene			109.5		%		60-130	21-MAR-14
Fluorene			108.4		%		60-130	21-MAR-14
Phenanthrene			107.4		%		60-130	21-MAR-14
Anthracene			109.7		%		60-130	21-MAR-14
Acridine			110.7		%		60-130	21-MAR-14
Fluoranthene			103.8		%		60-130	21-MAR-14
Pyrene			114.6		%		60-130	21-MAR-14
Benzo(a)anthracene			104.5		%		60-130	21-MAR-14
Chrysene			103.3		%		60-130	21-MAR-14
Benzo(b&j)fluoranthene			101.0		%		60-130	21-MAR-14
Benzo(k)fluoranthene			98.8		%		60-130	21-MAR-14
Benzo(a)pyrene			98.2		%		60-130	21-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-CL	**Water**							
Batch R2809595								
WG1848504-2 LCS								
Benzo(g,h,i)perylene			106.4		%		60-130	21-MAR-14
Indeno(1,2,3-cd)pyrene			98.3		%		60-130	21-MAR-14
Dibenzo(a,h)anthracene			103.3		%		60-130	21-MAR-14
WG1848504-3 LCS								
Naphthalene			87.9		%		50-130	25-MAR-14
Quinoline			91.4		%		60-130	25-MAR-14
Acenaphthene			91.4		%		60-130	25-MAR-14
Fluorene			92.9		%		60-130	25-MAR-14
Phenanthrene			93.8		%		60-130	25-MAR-14
Anthracene			93.3		%		60-130	25-MAR-14
Acridine			97.6		%		60-130	25-MAR-14
Fluoranthene			93.8		%		60-130	25-MAR-14
Pyrene			101.7		%		60-130	25-MAR-14
Benzo(a)anthracene			99.3		%		60-130	25-MAR-14
Chrysene			97.4		%		60-130	25-MAR-14
Benzo(b&j)fluoranthene			100.7		%		60-130	25-MAR-14
Benzo(k)fluoranthene			96.7		%		60-130	25-MAR-14
Benzo(a)pyrene			97.9		%		60-130	25-MAR-14
Benzo(g,h,i)perylene			103.3		%		60-130	25-MAR-14
Indeno(1,2,3-cd)pyrene			104.1		%		60-130	25-MAR-14
Dibenzo(a,h)anthracene			100.0		%		60-130	25-MAR-14
WG1848504-1 MB								
Naphthalene			<0.000050		mg/L		0.00005	21-MAR-14
Quinoline			<0.000050		mg/L		0.00005	21-MAR-14
Acenaphthene			<0.000050		mg/L		0.00005	21-MAR-14
Fluorene			<0.000050		mg/L		0.00005	21-MAR-14
Phenanthrene			<0.000050		mg/L		0.00005	21-MAR-14
Anthracene			<0.000010		mg/L		0.00001	21-MAR-14
Acridine			<0.000050		mg/L		0.00005	21-MAR-14
Fluoranthene			<0.000020		mg/L		0.00002	21-MAR-14
Pyrene			<0.000020		mg/L		0.00002	21-MAR-14
Benzo(a)anthracene			<0.000015		mg/L		0.000015	21-MAR-14
Chrysene			<0.000050		mg/L		0.00005	21-MAR-14
Benzo(b&j)fluoranthene			<0.000050		mg/L		0.00005	21-MAR-14
Benzo(k)fluoranthene			<0.000050		mg/L		0.00005	21-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-CL	**Water**							
Batch R2809595								
WG1848504-1 MB								
Benzo(a)pyrene			<0.000010		mg/L		0.00001	21-MAR-14
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	21-MAR-14
Indeno(1,2,3-cd)pyrene			<0.000050		mg/L		0.00005	21-MAR-14
Dibenzo(a,h)anthracene			<0.000050		mg/L		0.00005	21-MAR-14
Surrogate: d10-Acenaphthene			99.1		%		60-130	21-MAR-14
Surrogate: d10-Phenanthrene			99.3		%		60-130	21-MAR-14
Surrogate: d12-Chrysene			81.5		%		60-130	21-MAR-14
PH/EC/ALK-CL	**Water**							
Batch R2809553								
WG1848475-1 LCS								
pH			7.04		pH		6.9-7.1	21-MAR-14
Conductivity (EC)			98.4		%		90-110	21-MAR-14
Alkalinity, Total (as CaCO3)			102.6		%		85-115	21-MAR-14
WG1848475-3 LCS								
pH			7.04		pH		6.9-7.1	21-MAR-14
Conductivity (EC)			98.6		%		90-110	21-MAR-14
Alkalinity, Total (as CaCO3)			98.3		%		85-115	21-MAR-14
SO4-CL	**Water**							
Batch R2811330								
WG1850085-2 LCS								
Sulfate (SO4)			102.5		%		90-110	21-MAR-14
WG1850085-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	21-MAR-14
WG1850085-4 MS		**L1434769-1**						
Sulfate (SO4)			98.7		%		75-125	21-MAR-14
SRB-BART-SQ-CL	**Water**							
Batch R2814834								
WG1853080-2 DUP		**L1434701-1**						
Sulfur Reducing Bacteria		<200	<200	RPD-NA	CFU/mL	N/A	50	21-MAR-14
WG1853080-1 MB								
Sulfur Reducing Bacteria			<200		CFU/mL		200	21-MAR-14
SULPHIDE-ED	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SULPHIDE-ED	**Water**							
Batch R2811751								
WG1850505-2 LCS								
Sulphide			102.0		%		70-130	27-MAR-14
WG1850505-3 LCS								
Sulphide			94.0		%		70-130	27-MAR-14
WG1850505-1 MB								
Sulphide			<0.0020		mg/L		0.002	27-MAR-14
WG1850505-5 MS		**L1434674-1**						
Sulphide			93.8		%		65-135	27-MAR-14
TC-EC-MF-CL	**Water**							
Batch R2808873								
WG1848083-1 MB								
Coliform Bacteria - Total			<1		CFU/100mL		1	21-MAR-14
E. coli			<1		CFU/100mL		1	21-MAR-14
TEH-ADD-CL	**Water**							
Batch R2810682								
WG1849481-6 DUP		**L1434701-1**						
TEH (C11-C30)		<0.25	<0.25	RPD-NA	mg/L	N/A	30	25-MAR-14
WG1849481-5 LCS								
TEH (C11-C30)			98.7		%		70-130	25-MAR-14
WG1849481-1 MB								
TEH (C11-C30)			<0.25		mg/L		0.25	24-MAR-14
WG1849481-4 MB								
TEH (C11-C30)			<0.25		mg/L		0.25	24-MAR-14
TURBIDITY-CL	**Water**							
Batch R2808521								
WG1847672-2 LCS								
Turbidity			98.5		%		85-115	21-MAR-14
WG1847672-1 MB								
Turbidity			<0.10		NTU		0.1	21-MAR-14
VOC-8260-CL	**Water**							
Batch R2810980								
WG1849752-3 LCS								
Dichlorodifluoromethane			129.4		%		60-140	24-MAR-14
Chloromethane			120.7		%		60-140	24-MAR-14
Vinyl chloride			117.6		%		60-140	24-MAR-14
Bromomethane			100.6		%		60-140	24-MAR-14
Chloroethane			98.5		%		60-140	24-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-8260-CL	**Water**							
Batch R2810980								
WG1849752-3 LCS								
Trichlorofluoromethane			99.7		%		60-140	24-MAR-14
1,1-Dichloroethene			107.1		%		70-130	24-MAR-14
Methylene chloride			103.2		%		60-140	24-MAR-14
trans-1,2-Dichloroethene			97.8		%		70-130	24-MAR-14
1,1-Dichloroethane			92.1		%		70-130	24-MAR-14
2,2-Dichloropropane			71.1		%		70-130	24-MAR-14
cis-1,2-Dichloroethene			95.6		%		70-130	24-MAR-14
Chloroform			95.9		%		70-130	24-MAR-14
Bromochloromethane			94.1		%		70-130	24-MAR-14
1,2-Dichloroethane			93.5		%		70-130	24-MAR-14
1,1,1-Trichloroethane			91.2		%		70-130	24-MAR-14
1,1-Dichloropropene			96.3		%		70-130	24-MAR-14
Carbon tetrachloride			75.8		%		70-130	24-MAR-14
Benzene			93.6		%		70-130	24-MAR-14
Trichloroethene			99.7		%		70-130	24-MAR-14
1,2-Dichloropropane			92.8		%		70-130	24-MAR-14
Bromodichloromethane			91.9		%		70-130	24-MAR-14
Dibromomethane			90.6		%		70-130	24-MAR-14
cis-1,3-Dichloropropene			90.6		%		70-130	24-MAR-14
trans-1,3-Dichloropropene			87.2		%		70-130	24-MAR-14
Toluene			93.8		%		70-130	24-MAR-14
1,1,2-Trichloroethane			94.6		%		70-130	24-MAR-14
1,3-Dichloropropane			92.6		%		70-130	24-MAR-14
Tetrachloroethene			94.7		%		70-130	24-MAR-14
Dibromochloromethane			89.9		%		70-130	24-MAR-14
1,2-Dibromoethane			84.5		%		70-130	24-MAR-14
Chlorobenzene			96.9		%		70-130	24-MAR-14
Ethylbenzene			96.6		%		70-130	24-MAR-14
1,1,1,2-Tetrachloroethane			94.1		%		70-130	24-MAR-14
m+p-Xylenes			97.9		%		70-130	24-MAR-14
o-Xylene			96.8		%		70-130	24-MAR-14
Styrene			97.0		%		70-130	24-MAR-14
Bromoform			94.8		%		70-130	24-MAR-14
Isopropylbenzene			96.7		%		70-130	24-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-8260-CL	**Water**							
Batch R2810980								
WG1849752-3 LCS								
1,1,2,2-Tetrachloroethane			99.0		%		70-130	24-MAR-14
1,2,3-Trichloropropane			98.1		%		70-130	24-MAR-14
n-Propylbenzene			97.9		%		70-130	24-MAR-14
Bromobenzene			96.4		%		70-130	24-MAR-14
1,3,5-Trimethylbenzene			97.4		%		70-130	24-MAR-14
2-Chlorotoluene			99.0		%		70-130	24-MAR-14
4-Chlorotoluene			98.6		%		70-130	24-MAR-14
tert-Butylbenzene			97.8		%		70-130	24-MAR-14
1,2,4-Trimethylbenzene			96.1		%		70-130	24-MAR-14
sec-Butylbenzene			98.7		%		70-130	24-MAR-14
p-Isopropyltoluene			98.8		%		50-150	24-MAR-14
1,3-Dichlorobenzene			96.4		%		70-130	24-MAR-14
1,4-Dichlorobenzene			98.0		%		70-130	24-MAR-14
n-Butylbenzene			97.6		%		70-130	24-MAR-14
1,2-Dichlorobenzene			96.3		%		70-130	24-MAR-14
1,2-Dibromo-3-chloropropane			91.7		%		70-130	24-MAR-14
1,2,4-Trichlorobenzene			94.6		%		70-130	24-MAR-14
Hexachlorobutadiene			89.8		%		70-130	24-MAR-14
1,2,3-Trichlorobenzene			89.4		%		70-130	24-MAR-14
WG1849752-1 MB								
Dichlorodifluoromethane			<0.0010		mg/L		0.001	22-MAR-14
Chloromethane			<0.010		mg/L		0.01	22-MAR-14
Vinyl chloride			<0.00050		mg/L		0.0005	22-MAR-14
Bromomethane			<0.010		mg/L		0.01	22-MAR-14
Chloroethane			<0.010		mg/L		0.01	22-MAR-14
Trichlorofluoromethane			<0.0010		mg/L		0.001	22-MAR-14
1,1-Dichloroethene			<0.0010		mg/L		0.001	22-MAR-14
Methylene chloride			<0.0010		mg/L		0.001	22-MAR-14
trans-1,2-Dichloroethene			<0.0010		mg/L		0.001	22-MAR-14
1,1-Dichloroethane			<0.0010		mg/L		0.001	22-MAR-14
2,2-Dichloropropane			<0.0010		mg/L		0.001	22-MAR-14
cis-1,2-Dichloroethene			<0.0010		mg/L		0.001	22-MAR-14
Chloroform			<0.0010		mg/L		0.001	22-MAR-14
Bromochloromethane			<0.0010		mg/L		0.001	22-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-8260-CL	**Water**							
Batch R2810980								
WG1849752-1 MB								
1,2-Dichloroethane			<0.0010		mg/L		0.001	22-MAR-14
1,1,1-Trichloroethane			<0.0010		mg/L		0.001	22-MAR-14
1,1-Dichloropropene			<0.0010		mg/L		0.001	22-MAR-14
Carbon tetrachloride			<0.0010		mg/L		0.001	22-MAR-14
Benzene			<0.0010		mg/L		0.001	22-MAR-14
Trichloroethene			<0.0010		mg/L		0.001	22-MAR-14
1,2-Dichloropropane			<0.0010		mg/L		0.001	22-MAR-14
Bromodichloromethane			<0.0010		mg/L		0.001	22-MAR-14
Dibromomethane			<0.0010		mg/L		0.001	22-MAR-14
cis-1,3-Dichloropropene			<0.0010		mg/L		0.001	22-MAR-14
trans-1,3-Dichloropropene			<0.0010		mg/L		0.001	22-MAR-14
Toluene			<0.0010		mg/L		0.001	22-MAR-14
1,1,2-Trichloroethane			<0.0010		mg/L		0.001	22-MAR-14
1,3-Dichloropropane			<0.0010		mg/L		0.001	22-MAR-14
Tetrachloroethene			<0.0010		mg/L		0.001	22-MAR-14
Dibromochloromethane			<0.0010		mg/L		0.001	22-MAR-14
1,2-Dibromoethane			<0.0010		mg/L		0.001	22-MAR-14
Chlorobenzene			<0.0010		mg/L		0.001	22-MAR-14
Ethylbenzene			<0.0010		mg/L		0.001	22-MAR-14
1,1,1,2-Tetrachloroethane			<0.0010		mg/L		0.001	22-MAR-14
m+p-Xylenes			<0.0010		mg/L		0.001	22-MAR-14
o-Xylene			<0.0010		mg/L		0.001	22-MAR-14
Styrene			<0.0010		mg/L		0.001	22-MAR-14
Bromoform			<0.0010		mg/L		0.001	22-MAR-14
Isopropylbenzene			<0.0010		mg/L		0.001	22-MAR-14
1,1,2,2-Tetrachloroethane			<0.0050		mg/L		0.005	22-MAR-14
1,2,3-Trichloropropane			<0.0020		mg/L		0.002	22-MAR-14
n-Propylbenzene			<0.0010		mg/L		0.001	22-MAR-14
Bromobenzene			<0.0010		mg/L		0.001	22-MAR-14
1,3,5-Trimethylbenzene			<0.0010		mg/L		0.001	22-MAR-14
2-Chlorotoluene			<0.0010		mg/L		0.001	22-MAR-14
4-Chlorotoluene			<0.0010		mg/L		0.001	22-MAR-14
tert-Butylbenzene			<0.0010		mg/L		0.001	22-MAR-14
1,2,4-Trimethylbenzene			<0.0010		mg/L		0.001	22-MAR-14

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-8260-CL	**Water**							
Batch R2810980								
WG1849752-1 MB								
sec-Butylbenzene			<0.0010		mg/L		0.001	22-MAR-14
p-Isopropyltoluene			<0.0010		mg/L		0.001	22-MAR-14
1,3-Dichlorobenzene			<0.0010		mg/L		0.001	22-MAR-14
1,4-Dichlorobenzene			<0.0010		mg/L		0.001	22-MAR-14
n-Butylbenzene			<0.0010		mg/L		0.001	22-MAR-14
1,2-Dichlorobenzene			<0.0010		mg/L		0.001	22-MAR-14
1,2-Dibromo-3-chloropropane			<0.0010		mg/L		0.001	22-MAR-14
1,2,4-Trichlorobenzene			<0.0010		mg/L		0.001	22-MAR-14
Hexachlorobutadiene			<0.0010		mg/L		0.001	22-MAR-14
1,2,3-Trichlorobenzene			<0.0010		mg/L		0.001	22-MAR-14

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS E

L1434701-COFC

ody (COC) / Analytical
quest Form

Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 14 -

Page 1 of 2

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Alberta Environment	Select Report Format:	PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jordan Kings	Quality Control (QC) Report with Report	☒ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2938 - 11 St - NE	☐ Criteria on Report - provide details below if box checked		E ☒ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
Phone:	403 849 5299	Select Distribution:	☒ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
		Email 1 or Fax	jordan.Kings@gov.ab.ca	Specify Date Required for E2,E or P:
		Email 2		

Invoice To		Invoice Distribution	
	Same as Report To ☒ Yes ☐ No	Select Invoice Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☒ Yes ☐ No	Email 1 or Fax	
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:		GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ROU-POTABLE-CL	SULPHIDE-ED & SULPHIDE>H2S-ED	TCC,FCC-MF-CL & EC-MF-CL	IB-BART-SQ-CL & SRB-BART-SQ-CL	PAH-CCME-CL	BTX,F1,F2-CL	TEH-CL	VOC-8260-CL	MET-TOT-CCME-CL	C1/C5-HS-FID-WT	Number of Containers
	[redacted] Well JK1	20-03-14	11:58	Water	✓										
	Well JK2	" March"	12:10	Water		✓									
	Well JK3	" "	12:00	Water			✓	✓							
	Well JK4	" "	12:01	Water			✓	✓							
	Well JK5	" "	12:13	Water						✓					
	Well JK6	" "	12:12	Water						✓					
	Well JK7	" "	12:14	Water						✓					
	Well JK8	" "	12:19	Water								✓			
	Well JK9	" "	12:18	Water								✓			
	Well JK10	" "	12:19	Water								✓			
	Well JK11	" "	12:16	Water										✓	
	Well JK12	" "	12:17	Water										✓	

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☒ No	
Are samples for human drinking water use? ☒ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☑ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated	☐		

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
	15.C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by: ZRL	Date: 20-Mar-14	Time: 12:30

FINAL SHIPMENT RECEPTION (lab use only)		
Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-EM-0320e v08 Front404 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

L1434701-COFC

ustody (COC) / Analytical Request Form

. Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 14 -

Page 2 of 2

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Report To Same as 1	**Report Format / Distribution**	**Select Service Level Below** (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Select Report Format: ☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	☐ Criteria on Report - provide details below if box checked	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	Email 1 or Fax	Specify Date Required for E2,E or P:
	Email 2	

Invoice To Same as Report To ☐ Yes ☐ No	**Invoice Distribution**	**Analysis Request**
Copy of Invoice with Report ☐ Yes ☐ No	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	Email 1 or Fax	
Contact:	Email 2	

Project Information		**Oil and Gas Required Fields (client use)**	
ALS Quote #:		Approver ID:	Cost Center:
Job #:		GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		**ALS Contact:**	**Sampler:**

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ROU-POTABLE-CL	SULPHIDE-ED & SULPHIDE>H2S-ED	TCC,FCC-MF-CL & EC-MF-CL	IB-BART-SQ-CL & SRB-BART-SQ-CL	PAH-CCME-CL	BTX,F1,F2-CL	TEH-CL	VOC-8260-CL	MET-TOT-CCME-CL	C1/C5-HS-FID-WT				Number of Containers
	[redacted] Well JK13	20MAR19	12:15	Water										✓				
	Well JK14	20MAR19	12:07	Water					✓									
	Well JK15	20MAR19	12:07	Water					✓									
	Well JK16	20MAR19	12:06	Water						✓	✓							
	Well JK17	20MAR19	12:09	Water						✓	✓							
	Well JK18	20MAR19	12:02	Water									✓					

Drinking Water (DW) Samples† (client use)	**Special Instructions / Specify Criteria to add on report (client Use)**
Are samples taken from a Regulated DW System? ☐ Yes ☐ No	
Are samples for human drinking water use? ☐ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐		SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐ No ☐	Custody seal intact	Yes ☐	No ☐	
Cooling Initiated ☐					

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

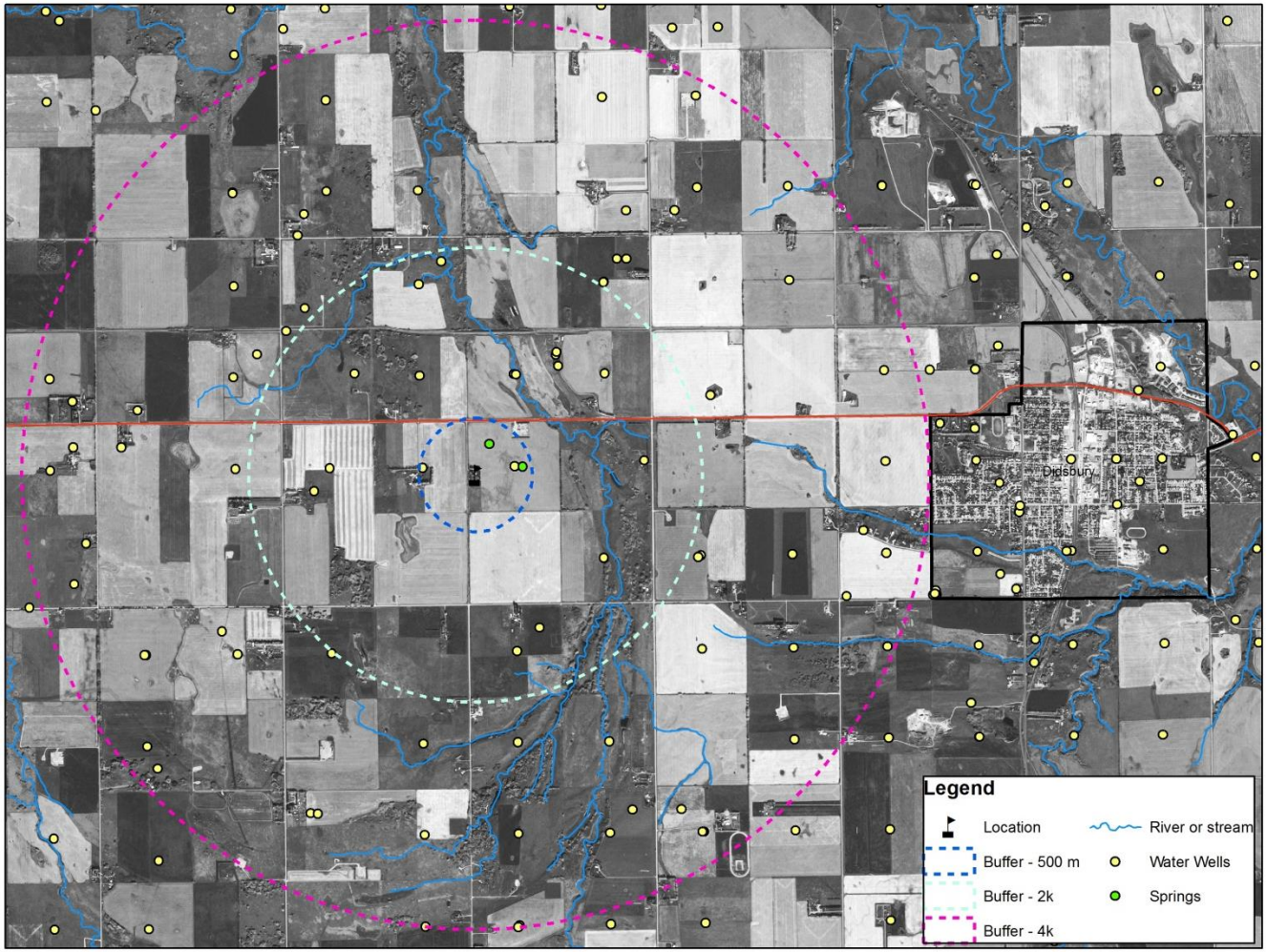
Alberta Energy Regulator

Appendix 6
Summary of Findings: Didsbury Area Water Concern

Work Completed

- Reviewed locations of water wells and springs
- Reviewed site geology
- Reviewed depth to the water table
- Reviewed depth of oil and gas wells

Locations of water wells and springs



- 141 wells within 4 km of residence
- 21 wells within 2 km of residence
- 4 wells within 500 m of residence
- 2 springs located within 500 m of residence

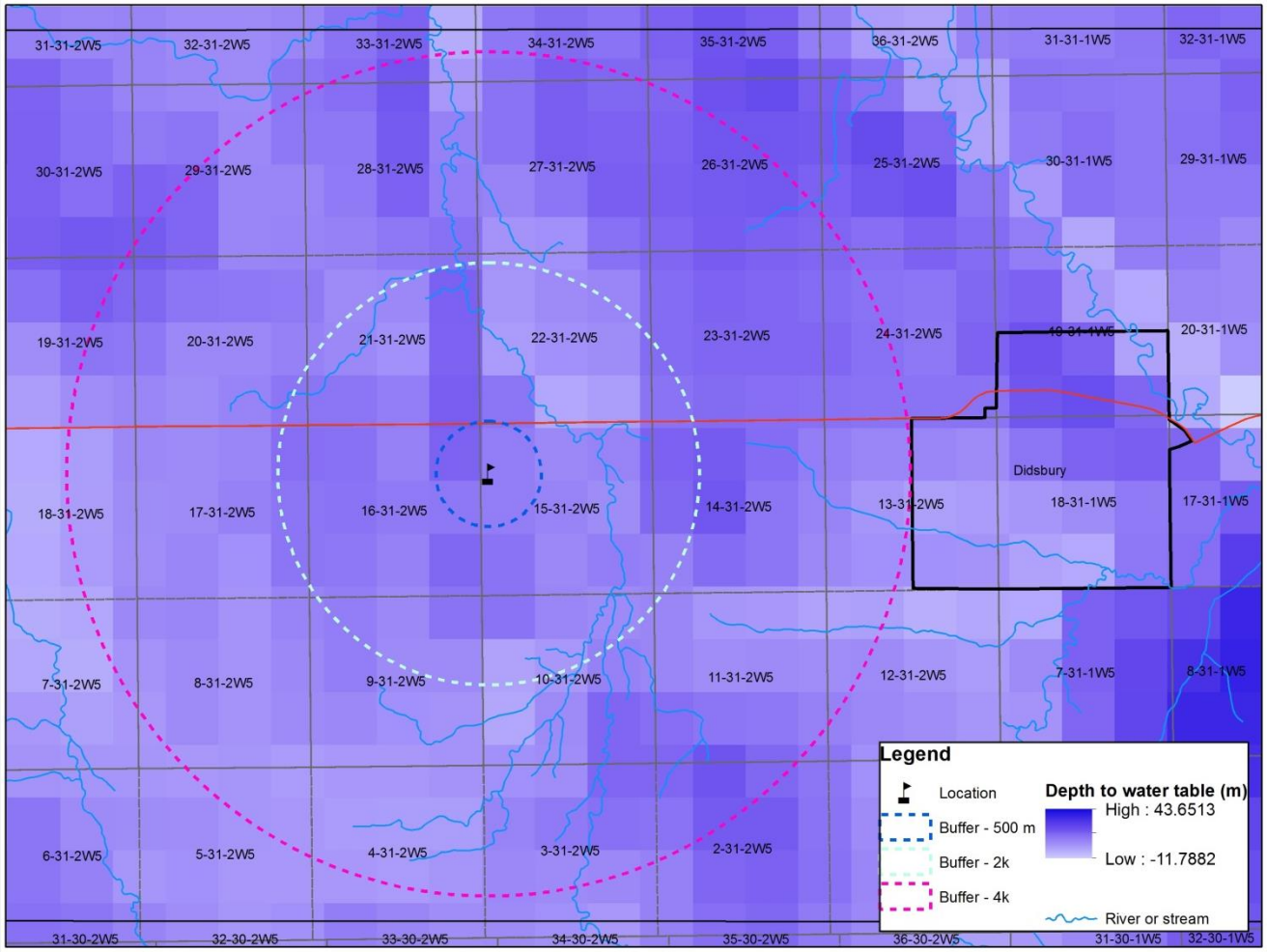
Sources: Alberta Water Well Information Database for well locations, and DIG 2014-0025 for springs

Alberta Energy Regulator

Summary of water well details

Radius Interval	Total # of water wells	# of water wells with Depth Details	Maximum Depth (m)	Minimum Depth (m)	Average Depth (m)
4 km	141	131	~183	~6	~48
2 km	21	20	~88	~11	~44
500 m	4	3	~88	~20	~59

Depth to Water Table



- Depth to water table within 500 m of residence
  - Maximum depth ~18 m
  - Minimum depth ~6 m
  - Average depth ~11 m
- Depth at residence ~9 m

Source: SRTM DEM DEM for land surface elevations and ECC Groundwater Atlas for water table elevations

Oil and Gas Well Details

Within 500 m of residence

Company	Zone	~Length of Well (m)	~Depth of Well (m)	Year Well Drilled	Type of Well
Bellatrix	Mannville	3300	2390	2010	Susp. Oil (Horiz. MSHF)
Bellatrix	L. Mannville	3820	2369	2012	Gas (Horiz. MSHF)
Bellatrix	L. Mannville	3892	2388	2012	Gas (Horiz. MSHF)
Bonavista	Basal Quartz	2500	2490	2000	Aban. (Directional)

Note: Based on Well Licences SHL (Conf) Enterprise GIS layer

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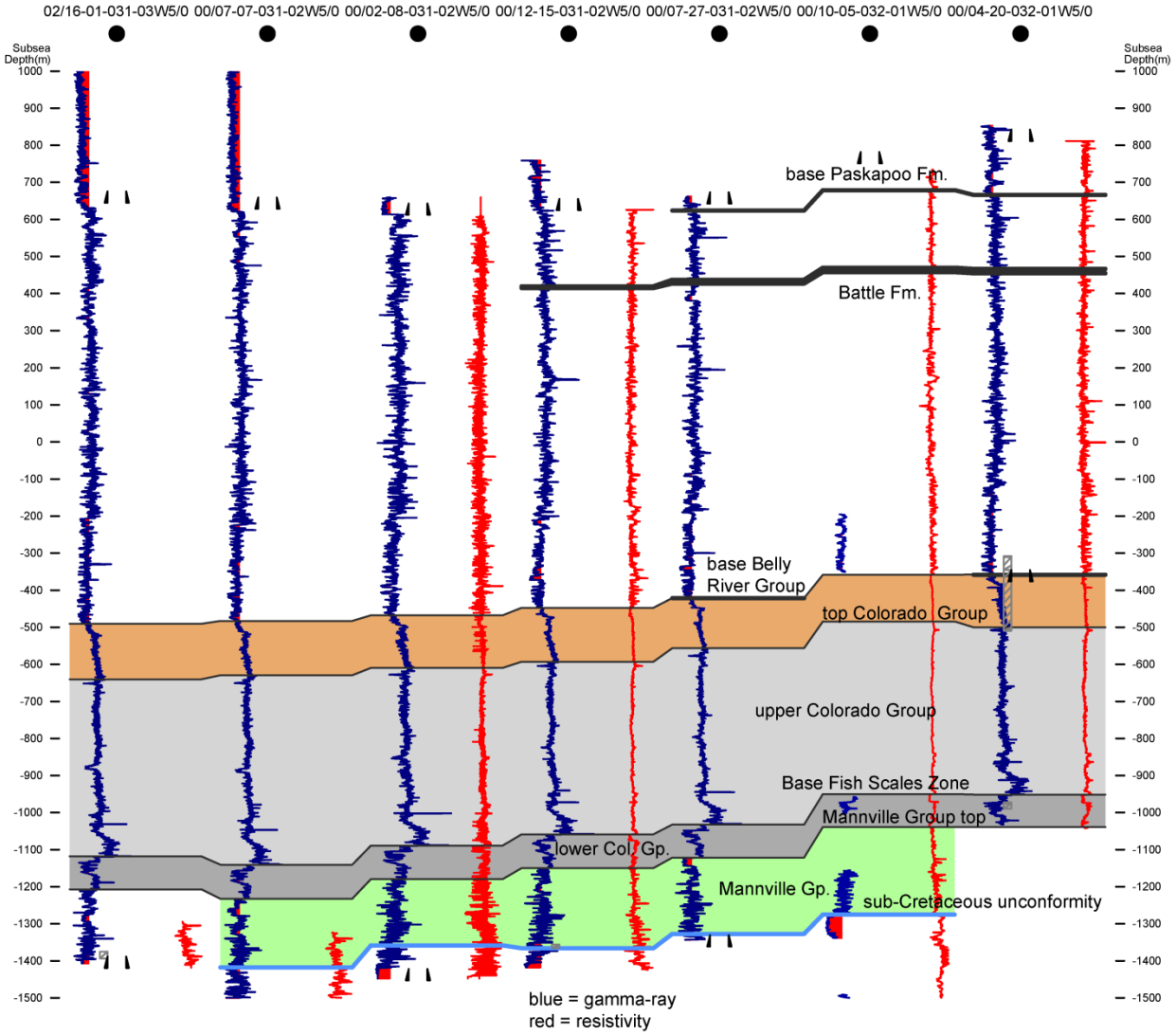
Regional Cross Section



- Cross section trends through 500m buffer around 4th well from the left (12-15)
- The Bellatrix wells are targeting the geological formation marked in green which is at a depth of 2200-2400m
- Water wells in the 500m buffer are less than 100m deep (above base Paskapoo on cross section)

Alberta Energy Regulator

PAMZ | Parkland Airshed Management Zone

Didsbury West
Martha Portable Station

Ambient Air Quality Monitoring
Monthly Summary
Tables, Graphs and Roses

PAMZ | Parkland Airshed Management Zone

Didsbury West (Martha) - Continuous Air Quality Monitoring Data Summary

Ambient Air Quality Data Summary for the Month of June 2013															
Parkland Airshed Management Zone						Maximum Recorded Values									
						1-hr				24-hr / 8-hr					
Pollutant	**Objectives**			**Station**	**Monthly**	Conc	Day	WSPD	WDIR	Conc	Day	**Exceedence**			**Operational**
(units)	1-hr	24-hr	30-day		**Average**			(km/hr)	(Sector)			1-hr	24-hr	30-day	**Time (%)**
SO_2 (ppb)	172	48	11	Didsbury West	0.3	7.0	Jun-30 15:00	3	NNE	0.7	Jun-30	0	0	0	99.5%
TRS (ppb)	10	3	-	Didsbury West	0.3	4.3	Jul-04 02:00	1	SSW	0.9	Jul-04	0	0	-	99.5%
NO_2 (ppb)	159	106	-	Didsbury West	2.2	12.3	Jul-09 02:00	9	SSW	4.0	Jun-18	0	0	-	99.4%
NO (ppb)	-	-	-	Didsbury West	0.3	7.4	Jul-02 07:00	6	SSW	0.7	Jun-17	-	-	-	99.4%
NO_X (ppb)	-	-	-	Didsbury West	2.5	18.3	Jul-09 02:00	9	SSW	4.6	Jun-18	-	-	-	99.4%
O_3 (ppb)	82	-	-	Didsbury West	26.0	55.4	Jul-02 15:00	19	SE	34.2	Jun-13	0	0	-	99.5%
O_3 (ppb) - 8-hr				Didsbury West						45.3	Jun-12	-			
THC (ppm)	-	-	-	Didsbury West	1.9	3.2	Jul-01 05:00	3	SSE	2.1	Jul-08	-	-	-	99.5%
CH_4 (ppb)	-	-	-	Didsbury West	1.9	3.0	Jul-01 05:00	3	SSE	2.0	Jul-08	-	-	-	99.5%
$PM_{2.5}$ ($\mu g/m^3$)	80	30	-	Didsbury West	10.6	37.7	Jul-02 11:00	10	S	19.8	Jul-02	0	0	-	99.3%
Temp (^oC)				Didsbury West	11.7	28.5	Jul-02 14:00			20.9	Jul-02				99.8%
RH (%)				Didsbury West	80.3	100.0	Jun-20 04:00			96.4	Jun-20				99.8%
SR (W/m^2)				Didsbury West	337.2	1289.9	Jun-15 13:00			471.9	Jul-01				99.8%
WSPD v (km/hr)				Didsbury West	1.0	23.0	Jun-17 11:00			14.0	Jun-15				95.4%
WDIR (Sector)				Didsbury West	SW										95.4%

Didsbury West (Martha) - Continuous Air Quality Monitoring Station & Equipment Summary

Didsbury West (Martha)			
General Station and Equipment Issues: Installation calibrations were performed on June 5th (SO_2, NO_X & $PM_{2.5}$), June 6th (O_3 & THC/CH_4) and June 7th (TRS). Removal calibrations were performed on July 9th (SO_2, TRS, NO_X, THC/CH_4 & $PM_{2.5}$) and July 10th (O_3). A power failure on July 2nd resulted in several hours of invalid data for all pollutant parameters. On June 20th an AESRD audit was conducted at the station.			
Parameter	**Make**	**Model**	**Notes**
SO_2	API	100A	Four (4) hours were flagged for above noted power failure. No other operational issues were noted.
TRS	API	100A	Four (4) hours were flagged for above noted power failure. No other operational issues were noted.
NO_2/NO/NO_X	API	200A	July 9th to 17th spans were outside target range – suspect valves need to be cleaned (maintenance slated for August). A power bump on June 11th resulted in one (1) hour of invalid data. Four (4) hours were flagged for above noted power failure. On July 2nd a single point cal was performed to ensure span integrity.
O_3	API	400A	Four (4) hours were flagged for above noted power failure. No other operational issues were noted.
$PM_{2.5}$	Met One	BAM 1020	Sample head cleaned June 5th. Power bumps on June 11th & on June 16th resulted in one (1) hour of invalid data on each day. Four (4) hours were flagged for above noted power failure.
THC/CH_4	TEI	55C	Four (4) hours were flagged for above noted power failure. No other operational issues were noted.
ET	Met One	083D	Two (2) hours flagged for maintenance on June 7th due to tech activity.
RH	Met One	083D	Two (2) hours flagged for maintenance on June 7th due to tech activity.
SR	Met One	096-1	Two (2) hours flagged for maintenance on June 7th due to tech activity.
WS/WD	Met One	014 / 024	Forty-one (41) hours were flagged invalid due to flatlining – reason under investigation. During the audit it was determined the wind direction sensor was oriented to magnetic north; a correction factor was applied to the data.

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7.0 ppb on Jun 30 15:00 Maximum Daily Average: 0.7 ppb on Jun 30

Minimum Value: 0 ppb on Jun 7 03:00 Minimum Daily Average: 0.1 ppb on Jun 23
Maximum Diurnal Average: 0.5 ppb at hour 15 Minimum Diurnal Average: 0.2 ppb at hour 23
Monthly Average: 0.32 ppb Percentiles: $P_1 = 0.0$ $P_{10} = 0.0$ $Q_1 = 0.1$ Median = 0.2 $Q_3 = 0.4$ $P_{90} = 0.6$ $P_{99} = 1.9$

Hours in Service:	820
Hours of Data:	768
Hours of Missing Data:	52
Hours of Calibration:	48
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0.2
6-Jun	A	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2.0
7-Jun	A	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	1	1	0	0	0	0	0	0	0.4	2.1
8-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0.3	0.8
9-Jun	A	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.6
10-Jun	A	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0.4	1.3
11-Jun	A	0	0	0	0	0	0	0	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.4	2.8
12-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	0.6
13-Jun	A	0	0	0	0	0	0	0	0	2	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0.4	1.6
14-Jun	A	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.8
15-Jun	A	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.6
16-Jun	A	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	0.8
17-Jun	A	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	0.8
18-Jun	A	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	2	1	0	0	0	0	0	0.4	1.8
19-Jun	A	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.9
20-Jun	A	1	0	1	1	0	0	0	AC	AC	AC	AC	0	0	0	1	0	0	0	0	0	0	0	0	0.3	0.8
21-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3
22-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.5
23-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3
24-Jun	A	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	1	0	0	1	0	0	0	0	0.4	1.1
25-Jun	A	2	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1.9
26-Jun	A	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0.2	0.6
27-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.4
28-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.3
29-Jun	A	0	0	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	0.7
30-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	1	2	0	0	0	0	0	0	0.7	7.0
1-Jul	A	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0.4	1.1
2-Jul	A	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	P	P	P	P	0	0	0.5	2.1
3-Jul	A	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	1	2	2	1	1	0	0	0	0.7	1.6
4-Jul	A	0	0	0	0	1	2	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0.5	1.6
5-Jul	A	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	0.6
6-Jul	A	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.7
7-Jul	A	0	0	0	0	0	0	1	1	2	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0.5	2.3
8-Jul	A	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.6
9-Jul	A	0	0	0	0	0	0	0	0	0	0	C	C	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	0.5
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	Diurnal Average	
	--	1.6	1.9	0.7	0.8	0.5	1.6	1.1	2.8	2.3	1.3	1.1	2.1	1.1	7.0	2.4	1.3	2.4	1.5	1.3	0.5	1.0	0.5	0.6	Diurnal Maximum	

C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb 30-day 11 ppb

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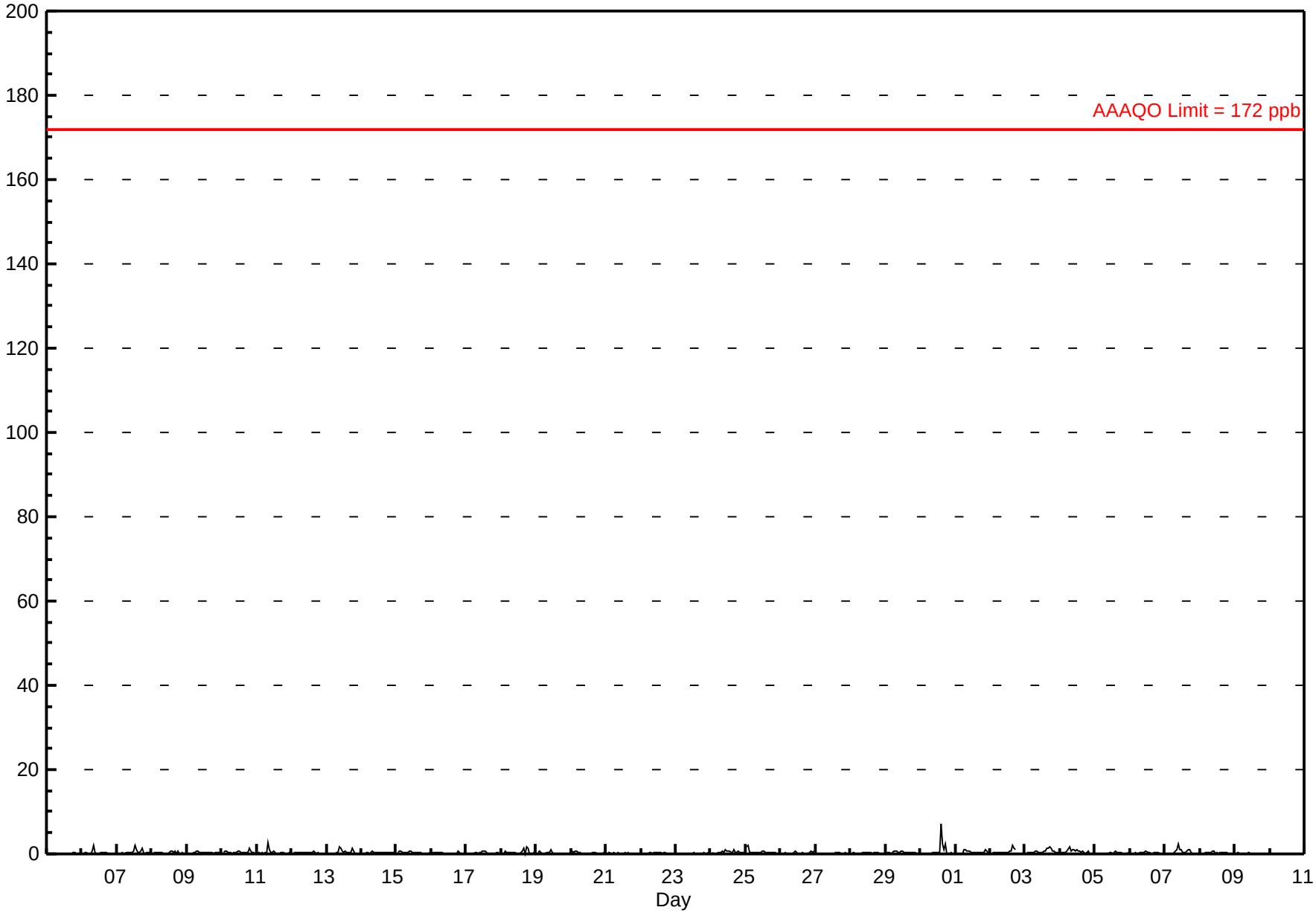
Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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Hourly Maximums

Sulphur Dioxide (SO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 35.7 ppb on Jun 30 15:00

Maximum Daily Average: 3.2 ppb on Jun 30

Minimum Value: 0 ppb on Jun 22 02:00

Minimum Daily Average: 0.3 ppb on Jun 23

Maximum Diurnal Average: 1.7 ppb at hour 15

Minimum Diurnal Average: 0.4 ppb at hour 6

Monthly Average: 0.74 ppb

Percentiles: $P_1 = 0.1$ $P_{10} = 0.2$ $Q_1 = 0.3$ Median = 0.4 $Q_3 = 0.7$ $P_{90} = 1.3$ $P_{99} = 4.8$

Hours in Service:	820
Hours of Data:	768
Hours of Missing Data:	52
Hours of Calibration:	48
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0.3
6-Jun	A	0	0	0	0	0	0	3	4	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.6	4.0
7-Jun	A	0	0	0	0	0	1	0	0	0	1	1	4	3	1	1	3	3	1	0	0	1	1	1	1.0	4.4
8-Jun	A	1	0	0	1	1	1	1	1	0	0	0	0	1	1	1	1	0	5	0	1	1	0	0	0.8	4.8
9-Jun	A	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	1	0	0	0	1	1	1	0	0.5	0.8
10-Jun	A	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	2	6	2	1	1	0	1.0	6.2
11-Jun	A	1	0	0	1	0	1	1	5	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0.7	5.0
12-Jun	A	1	1	1	1	0	1	0	0	0	1	0	1	1	1	1	1	1	1	0	0	0	0	1	0.5	0.9
13-Jun	A	0	0	0	0	0	0	1	1	3	2	2	1	1	1	1	1	1	3	1	0	0	0	0	0.9	3.3
14-Jun	A	0	0	1	0	0	1	1	1	1	1	1	1	0	0	1	1	1	0	1	1	1	0	0	0.5	1.4
15-Jun	A	0	1	1	0	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0.5	1.0
16-Jun	A	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0.5	2.2
17-Jun	A	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0	0.5	1.3
18-Jun	A	0	0	1	0	0	0	1	1	1	1	0	0	1	4	6	0	4	2	0	0	0	0	1	1.1	6.0
19-Jun	A	1	2	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2.1
20-Jun	A	2	2	2	2	0	1	0	AC	AC	AC	AC	0	0	0	1	1	1	0	0	0	0	1	1	0.9	2.2
21-Jun	A	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0.4	1.5
22-Jun	A	0	0	0	0	0	1	1	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0.4	1.3
23-Jun	A	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1	0	0.3	0.6
24-Jun	A	0	0	0	0	0	0	1	1	1	2	2	1	1	1	1	4	1	1	1	1	1	1	1	0.8	3.8
25-Jun	A	8	4	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1.1	7.7
26-Jun	A	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1.3
27-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	0	0	0	0.3	0.8
28-Jun	A	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.8
29-Jun	A	0	1	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0.6	1.0
30-Jun	A	0	0	0	0	0	0	0	0	1	1	0	0	3	36	4	10	14	0	0	0	1	0	0	3.2	35.7
1-Jul	A	0	0	0	0	0	2	2	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	0.6	1.9
2-Jul	A	0	0	0	1	0	1	0	1	1	1	1	1	1	1	6	5	1	P	P	P	P	0	1	1.2	6.4
3-Jul	A	0	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	2	2	1	1	1	1	1	1.0	2.6
4-Jul	A	1	1	1	0	2	3	2	1	1	1	1	1	1	1	2	1	0	0	3	0	0	0	0	1.0	3.0
5-Jul	A	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	2	0	0	0	0	0	0	0	0.5	1.9
6-Jul	A	0	0	0	0	0	1	0	0	0	1	2	1	1	0	0	0	0	1	0	0	0	0	0	0.4	1.7
7-Jul	A	0	0	0	0	0	0	1	2	4	1	1	1	0	0	1	1	1	1	0	1	0	0	0	0.8	3.5
8-Jul	A	0	0	0	0	1	1	0	0	2	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0.6	1.8
9-Jul	A	1	0	0	0	0	0	0	0	0	1	C	C	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	1.0
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	0.7	0.6	0.5	0.4	0.4	0.6	0.7	0.8	0.8	0.8	0.7	0.7	0.9	1.7	1.1	1.2	1.1	0.8	0.7	0.5	0.4	0.4	0.4	Diurnal Average	
	--	7.7	3.5	2.2	2.2	1.6	2.7	2.6	5.0	3.5	2.0	1.8	4.4	3.5	35.7	6.4	9.6	14.1	4.8	6.2	2.1	1.2	1.3	1.3	Diurnal Maximum	

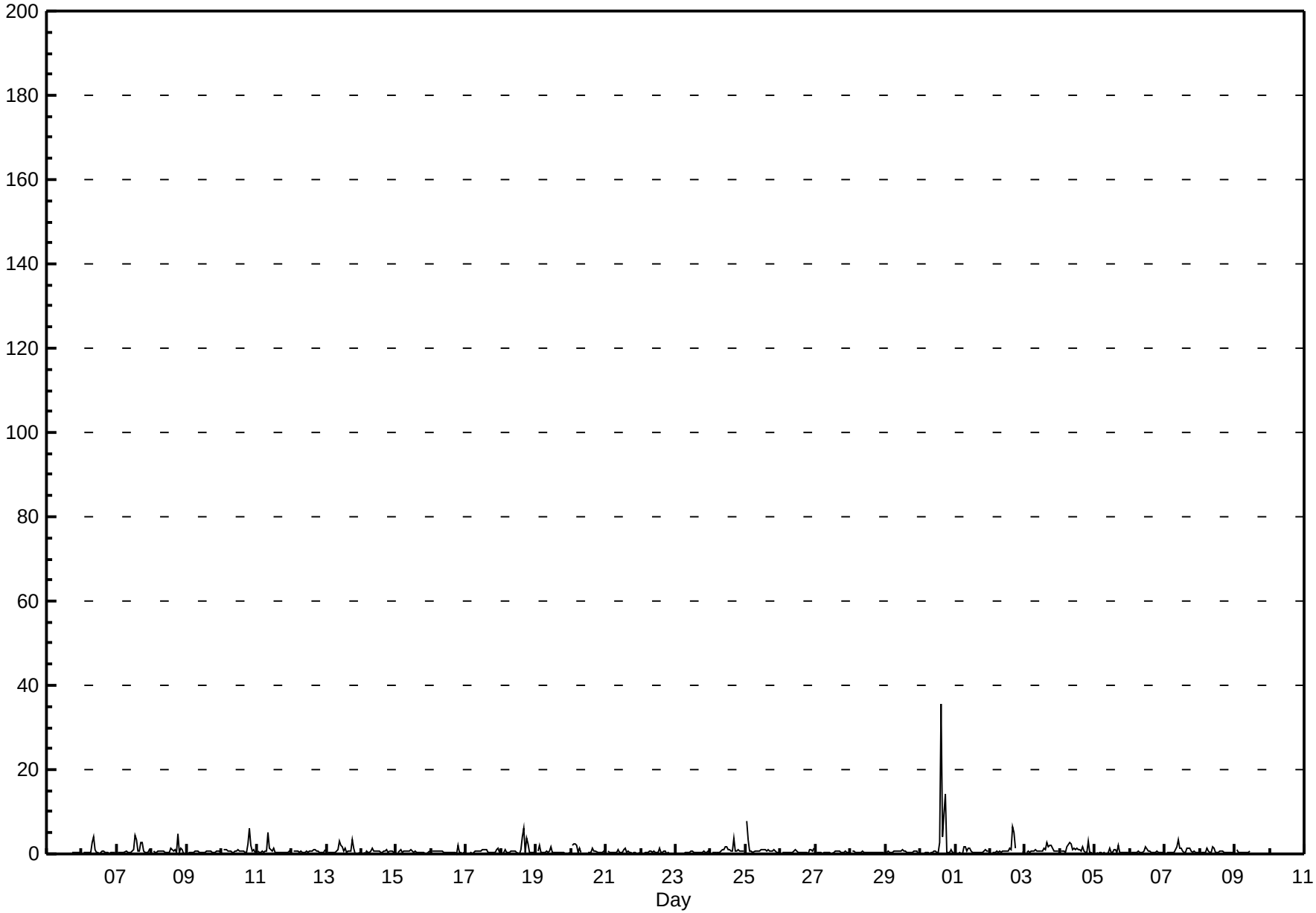
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Sulphur Dioxide (SO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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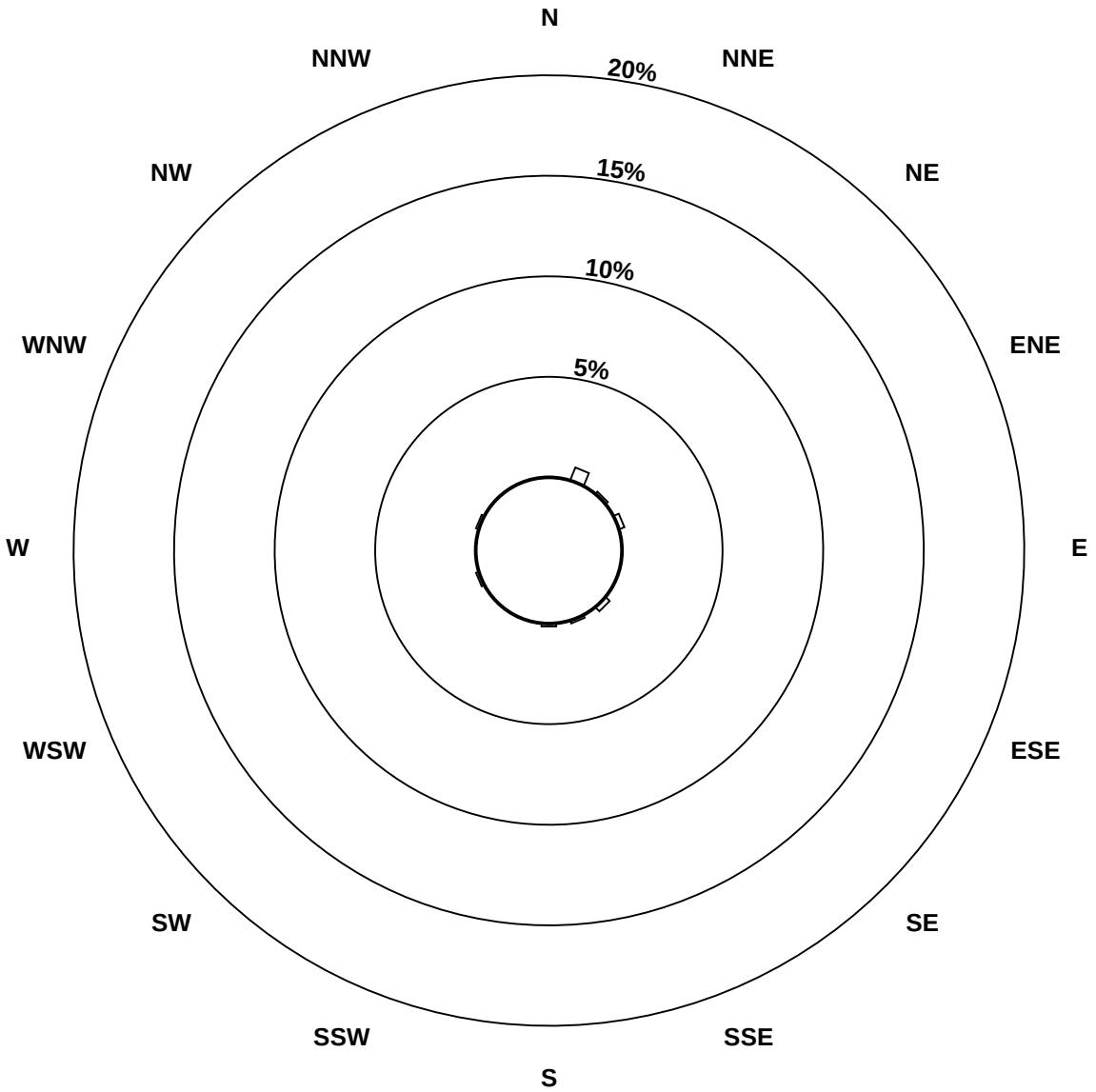
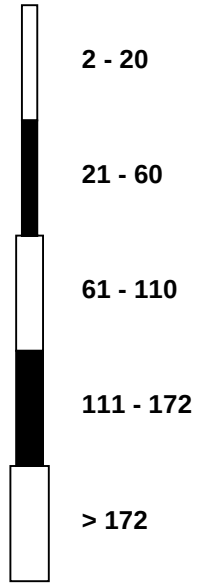
Pollutant Rose

Sulphur Dioxide (SO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Pollutant Classes (ppb)

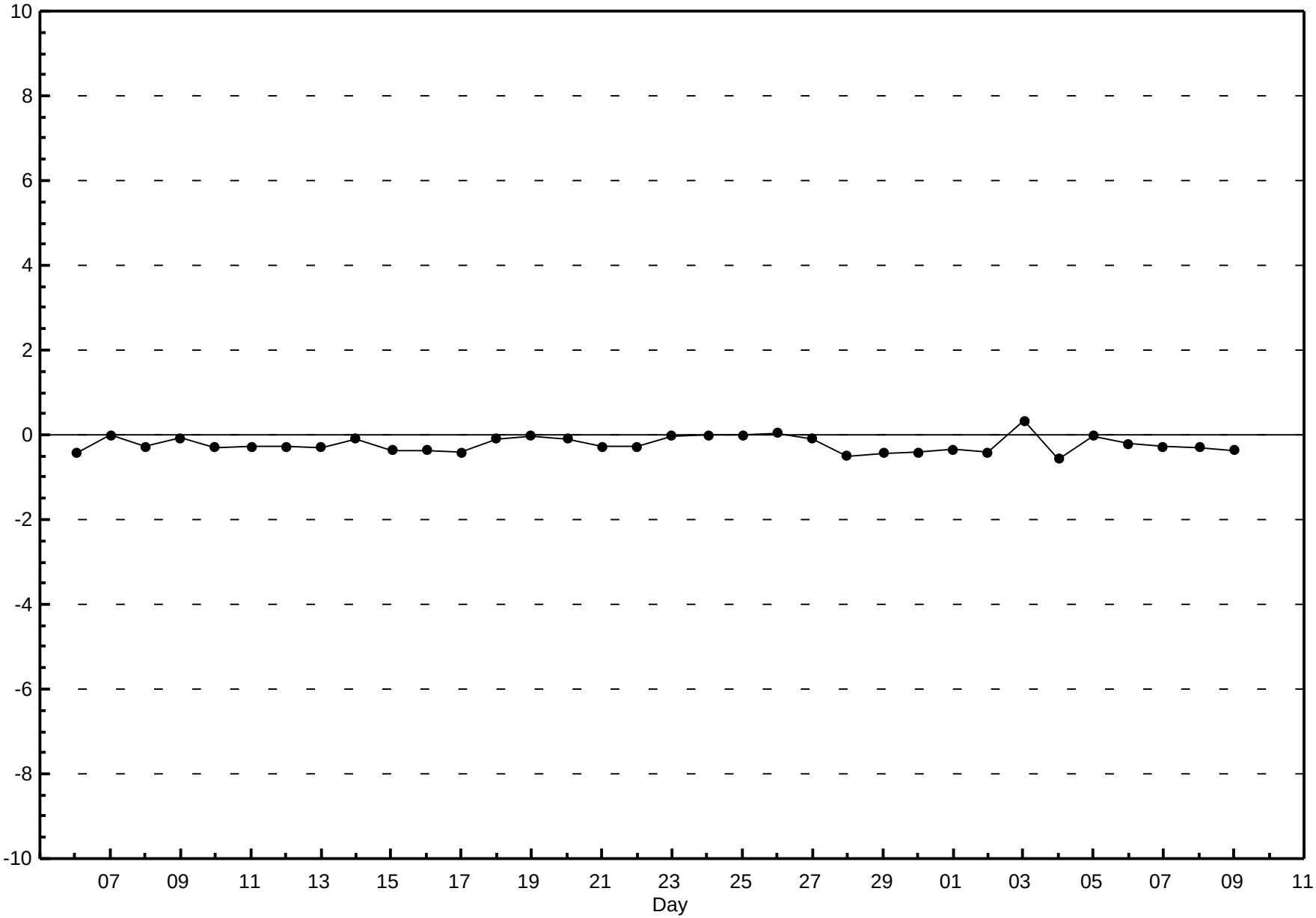


PAMZ | Parkland Airshed Management Zone

Zero Responses

Sulphur Dioxide (SO_2)

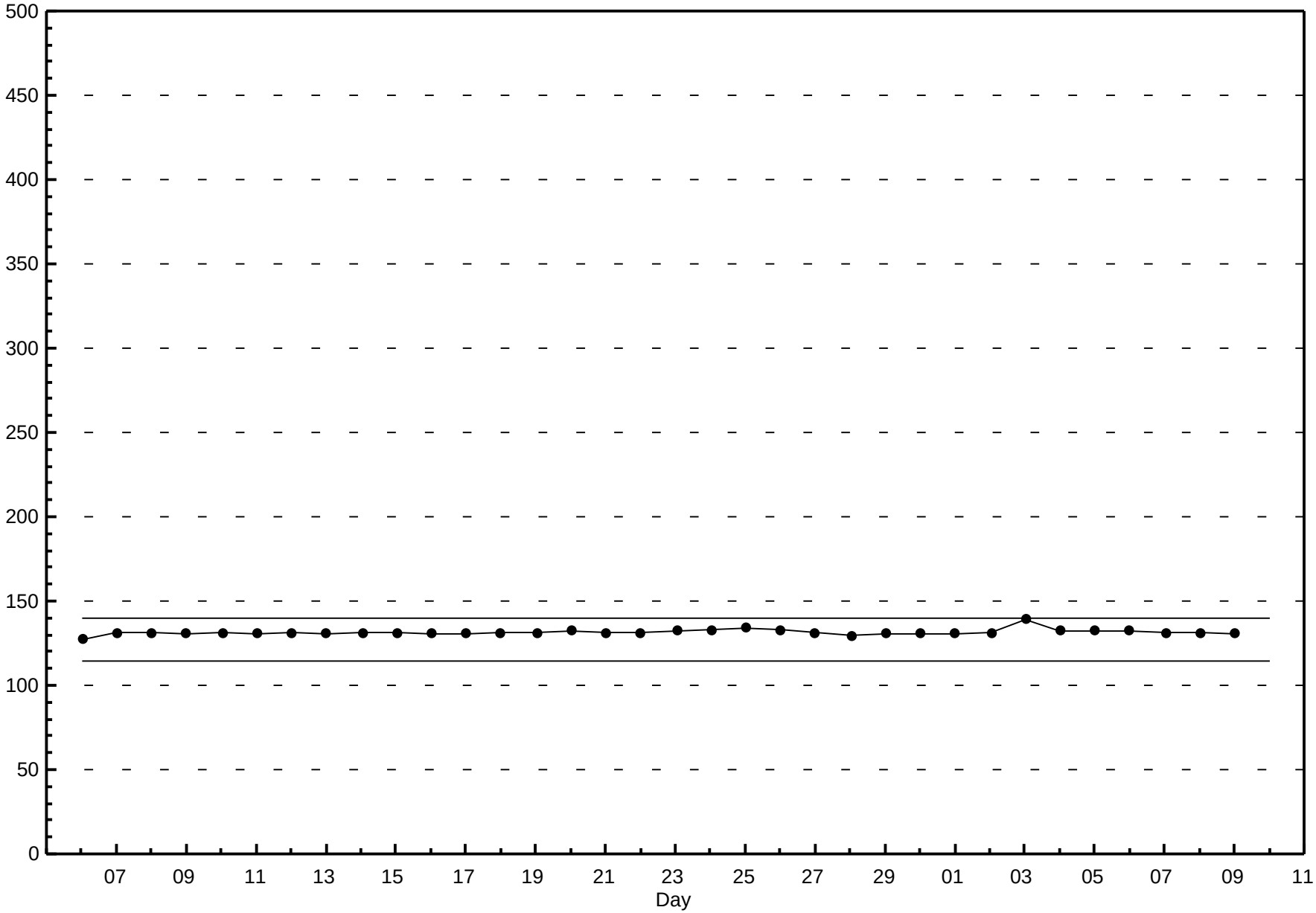
Didsbury West - Jun 5, 2013 to Jul 11, 2013



Span Responses

Sulphur Dioxide (SO_2)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Calibration Report

Parameter **SO_2**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	June 5 2013	Previous Calibration	NA
Station Name	Martha	Station Location	Didsbury
Reason: Routine	Install	Removal	Other:
Start Time (MST)	9:00	End Time (MST)	14:00
Barometric Pressure	679 mmHg	Station Temperature	22.0 Deg C
Calibrator	Sabio 2010	Serial Number	3951108
Cal Gas Concentration	51.6 ppm	Cal Gas Expiry Date	DEC 29 2013
Gas Cert Reference	LL105164		
DACS make	Campbell Scientific CR3000	DACS serial No.	6778
DACS voltage range	0 - 5 volt	DACS channel #	1
	Before		After
DACS Scale High	500	DACS slope	500
DACS Scale Low	0	DACS intercept	0
Calculated slope	0.019889	Calculated slope	0.020007
Calculated intercept	-0.162576	Calculated intercept	-0.873948
Analyzer make	API 100A	Analyzer serial #	1367

	before		after	
Concentration range	0-500		0-500	ppb
Slope	NA		0.906	
Offset	NA	mV	66.5	mV
Pressure	NA	inHg	23.2	inHg
Flow	NA	ccm	656.0	ccm
UV Lamp	NA	Hz	2422.1	Hz
Lamp Ratio	NA	%	81.0	%
Rcell Temp	NA	degC	50.0	degC

Calibration Data

Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
5031	0.00	0.0	-0.6	NA
5031	40.30	410.0	410.0	1.0001
5031	30.40	309.9	309.7	1.0006
5031	20.40	208.4	208.3	1.0002
5031	10.30	105.4	106.3	0.9921
				As found zero
				As found span
			Average Correction Factor	0.9983

Calculated value of As Found Response: NA

Percent Change of As Found: NA

	before calibration		after calibration	
Auto zero	NA	ppm	-0.1	ppm
Auto span	NA	ppm	128.4	ppm

Notes: Install Calibration due to station move.

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **SO2**

Air Monitoring Network **PAMZ**

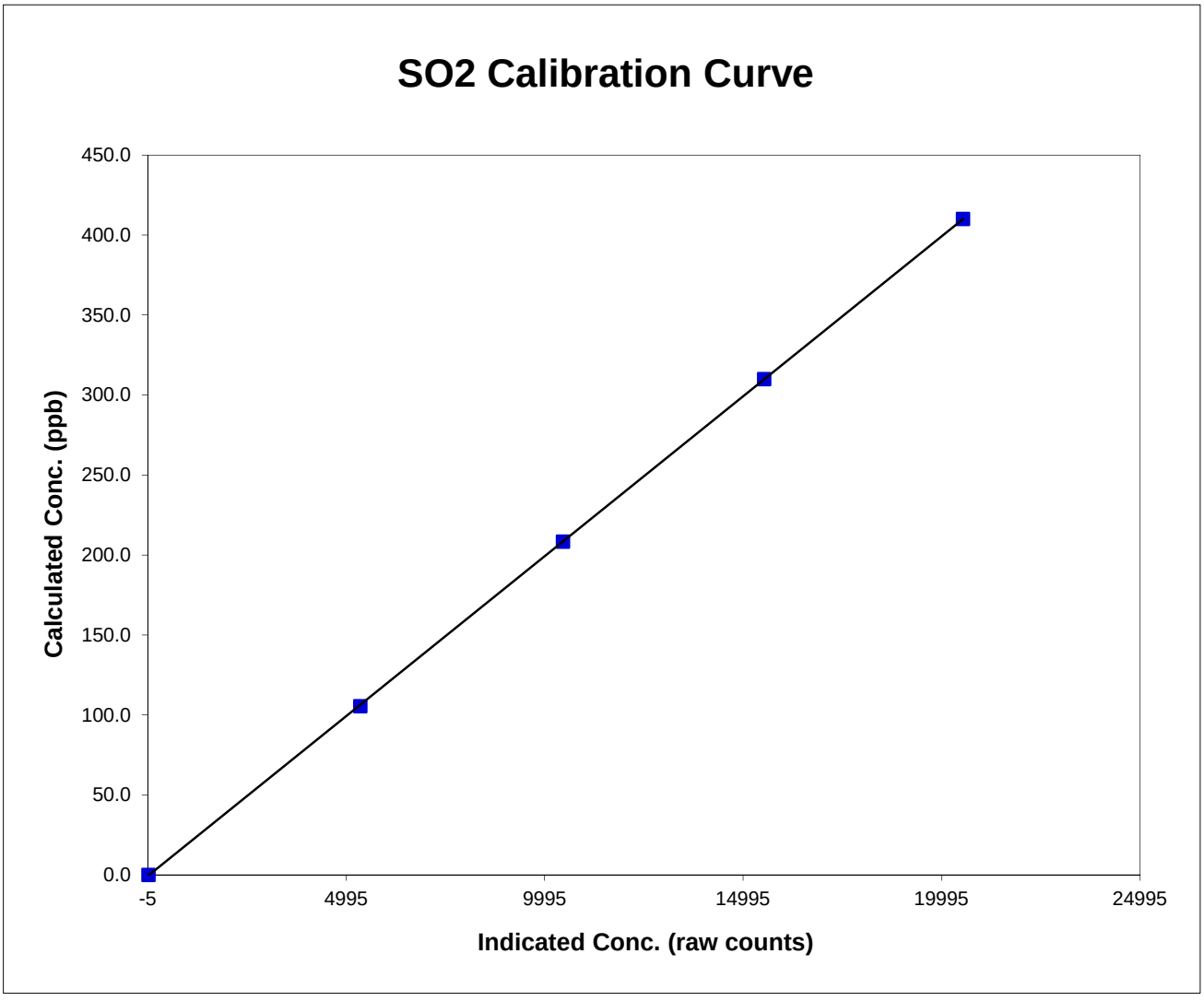
FOCUS AIR QUALITY MONITORING

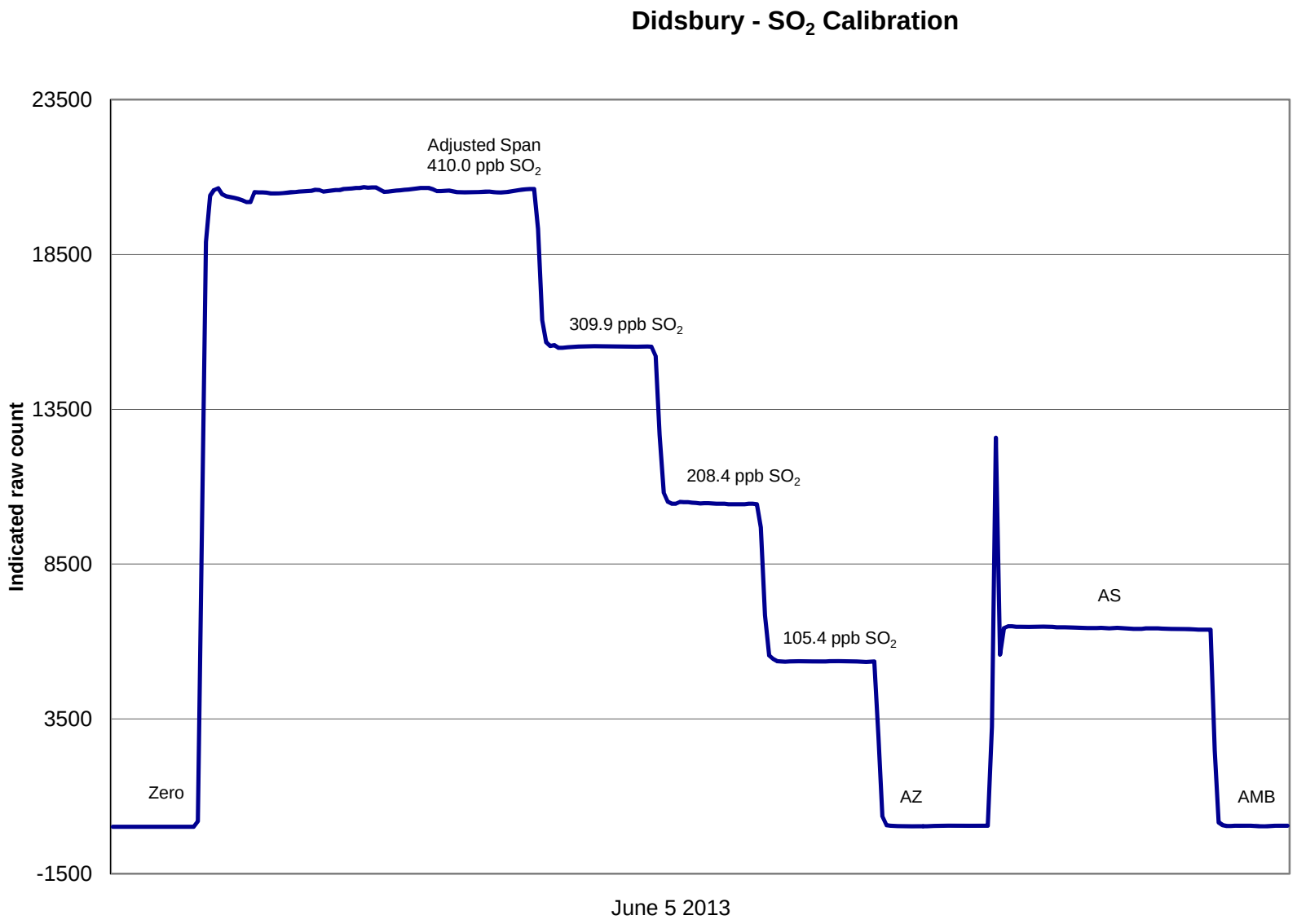
Station Information

Calibration Date	June 5 2013	Previous Calibration	NA
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	9:00	End Time (MST)	14:00
Analyzer make/model	API 100A	Analyzer serial #	1367

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	16.0	N/A		
410.0	20536.2	0.0200	Correlation Coefficient	0.999990
309.9	15525.2	0.0200		
208.4	10457.4	0.0199	Slope	0.020007
105.4	5355.0	0.0197		
			Intercept	-0.873948




Didsbury - SO2 Calibration
23500
18500
13500
8500
3500
-1500
Indicated raw count
Adjusted Span
410.0 ppb SO2
309.9 ppb SO2
208.4 ppb SO2
105.4 ppb SO2
Zero
AZ
AS
AMB
June 5 2013

Calibration Report

Parameter **SO_2**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	July 9 2013	Previous Calibration	June 5 2013
Station Name	Martha	Station Location	Didsbury

Reason: Routine | Install | **Removal** | Other:

Start Time (MST)	11:45	End Time (MST)	14:30
Barometric Pressure	679 mmHg	Station Temperature	22.0 Deg C
Calibrator	Sabio 2010	Serial Number	3951108
Cal Gas Concentration	51.6 ppm	Cal Gas Expiry Date	DEC 29 2013
Gas Cert Reference	LL105164		
DACS make	Campbell Scientific CR3000	DACS serial No.	6778
DACS voltage range	0 - 5 volt	DACS channel #	1
	Before		After
DACS Scale High	500	DACS slope	500
DACS Scale Low	0	DACS intercept	0
Calculated slope	0.020007	Calculated slope	0.019936
Calculated intercept	-0.873948	Calculated intercept	-1.290316
Analyzer make	API 100A	Analyzer serial #	1367

	before		after	
Concentration range	0-500		0-500	ppb
Slope	0.906		NA	
Offset	66.5	mV	NA	mV
Pressure	23.2	inHg	NA	inHg
Flow	656.0	ccm	NA	ccm
UV Lamp	2422.1	Hz	NA	Hz
Lamp Ratio	81.0	%	NA	%
Rcell Temp	50.0	degC	NA	degC

Calibration Data

Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
5031	0.00	0.0	-0.9	NA
5031	40.30	410.0	409.9	1.0004
5031	30.40	309.9	309.6	1.0010
5031	20.40	208.4	208.6	0.9990
5031	10.30	105.4	106.6	0.9892
5031	0.00	0.0	-0.5	As found zero
5031	40.30	410.0	411.8	As found span
			Average Correction Factor	0.9974

Calculated value of As Found Response: 412.2 ppb Percent Change of As Found: -0.53%

	before calibration		after calibration	
Auto zero	-0.1	ppm	NA	ppm
Auto span	128.4	ppm	NA	ppm

Notes:

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **SO2**

Air Monitoring Network **PAMZ**

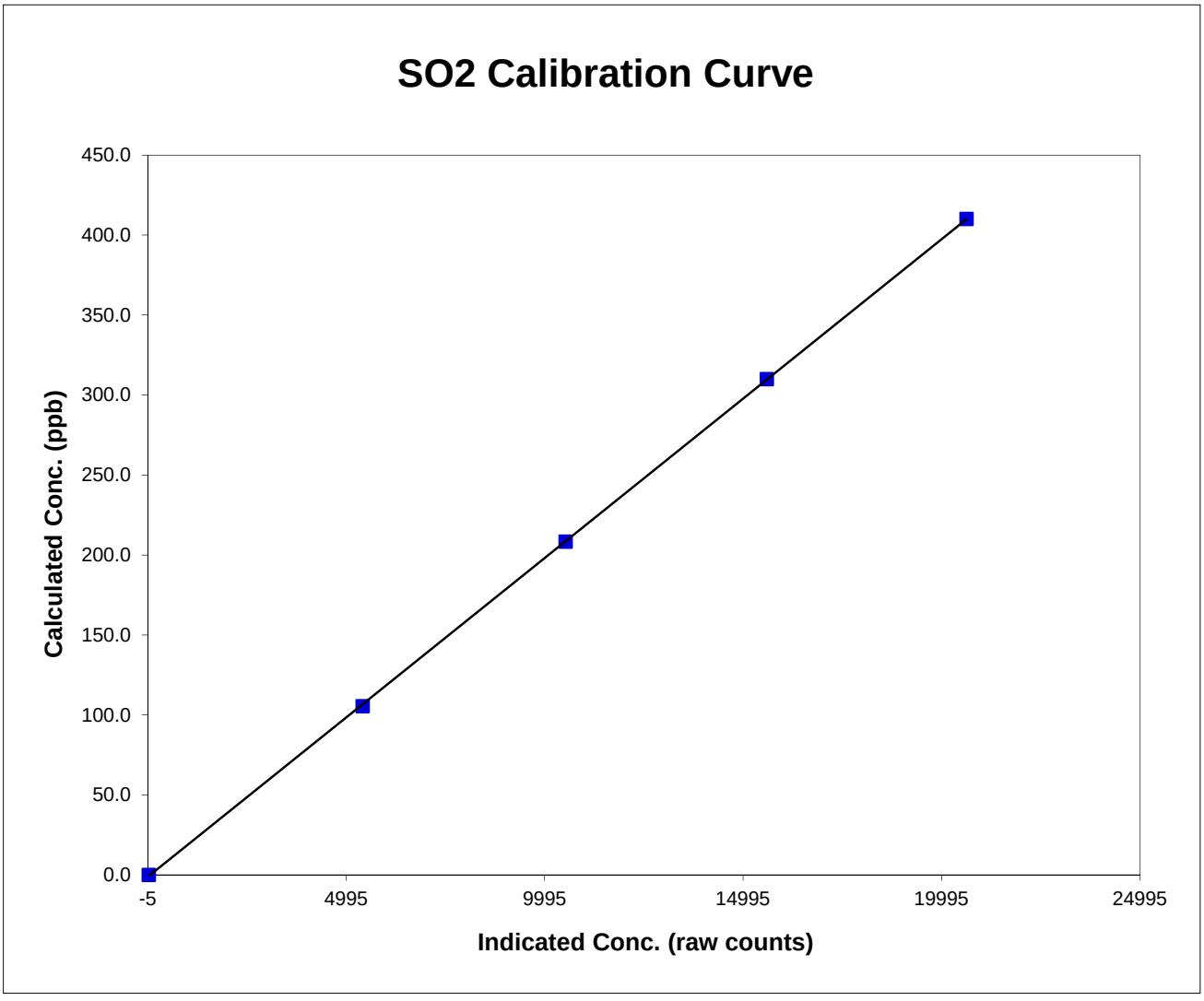
FOCUS AIR QUALITY MONITORING

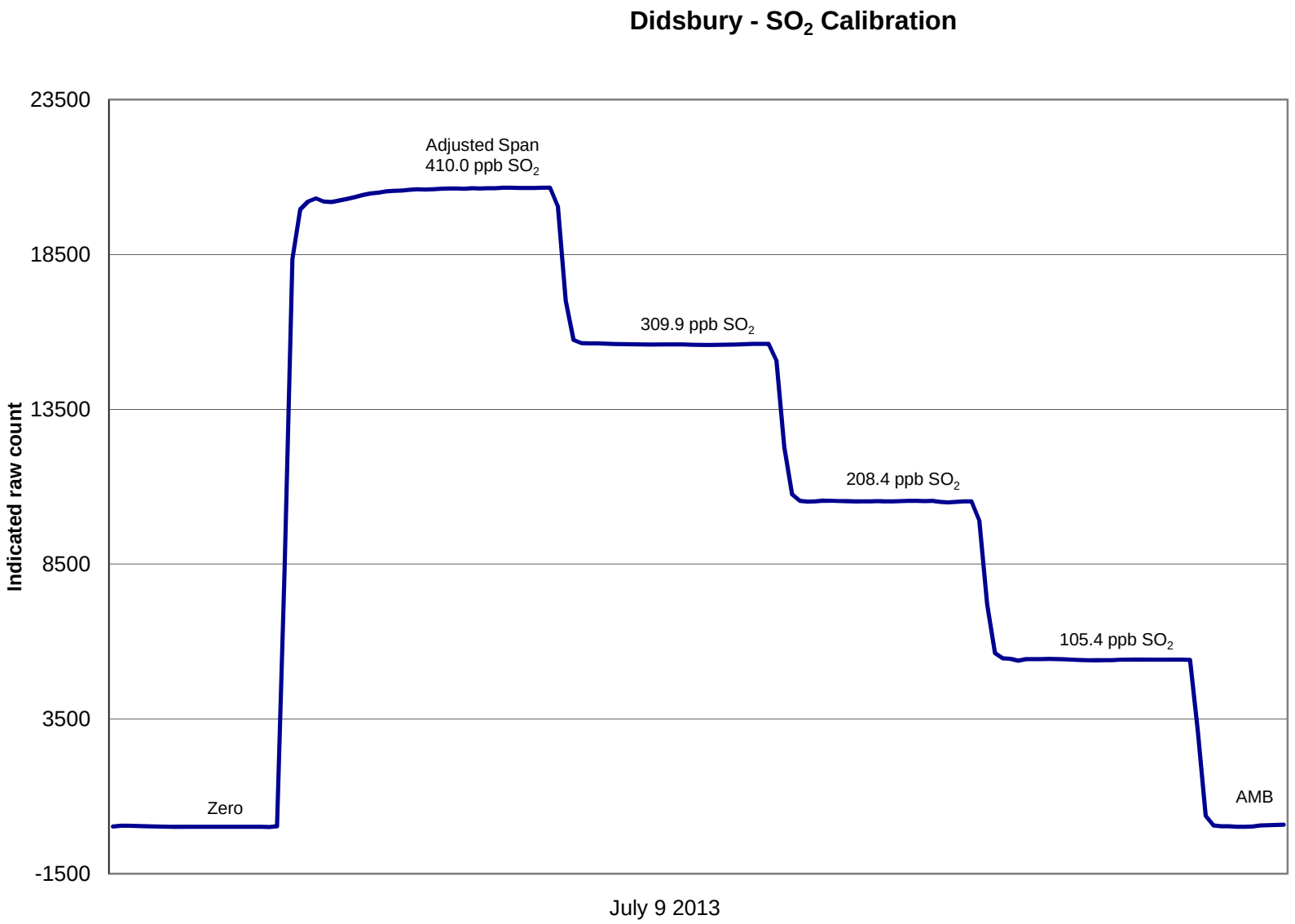
Station Information

Calibration Date	July 9 2013	Previous Calibration	June 5 2013
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	11:45	End Time (MST)	14:30
Analyzer make/model	API 100A	Analyzer serial #	1367

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	20.8	N/A		
410.0	20624.3	0.0199	Correlation Coefficient	0.999979
309.9	15595.5	0.0199		
208.4	10527.6	0.0198	Slope	0.019936
105.4	5410.7	0.0195		
			Intercept	-1.290316




Didsbury - SO2 Calibration
23500
18500
13500
8500
3500
-1500
Indicated raw count
Adjusted Span
410.0 ppb SO2
309.9 ppb SO2
208.4 ppb SO2
105.4 ppb SO2
Zero
AMB
July 9 2013

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.3 ppb on Jul 4 02:00 Maximum Daily Average: 0.9 ppb on Jul 4

Minimum Value: 0 ppb on Jun 8 07:00 Minimum Daily Average: 0.1 ppb on Jun 8
Maximum Diurnal Average: 0.7 ppb at hour 4 Minimum Diurnal Average: 0.1 ppb at hour 17
Monthly Average: 0.30 ppb Percentiles: $P_1 = 0.0$ $P_{10} = 0.0$ $Q_1 = 0.1$ Median = 0.2 $Q_3 = 0.3$ $P_{90} = 0.7$ $P_{99} = 2.0$

Hours in Service:	777
Hours of Data:	729
Hours of Missing Data:	48
Hours of Calibration:	44
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
7-Jun	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	--	0.3
8-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2
9-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3
10-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2
11-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.4
12-Jun	A	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.5
13-Jun	A	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.5
14-Jun	A	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.7
15-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2
16-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3
17-Jun	A	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1.4
18-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.4
19-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.2
20-Jun	A	0	0	0	0	0	0	0	AC	AC	AC	AC	1	0	0	0	0	0	0	0	0	0	0	0	0.3	0.6
21-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.3
22-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	0.7
23-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1.0
24-Jun	A	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1.3
25-Jun	A	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.5	1.1
26-Jun	A	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.5	1.6
27-Jun	A	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0.5	2.1
28-Jun	A	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.8
29-Jun	A	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1.2
30-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0.4	3.9
1-Jul	A	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2.2
2-Jul	A	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	P	P	P	P	0	0	0.4	1.7
3-Jul	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.2	2.0
4-Jul	A	4	4	3	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	4.3
5-Jul	A	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1.3
6-Jul	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0.2	2.0
7-Jul	A	0	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	2.7
8-Jul	A	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.6	1.4
9-Jul	A	1	2	2	1	1	0	0	0	0	0	0	0	0	C	C	C	NS	NS	NS	NS	NS	NS	NS	--	1.8
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	0.6	0.6	0.7	0.6	0.4	0.3	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.4	0.6	Diurnal Average	
	--	4.3	4.0	2.7	3.6	1.7	1.0	0.7	0.6	0.7	0.7	0.4	0.6	0.4	0.3	0.4	0.4	0.5	0.3	0.4	0.5	0.7	1.5	3.9	Diurnal Maximum	

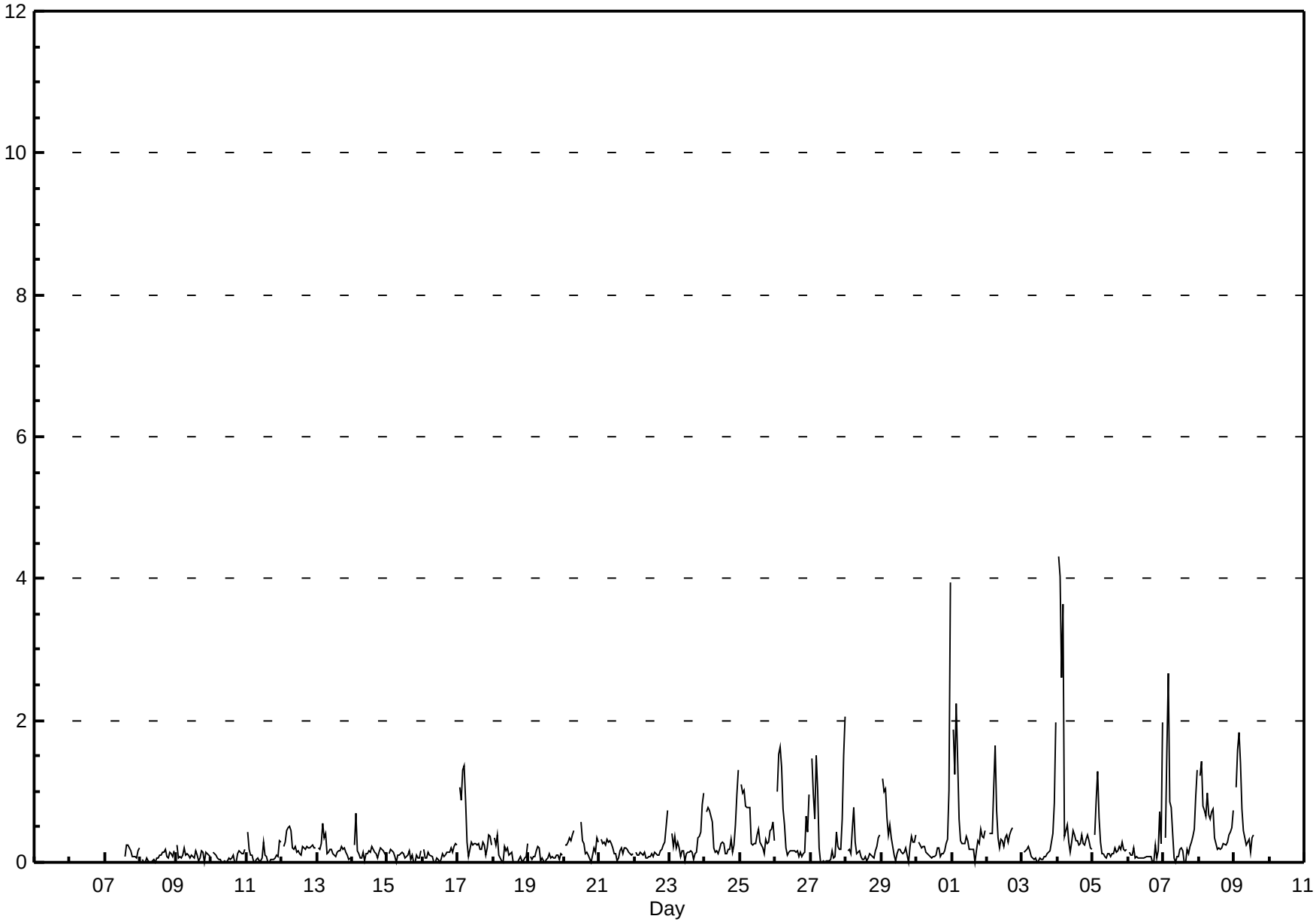
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Total Reduced Sulphur (TRS) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 8.1 ppb on Jul 4 02:00

Maximum Daily Average: 1.6 ppb on Jul 4

Minimum Value: 0 ppb on Jun 10 08:00

Minimum Daily Average: 0.2 ppb on Jun 8

Maximum Diurnal Average: 1.3 ppb at hour 4

Minimum Diurnal Average: 0.3 ppb at hour 9

Monthly Average: 0.57 ppb

Percentiles: $P_1 = 0.1$ $P_{10} = 0.2$ $Q_1 = 0.2$ Median = 0.3 $Q_3 = 0.5$ $P_{90} = 1.2$ $P_{99} = 5.9$

Hours in Service:	777
Hours of Data:	729
Hours of Missing Data:	48
Hours of Calibration:	44
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
7-Jun	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	--	0.4
8-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.5
9-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.5
10-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.5
11-Jun	A	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0.3	1.1
12-Jun	A	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	0.7
13-Jun	A	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1.1
14-Jun	A	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1.6
15-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.4
16-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.4
17-Jun	A	2	1	2	2	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0.7	2.2
18-Jun	A	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1.3
19-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.4
20-Jun	A	0	0	0	1	0	1	1	AC	AC	AC	AC	1	1	0	0	0	0	0	0	0	0	0	0	0.4	0.9
21-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.5
22-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1.0
23-Jun	A	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	0.5	1.8
24-Jun	A	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	3	0.7	2.7
25-Jun	A	1	1	2	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	1	1	1	1	0.7	2.2
26-Jun	A	2	3	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	0.9	2.9
27-Jun	A	6	3	2	2	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	3	1.2	5.9
28-Jun	A	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1.3
29-Jun	A	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.6	2.2
30-Jun	A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	7	0.8	6.9
1-Jul	A	3	2	6	3	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	1.0	5.9
2-Jul	A	1	1	1	2	2	1	1	0	0	1	0	0	1	0	1	1	1	P	P	P	P	0	0	0.7	1.9
3-Jul	A	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	6	0.6	6.3
4-Jul	A	8	7	5	6	1	1	1	0	1	1	1	1	0	0	0	1	0	0	1	1	0	0	0	1.6	8.1
5-Jul	A	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2.5
6-Jul	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	1	4	0.5	4.3
7-Jul	A	1	5	5	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	1.0	5.0
8-Jul	A	3	3	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0.9	3.3
9-Jul	A	2	3	3	3	1	1	1	0	0	0	0	0	1	C	C	C	NS	NS	NS	NS	NS	NS	NS	--	3.0
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	1.3	1.3	1.3	1.1	0.7	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.8	1.3	Diurnal Average	
	--	8.1	7.1	5.9	6.3	2.0	1.3	1.0	0.8	0.9	1.0	0.6	1.1	0.6	0.7	0.7	0.6	0.6	0.6	0.8	1.2	1.7	4.0	6.9	Diurnal Maximum	

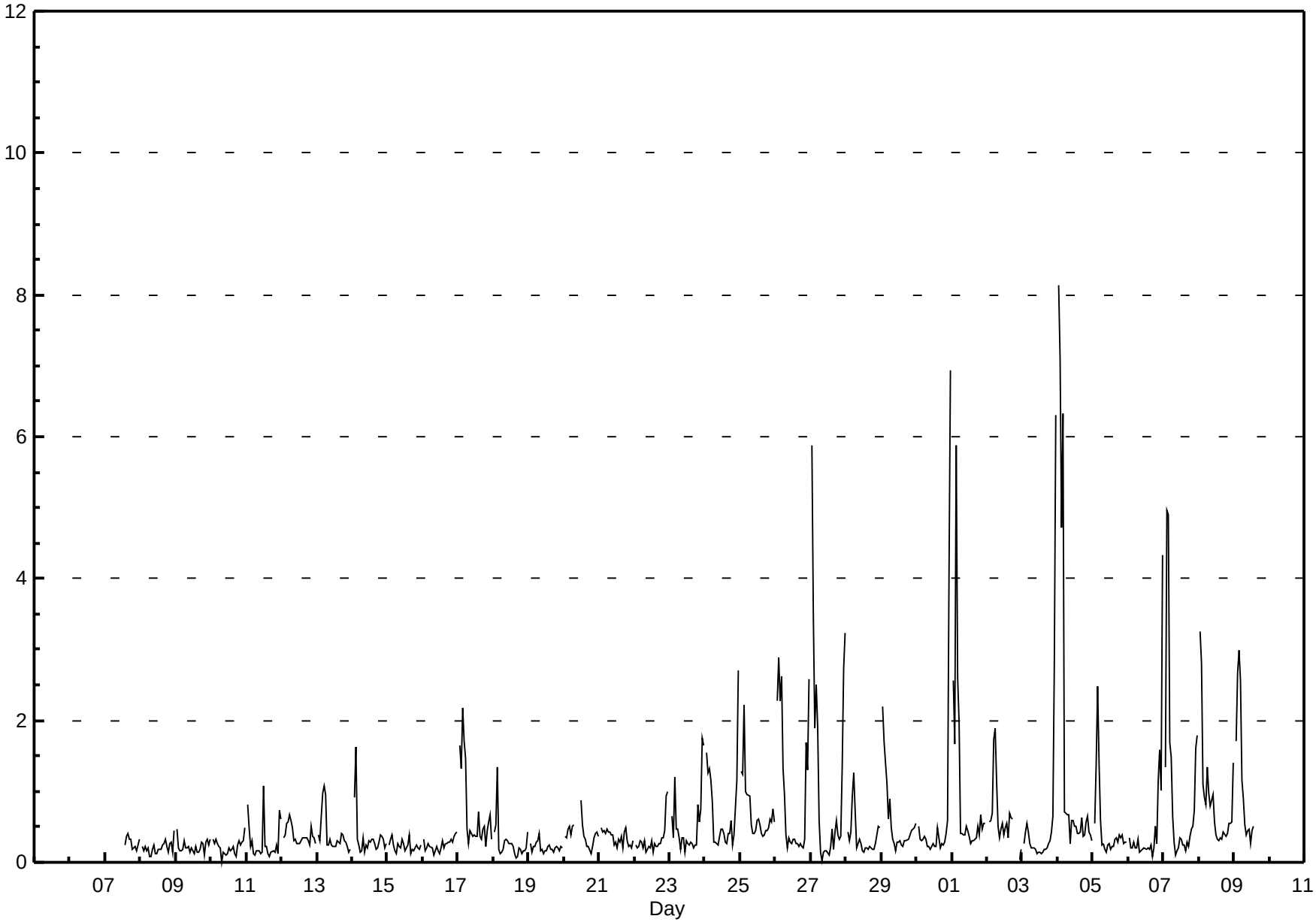
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Total Reduced Sulphur (TRS) - ppb

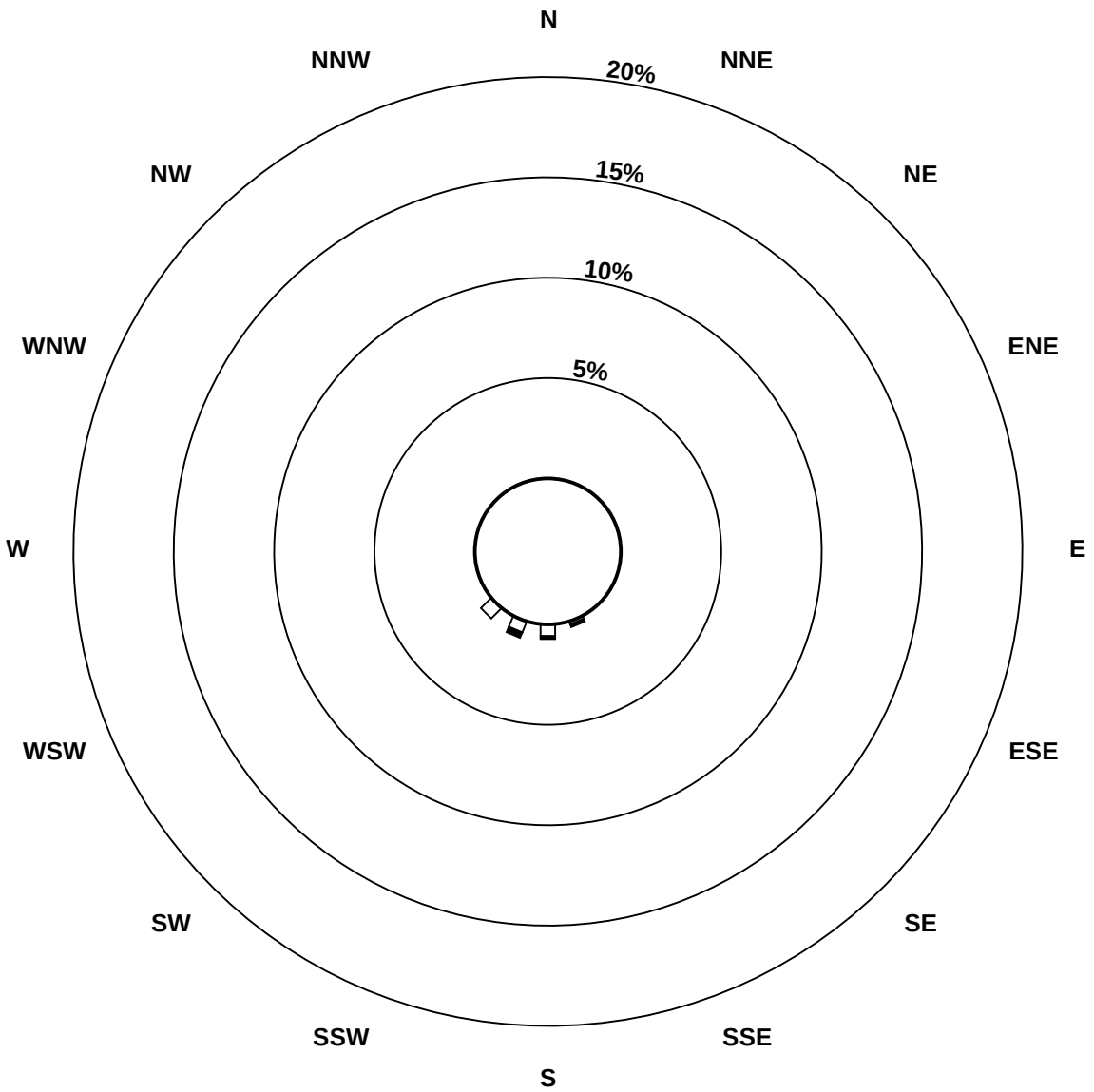
Didsbury West - Jun 5, 2013 to Jul 11, 2013



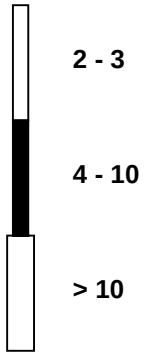
Pollutant Rose

Total Reduced Sulphur (TRS) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



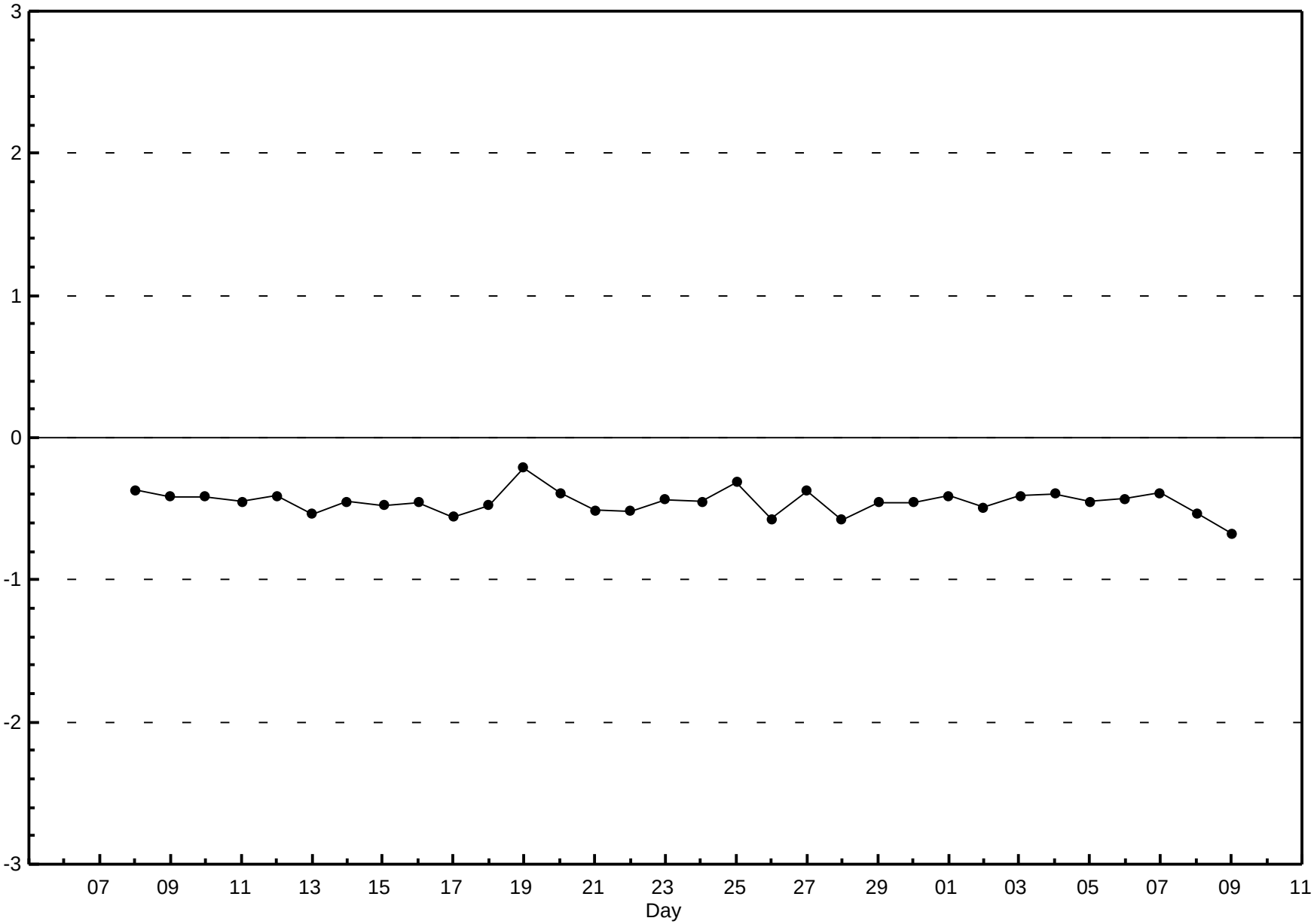
Pollutant Classes (ppb)



Zero Responses

Total Reduced Sulphur (TRS)

Didsbury West - Jun 5, 2013 to Jul 11, 2013

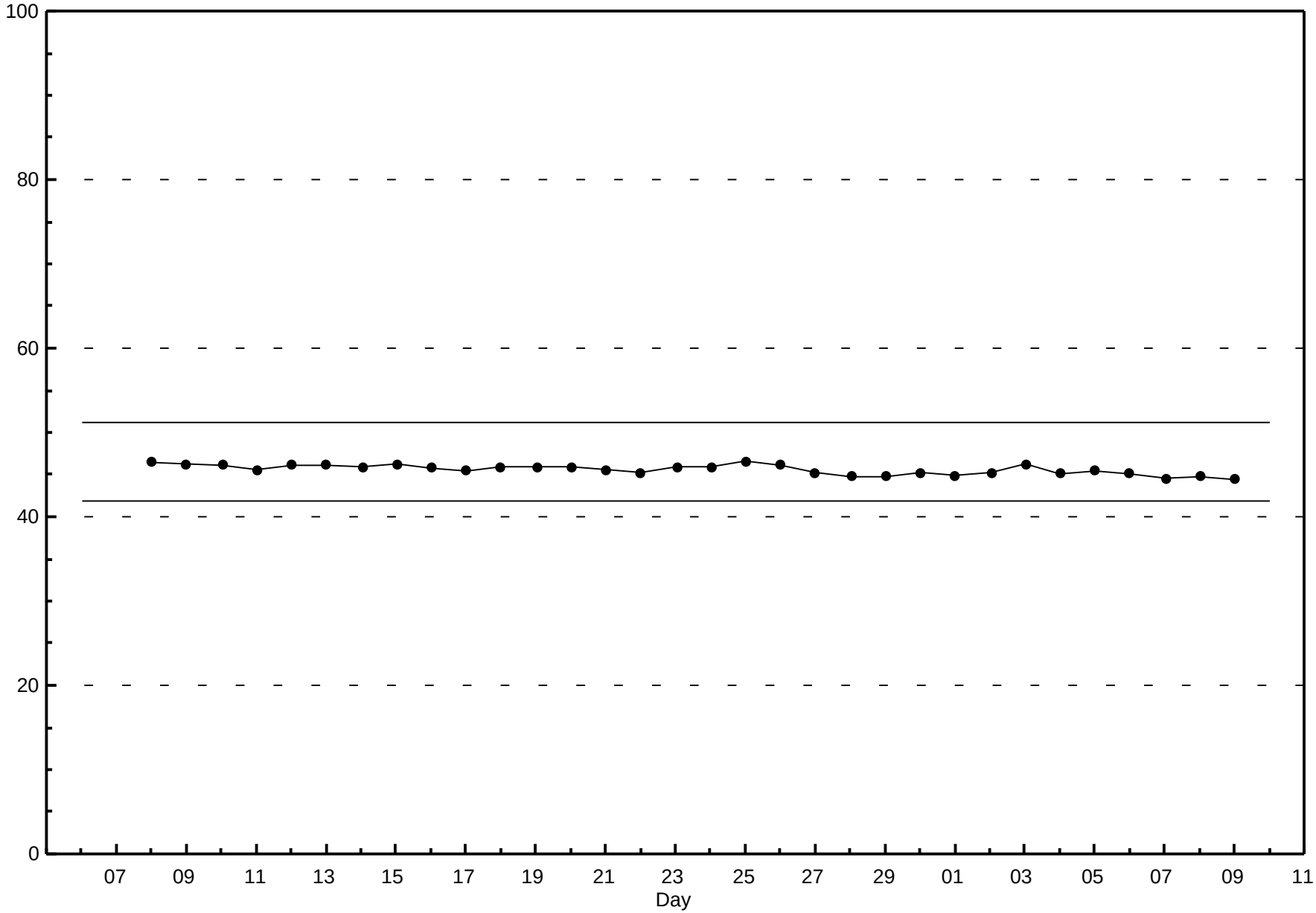


PAMZ | Parkland Airshed Management Zone

Span Responses

Total Reduced Sulphur (TRS)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Calibration Report

Parameter **TRS**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	June 6 2013	Previous Calibration	NA
Station Name	Martha	Station Location	Disbury
Reason: Routine	Install	Removal	Other:
Start Time (MST)	8:00	End Time (MST)	12:00
Barometric Pressure	687 mmHg	Station Temperature	22.0 Deg C
Calibrator	Environics	Serial Number	2844
Cal Gas Concentration	10.1 ppm H2S	Cal Gas Expiry Date	August 06 2013
Gas Cert Reference	LL74277		
DACS make	Campbell Scientific CR3000	DACS serial No.	6778
DACS voltage range	0 - 5 v	DACS channel #	3
	Before		After
DACS Scale High	100	DACS slope	100
DACS Scale Low	0	DACS intercept	0
Calc Omron slope	NA	Calc Omron slope	0.019943
Calc Omron intercept	NA	Calc Omron intercept	-0.186894
Analyzer make	API 100A	Analyzer serial #	1366

	before		after	
Concentration range	0-100	ppb	0-100	ppb
Slope	NA		0.950	
Offset	NA	mV	24.3	mV
Pressure	NA	inHg	22.6	inHg
Sample flow	NA	ccm	473	ccm
UV Lamp	NA	mV	2754.0	mV
Lamp Ratio	NA	%	91.0	%
Rcell Temp	NA	degC	50.0	degC

Calibration Data

Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
4994	0.0	0.0	-0.6	N/A
4994	40.0	80.3	79.8	1.0061
4994	30.0	60.3	60.6	0.9960
4994	20.0	40.3	40.6	0.9911
4994	10.0	20.2	20.6	0.9782
4994	10.0	98.9	0.7	SOx Scrubber Test
				As found zero
				As found span
			Average Correction Factor	0.9929

Calculated value of As Found Response: NA ppm Percent Change of As Found: NA

	before calibration		after calibration	
Auto zero	NA	ppb	-0.2	ppb
Auto span	NA	ppb	46.7	ppb

Notes: Install following station move.

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **TRS**

Air Monitoring Network **PAMZ**

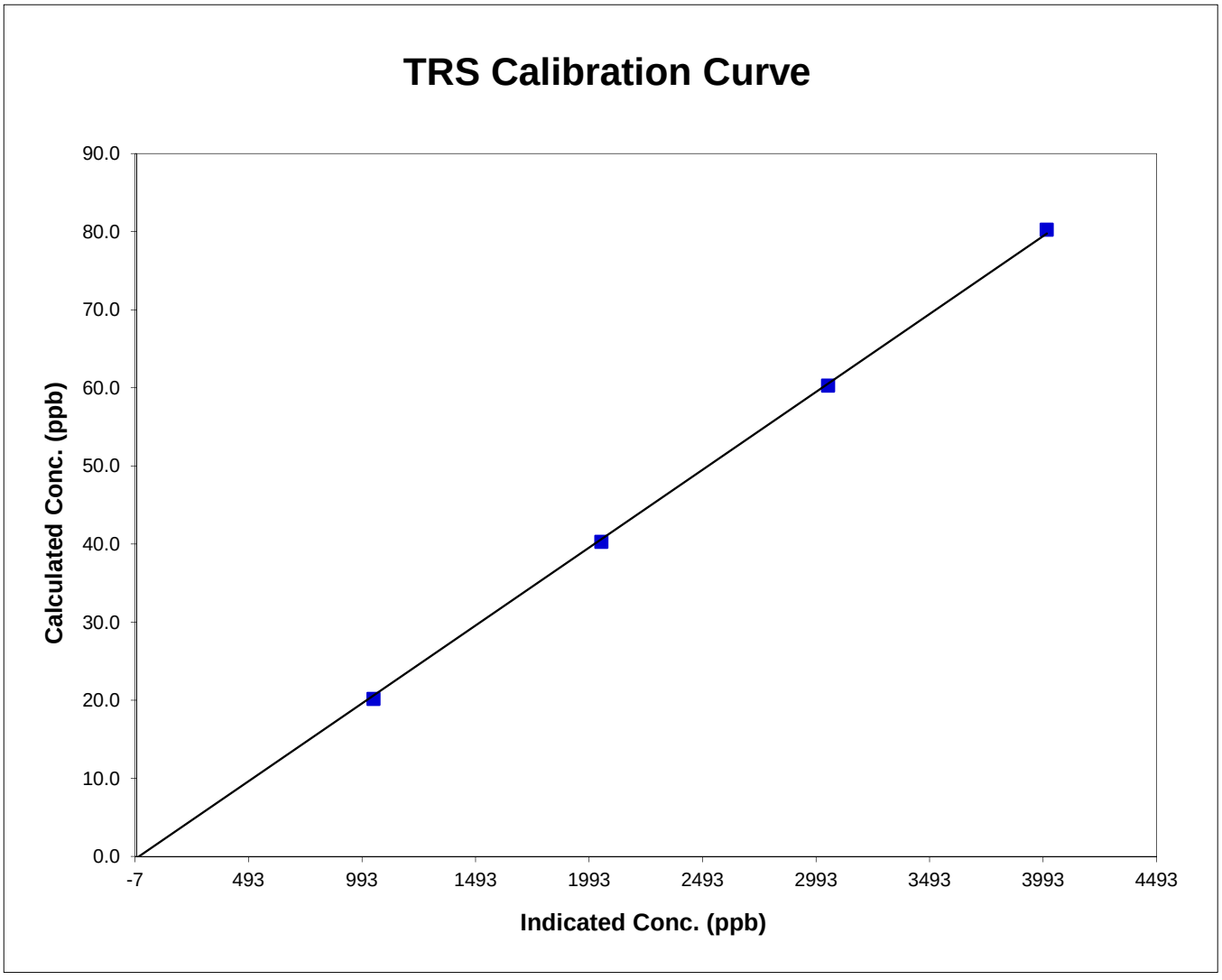
FOCUS AIR QUALITY MONITORING

Station Information

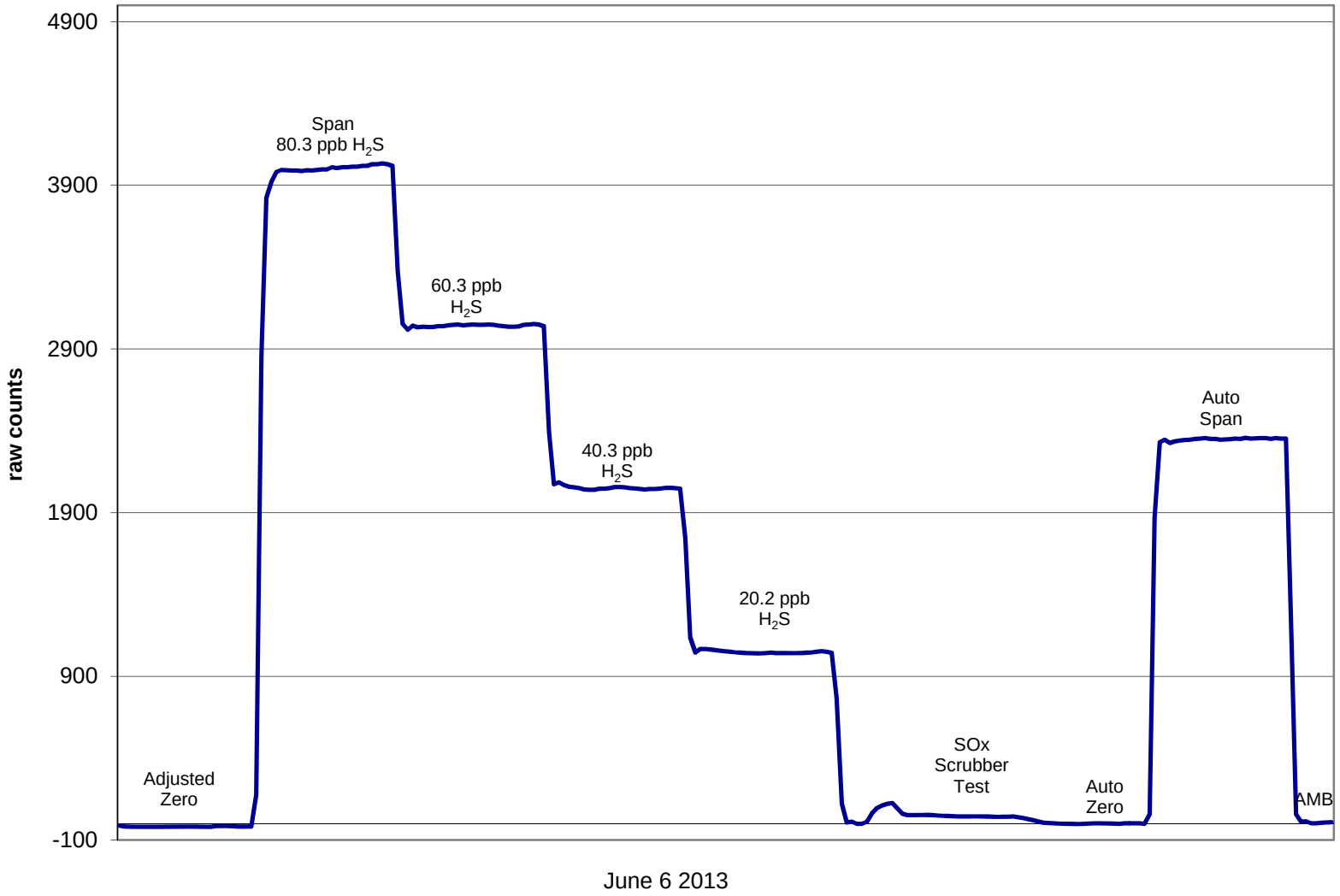
Calibration Date	June 6 2013	Previous Calibration	NA
Station Number	Martha	Station Location	Disbury
Start Time (MST)	8:00	End Time (MST)	12:00
Analyzer make/model	API 100A	Analyzer serial #	1366

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-19.0	0.0000		
80.3	4009.1	0.0200	Correlation Coefficient	0.999765
60.3	3045.6	0.0198		
40.3	2047.6	0.0197	Slope	0.019943
20.2	1044.0	0.0193		
			Intercept	-0.186894



Didsbury - TRS Calibration



Calibration Report

Parameter **TRS**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	July 9 2013	Previous Calibration	June 6 2013
Station Name	Martha	Station Location	Disbury

Reason: Routine | Install | **Removal** | Other:

Start Time (MST)	14:00	End Time (MST)	12:00
Barometric Pressure	687 mmHg	Station Temperature	22.0 Deg C
Calibrator	Environics	Serial Number	2844
Cal Gas Concentration	9.97 ppm H2S	Cal Gas Expiry Date	August 06 2013
Gas Cert Reference	LL74277		
DACS make	Campbell Scientific CR3000	DACS serial No.	6778
DACS voltage range	0 - 5 v	DACS channel #	3
	Before		After
DACS Scale High	100	DACS slope	100
DACS Scale Low	0	DACS intercept	0
Calc Omron slope	0.019943	Calc Omron slope	0.021585
Calc Omron intercept	-0.186894	Calc Omron intercept	0.335379

Analyzer make	API 100A		Analyzer serial #	1366

	before		after	
Concentration range	0-100	ppb	0-100	ppb
Slope	0.950		NA	
Offset	24.3	mV	NA	mV
Pressure	22.6	inHg	NA	inHg
Sample flow	473	ccm	NA	ccm
UV Lamp	2754.0	mV	NA	mV
Lamp Ratio	91.0	%	NA	%
Rcell Temp	50.0	degC	NA	degC

Calibration Data

Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
4994	0.0	0.0	0.1	N/A
4994	40.0	79.2	79.1	1.0013
4994	30.0	59.5	59.6	0.9982
4994	20.0	39.8	39.9	0.9964
4994	10.0	19.9	19.7	1.0100
4994	10.0	98.9		SOx Scrubber Test
4994	0.0	0.0	-0.4	As found zero
4994	40.0	79.2	72.6	As found span
			Average Correction Factor	1.0015

Calculated value of As Found Response: 73.05 ppm Percent Change of As Found: 7.8%

	before calibration		after calibration	
Auto zero	-0.2	ppb	NA	ppb
Auto span	46.7	ppb	NA	ppb

Notes: Removal due to station move.

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **TRS**

Air Monitoring Network **PAMZ**

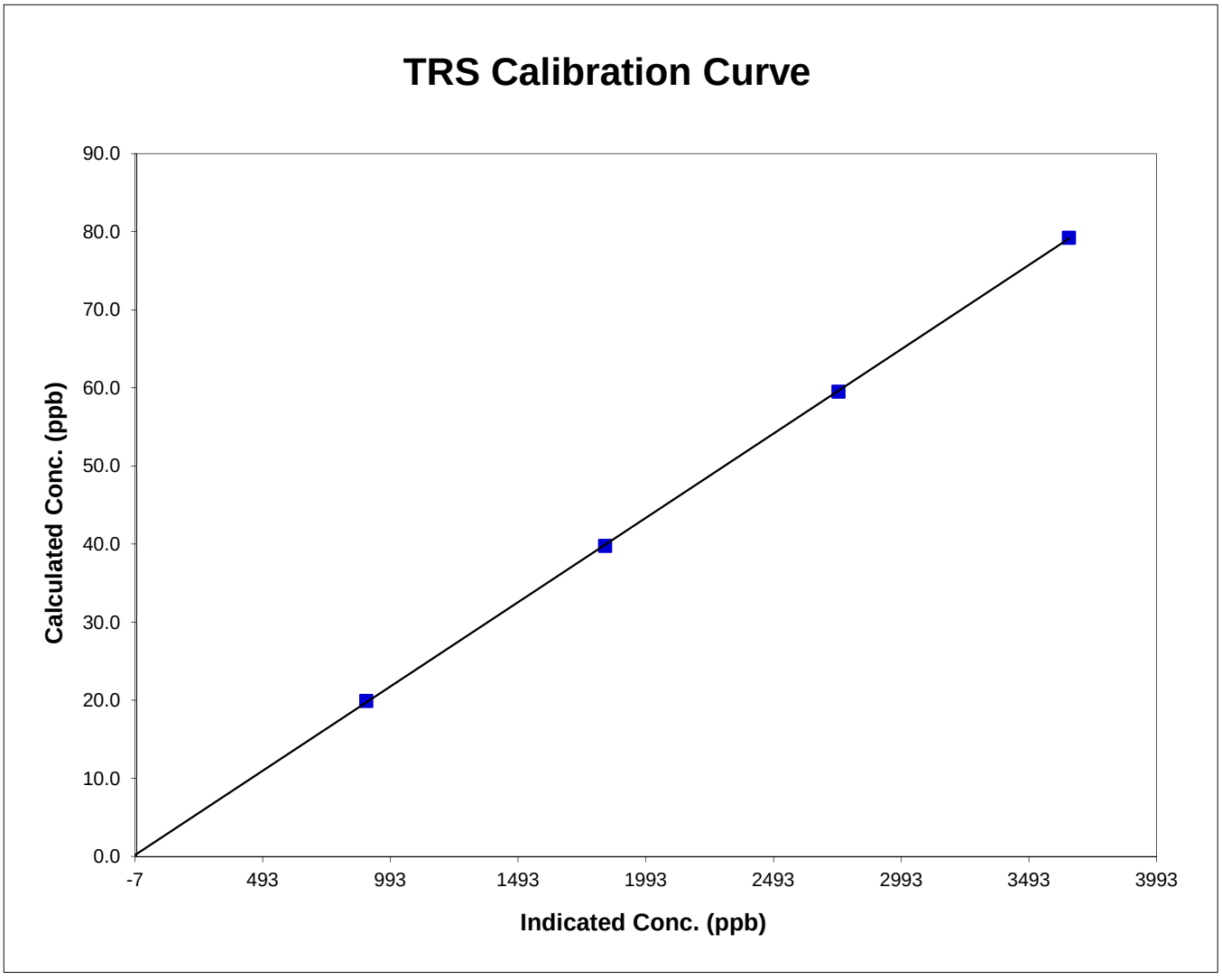
FOCUS AIR QUALITY MONITORING

Station Information

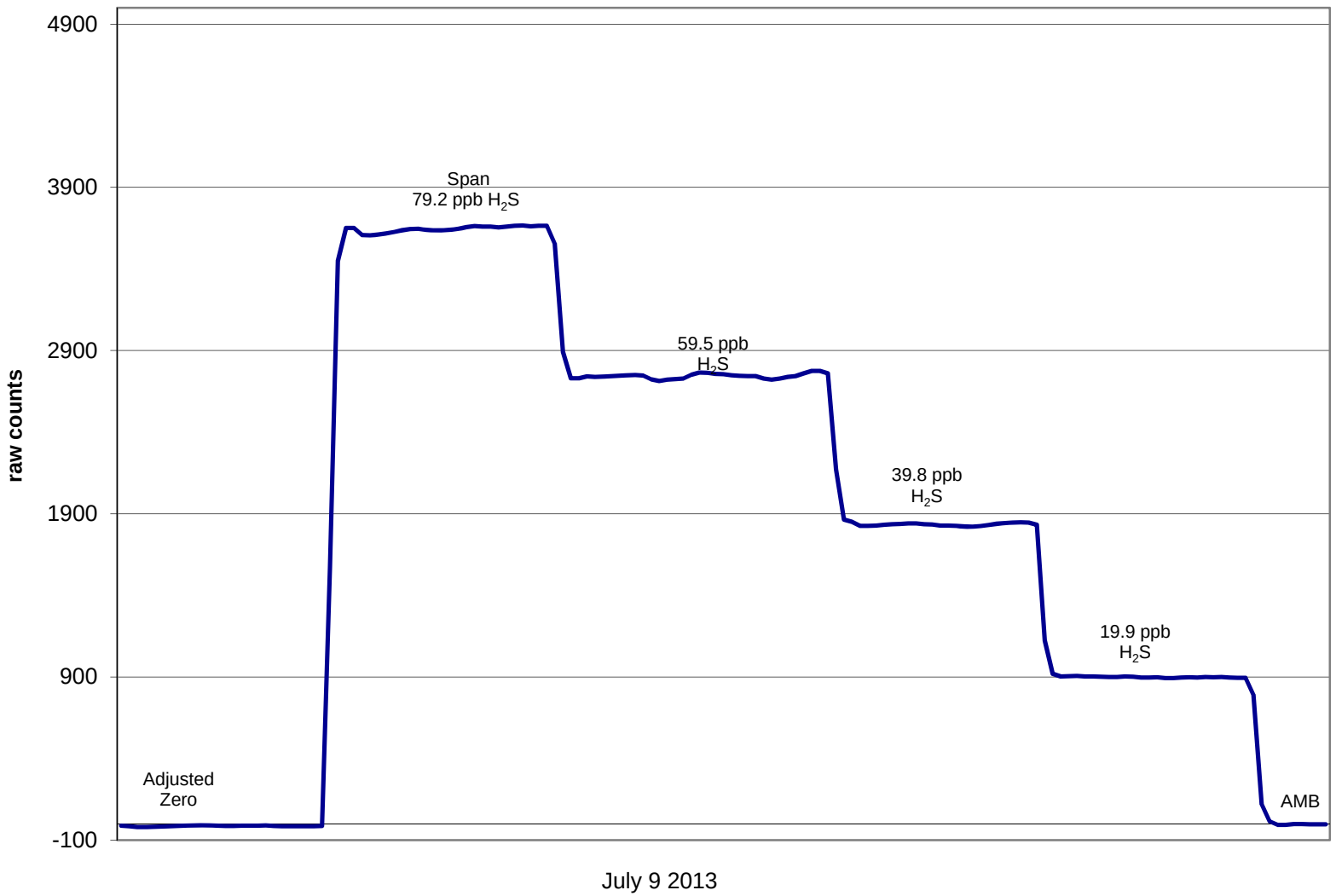
Calibration Date	July 9 2013	Previous Calibration	June 6 2013
Station Number	Martha	Station Location	Disbury
Start Time (MST)	14:00	End Time (MST)	12:00
Analyzer make/model	API 100A	Analyzer serial #	1366

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-13.2	0.0000		
79.2	3650.0	0.0217	Correlation Coefficient	0.999979
59.5	2747.5	0.0217		
39.8	1833.6	0.0217	Slope	0.021585
19.9	898.4	0.0222		
			Intercept	0.335379



Didsbury - TRS Calibration



PAMZ | Parkland Airshed Management Zone

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 12.3 ppb on Jul 9 02:00 Maximum Daily Average: 4.0 ppb on Jun 18

Minimum Value: 0 ppb on Jun 10 10:00 Minimum Daily Average: 1.1 ppb on Jun 26
Maximum Diurnal Average: 6.6 ppb at hour 2 Minimum Diurnal Average: 1.4 ppb at hour 18
Monthly Average: 2.23 ppb Percentiles: P_1 = 0.3 P_{10} = 0.8 Q_1 = 1.2 Median = 1.8 Q_3 = 2.7 P_{90} = 4.1 P_{99} = 7.9

Hours in Service:	826
Hours of Data:	756
Hours of Missing Data:	70
Hours of Calibration:	65
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	C	C	C	1	1	1	2	2	--	1.8
6-Jun	A	6	4	2	1	1	1	1	1	1	1	3	2	2	2	2	2	2	2	2	4	4	4	4	2.3	6.4
7-Jun	A	8	5	6	6	6	4	3	3	2	1	2	2	2	3	3	2	2	1	1	1	2	2	3	3.0	7.7
8-Jun	A	6	2	2	4	3	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1.6	5.5
9-Jun	A	5	3	3	3	3	3	2	2	1	1	1	1	1	1	2	1	1	0	1	1	1	2	1	1.7	4.6
10-Jun	A	5	3	2	2	1	1	1	0	0	1	1	1	1	1	1	2	1	2	2	2	2	3	1	1.4	5.0
11-Jun	A	7	5	4	3	3	3	3	3	2	2	3	7	2	2	2	P	3	4	4	5	6	4	2	3.6	6.9
12-Jun	A	7	7	7	8	6	4	3	4	5	4	3	2	1	2	2	3	2	3	2	2	2	1	2	3.5	8.2
13-Jun	A	6	6	3	3	2	3	4	2	3	4	2	2	2	2	2	2	2	2	2	2	1	1	1	2.5	6.2
14-Jun	A	6	4	7	4	3	2	2	1	1	1	1	1	3	1	1	1	1	1	1	1	2	1	1	1.9	7.3
15-Jun	A	4	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	0	1	1	1	1	2	1.1	3.7
16-Jun	A	5	3	2	3	2	2	1	1	1	1	1	1	2	2	2	2	2	2	3	4	5	3	2	2.1	5.2
17-Jun	A	8	4	3	2	3	2	2	3	6	4	3	2	2	2	2	2	1	2	2	2	3	3	5	2.9	8.2
18-Jun	A	10	9	5	4	3	4	4	4	3	5	3	3	3	2	2	2	3	3	5	4	4	4	4	4.0	10.1
19-Jun	A	5	3	3	2	2	3	4	3	2	2	3	2	2	2	2	2	2	2	1	1	1	1	2	2.3	5.3
20-Jun	A	4	3	3	2	2	2	2	AC	AC	AC	AC	1	1	1	1	1	1	1	1	1	1	1	1	1.6	4.0
21-Jun	A	5	3	2	2	2	2	2	2	2	2	C	C	C	C	C	C	C	3	2	1	1	1	1	--	4.6
22-Jun	A	5	2	2	3	3	4	4	1	1	1	1	1	2	2	2	1	1	1	1	2	2	5	4	2.2	5.4
23-Jun	A	8	2	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	3	1.6	7.5
24-Jun	A	8	2	1	1	1	1	3	4	1	2	3	2	1	1	1	1	2	2	2	3	3	2	2	2.1	7.7
25-Jun	A	7	4	4	4	4	4	2	2	2	2	2	2	1	2	2	2	1	1	2	2	3	2	2	2.5	7.1
26-Jun	A	7	3	2	2	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0	0	0	0	1.1	6.9
27-Jun	A	7	2	2	2	1	1	3	2	2	2	1	1	2	3	2	1	1	1	1	2	1	0	0	1.6	6.6
28-Jun	A	6	4	2	2	2	1	2	2	3	3	1	1	1	1	1	1	1	1	3	3	4	4	3	2.2	6.3
29-Jun	A	8	5	3	3	2	2	4	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2.1	8.2
30-Jun	A	5	4	3	2	2	2	2	2	2	4	2	2	2	2	2	2	1	1	1	1	1	2	3	2.1	5.0
1-Jul	A	5	4	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	2	2	2	2	1.9	5.4
2-Jul	A	3	2	2	2	3	5	3	1	1	3	C	C	2	2	2	2	2	P	P	P	P	2	2	--	4.7
3-Jul	A	7	4	3	2	2	2	4	3	2	3	1	1	2	2	2	3	2	2	2	2	3	2	2	2.4	6.9
4-Jul	A	10	4	3	3	2	2	1	1	3	3	2	2	2	1	3	4	2	1	2	1	2	1	1	2.4	10.2
5-Jul	A	8	4	3	3	2	2	2	3	2	3	2	2	2	2	3	2	1	2	1	1	1	1	1	2.2	7.9
6-Jul	A	8	4	3	2	2	2	3	2	2	2	2	2	2	1	1	1	2	1	1	1	1	2	2	2.1	7.7
7-Jul	A	7	4	3	2	1	1	3	2	2	1	2	1	1	1	1	1	1	1	2	2	2	2	5	2.1	6.9
8-Jul	A	8	7	2	3	7	4	3	4	3	6	4	3	2	4	1	1	1	2	1	2	1	1	1	3.1	7.5
9-Jul	A	12	4	2	1	1	1	1	1	2	2	C	C	C	C	C	C	C	C	NS	NS	NS	NS	NS	--	12.3
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	6.6	3.8	2.9	2.6	2.3	2.3	2.3	2.1	1.9	2.1	1.8	1.7	1.5	1.6	1.5	1.5	1.4	1.5	1.7	1.9	2.0	1.9	2.0	Diurnal Average	
	--	12.3	8.5	7.3	8.2	6.8	4.7	4.2	4.3	6.1	5.5	4.3	6.9	3.0	4.3	3.2	3.8	3.1	4.0	4.8	5.4	5.6	5.3	4.9	Diurnal Maximum	

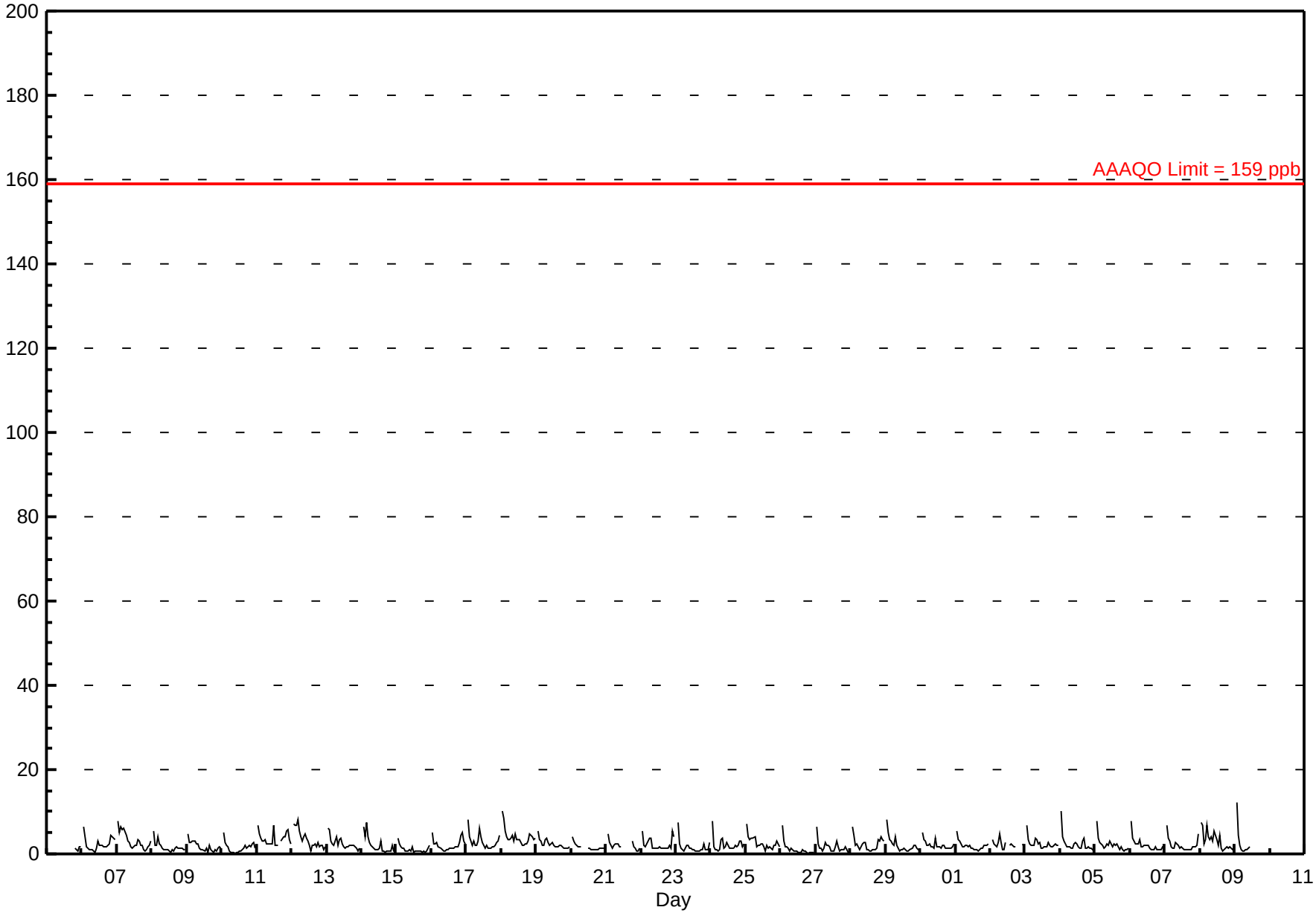
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb 24-hr 106 ppb

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Nitrogen Dioxide (NO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 35.0 ppb on Jun 11 13:00

Maximum Daily Average: 6.2 ppb on Jun 11

Minimum Value: 0 ppb on Jun 28 00:00

Minimum Daily Average: 1.9 ppb on Jun 26

Maximum Diurnal Average: 11.8 ppb at hour 2

Minimum Diurnal Average: 2.2 ppb at hour 18

Monthly Average: 3.66 ppb

Percentiles: P_1 = 0.8 P_{10} = 1.2 Q_1 = 1.7 Median = 2.6 Q_3 = 4.1 P_{90} = 7.7 P_{99} = 17.9

Hours in Service:	826
Hours of Data:	756
Hours of Missing Data:	70
Hours of Calibration:	65
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	C	C	C	2	2	2	3	3	--	3.3
6-Jun	A	9	6	2	2	1	1	1	1	1	2	4	2	2	2	2	2	2	2	3	5	5	4	4	3.0	9.5
7-Jun	A	14	6	10	8	9	5	8	3	2	2	2	2	2	8	4	3	5	2	1	1	3	3	5	4.7	13.7
8-Jun	A	11	3	3	6	4	3	2	1	1	1	1	1	1	1	1	2	3	2	2	2	2	1	1	2.4	10.7
9-Jun	A	9	3	3	4	4	3	3	2	2	1	1	1	2	1	4	4	3	1	4	1	3	2	2	2.8	9.4
10-Jun	A	9	4	3	3	2	1	2	1	1	1	1	1	1	1	2	11	2	3	9	2	3	4	2	3.0	10.5
11-Jun	A	11	6	4	3	4	4	8	3	2	3	3	35	3	5	2	P	4	5	6	9	8	6	3	6.2	35.0
12-Jun	A	11	8	7	10	6	5	3	5	5	5	4	3	2	3	3	3	3	3	3	3	4	2	3	4.5	11.2
13-Jun	A	11	12	5	4	2	5	11	2	6	4	4	2	2	2	2	3	3	3	3	2	2	1	3	4.1	12.2
14-Jun	A	11	5	12	7	5	3	4	1	1	1	1	2	5	2	1	1	1	1	1	1	10	2	3	3.5	12.4
15-Jun	A	8	3	2	2	2	1	1	1	2	1	8	1	1	1	1	1	1	1	1	1	1	2	3	2.0	8.0
16-Jun	A	9	3	3	3	2	2	1	1	1	1	1	2	2	4	2	2	2	2	3	7	6	4	4	3.1	8.8
17-Jun	A	12	6	3	3	3	3	2	7	7	5	3	3	2	4	2	2	2	2	2	2	3	10	10	4.3	11.8
18-Jun	A	22	17	8	6	4	4	5	6	4	15	4	4	4	2	3	3	3	3	7	6	5	4	4	6.1	21.5
19-Jun	A	8	5	4	3	3	4	15	4	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	3.3	14.6
20-Jun	A	6	4	4	3	2	2	3	AC	AC	AC	AC	2	2	1	1	1	2	2	2	2	2	2	2	2.3	6.0
21-Jun	A	6	4	2	2	3	3	10	6	2	2	C	C	C	C	C	C	C	7	2	2	1	1	2	--	10.0
22-Jun	A	10	3	2	4	8	5	5	2	1	2	2	2	3	2	2	2	2	2	2	3	2	10	8	3.6	10.1
23-Jun	A	18	3	2	1	1	2	3	2	2	3	2	2	1	1	1	1	1	3	4	2	2	2	9	2.9	17.9
24-Jun	A	17	3	2	1	1	2	6	6	2	2	4	3	2	2	1	1	3	2	2	5	6	2	3	3.4	17.1
25-Jun	A	12	5	4	5	4	5	5	5	3	3	3	2	1	10	4	3	3	3	3	3	4	3	2	4.1	11.6
26-Jun	A	11	4	2	2	1	1	2	1	1	1	1	2	2	1	2	2	1	1	1	1	1	1	1	1.9	11.0
27-Jun	A	11	4	2	3	1	2	4	3	3	6	1	1	9	18	20	4	1	1	1	4	1	1	0	4.5	19.6
28-Jun	A	11	10	2	3	3	1	3	6	6	6	2	2	1	1	1	1	1	2	5	4	6	5	3	3.7	10.9
29-Jun	A	12	6	5	4	2	2	7	3	1	1	1	1	2	1	1	1	1	2	3	2	2	1	1	2.8	12.5
30-Jun	A	7	4	3	2	2	3	2	2	2	11	3	3	3	3	3	5	1	1	1	2	2	2	7	3.2	11.2
1-Jul	A	7	4	3	3	2	2	2	3	2	3	2	2	1	1	1	1	1	2	2	2	2	2	3	2.4	7.5
2-Jul	A	4	3	2	2	6	10	7	1	1	5	C	C	2	3	3	2	2	P	P	P	P	3	2	--	10.3
3-Jul	A	11	5	3	2	2	3	5	5	6	6	2	2	8	3	3	10	3	2	2	2	18	3	2	4.8	17.9
4-Jul	A	26	5	4	3	2	2	1	2	3	3	3	2	2	2	8	21	2	2	2	2	2	2	1	4.5	25.7
5-Jul	A	13	5	3	3	2	2	3	5	3	16	8	3	11	3	4	4	2	3	1	1	2	2	2	4.5	15.8
6-Jul	A	15	5	4	3	3	3	8	2	4	2	3	4	4	2	1	2	4	1	1	1	2	3	4	3.5	15.1
7-Jul	A	14	7	9	2	2	2	4	3	3	2	2	2	2	1	1	1	1	1	2	2	2	4	9	3.4	13.6
8-Jul	A	13	13	4	4	9	5	4	5	4	8	7	10	3	6	3	1	3	4	2	3	2	1	2	5.1	13.5
9-Jul	A	21	6	3	2	1	1	1	1	2	2	C	C	C	C	C	C	C	C	NS	NS	NS	NS	NS	--	20.9
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	11.8	5.5	4.0	3.5	3.2	3.0	4.5	3.1	2.8	4.0	2.8	3.4	2.8	3.1	2.9	3.3	2.2	2.3	2.7	2.8	3.4	3.0	3.5	Diurnal Average	
	--	25.7	16.8	12.4	10.3	9.1	10.3	14.6	6.9	7.3	15.8	8.1	35.0	10.6	18.1	19.6	21.5	4.9	7.5	8.9	8.6	17.9	10.4	10.4	Diurnal Maximum	

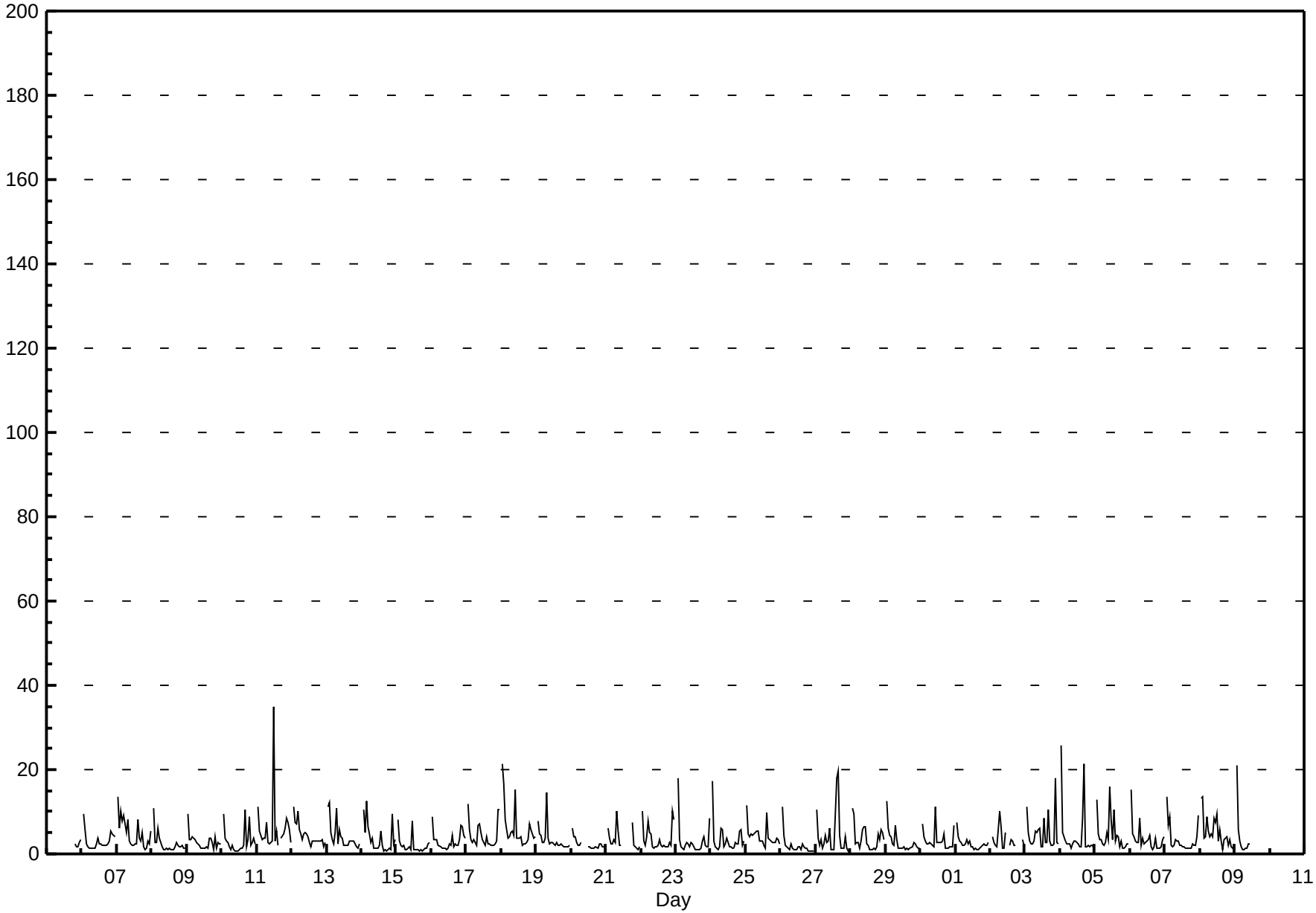
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Nitrogen Dioxide (NO_2) - ppb

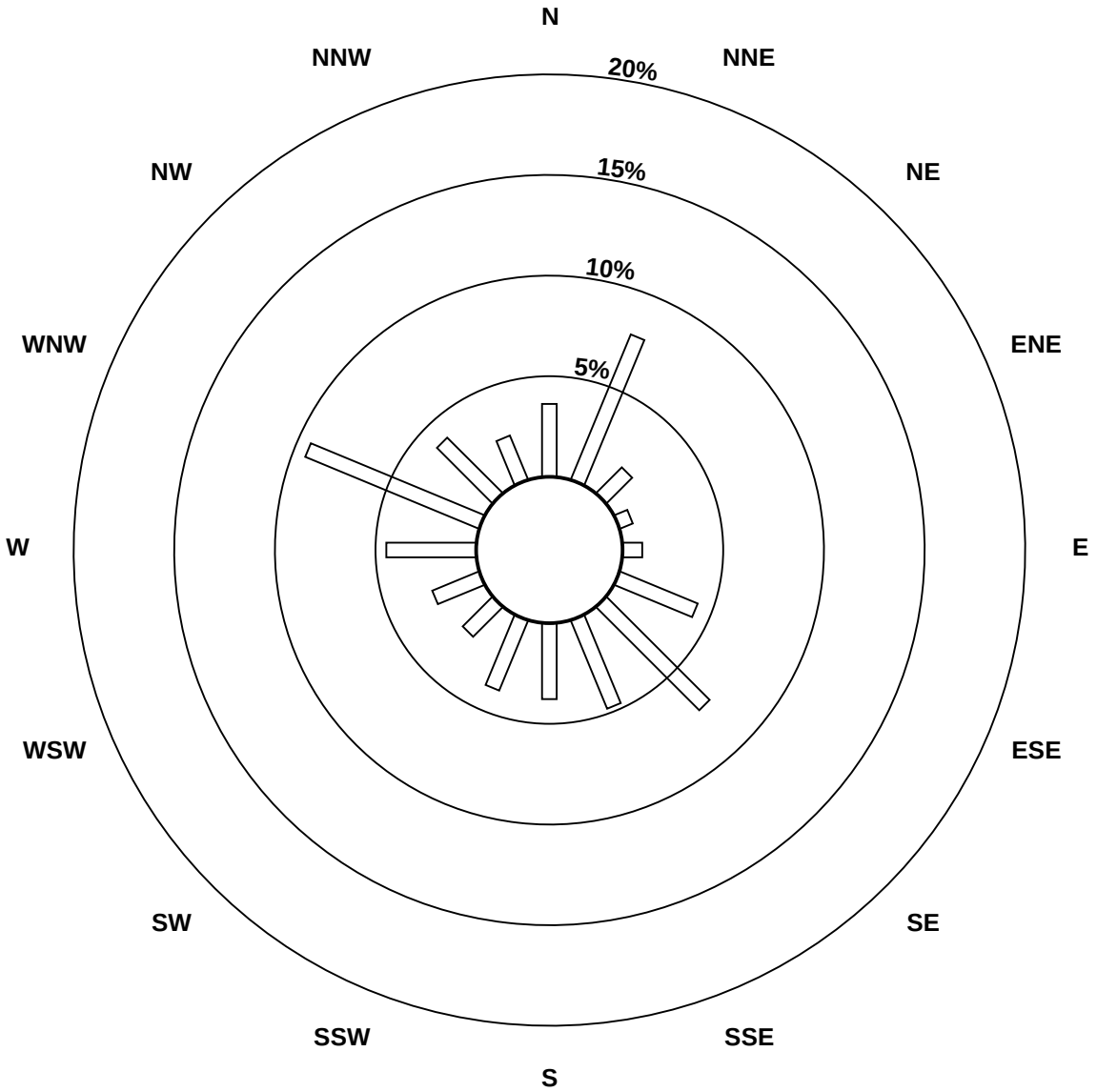
Didsbury West - Jun 5, 2013 to Jul 11, 2013



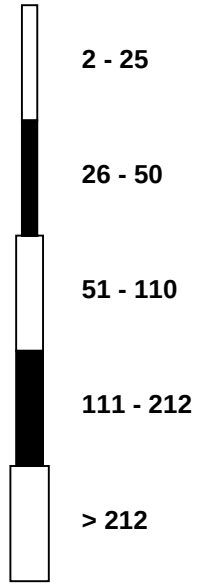
Pollutant Rose

Nitrogen Dioxide (NO_2) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Pollutant Classes (ppb)



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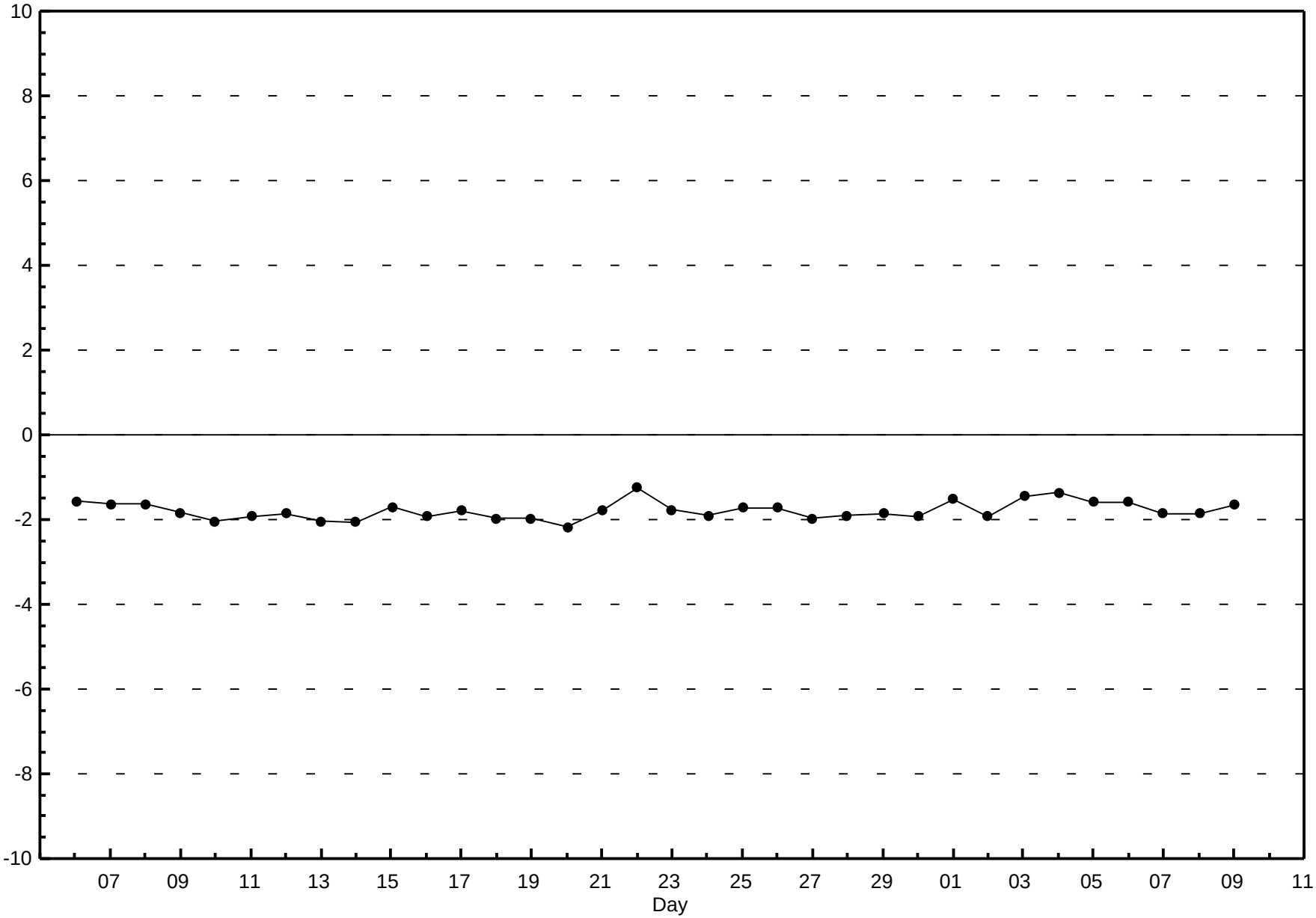
Zero Responses

Nitrogen Dioxide (NO_2)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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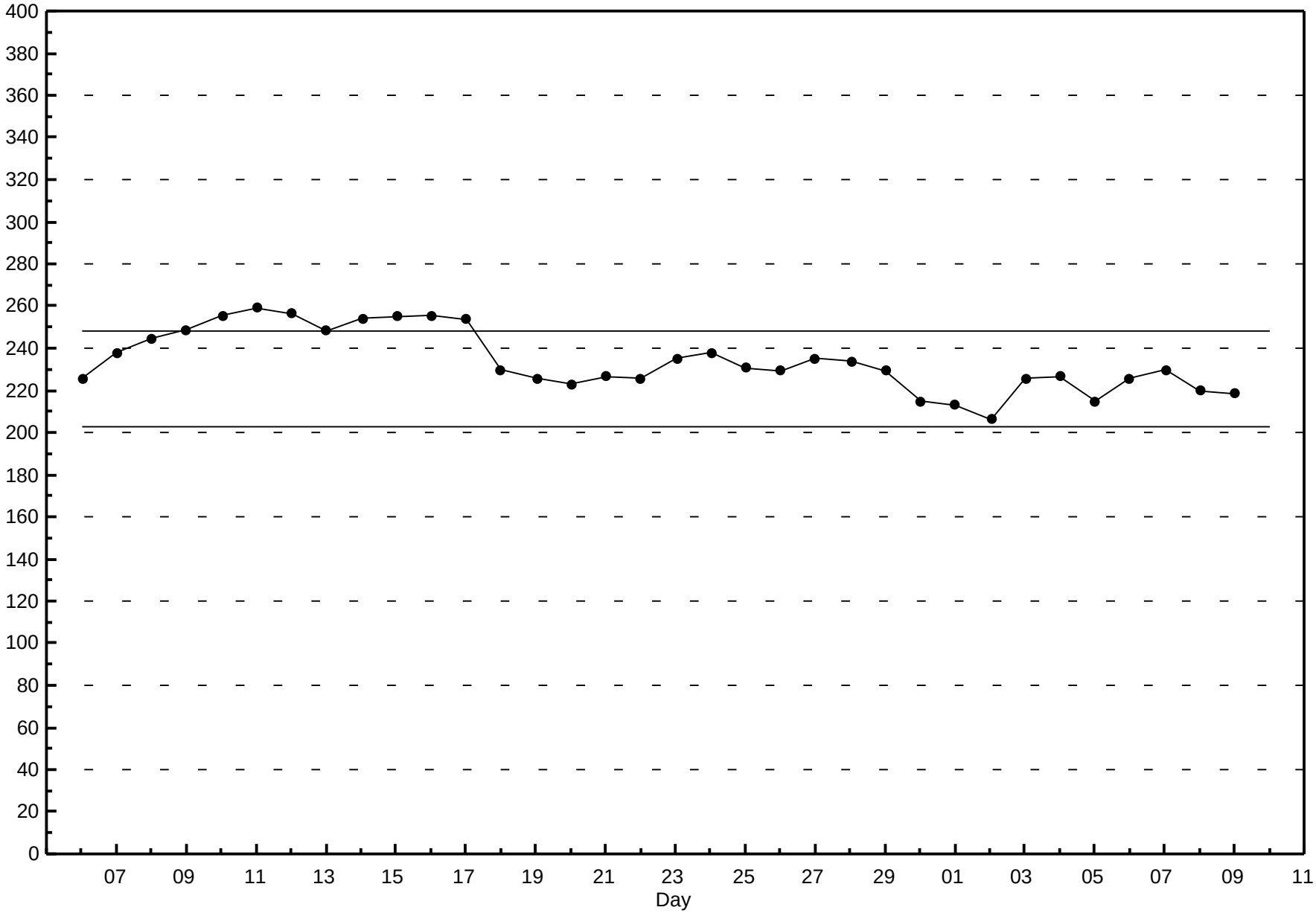
Span Responses

Nitrogen Dioxide (NO_2)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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Hourly Averages

Oxides of Nitrogen (NO_X) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 18.3 ppb on Jul 9 02:00 Maximum Daily Average: 4.6 ppb on Jun 18

Minimum Value: 0 ppb on Jun 26 20:00
Maximum Diurnal Average: 7.1 ppb at hour 2
Monthly Average: 2.54 ppb

Minimum Daily Average: 1.1 ppb on Jun 26
Minimum Diurnal Average: 1.6 ppb at hour 18
Percentiles: P_1 = 0.3 P_{10} = 0.9 Q_1 = 1.3 Median = 2.1 Q_3 = 3.2 P_{90} = 4.9 P_{99} = 9.2

Hours in Service:	826
Hours of Data:	756
Hours of Missing Data:	70
Hours of Calibration:	65
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	C	C	C	1	1	1	2	2	--	1.8
6-Jun	A	6	4	2	1	1	1	1	1	0	1	3	2	2	2	2	2	2	2	3	4	4	4	4	2.4	6.4
7-Jun	A	8	5	7	6	6	5	4	3	2	1	2	2	3	4	3	3	2	1	1	1	2	2	4	3.4	8.2
8-Jun	A	6	2	2	4	3	2	1	1	1	1	1	1	0	1	1	1	2	1	1	1	1	1	1	1.6	5.6
9-Jun	A	5	3	3	3	3	4	3	3	1	1	1	1	1	1	2	1	1	0	1	1	1	2	1	1.8	4.6
10-Jun	A	5	3	2	2	1	1	1	0	0	1	1	1	1	1	1	3	1	2	2	2	2	3	1	1.5	5.0
11-Jun	A	7	5	4	3	3	4	3	3	3	3	3	13	2	2	2	P	4	5	5	6	6	4	2	4.0	12.6
12-Jun	A	8	8	7	9	6	5	4	5	7	5	4	2	1	2	2	2	2	3	2	2	2	1	2	3.9	9.2
13-Jun	A	6	6	3	2	2	3	5	2	4	4	2	2	2	2	2	2	2	2	2	2	2	1	1	2.7	6.2
14-Jun	A	7	5	7	4	3	2	2	1	1	1	1	2	4	1	1	1	1	1	1	1	2	1	1	2.3	7.5
15-Jun	A	4	2	2	2	1	1	1	1	1	1	3	1	1	1	1	1	1	0	1	0	1	1	2	1.3	4.0
16-Jun	A	5	3	3	3	2	2	1	1	1	1	1	2	2	2	2	2	2	2	3	5	5	3	3	2.4	5.5
17-Jun	A	9	5	3	2	4	3	2	5	9	6	3	2	2	2	2	2	2	2	2	2	3	4	5	3.6	9.3
18-Jun	A	12	9	6	5	4	4	4	5	4	5	4	4	3	2	2	3	3	3	5	5	4	4	4	4.6	12.3
19-Jun	A	5	3	3	2	2	3	7	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2.8	7.0
20-Jun	A	4	3	3	3	2	2	2	AC	AC	AC	AC	2	2	1	1	1	1	1	2	2	1	2	2	1.9	4.3
21-Jun	A	5	3	2	2	3	3	3	3	2	2	C	C	C	C	C	C	C	3	2	1	1	1	1	--	4.9
22-Jun	A	6	2	2	3	4	4	4	2	2	1	2	1	2	2	1	2	2	1	1	2	2	6	4	2.5	5.8
23-Jun	A	8	2	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	3	1.6	7.8
24-Jun	A	8	2	1	1	1	1	5	5	1	2	3	2	1	1	1	1	2	2	2	3	3	2	3	2.3	8.0
25-Jun	A	7	4	4	4	5	6	3	3	3	4	3	2	1	3	2	2	1	1	2	2	3	2	2	3.1	7.4
26-Jun	A	7	3	2	2	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	1.1	6.9
27-Jun	A	7	2	1	1	1	1	3	3	2	3	1	1	3	5	2	1	1	1	1	2	1	0	1	1.9	6.7
28-Jun	A	7	5	2	2	2	1	2	3	4	4	1	1	1	1	1	1	1	2	4	3	4	4	3	2.6	6.6
29-Jun	A	9	5	4	3	3	2	7	3	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	2.5	8.5
30-Jun	A	5	4	3	2	2	3	2	2	2	5	2	2	2	2	3	2	1	1	1	1	1	2	3	2.4	5.3
1-Jul	A	6	4	3	3	2	2	3	3	2	3	2	2	1	1	2	1	1	2	2	2	2	2	3	2.3	5.7
2-Jul	A	3	3	2	2	4	12	5	2	2	4	C	C	2	3	2	2	2	P	P	P	P	3	2	--	12.0
3-Jul	A	7	4	2	2	2	2	5	4	3	4	1	1	2	2	2	3	2	2	2	2	3	2	2	2.7	6.9
4-Jul	A	10	4	3	3	2	2	2	2	3	3	3	2	2	2	4	5	2	2	2	1	2	1	1	2.6	10.2
5-Jul	A	8	4	3	3	2	1	2	3	2	4	3	2	3	2	3	2	1	2	1	1	1	1	1	2.3	8.0
6-Jul	A	8	4	3	2	2	2	4	2	2	2	2	2	2	1	1	1	2	1	1	1	1	2	2	2.3	7.7
7-Jul	A	8	4	4	2	2	2	4	3	2	2	2	1	1	1	1	1	1	1	2	2	2	2	5	2.4	7.7
8-Jul	A	8	7	2	3	7	5	4	5	4	7	5	4	2	5	1	1	1	2	1	2	1	1	2	3.6	7.6
9-Jul	A	18	4	2	1	1	1	1	1	2	2	C	C	C	C	C	C	C	C	NS	NS	NS	NS	NS	--	18.3
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	7.1	4.0	3.1	2.8	2.6	2.8	3.1	2.6	2.4	2.7	2.1	2.1	1.7	1.9	1.8	1.7	1.6	1.7	1.9	2.0	2.1	2.0	2.2	Diurnal Average	
	--	18.3	9.4	7.5	9.2	7.5	12.0	7.4	5.4	9.3	6.5	4.9	12.6	3.6	5.3	4.2	4.7	3.9	4.6	5.1	5.7	5.6	5.8	5.2	Diurnal Maximum	

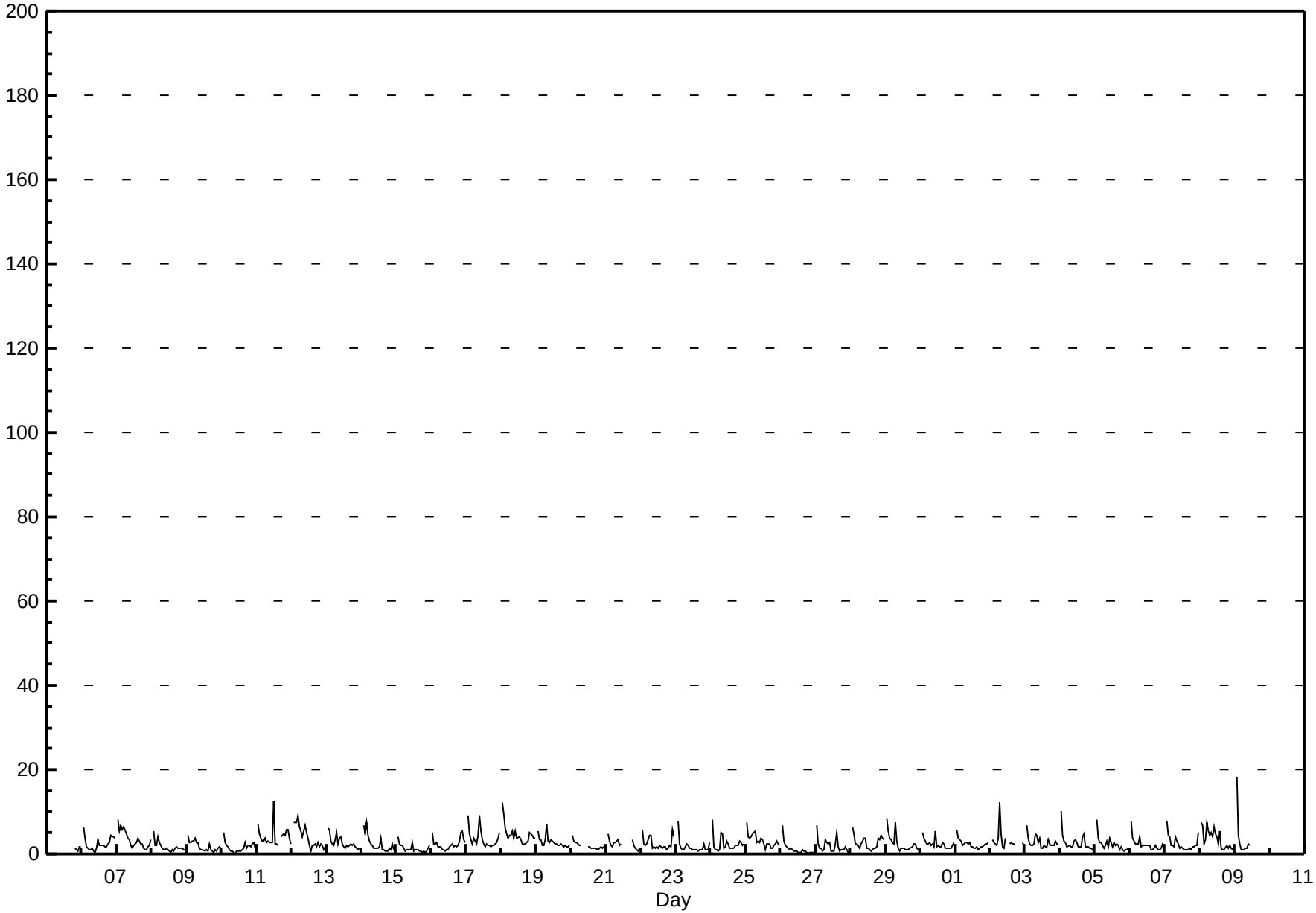
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Oxides of Nitrogen (NO_X) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Oxides of Nitrogen (NO_X) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 98.1 ppb on Jun 19 08:00

Maximum Daily Average: 9.6 ppb on Jun 11

Minimum Value: 0 ppb on Jun 10 10:00

Minimum Daily Average: 2.3 ppb on Jun 26

Maximum Diurnal Average: 13.4 ppb at hour 2

Minimum Diurnal Average: 2.7 ppb at hour 18

Monthly Average: 4.76 ppb

Percentiles: $P_1 = 0.5$ $P_{10} = 1.4$ $Q_1 = 1.9$ Median = 3.0 $Q_3 = 4.9$ $P_{90} = 9.8$ $P_{99} = 29.9$

Hours in Service:	826
Hours of Data:	756
Hours of Missing Data:	70
Hours of Calibration:	65
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	C	C	C	2	2	1	3	3	--	3.2
6-Jun	A	9	6	2	2	1	2	2	1	1	3	5	3	3	2	2	2	2	3	3	6	5	5	5	3.3	9.3
7-Jun	A	14	7	11	8	10	6	25	4	3	2	3	3	3	11	5	4	8	2	1	1	3	3	6	6.2	25.1
8-Jun	A	12	3	3	7	4	3	2	1	1	2	2	1	1	2	2	2	3	2	2	2	2	1	1	2.6	11.5
9-Jun	A	10	3	3	4	4	4	4	3	2	1	2	1	2	1	5	5	3	1	4	1	2	2	2	3.1	10.2
10-Jun	A	9	4	3	3	2	1	5	1	0	1	1	1	2	2	3	16	2	7	16	2	3	4	2	4.0	16.5
11-Jun	A	12	6	4	4	4	4	10	4	3	3	3	89	5	14	3	P	5	6	7	9	8	6	3	9.6	88.5
12-Jun	A	11	9	8	12	8	6	5	7	7	7	5	3	2	3	4	3	3	4	2	3	3	2	3	5.1	11.7
13-Jun	A	11	12	5	4	2	6	22	3	6	5	4	2	2	3	2	4	4	3	3	3	3	1	3	4.9	21.9
14-Jun	A	11	6	12	7	5	3	8	2	2	2	2	2	7	4	1	1	1	1	2	1	10	3	4	4.2	12.3
15-Jun	A	8	3	3	2	2	1	1	1	3	1	12	1	1	2	1	1	1	1	1	1	2	3	3	2.4	11.6
16-Jun	A	9	4	4	4	2	3	1	2	1	2	2	4	3	8	2	3	2	3	4	8	7	5	4	3.7	8.8
17-Jun	A	12	7	4	3	4	4	3	11	11	7	4	3	2	5	3	3	3	3	3	3	3	11	11	5.4	12.2
18-Jun	A	31	19	10	7	5	5	6	7	5	23	4	5	5	3	3	3	3	4	7	7	5	4	4	7.7	31.0
19-Jun	A	8	5	5	3	3	4	98	5	3	4	4	4	3	4	2	3	3	2	2	3	2	2	3	7.5	98.1
20-Jun	A	6	4	4	3	3	3	3	AC	AC	AC	AC	2	2	2	2	2	2	2	3	3	2	2	2	2.7	6.3
21-Jun	A	6	4	3	3	4	3	20	12	3	3	C	C	C	C	C	C	C	9	2	2	1	1	2	--	20.3
22-Jun	A	10	3	2	4	9	6	6	2	2	2	2	2	4	3	2	2	2	2	2	3	2	11	9	4.0	11.3
23-Jun	A	18	3	2	1	1	3	3	3	2	3	3	2	1	2	1	1	1	3	4	2	2	2	9	3.2	18.0
24-Jun	A	20	3	1	1	1	2	9	8	2	3	4	3	2	2	2	2	3	3	2	6	5	2	3	4.0	20.4
25-Jun	A	12	5	4	5	5	10	9	11	4	5	5	3	2	18	6	5	4	4	3	3	4	3	2	5.8	17.5
26-Jun	A	11	4	2	2	2	1	9	2	1	1	1	2	2	1	3	2	2	2	1	1	1	1	1	2.3	11.3
27-Jun	A	11	4	2	4	1	3	13	3	4	14	1	1	19	30	22	6	1	2	2	5	2	1	1	6.6	30.0
28-Jun	A	12	10	3	3	3	2	4	8	10	9	3	3	1	1	2	2	2	2	6	4	6	6	4	4.5	11.6
29-Jun	A	13	6	5	4	4	3	13	5	2	1	1	2	2	2	2	1	2	2	4	3	2	1	2	3.6	13.1
30-Jun	A	7	4	3	3	3	4	3	3	2	21	4	4	3	3	4	5	2	1	2	2	2	2	7	4.1	21.0
1-Jul	A	8	4	4	3	3	3	3	5	3	4	2	2	2	2	2	2	2	3	3	3	2	2	3	3.0	7.7
2-Jul	A	4	3	3	2	9	37	14	2	2	7	C	C	3	4	4	3	3	P	P	P	P	4	3	--	37.3
3-Jul	A	11	5	3	2	2	3	8	7	8	9	2	2	12	3	3	15	4	2	2	2	36	3	3	6.5	36.1
4-Jul	A	27	5	4	3	2	3	2	3	4	4	3	3	2	3	10	33	2	2	2	2	2	2	1	5.5	33.5
5-Jul	A	13	5	3	4	3	2	4	7	4	23	10	4	18	3	5	5	2	4	2	1	2	2	2	5.5	22.6
6-Jul	A	15	4	4	3	3	3	11	3	5	3	3	4	10	2	2	2	4	2	1	2	2	4	5	4.2	14.9
7-Jul	A	20	10	13	3	3	3	6	5	4	2	2	2	1	2	2	2	2	1	3	2	2	4	10	4.5	20.2
8-Jul	A	14	14	4	4	10	6	6	6	5	10	9	12	3	8	4	2	4	5	2	4	2	1	2	5.9	14.5
9-Jul	A	47	6	3	2	1	1	2	2	3	3	C	C	C	C	C	C	C	C	NS	NS	NS	NS	NS	--	46.6
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	13.4	5.9	4.4	3.8	3.8	4.5	10.0	4.5	3.7	5.8	3.6	5.6	4.1	4.7	3.6	4.6	2.7	2.9	3.2	3.0	4.2	3.3	3.7	Diurnal Average	
	--	46.6	18.6	12.7	11.7	10.4	37.3	98.1	11.5	11.3	23.2	11.6	88.5	19.1	30.0	22.0	33.5	7.8	8.8	16.0	9.4	36.1	11.3	11.4	Diurnal Maximum	

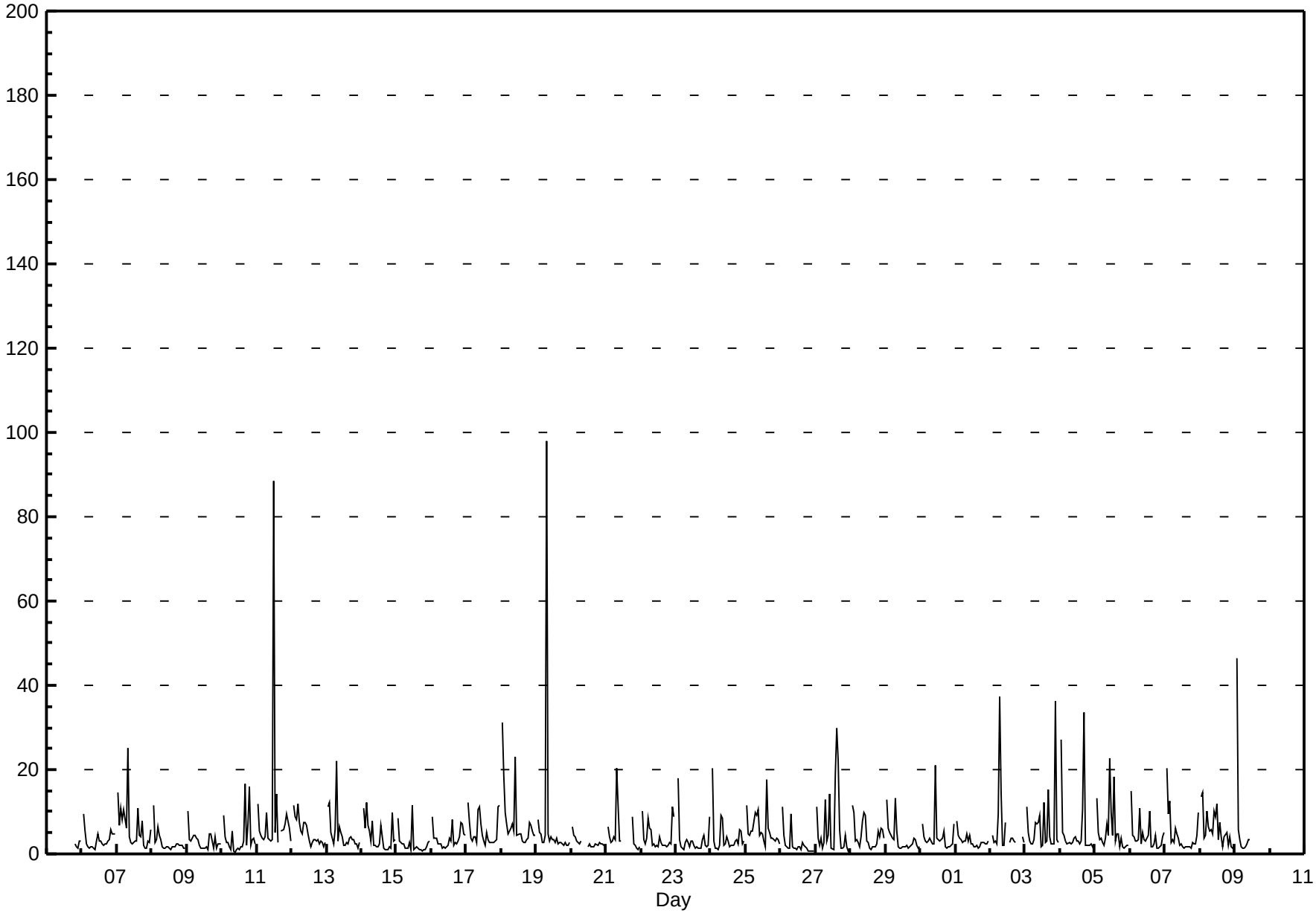
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Oxides of Nitrogen (NO_X) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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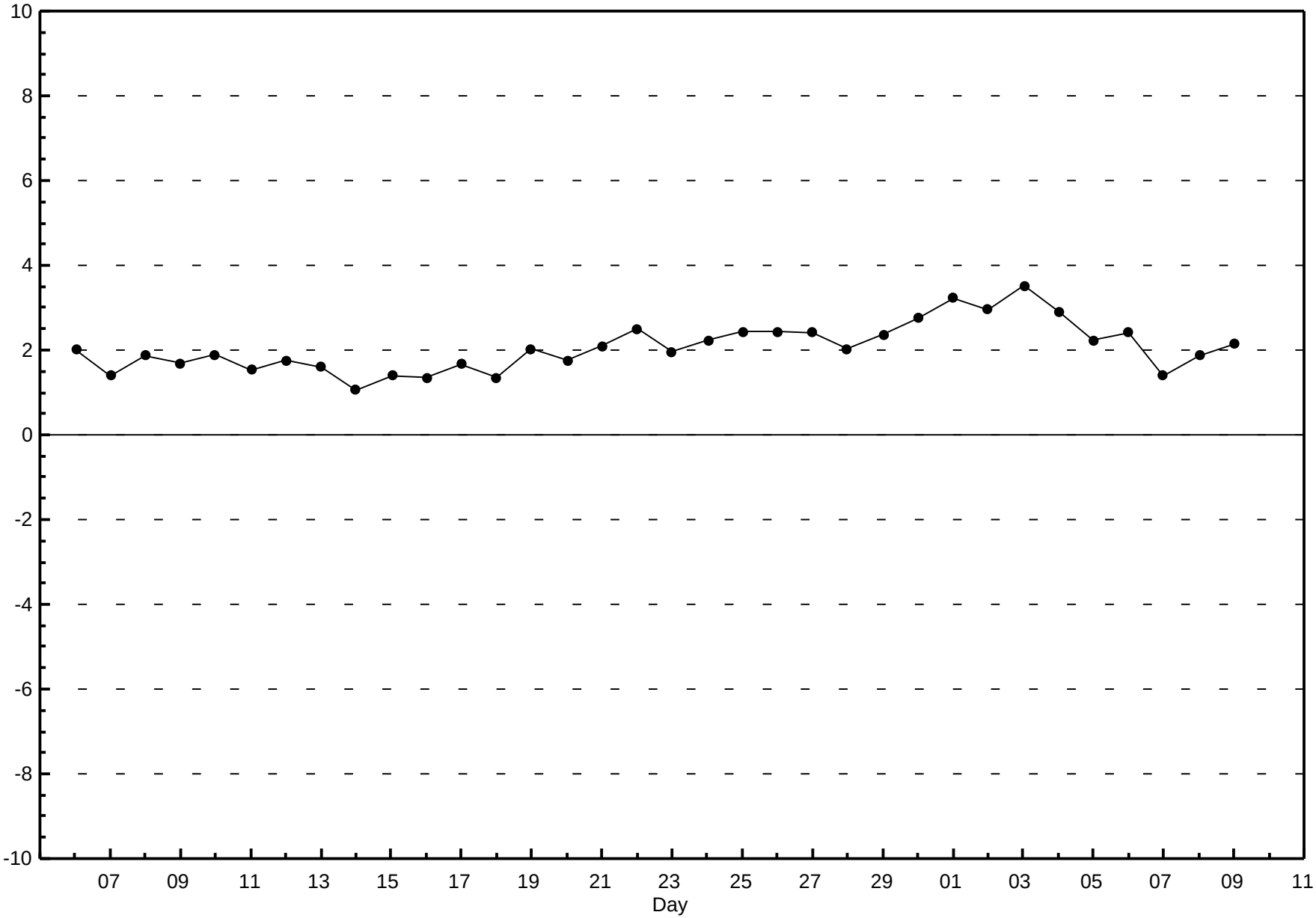
Zero Responses

Oxides of Nitrogen (NO_X)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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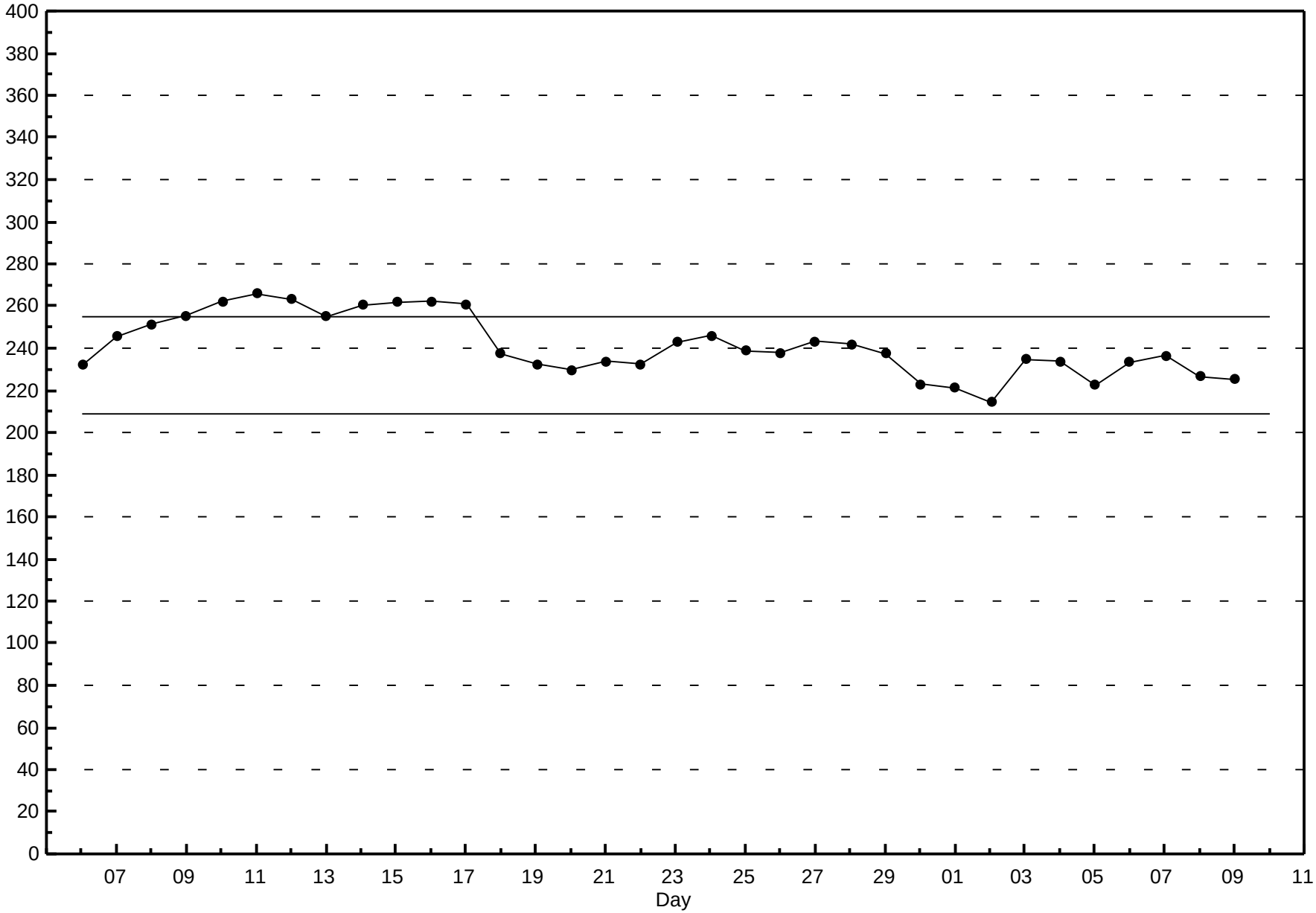
Span Responses

Oxides of Nitrogen (NO_X)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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Hourly Averages

Nitrogen Oxide (NO) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7.3 ppb on Jul 2 07:00 Maximum Daily Average: 0.7 ppb on Jun 17

Minimum Value: 0 ppb on Jun 5 20:00 Minimum Daily Average: 0.0 ppb on Jun 8
Maximum Diurnal Average: 0.8 ppb at hour 8 Minimum Diurnal Average: 0.1 ppb at hour 22
Monthly Average: 0.32 ppb Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.2 Q_3 = 0.4 P_{90} = 0.7 P_{99} = 2.2

Hours in Service:	826
Hours of Data:	756
Hours of Missing Data:	70
Hours of Calibration:	65
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	C	C	C	0	0	0	0	0	--	0.0
6-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.5
7-Jun	A	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.8
8-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.3
9-Jun	A	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.5
10-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.0	0.6
11-Jun	A	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	P	1	1	0	0	0	0	0	0.5	5.7
12-Jun	A	0	1	1	1	1	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2.2
13-Jun	A	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1.3
14-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	0.6
15-Jun	A	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.8
16-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0.2	0.7
17-Jun	A	1	1	0	0	1	1	0	2	3	2	1	0	0	0	0	0	0	0	0	1	0	1	0	0.7	3.2
18-Jun	A	2	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0.6	2.2
19-Jun	A	0	0	0	0	0	0	3	1	0	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0.5	3.3
20-Jun	A	0	0	0	1	0	0	0	AC	AC	AC	AC	0	0	1	0	0	0	0	0	0	0	0	0	0.3	0.6
21-Jun	A	0	0	0	0	1	0	1	1	1	1	C	C	C	C	C	C	C	0	0	0	0	0	0	--	1.0
22-Jun	A	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	0.9
23-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.5
24-Jun	A	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1.7
25-Jun	A	0	0	0	0	1	2	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0.6	1.6
26-Jun	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.3
27-Jun	A	0	0	0	0	0	0	1	0	1	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0.3	2.0
28-Jun	A	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1.1
29-Jun	A	0	0	0	0	1	0	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	3.2
30-Jun	A	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1.5
1-Jul	A	0	0	0	0	0	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0.4	0.8
2-Jul	A	0	0	0	0	1	7	2	1	1	1	C	C	0	0	1	1	0	P	P	P	P	0	0	--	7.3
3-Jul	A	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1.2
4-Jul	A	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1.0
5-Jul	A	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.6
6-Jul	A	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	0.7
7-Jul	A	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1.4
8-Jul	A	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	0	0	0.5	1.3
9-Jul	A	6	0	0	0	0	0	0	0	1	1	C	C	C	C	C	C	C	C	NS	NS	NS	NS	NS	--	6.0
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	0.4	0.2	0.2	0.2	0.3	0.6	0.8	0.6	0.5	0.5	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	Diurnal Average	
	--	6.0	0.9	0.8	1.0	1.2	7.3	3.3	1.5	3.2	1.7	1.1	5.7	0.9	2.0	1.0	0.9	0.8	0.6	0.5	0.6	0.6	0.6	0.5	Diurnal Maximum	

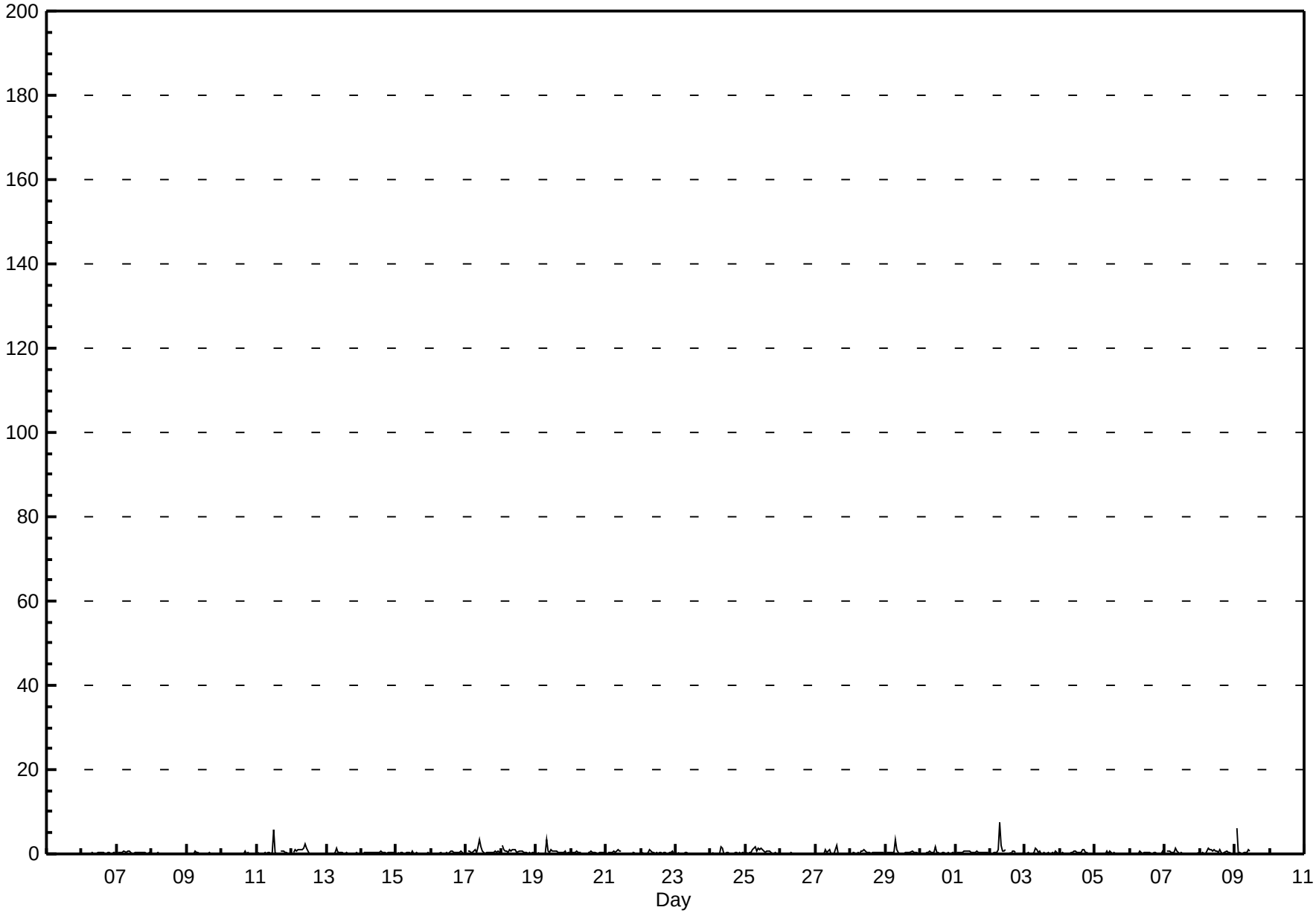
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Nitrogen Oxide (NO) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Nitrogen Oxide (NO) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 83.9 ppb on Jun 19 08:00

Maximum Daily Average: 4.3 ppb on Jun 19

Minimum Value: 0 ppb on Jun 5 20:00

Minimum Daily Average: 0.4 ppb on Jun 23

Maximum Diurnal Average: 5.9 ppb at hour 8

Minimum Diurnal Average: 0.5 ppb at hour 21

Monthly Average: 1.34 ppb

Percentiles: $P_1 = 0.0$ $P_{10} = 0.2$ $Q_1 = 0.4$ Median = 0.6 $Q_3 = 0.9$ $P_{90} = 1.9$ $P_{99} = 12.1$

Hours in Service:	826
Hours of Data:	756
Hours of Missing Data:	70
Hours of Calibration:	65
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	C	C	C	0	0	0	0	0	--	0.2
6-Jun	A	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0	0	1	1	0	1	1	1	0.5	1.3
7-Jun	A	1	1	1	1	1	1	17	1	0	0	1	1	1	3	1	1	3	0	1	0	0	1	1	1.6	16.9
8-Jun	A	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.8
9-Jun	A	1	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	3	0	0	0	0	0	0	0.5	2.6
10-Jun	A	0	0	0	0	0	0	5	0	0	0	1	0	1	0	2	10	0	4	7	0	0	0	0	1.3	10.0
11-Jun	A	1	0	0	0	0	1	2	1	1	1	1	59	2	9	0	P	1	1	1	1	0	0	0	3.8	58.9
12-Jun	A	1	1	1	2	2	2	2	2	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	2.5
13-Jun	A	0	0	0	0	0	1	11	1	1	1	1	0	0	1	0	1	1	0	0	0	1	1	0	1.0	11.2
14-Jun	A	1	1	1	1	1	1	4	1	1	1	0	1	1	2	1	1	0	0	1	1	1	1	0	0.9	4.0
15-Jun	A	1	1	1	1	0	0	1	1	1	0	4	0	0	1	0	0	0	0	0	0	0	1	0	0.6	4.0
16-Jun	A	0	0	1	0	0	1	0	0	0	0	0	1	2	7	0	1	1	1	1	1	1	1	1	0.9	6.7
17-Jun	A	3	1	1	1	1	1	1	4	4	2	1	1	0	1	1	1	1	1	1	1	1	1	1	1.4	4.0
18-Jun	A	10	2	1	1	1	3	1	2	1	12	1	2	1	1	1	1	1	0	1	1	1	1	0	1.9	12.2
19-Jun	A	1	1	0	0	0	1	84	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	4.3	83.9
20-Jun	A	1	0	1	1	1	1	1	AC	AC	AC	AC	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1.1
21-Jun	A	1	1	1	1	1	1	10	7	1	1	C	C	C	C	C	C	C	1	0	0	0	0	1	--	10.5
22-Jun	A	1	1	1	1	1	1	2	1	1	0	1	0	1	1	0	1	1	0	1	1	1	2	1	0.7	1.5
23-Jun	A	1	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0.4	0.8
24-Jun	A	3	0	0	0	0	0	7	3	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0.9	7.2
25-Jun	A	0	1	1	1	1	5	4	5	1	2	2	1	0	8	2	2	1	1	1	1	0	0	0	1.8	7.7
26-Jun	A	0	0	0	0	0	1	7	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.6	7.2
27-Jun	A	1	0	0	0	0	0	9	1	1	8	0	0	11	23	2	1	0	0	1	1	1	0	1	2.7	22.9
28-Jun	A	1	1	1	1	1	1	1	2	3	3	1	1	0	0	1	0	1	1	1	1	1	1	1	0.9	3.2
29-Jun	A	1	0	1	1	1	1	6	2	1	0	0	0	0	1	1	0	1	1	1	1	1	0	1	1.0	6.4
30-Jun	A	1	1	1	1	1	1	1	1	1	10	1	1	1	1	1	1	1	0	0	0	0	0	1	1.0	9.9
1-Jul	A	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1.6
2-Jul	A	0	1	1	1	4	29	8	1	1	2	C	C	1	1	1	1	1	P	P	P	P	1	1	--	28.5
3-Jul	A	0	1	0	0	0	0	2	2	2	3	0	0	4	1	1	5	1	1	1	0	18	1	0	1.9	18.3
4-Jul	A	1	1	1	1	0	1	1	1	1	1	1	1	1	1	2	12	1	1	0	0	0	0	0	1.2	12.0
5-Jul	A	0	0	0	0	1	0	1	2	1	7	3	1	8	0	0	1	0	1	0	0	0	0	0	1.2	7.7
6-Jul	A	0	0	0	0	0	0	2	1	1	1	1	1	6	0	1	1	1	0	0	0	1	1	1	0.9	5.9
7-Jul	A	12	3	4	1	2	1	2	1	1	1	1	0	0	0	0	0	0	0	1	1	0	1	1	1.5	12.4
8-Jul	A	1	1	1	0	2	2	2	1	1	2	1	2	1	2	1	1	1	1	1	1	0	1	1	1.1	2.4
9-Jul	A	26	0	1	0	1	1	1	1	1	1	C	C	C	C	C	C	C	C	NS	NS	NS	NS	NS	--	26.4
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	2.1	0.6	0.6	0.5	0.8	1.8	5.9	1.5	1.0	2.0	0.9	2.6	1.5	2.1	0.8	1.5	0.8	0.7	0.7	0.5	1.0	0.5	0.5	Diurnal Average	
	--	26.4	2.7	3.7	1.6	3.9	28.5	83.9	7.1	4.0	12.2	4.0	58.9	11.5	22.9	2.4	12.0	2.8	3.8	7.0	1.0	18.3	1.5	1.1	Diurnal Maximum	

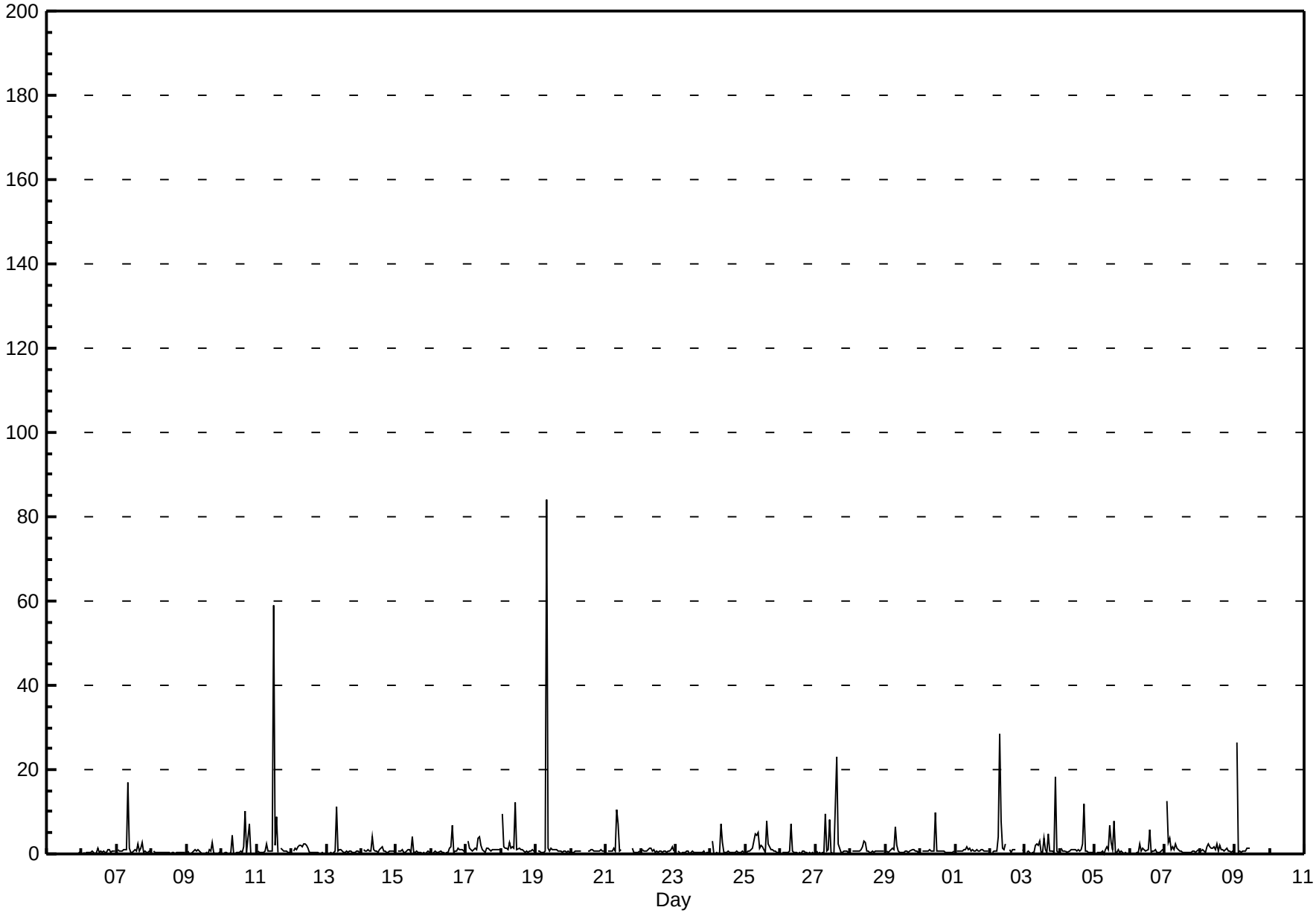
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Nitrogen Oxide (NO) - ppb

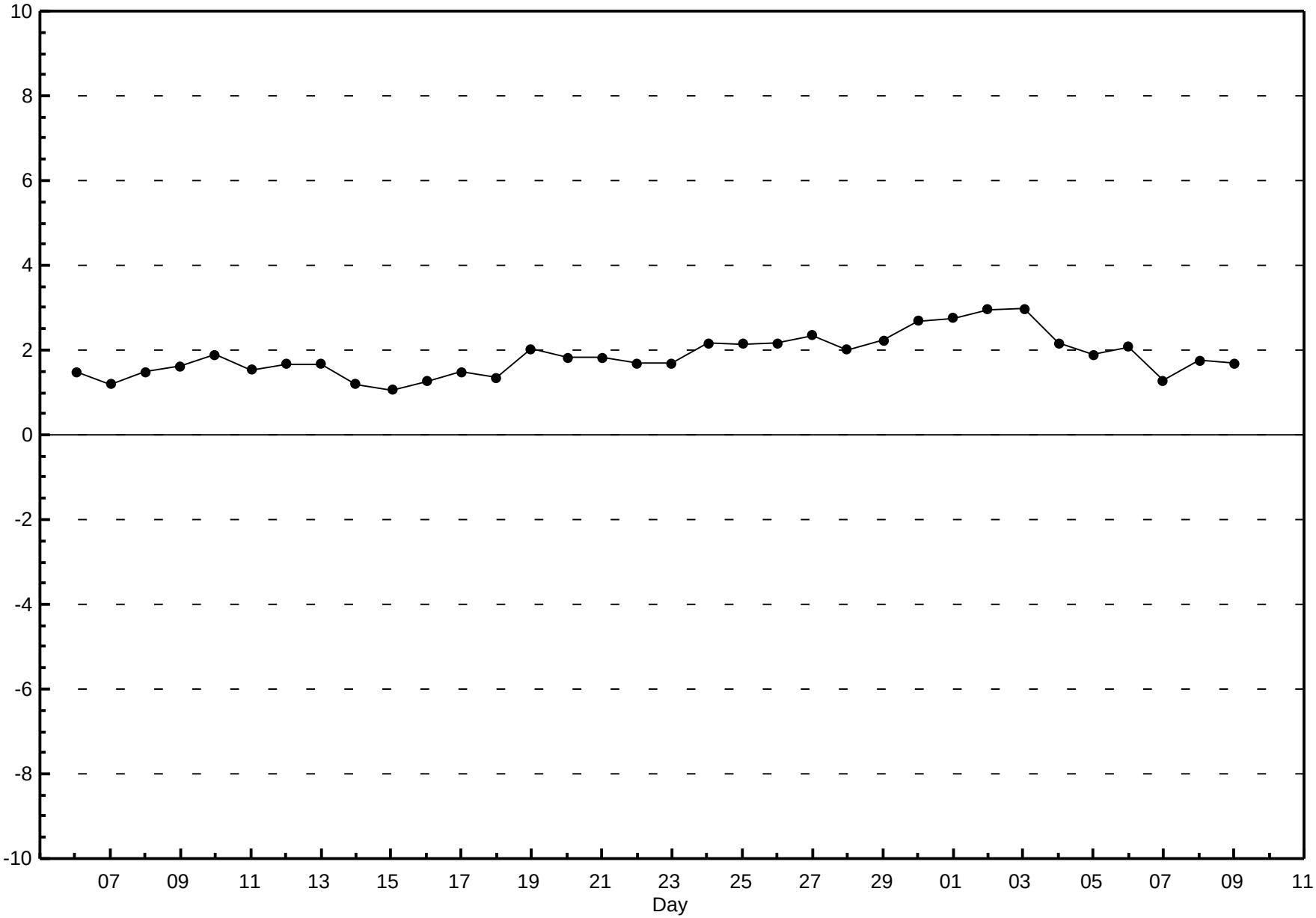
Didsbury West - Jun 5, 2013 to Jul 11, 2013



Zero Responses

Nitrogen Oxide (NO)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Calibration Report

Parameter **NO_X-NO-NO_2**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	June 5 2013	Previous Calibration	NA
Station Name	Martha	Station Location	31260 Rge Rd 23 Didsbury

Reason: Routine | **Install** | Removal | Other:

Start Time (MST)	9:00		End Time (MST)	18:15	
Barometric Pressure	679	mmHg	Station Temperature	24.0	Deg C
Calibrator	Sabio		Serial Number	3951108	
NO Cal Gas Conc	49.9	ppm	Cal Gas Expiry Date	December 29, 2013	
NOx Cal Gas Conc	50.1	ppm	Cal Gas Serial #	LL105164	

DACS Information

DACS make: Campbell Scientific CR3000 DACS serial No.: 6778

Parameter		NO2	NOx	NO
Before	Data Slope	NA	NA	NA
	Data Offset	NA	NA	NA
After	Data Slope	0.020178	0.020102	0.020172
	Data Offset	-0.996152	1.831676	0.755217
Channel #		11	12	10
Voltage Range		0 - 1V	0 - 1V	0 - 1V

Analyzer Information

Analyzer make/model: API 200A Analyzer serial #: 1620

Test Point	before		after	
Concentration range	0 - 500	ppb	0-500	ppb
NOx slope	NA		0.898	
NOx offset	NA	mV	-11.7	mV
NO slope	NA		0.886	
NO offset	NA	mV	-15.9	mV
Sample Flow	NA	Deg C	473	ccm
O3 Flow	NA	Deg C	69	ccm
Rcell Temp	NA	Deg C	50.1	Deg C
PMT Temp	NA	ccm	6.7	ccm
Moly Temp	NA	ccm	315.0	ccm
Sample Pressure	NA	in Hg	27.8	in Hg
Rcell Pressure	NA	in Hg	5.0	in Hg

Notes: Install calibration due to station move.
Adjusted the incorrect flow on the calibrator which dropped the Nox reference point during the GPT. Rest

Calibration Report

Parameter **NOx-NO-NO_2**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date: June 5 2013 Station Location: 31260 Rge Rd 23 Didsbury

Calibration Data

	Dilution flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
zero	5031	0.00	0.0	0.0	0.0	1.2	1.2	-2.0	N/A	N/A
1	5031	40.30	398.1	396.5	1.6	400.1	398.5	1.4	0.9950	0.9950
2	5031	30.40	300.9	299.7	1.2	299.3	298.1	0.6	1.0053	1.0055
3	5031	20.40	202.3	201.5	0.8	200.6	200.0	-0.5	1.0085	1.0078
4	5031	10.30	102.4	102.4	0.0	102.4	102.4	-1.5	0.9992	0.9998
AFZ										
							Average Correction Factor		1.0020	1.0020

As Found Concentrations: NO_X= NA NO= NA As Found Percent Change NO_X= NA NO= NA

GPT Calibration Data

Dilution Flow 5031 ccm Source Gas Flow 40.30 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
0	1.2	1.2	0.0	1.2	1.2	-2.0	N/A	N/A	N/A	N/A
1st NO2 (0.95V)	393.4	55.2	338.2	392.5	55.2	336.9	1.0023	1.0000	1.0038	99.6%
2nd NO2 (0.67V)	393.4	165.7	227.7	394.9	165.7	228.8	0.9964	1.0000	0.9953	100.5%
3rd NO2 (0.47V)	393.4	245.9	147.6	393.9	245.9	147.7	0.9988	1.0000	0.9990	100.1%
4th NO2 (0.30V)	393.4	318.3	75.1	395.7	318.3	77.2	0.9942	1.0000	0.9726	102.8%
					Average Correction Factor		0.9965	1.0000	0.9927	100.8%

AIC Data

		Previous calibration				Current calibration			
	Parameter	NOx	NO2	NO		NOx	NO2	NO	
	Auto zero	NA	NA	NA	ppb	1.4	-1.5	1.0	ppb
	Auto span	NA	NA	NA	ppb	231.7	225.3	5.3	ppb

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **NO_x**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

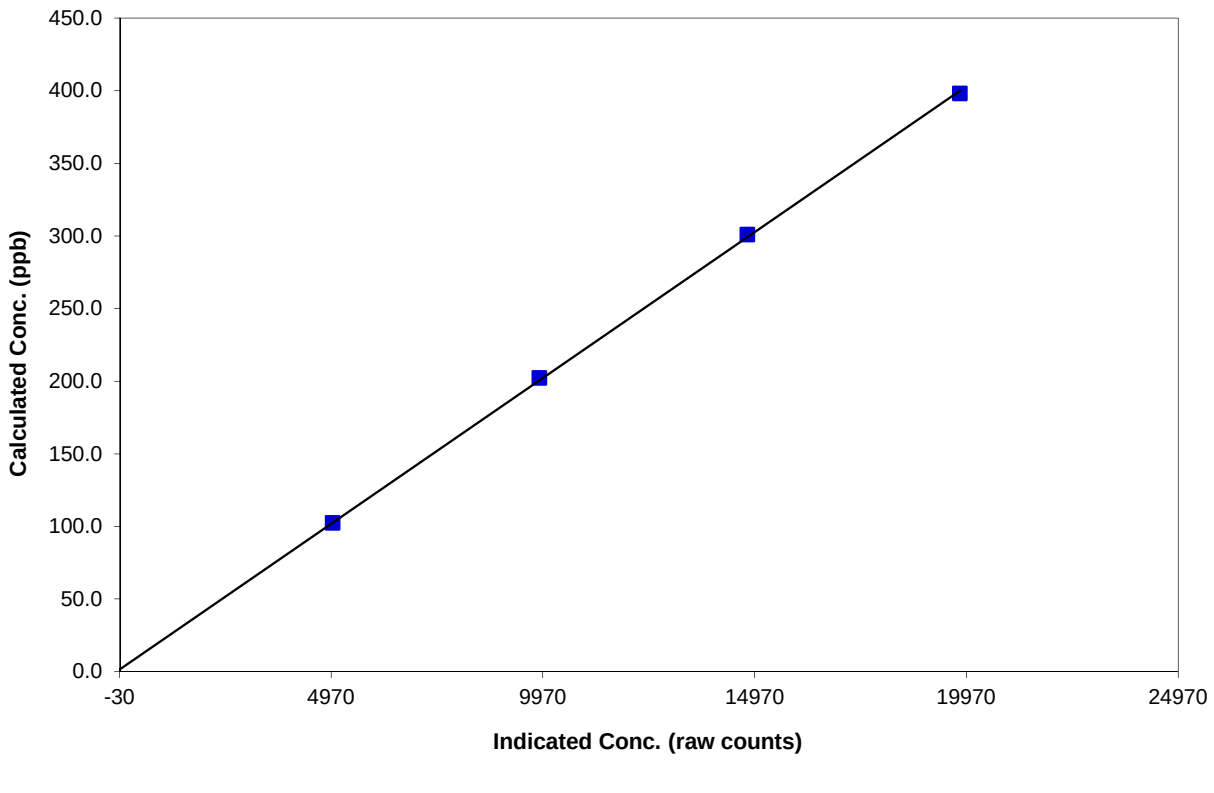
Station Information

Calibration Date	June 5 2013	Previous Calibration	NA
Station Number	Martha	Station Location	31260 Rge Rd 23 Didsbury
Start Time (MST)	9:00	End Time (MST)	18:15
Analyzer make	API 200A	Analyzer serial #	1620

Calibration Data

Calculated conc (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-32.0	N/A		
398.1	19814.8	0.0201	Correlation Coefficient	0.999890
300.9	14800.0	0.0203		
202.3	9889.5	0.0205	Slope	0.020102
102.4	5005.2	0.0205		
			Intercept	1.831676

NOx Calibration Curve



Calibration Summary

Parameter **NO**

Air Monitoring Network **PAMZ**

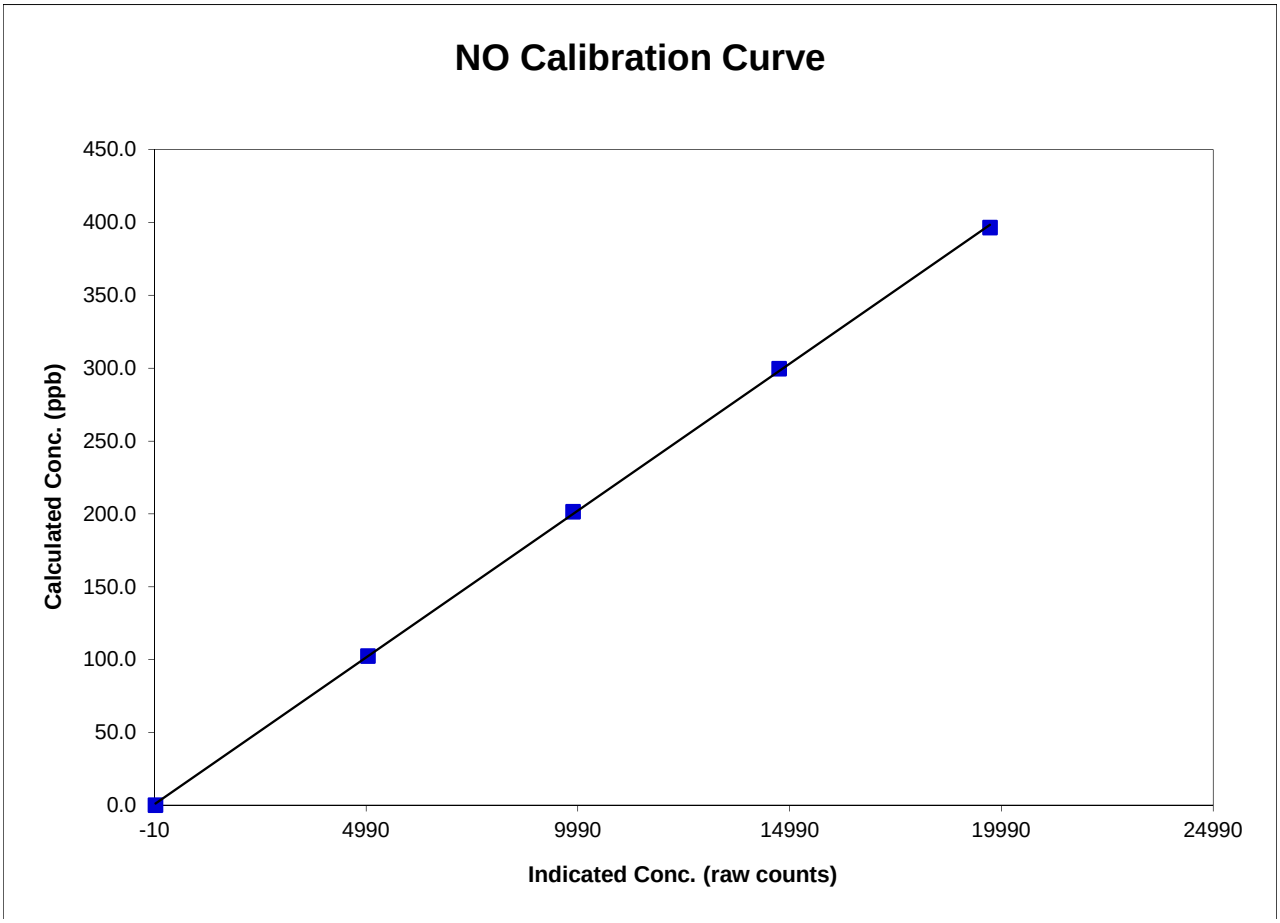
FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	June 5 2013	Previous Calibration	NA
Station Number	Martha	Station Location	31260 Rge Rd 23 Didsbury
Start Time (MST)	9:00	End Time (MST)	18:15
Analyzer make	API 200A	Analyzer serial #	1620

Calibration Data

Calculated conc (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	20.7	N/A		
396.5	19719.0	0.0201	Correlation Coefficient	0.999893
299.7	14738.8	0.0203		
201.5	9875.5	0.0204	Slope	0.020172
102.4	5038.1	0.0203		
			Intercept	0.755217



Calibration Summary

Parameter **NO_2**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

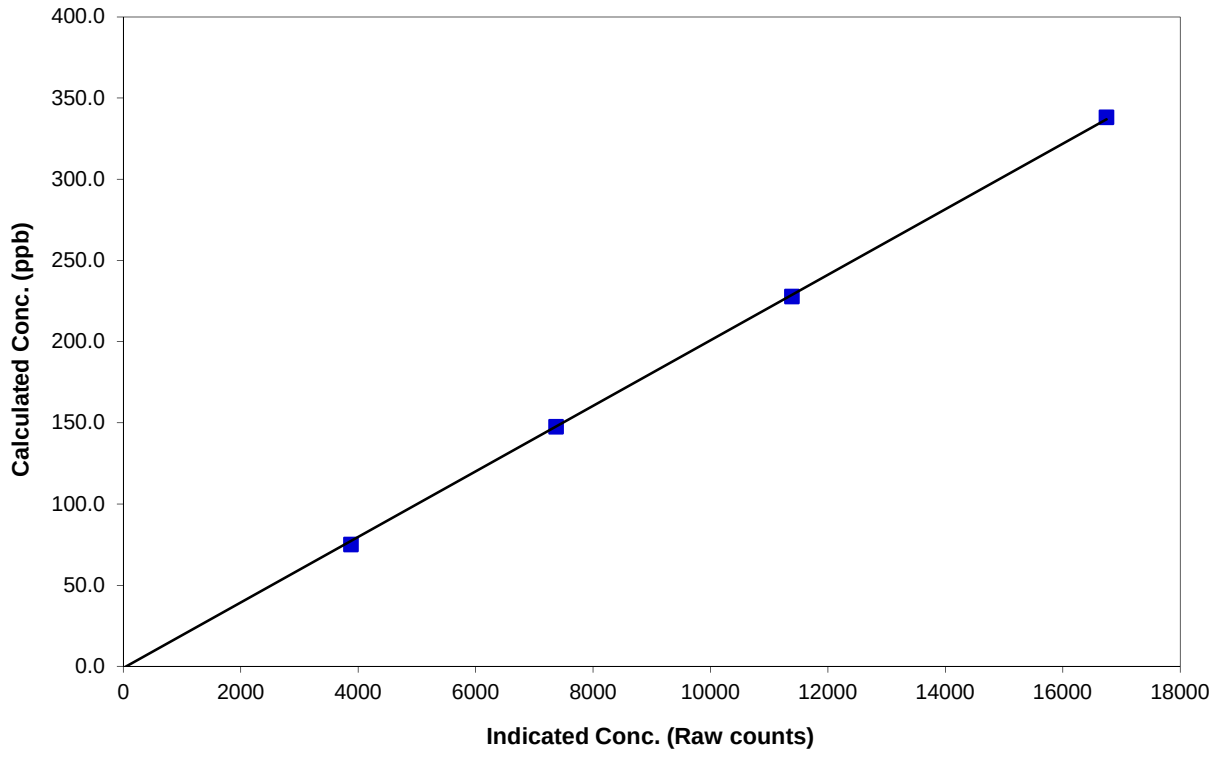
Station Information

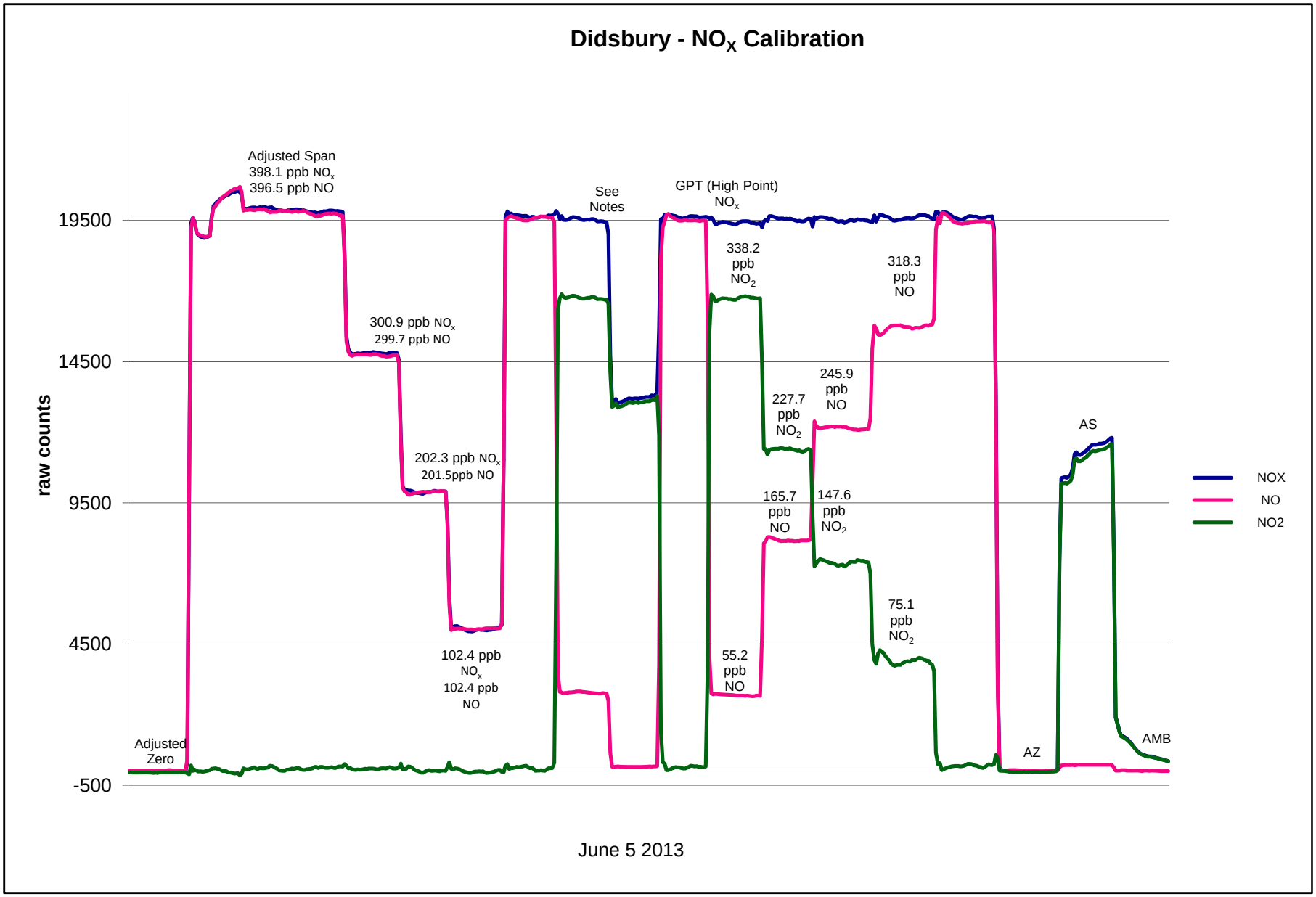
Calibration Date	June 5 2013	Previous Calibration	NA
Station Number	Martha	Station Location	31260 Rge Rd 23 Didsbury
Start Time (MST)	9:00	End Time (MST)	18:15
Analyzer make	API 200A	Analyzer serial #	1620

Calibration Data

Calculated conc (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-52.1	N/A		
338.2	16746.7	0.0202	Correlation Coefficient	0.999834
227.7	11388.1	0.0200		
147.6	7370.2	0.0200	Slope	0.020178
75.1	3875.8	0.0194		
			Intercept	-0.996152

NO_2 Calibration Curve




Didsbury - NOX Calibration
raw counts
19500
14500
9500
4500
-500
Adjusted Span
398.1 ppb NOx
396.5 ppb NO
300.9 ppb NOx
299.7 ppb NO
202.3 ppb NOx
201.5ppb NO
102.4 ppb NOx
102.4 ppb NO
Adjusted Zero
See Notes
GPT (High Point) NOx
338.2 ppb NO2
55.2 ppb NO
165.7 ppb NO
227.7 ppb NO2
245.9 ppb NO
318.3 ppb NO
147.6 ppb NO2
75.1 ppb NO2
AS
AZ
AMB
NOX
NO
NO2
June 5 2013

Calibration Report

Parameter **NO_X-NO-NO_2**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	July 9 2013	Previous Calibration	June 5 2013
Station Name	Martha	Station Location	Didsbury
Reason:	Routine / Install / **Removal**	Other:	
Start Time (MST)	12:00	End Time (MST)	17:30
Barometric Pressure	679 mmHg	Station Temperature	24.0 Deg C
Calibrator	Sabio	Serial Number	3951108
NO Cal Gas Conc	49.9 ppm	Cal Gas Expiry Date	December 29, 2013
NOx Cal Gas Conc	50.1 ppm	Cal Gas Serial #	LL105164

DACS Information

DACS make: Campbell Scientific CR3000 — DACS serial No.: 6778

Parameter		NO2	NOx	NO
Before	Data Slope	0.020178	0.020102	0.020172
	Data Offset	-0.996152	1.831676	0.755217
After	Data Slope	0.020355	0.020408	0.020247
	Data Offset	-0.987409	-0.487641	-0.456906
Channel #		11	12	10
Voltage Range		0 - 1V	0 - 1V	0 - 1V

Analyzer Information

Analyzer make/model: API 200A — Analyzer serial #: 1620

Test Point	before		after	
Concentration range	0 - 500	ppb	0-500	ppb
NOx slope	0.898		NA	
NOx offset	-11.7	mV	NA	mV
NO slope	0.886		NA	
NO offset	-15.9	mV	NA	mV
Sample Flow	473	Deg C	NA	ccm
O3 Flow	69	Deg C	NA	ccm
Rcell Temp	50.1	Deg C	NA	Deg C
PMT Temp	6.7	ccm	NA	ccm
Moly Temp	315.0	ccm	NA	ccm
Sample Pressure	27.8	in Hg	NA	in Hg
Rcell Pressure	5.0	in Hg	NA	in Hg

Notes:

Calibration Report

Parameter **NOx-NO-NO_2**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date: July 9 2013 Station Location: Didsbury

Calibration Data

	Dilution flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
zero	5031	0.00	0.0	0.0	0.0	-0.2	0.4	-1.5	N/A	N/A
1	5031	40.30	398.1	396.5	1.6	398.4	396.9	-2.0	0.9993	0.9992
2	5031	30.40	300.9	299.7	1.2	300.1	299.8	-2.6	1.0028	0.9997
3	5031	20.40	202.3	201.5	0.8	203.0	200.7	0.0	0.9965	1.0038
4	5031	10.30	102.4	102.4	0.0	102.4	102.3	-1.5	0.9999	1.0004
AFZ	5031	0.00	0.0	0.0	0.0	-0.2	0.4	-1.5	0.0000	0.0000
	5031	40.30	398.1	396.5	1.6	398.4	396.9	-2.0	0.9993	0.9992
							Average Correction Factor		0.9996	1.0008

As Found Concentrations: NO_X= 398.6 NO= 396.5 As Found Percent Change NO_X= 0.11% NO= -0.02%

GPT Calibration Data

Dilution Flow 5031 ccm Source Gas Flow 40.30 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
0	0.4	0.4	0.0	-0.2	0.4	-1.5	N/A	N/A	N/A	N/A
1st NO2 (0.95V)	398.6	61.7	336.9	399.6	61.7	335.9	0.9974	1.0000	1.0031	99.7%
2nd NO2 (0.67V)	398.6	168.7	229.8	401.9	168.7	230.6	0.9916	1.0000	0.9966	100.3%
3rd NO2 (0.47V)	398.6	251.0	147.5	402.0	251.0	148.0	0.9915	1.0000	0.9968	100.3%
4th NO2 (0.30V)	398.6	323.9	74.6	403.1	323.9	75.9	0.9888	1.0000	0.9835	101.7%
					Average Correction Factor		0.9906	1.0000	0.9950	100.5%

AIC Data

		Previous calibration				Current calibration			
	Parameter	NOx	NO2	NO		NOx	NO2	NO	
	Auto zero	1.4	-1.5	1.0	ppb	NA	NA	NA	ppb
	Auto span	231.7	225.3	5.3	ppb	NA	NA	NA	ppb

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **NO_x**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

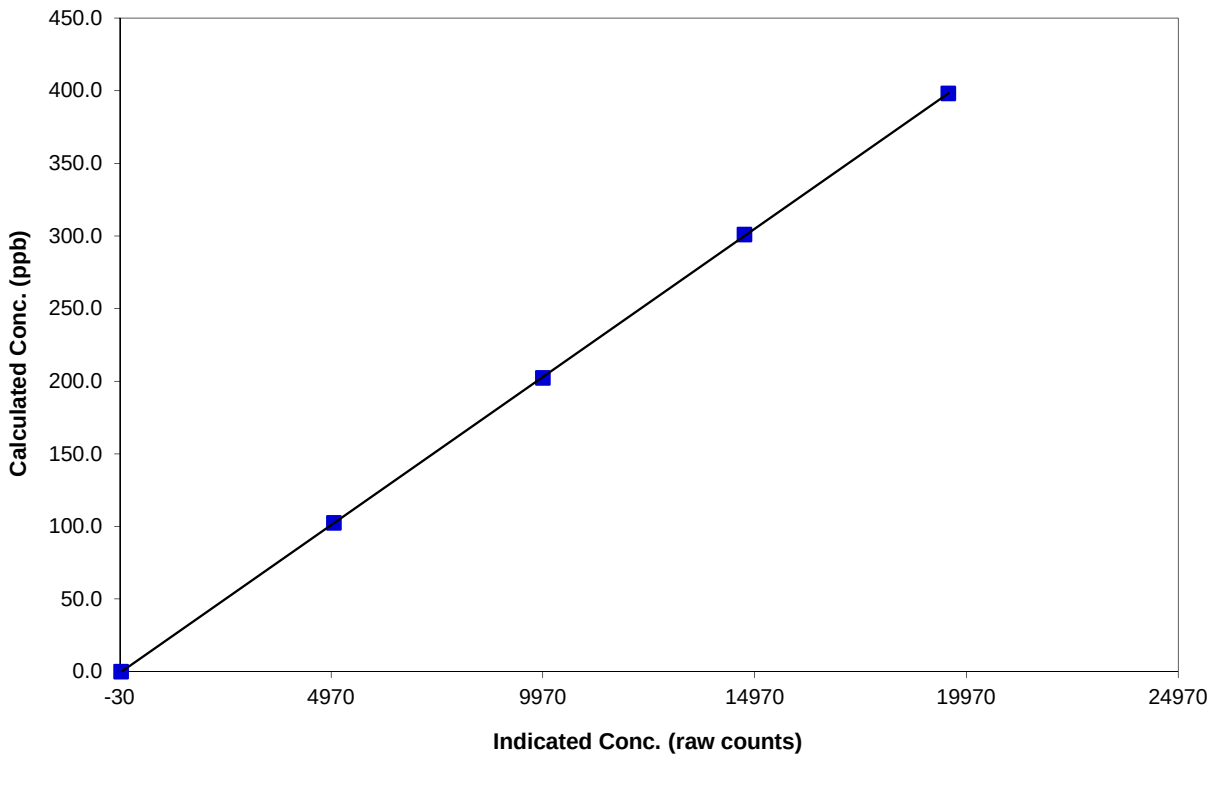
Station Information

Calibration Date	July 9 2013	Previous Calibration	June 5 2013
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	12:00	End Time (MST)	17:30
Analyzer make	API 200A	Analyzer serial #	1620

Calibration Data

Calculated conc (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	16.5	N/A		
398.1	19545.7	0.0204	Correlation Coefficient	0.999986
300.9	14726.9	0.0204		
202.3	9973.1	0.0203	Slope	0.020408
102.4	5040.2	0.0203		
			Intercept	-0.487641

NOx Calibration Curve



Calibration Summary

Parameter **NO**

Air Monitoring Network **PAMZ**

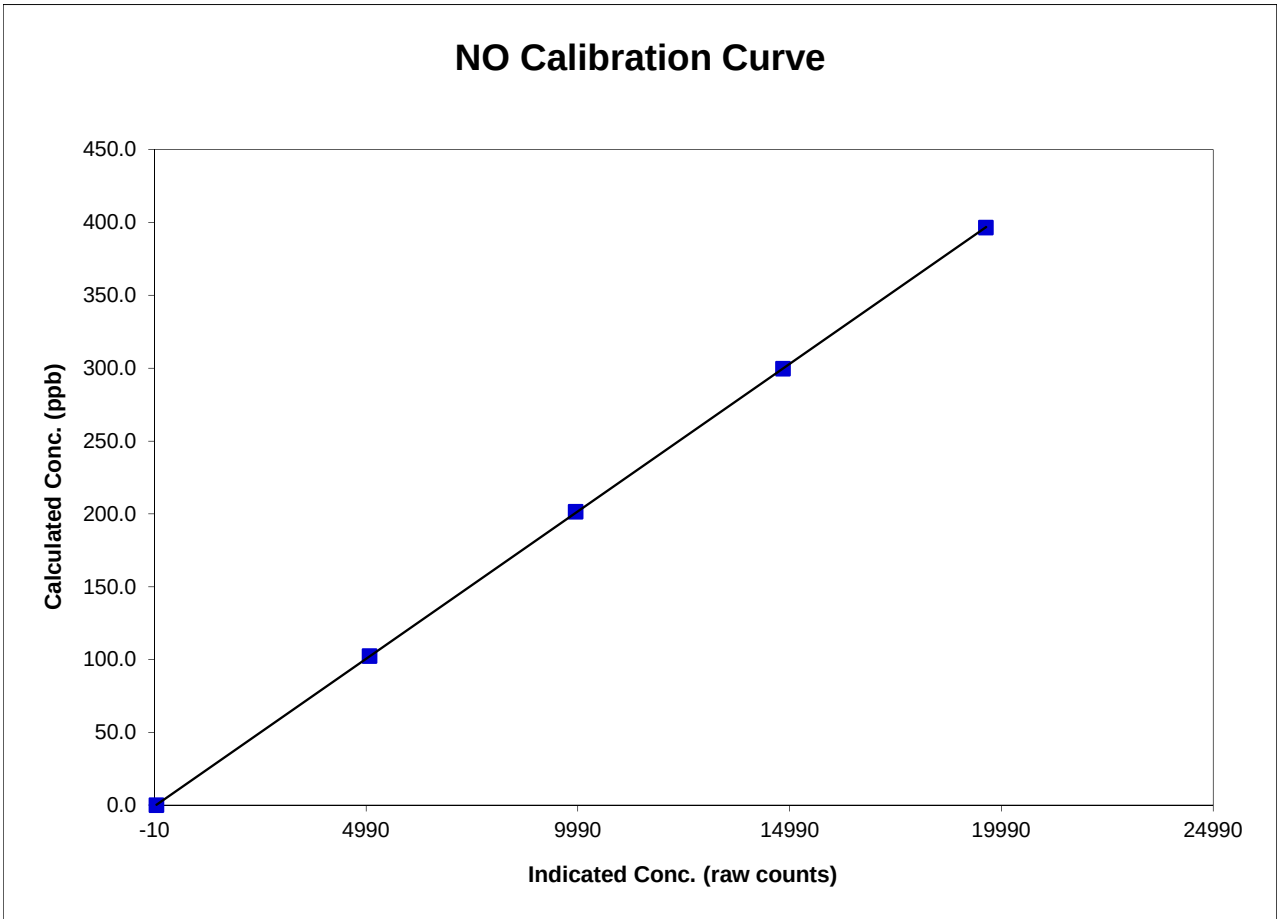
FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	July 9 2013	Previous Calibration	June 5 2013
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	12:00	End Time (MST)	17:30
Analyzer make	API 200A	Analyzer serial #	1620

Calibration Data

Calculated conc (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	42.0	N/A		
396.5	19624.3	0.0202	Correlation Coefficient	0.999991
299.7	14830.0	0.0202		
201.5	9937.6	0.0203	Slope	0.020247
102.4	5076.0	0.0202		
			Intercept	-0.456906



Calibration Summary

Parameter **NO_2**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

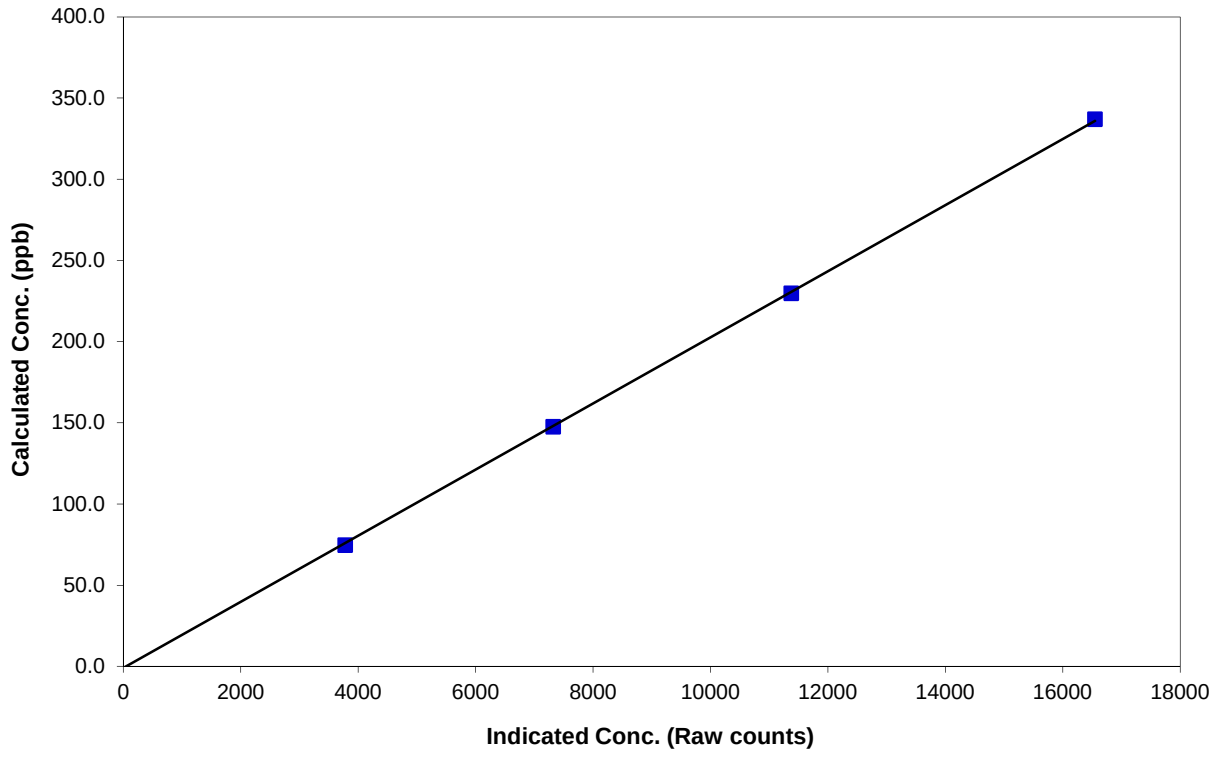
Station Information

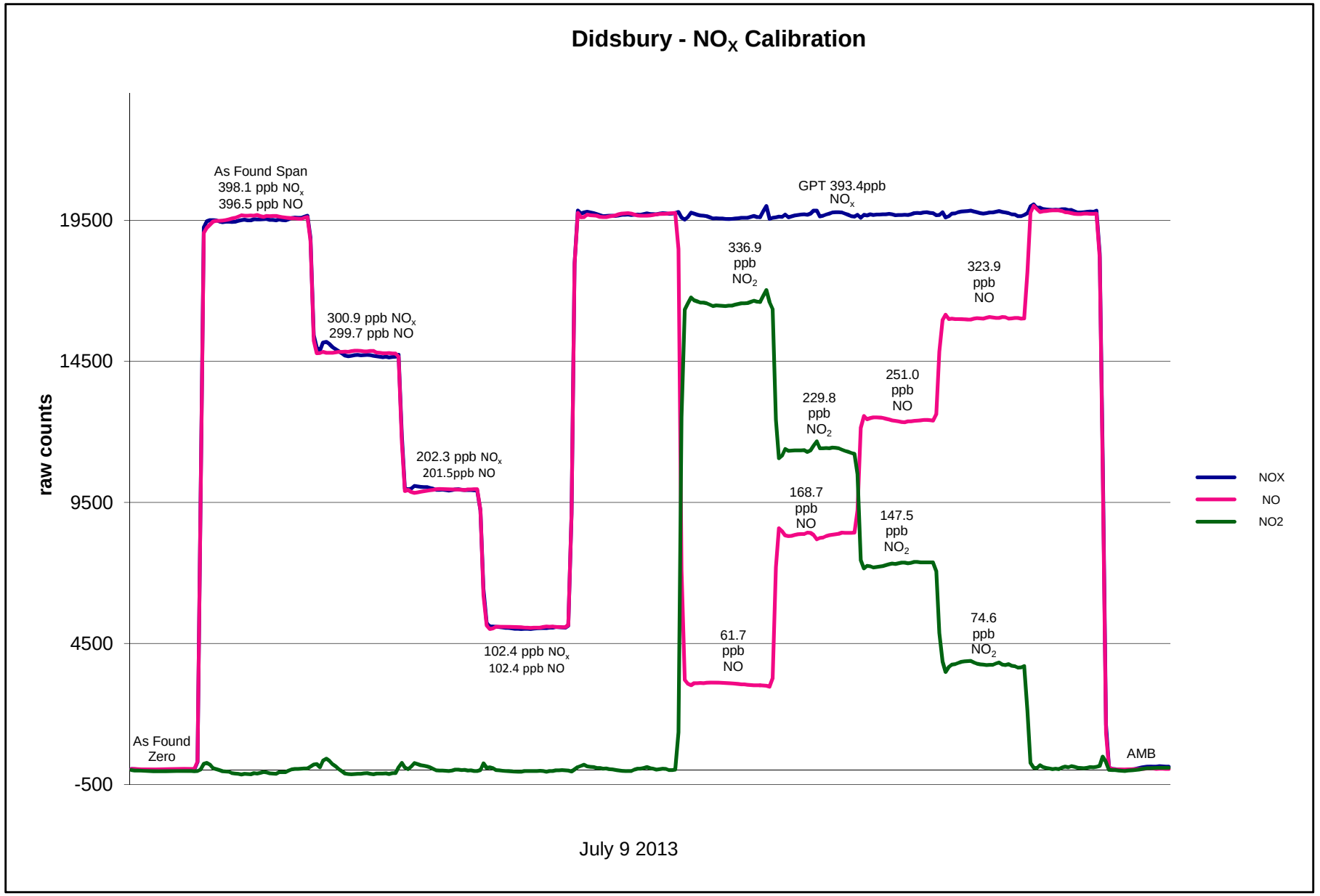
Calibration Date	July 9 2013	Previous Calibration	June 5 2013
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	12:00	End Time (MST)	17:30
Analyzer make	API 200A	Analyzer serial #	1620

Calibration Data

Calculated conc (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-23.9	N/A		
336.9	16550.2	0.0204	Correlation Coefficient	0.999919
229.8	11377.9	0.0202		
147.5	7320.2	0.0202	Slope	0.020355
74.6	3777.2	0.0198		
			Intercept	-0.987409

NO_2 Calibration Curve




Didsbury - NOX Calibration
raw counts
19500
14500
9500
4500
-500
As Found Span
398.1 ppb NOx
396.5 ppb NO
300.9 ppb NOx
299.7 ppb NO
202.3 ppb NOx
201.5ppb NO
102.4 ppb NOx
102.4 ppb NO
As Found
Zero
GPT 393.4ppb
NOx
336.9
ppb
NO2
61.7
ppb
NO
229.8
ppb
NO2
168.7
ppb
NO
251.0
ppb
NO
323.9
ppb
NO
147.5
ppb
NO2
74.6
ppb
NO2
AMB
NOX
NO
NO2
July 9 2013

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Ozone (O_3) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 55.4 ppb on Jul 2 15:00 Maximum Daily Average: 34.2 ppb on Jun 13

Minimum Value: 6 ppb on Jun 25 06:00 Minimum Daily Average: 16.7 ppb on Jun 25
Maximum Diurnal Average: 34.7 ppb at hour 17 Minimum Diurnal Average: 17.0 ppb at hour 5
Monthly Average: 26.00 ppb Percentiles: P_1 = 7.4 P_{10} = 14.2 Q_1 = 19.9 Median = 26.3 Q_3 = 32.5 P_{90} = 36.2 P_{99} = 45.6

Hours in Service:	822
Hours of Data:	765
Hours of Missing Data:	57
Hours of Calibration:	53
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	47	45	42	39	33	30	26	22	--	47.2
7-Jun	A	21	18	24	22	21	26	31	33	37	39	38	40	40	35	28	31	36	34	31	27	22	22	16	29.2	39.9
8-Jun	A	20	26	25	24	22	26	30	29	30	32	34	34	35	35	40	35	30	32	27	25	27	28	27	29.3	39.8
9-Jun	A	23	23	21	17	16	17	20	23	29	29	30	31	30	31	30	30	30	31	28	24	21	20	20	25.0	31.1
10-Jun	A	19	21	21	20	22	26	27	29	29	33	32	32	33	35	35	33	34	33	33	31	27	22	21	28.2	34.8
11-Jun	A	13	15	18	17	19	20	23	25	26	26	26	26	29	30	31	31	31	25	26	22	21	24	26	24.0	31.4
12-Jun	A	20	16	12	9	11	18	22	23	25	33	38	37	46	48	50	49	46	45	41	36	36	40	38	32.1	50.2
13-Jun	A	30	27	25	22	19	18	22	35	37	37	44	47	42	38	40	41	41	40	34	33	36	43	37	34.2	47.1
14-Jun	A	26	20	20	19	19	21	24	27	28	28	27	26	25	27	26	25	27	27	26	26	26	29	26	24.9	29.4
15-Jun	A	25	26	29	29	30	34	34	35	36	36	35	37	34	34	34	37	38	38	35	35	34	31	28	33.2	38.0
16-Jun	A	27	26	25	22	22	23	25	26	26	26	27	27	26	27	28	29	29	28	25	20	16	15	16	24.4	29.0
17-Jun	A	10	10	11	11	14	17	21	25	26	32	37	41	39	33	36	38	38	36	34	31	27	21	21	26.4	41.2
18-Jun	A	13	14	17	16	18	20	21	20	23	20	19	18	23	32	34	35	36	32	26	25	22	23	24	23.2	36.0
19-Jun	A	24	27	23	24	24	19	19	25	29	31	30	30	33	30	34	37	34	33	32	28	27	28	29	28.3	36.9
20-Jun	A	28	26	28	26	28	28	26	25	42	40	AC	31	AC	AC	36	35	33	35	32	29	29	24	21	30.1	41.5
21-Jun	A	20	20	23	31	23	16	18	21	25	29	26	25	27	27	C	C	C	29	30	34	34	30	27	25.7	34.0
22-Jun	A	23	22	20	18	17	15	14	22	30	33	34	35	36	35	34	38	37	36	32	29	29	14	12	26.7	37.5
23-Jun	A	15	17	18	16	15	14	14	24	31	34	36	37	36	33	37	38	39	40	38	33	27	27	18	27.7	39.9
24-Jun	A	17	19	16	14	13	14	18	27	32	34	33	39	36	33	36	35	33	29	29	24	21	18	16	25.4	38.6
25-Jun	A	14	12	10	7	6	8	10	11	16	16	22	27	24	21	21	25	28	27	21	18	15	12	13	16.7	28.0
26-Jun	A	12	13	14	13	13	15	18	25	29	30	32	34	34	35	33	33	33	33	30	29	27	24	23	25.2	35.0
27-Jun	A	21	19	20	18	22	23	25	28	33	36	37	36	37	42	42	39	40	39	36	28	22	23	22	30.0	42.4
28-Jun	A	19	20	20	17	17	18	20	26	30	33	39	39	40	39	37	35	33	32	26	22	21	22	20	27.1	40.3
29-Jun	A	17	14	14	13	13	16	15	19	25	28	31	32	31	31	29	29	27	22	18	16	27	22	17	22.0	31.7
30-Jun	A	15	14	13	10	7	10	14	18	21	24	28	30	32	33	32	34	34	34	30	24	24	21	17	22.6	34.4
1-Jul	A	13	13	14	11	13	18	20	22	29	34	33	36	35	34	34	32	33	30	26	25	24	22	19	24.7	35.8
2-Jul	A	16	14	14	12	9	8	13	17	20	27	33	34	37	55	42	39	35	P	P	P	P	23	22	24.7	55.4
3-Jul	A	22	21	19	19	19	20	19	22	26	27	31	32	32	32	34	33	34	33	29	23	20	19	18	25.4	34.0
4-Jul	A	13	14	15	17	28	27	30	33	32	29	30	31	35	29	31	35	35	34	30	22	25	32	32	27.8	35.4
5-Jul	A	26	21	17	17	17	22	24	28	30	31	31	30	30	28	20	26	30	25	24	26	23	21	25	24.9	31.2
6-Jul	A	31	25	20	18	19	20	18	23	22	23	22	22	22	29	36	44	39	33	29	21	17	15	12	24.3	43.7
7-Jul	A	9	7	7	8	7	9	12	22	29	31	32	31	31	32	31	32	33	27	24	21	20	18	11	21.1	32.8
8-Jul	A	19	16	11	14	13	12	19	20	23	20	24	26	30	31	34	34	32	31	28	20	18	17	16	22.1	34.1
9-Jul	A	9	11	11	11	12	12	12	14	20	27	30	33	33	31	29	34	35	30	29	26	21	13	19	21.8	35.5
10-Jul	A	17	13	19	17	14	14	15	23	C	C	C	C	C	C	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	23.1
	--	19.0	18.3	18.1	17.0	17.2	18.3	20.4	24.2	28.1	29.9	31.3	32.3	32.9	33.3	33.5	34.7	34.5	32.6	29.6	26.2	24.7	23.2	21.5	Diurnal Average	
	--	31.4	27.0	29.3	31.1	29.8	34.2	33.6	35.2	41.5	40.2	44.2	47.1	46.0	55.4	50.2	48.5	45.7	45.1	41.2	35.6	36.1	42.6	38.2	Diurnal Maximum	

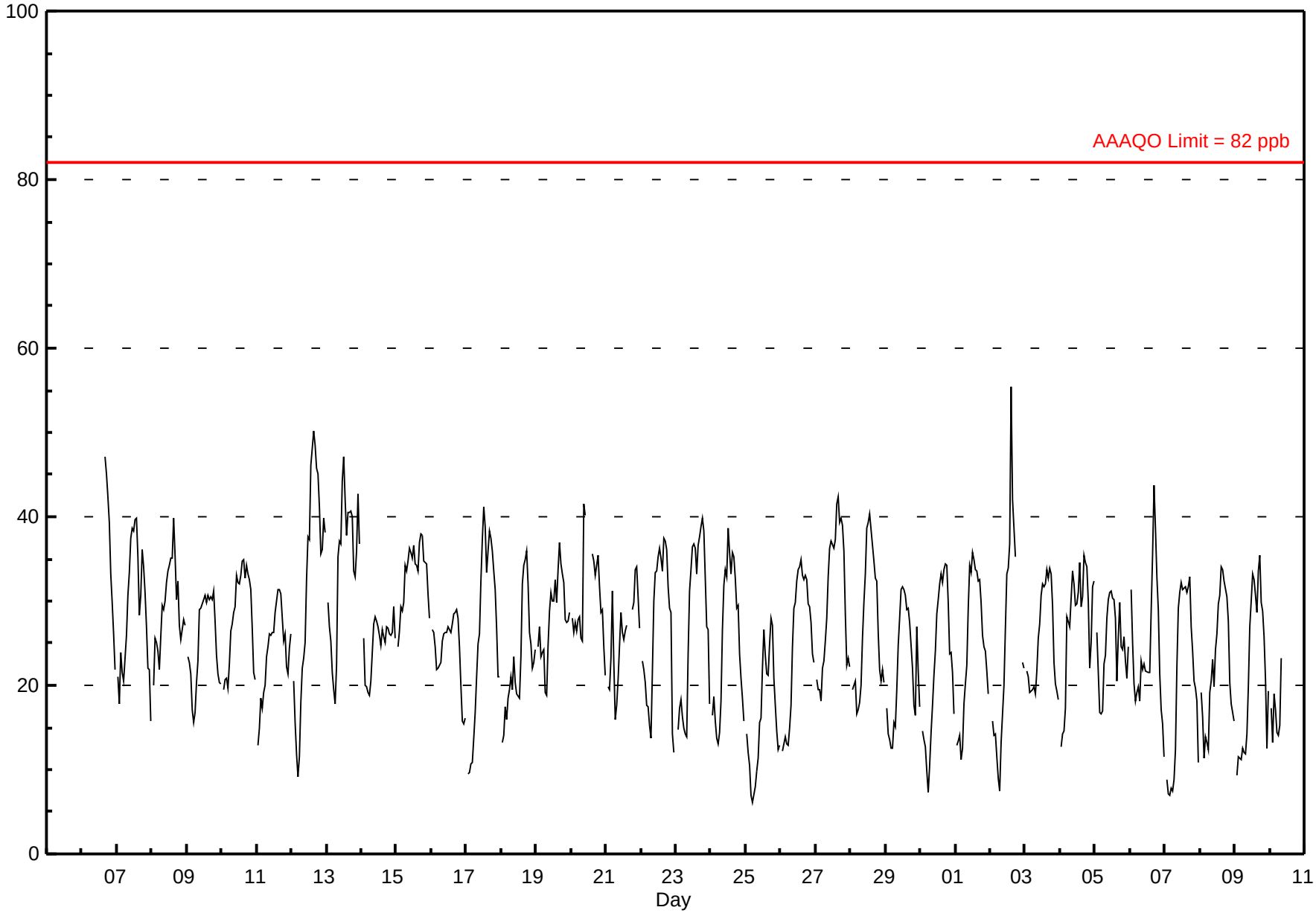
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb 24-hr na

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Ozone (O_3) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Ozone (O_3) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 73.3 ppb on Jul 2 15:00

Maximum Daily Average: 38.4 ppb on Jun 13

Minimum Value: 7 ppb on Jun 25 06:00

Minimum Daily Average: 19.7 ppb on Jun 25

Maximum Diurnal Average: 38.0 ppb at hour 17

Minimum Diurnal Average: 20.2 ppb at hour 6

Monthly Average: 29.37 ppb

Percentiles: P_1 = 11.1 P_{10} = 17.7 Q_1 = 23.0 Median = 29.6 Q_3 = 35.5 P_{90} = 40.1 P_{99} = 49.8

Hours in Service:	822
Hours of Data:	765
Hours of Missing Data:	57
Hours of Calibration:	53
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	C	50	47	45	43	35	33	33	25	--	50.2
7-Jun	A	26	25	35	34	32	29	34	36	39	41	40	42	42	42	34	38	41	36	34	29	26	25	18	33.8	42.4
8-Jun	A	25	28	28	30	27	28	31	31	32	34	36	37	37	38	42	39	33	34	33	32	31	30	29	32.4	41.8
9-Jun	A	26	25	24	20	17	19	22	28	32	31	33	35	32	33	32	32	35	34	31	27	23	22	23	27.7	34.7
10-Jun	A	21	23	23	22	26	28	29	30	32	35	34	34	36	36	36	36	36	35	35	34	30	24	23	30.3	36.4
11-Jun	A	19	19	22	20	22	22	26	27	28	28	29	31	31	32	33	34	32	31	32	28	30	29	29	27.5	33.9
12-Jun	A	24	19	14	12	14	21	25	25	27	40	41	41	50	52	53	52	48	49	44	39	41	44	44	35.5	52.7
13-Jun	A	32	32	28	24	23	21	28	39	40	39	49	49	49	42	43	44	44	43	42	39	39	47	46	38.4	49.2
14-Jun	A	33	24	24	25	23	22	27	29	30	30	30	29	28	28	28	28	29	29	28	28	29	32	28	27.8	32.9
15-Jun	A	26	30	31	31	34	36	36	37	37	38	38	38	36	36	38	39	40	39	36	37	37	36	31	35.5	39.6
16-Jun	A	28	30	28	25	24	24	27	28	28	28	29	30	29	28	30	30	31	31	27	25	18	19	20	26.7	31.2
17-Jun	A	13	12	13	13	16	19	26	27	29	35	41	43	43	37	40	40	40	38	35	34	29	27	23	29.2	42.9
18-Jun	A	20	20	25	19	21	23	24	23	26	26	21	23	31	35	37	37	39	35	32	29	25	25	28	27.1	38.6
19-Jun	A	28	29	28	27	26	25	22	29	34	34	33	33	35	32	37	40	37	35	35	31	29	30	30	31.2	39.6
20-Jun	A	29	28	29	29	29	30	27	26	48	48	AC	34	AC	AC	39	38	37	42	36	31	31	26	25	33.2	47.8
21-Jun	A	22	21	34	35	28	18	19	23	27	31	29	27	32	33	C	C	C	32	33	43	39	35	30	29.5	43.3
22-Jun	A	24	24	23	20	19	18	18	26	34	37	36	38	39	39	38	40	39	39	36	34	34	22	15	30.2	40.1
23-Jun	A	19	19	20	18	16	17	20	30	37	37	39	40	38	35	40	41	41	42	43	40	31	32	24	31.3	42.5
24-Jun	A	23	22	19	16	16	17	28	32	35	37	36	41	39	38	38	38	36	33	32	27	23	20	18	28.8	40.7
25-Jun	A	17	16	12	11	7	10	12	13	18	18	27	30	30	24	23	29	30	30	24	20	17	17	17	19.7	30.2
26-Jun	A	15	15	15	16	15	17	22	30	31	32	35	35	37	38	37	36	35	35	32	34	29	27	25	27.9	37.8
27-Jun	A	26	22	22	20	24	26	30	30	37	39	40	38	41	47	50	41	43	43	44	36	26	25	25	33.7	49.8
28-Jun	A	22	22	23	19	19	20	22	30	33	37	41	41	41	40	39	37	35	34	31	23	23	25	23	29.7	41.3
29-Jun	A	19	18	16	15	17	18	18	22	29	29	34	35	35	33	30	31	30	26	22	21	32	27	23	25.2	35.3
30-Jun	A	18	17	15	13	10	15	18	21	25	28	32	33	35	36	37	36	38	38	33	29	27	24	22	26.0	38.4
1-Jul	A	15	16	18	14	14	21	22	26	35	37	37	38	37	36	36	34	34	32	28	27	25	23	21	27.3	38.2
2-Jul	A	18	16	16	14	11	13	17	19	22	37	36	37	45	73	64	44	41	P	P	P	P	27	24	30.2	73.3
3-Jul	A	23	23	20	20	21	21	22	25	27	31	33	35	34	36	36	36	37	37	35	26	25	23	22	28.2	37.4
4-Jul	A	18	19	17	26	30	29	34	36	37	31	33	34	37	34	40	41	37	38	37	28	30	38	37	32.3	41.2
5-Jul	A	30	27	23	19	23	25	28	33	34	35	37	32	45	33	24	30	33	30	26	29	27	24	28	29.3	44.6
6-Jul	A	35	27	24	20	21	23	23	25	24	25	24	25	23	34	41	47	44	38	34	26	23	20	15	27.9	46.7
7-Jul	A	11	10	9	12	11	12	18	28	32	34	35	34	33	34	34	35	35	34	28	24	22	21	17	24.4	34.9
8-Jul	A	27	25	15	17	16	17	25	25	28	27	30	32	35	35	36	36	34	33	32	26	20	19	19	26.4	36.3
9-Jul	A	14	13	12	12	15	13	13	16	25	30	33	35	35	34	34	46	42	33	31	28	23	20	22	25.3	46.5
10-Jul	A	20	18	20	22	18	16	18	30	C	C	C	C	C	C	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	29.6
	--	22.5	21.6	21.3	20.2	20.2	20.9	23.8	27.5	31.2	33.3	34.4	35.1	36.5	37.1	37.5	38.0	37.4	35.9	33.5	30.3	28.1	27.0	24.9	Diurnal Average	
	--	35.4	32.2	34.9	35.0	33.8	36.3	35.6	38.8	47.8	47.7	48.7	49.2	49.8	73.3	63.5	52.3	48.0	48.8	44.2	43.3	41.2	47.1	46.0	Diurnal Maximum	

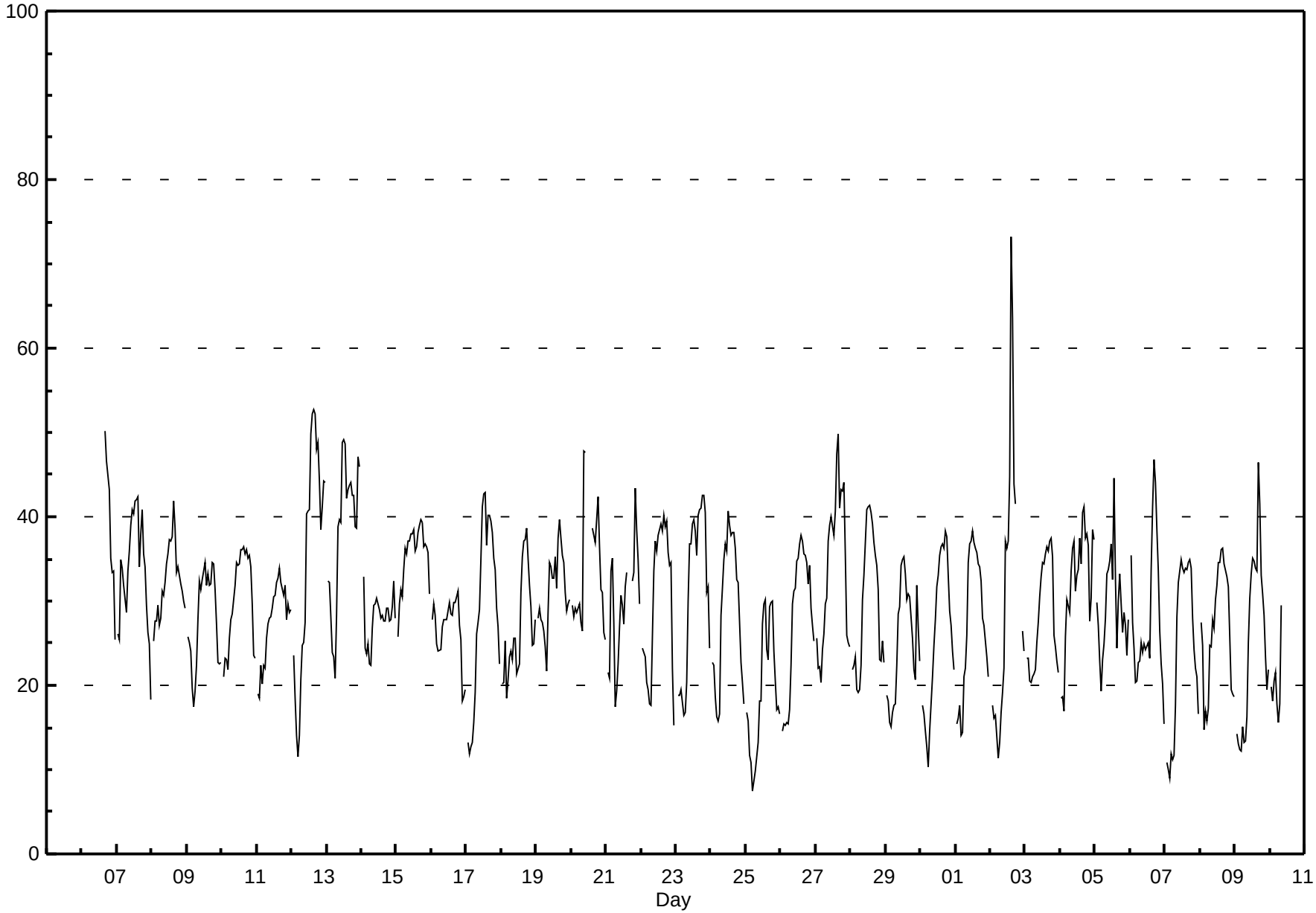
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Ozone (O_3) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Eight Hour Running Averages

Ozone (O_3) - ppb

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 45.3 ppb on Jun 12 20:00

Minimum Value: 8.4 ppb on Jul 7 07:00

Percentiles: P_1 = 10.5 P_{10} = 16.4 Q_1 = 21.0 Median = 26.0 Q_3 = 30.7 P_{90} = 34.5 P_{99} = 41.2

Hours in Service:	822
Hours of Data:	787
Hours of Missing Data:	35
Hours of Calibration:	27
Percent Operational Time:	99.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
5-Jun	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	--
6-Jun	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	40	38	36	39.5
7-Jun	34	31	27	25	23	22	22	23	24	26	29	31	33	35	37	36	36	36	35	34	33	31	29	27	36.7
8-Jun	27	25	23	23	22	22	23	25	25	26	27	28	30	31	32	34	34	34	34	34	33	31	31	29	34.5
9-Jun	28	27	26	25	24	22	21	20	20	21	22	23	24	26	28	29	30	30	30	30	29	28	27	26	30.3
10-Jun	25	23	22	21	20	20	21	22	23	24	26	27	29	30	31	32	33	33	33	33	33	33	31	29	33.4
11-Jun	29	26	23	21	19	18	18	18	19	20	22	23	24	25	26	27	28	29	29	29	28	27	27	26	28.8
12-Jun	25	24	22	20	18	17	16	16	16	17	19	22	26	30	34	38	41	43	45	45	45	44	43	41	45.3
13-Jun	40	38	35	33	31	29	26	23	25	26	27	29	32	35	38	40	41	41	42	40	38	38	38	38	41.6
14-Jun	37	35	32	30	29	26	23	21	22	22	23	24	25	26	26	27	26	26	26	26	26	26	27	27	37.5
15-Jun	27	26	26	27	27	28	28	30	30	32	33	34	35	35	35	35	35	36	36	36	36	36	35	34	35.8
16-Jun	34	32	31	29	28	26	25	24	24	24	24	25	25	26	26	27	27	27	28	27	27	25	24	22	34.0
17-Jun	21	18	16	14	13	12	12	13	15	17	20	23	27	30	32	34	35	37	37	37	36	34	33	31	37.3
18-Jun	30	26	23	21	19	17	17	17	17	19	19	20	20	21	22	24	26	27	29	30	30	30	29	28	30.4
19-Jun	27	25	25	24	24	24	24	23	23	24	24	25	26	27	28	30	32	32	33	33	33	32	32	31	32.9
20-Jun	30	29	28	28	27	27	28	27	27	29	30	31	31	32	AC	AC	AC	AC	AC	34	33	33	32	30	33.6
21-Jun	29	27	25	24	24	23	22	21	21	22	23	23	23	23	25	26	26	N	N	N	N	N	N	31	30.7
22-Jun	31	30	29	27	25	23	20	18	19	20	21	23	25	27	30	32	34	35	36	35	35	34	31	28	35.6
23-Jun	27	24	21	19	17	15	15	16	17	19	21	23	26	28	31	34	35	36	37	37	37	36	35	32	37.2
24-Jun	32	28	25	22	19	17	16	16	17	19	21	23	26	29	31	34	35	35	34	34	32	30	28	26	34.7
25-Jun	24	22	19	16	14	12	11	10	10	10	11	12	14	17	18	20	21	23	24	24	23	22	21	20	24.4
26-Jun	19	17	15	14	13	13	13	14	15	17	19	22	24	27	30	31	32	33	33	33	32	32	30	29	33.3
27-Jun	28	27	25	23	22	21	21	21	22	24	26	28	30	32	34	36	38	39	39	39	38	36	34	31	39.1
28-Jun	30	27	24	22	21	20	19	19	20	21	23	25	28	31	33	35	36	37	37	35	33	30	28	26	36.8
29-Jun	25	23	20	19	17	16	15	14	15	16	18	20	22	25	27	28	29	30	29	27	25	25	24	22	29.8
30-Jun	21	20	18	18	17	14	12	12	13	13	15	17	19	22	25	27	29	31	32	32	32	31	29	27	32.5
1-Jul	26	23	20	18	16	15	14	15	16	18	20	23	26	28	30	32	33	34	33	32	31	30	28	26	33.8
2-Jul	25	23	21	19	17	15	13	12	13	13	15	17	20	23	29	33	36	38	39	40	N	N	N	N	40.4
3-Jul	N	N	N	N	21	21	20	20	20	21	21	23	24	26	28	29	31	32	33	32	31	30	28	26	32.5
4-Jul	25	22	20	17	17	18	19	21	22	25	27	28	30	31	31	31	31	32	32	32	31	30	30	31	32.4
5-Jul	30	29	27	25	24	23	22	21	22	22	23	25	27	28	29	29	28	28	28	27	26	25	24	25	30.0
6-Jul	25	25	25	24	23	23	23	22	22	21	20	21	21	21	22	25	27	29	31	31	31	31	29	26	31.4
7-Jul	24	19	16	13	11	9	8	8	10	13	16	19	22	25	28	30	31	32	31	30	29	27	26	23	31.7
8-Jul	22	20	18	17	16	15	14	15	16	16	17	18	20	22	24	26	28	29	30	31	30	28	27	24	30.6
9-Jul	23	20	17	15	13	13	12	11	12	13	15	17	20	23	25	27	29	31	32	32	31	29	27	26	31.7
10-Jul	25	22	20	18	17	16	16	16	17	17	17	N	N	N	N	N	N	N	N	N	N	N	N	N	24.6
	40.3	38.0	35.4	33.1	31.1	28.7	28.4	29.5	30.2	31.6	32.8	33.6	34.5	35.5	37.8	40.1	40.7	43.3	44.8	45.3	45.1	43.8	42.8	41.3	
	Diurnal Maximums																								

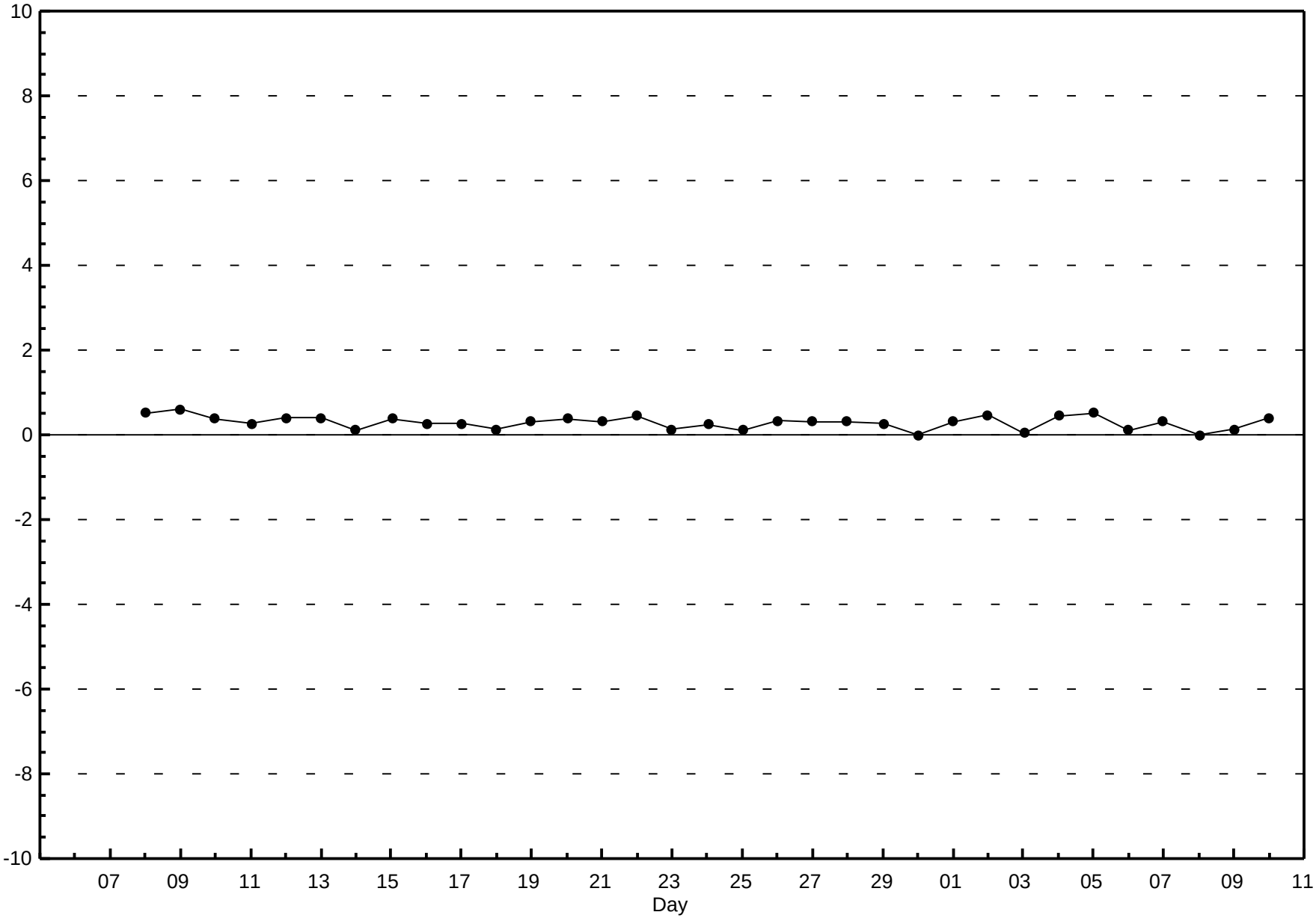
N - Not Valid AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Zero Responses

Ozone (O_3)

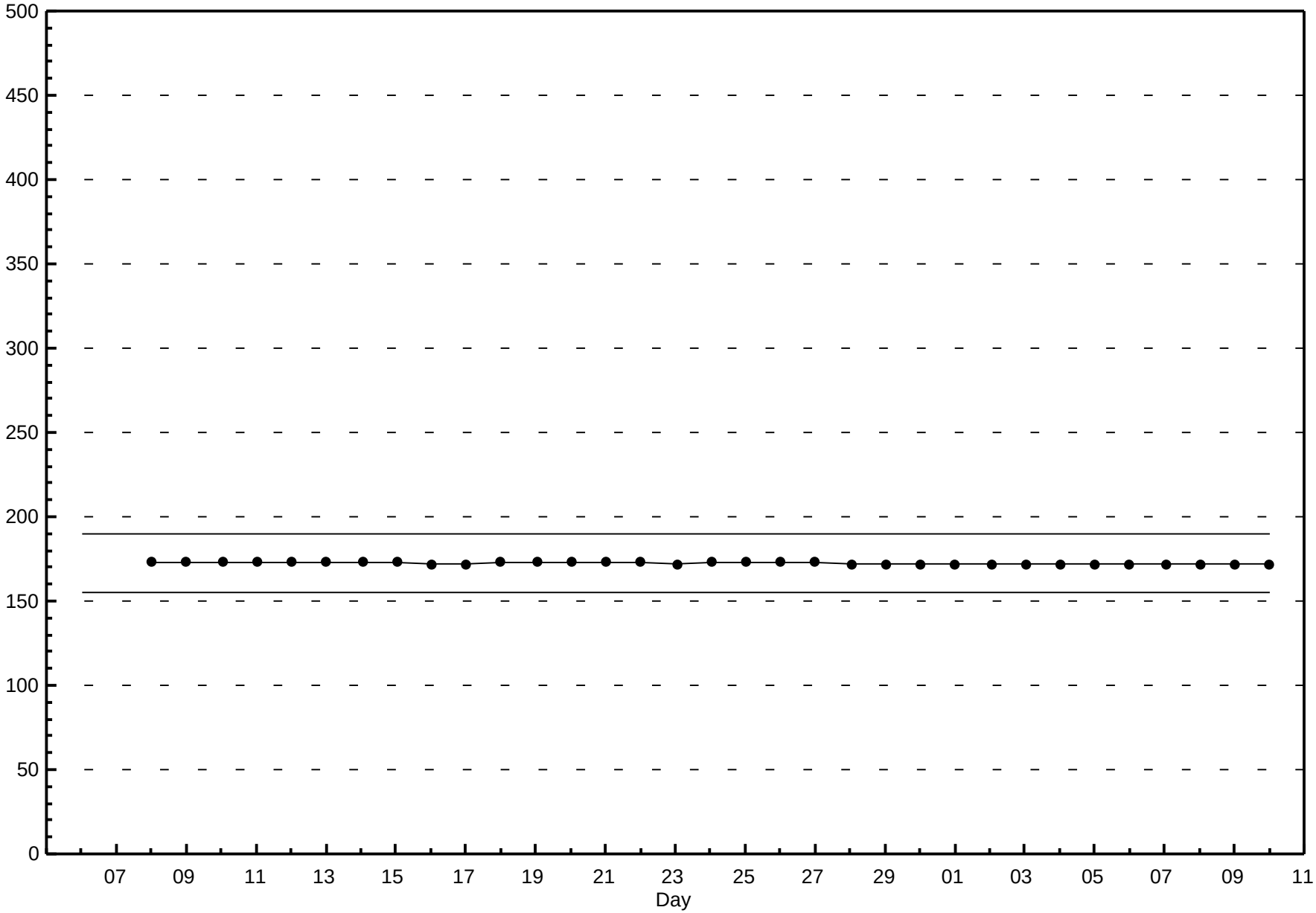
Didsbury West - Jun 5, 2013 to Jul 11, 2013



Span Responses

Ozone (O_3)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Calibration Report

Parameter O_3

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	June 6 2013	Previous Calibration	NA
Station Name	Martha	Station Location	Didsbury

Reason: Routine | Install | Removal | Other:

Start Time (MST)	8:30	End Time (MST)	12:30
Barometric Pressure	679 mmHg	Station Temperature	22.0 Deg C
Calibrator	Sabio 2010	Serial Number	3951108
DACS make	Campbell Scientific CR3000	DACS serial No.	6778
DACS voltage range	0 - 5 volt	DACS channel #	4
	Before		After
Calculated slope	NA	Calculated slope	0.019948
Calculated intercept	NA	Calculated intercept	-0.004754

Analyzer make	API 400A		Analyzer serial #	489

	before		after	
Concentration range	0 - 500	ppb	0 - 500	ppb
Slope	NA		0.906	
Offset	NA	ppb	-0.8	ppb
Pressure	NA	in Hg	25.3	in Hg
Flow	NA	ccm	626.0	ccm
O3 Meas	NA	mV	2918.3	mV
O3 Ref	NA	mV	2919.4	mV
Photo Lamp	NA	Deg C	52.0	Deg C
Box Temp	NA	Deg C	31.9	Deg C

Calibration Data

Dilution air flow rate (cc/min)	Ozone Set Point (Actual)	Calculated concentration (ppb)(CC)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
5031	0.00v (0.107v)	0.0	-0.2	N/A
5031	0.95v (0.822v)	338.2	338.3	0.9996
5031	0.67v (0.581v)	227.7	227.7	1.0001
5031	0.47v (0.412v)	147.6	146.9	1.0044
5031	0.30v (0.260v)	75.1	75.8	0.9906
				AF Zero
				AF Span
			Average Correction Factor	0.9987

Calculated value of As Found Response: NA Percent Change of As Found: NA

	before calibration		after calibration	
Auto zero	NA	ppb	0.5	ppb
Auto span	NA	ppb	173.0	ppb

Notes: Install following station move

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **O3**

Air Monitoring Network **PAMZ**

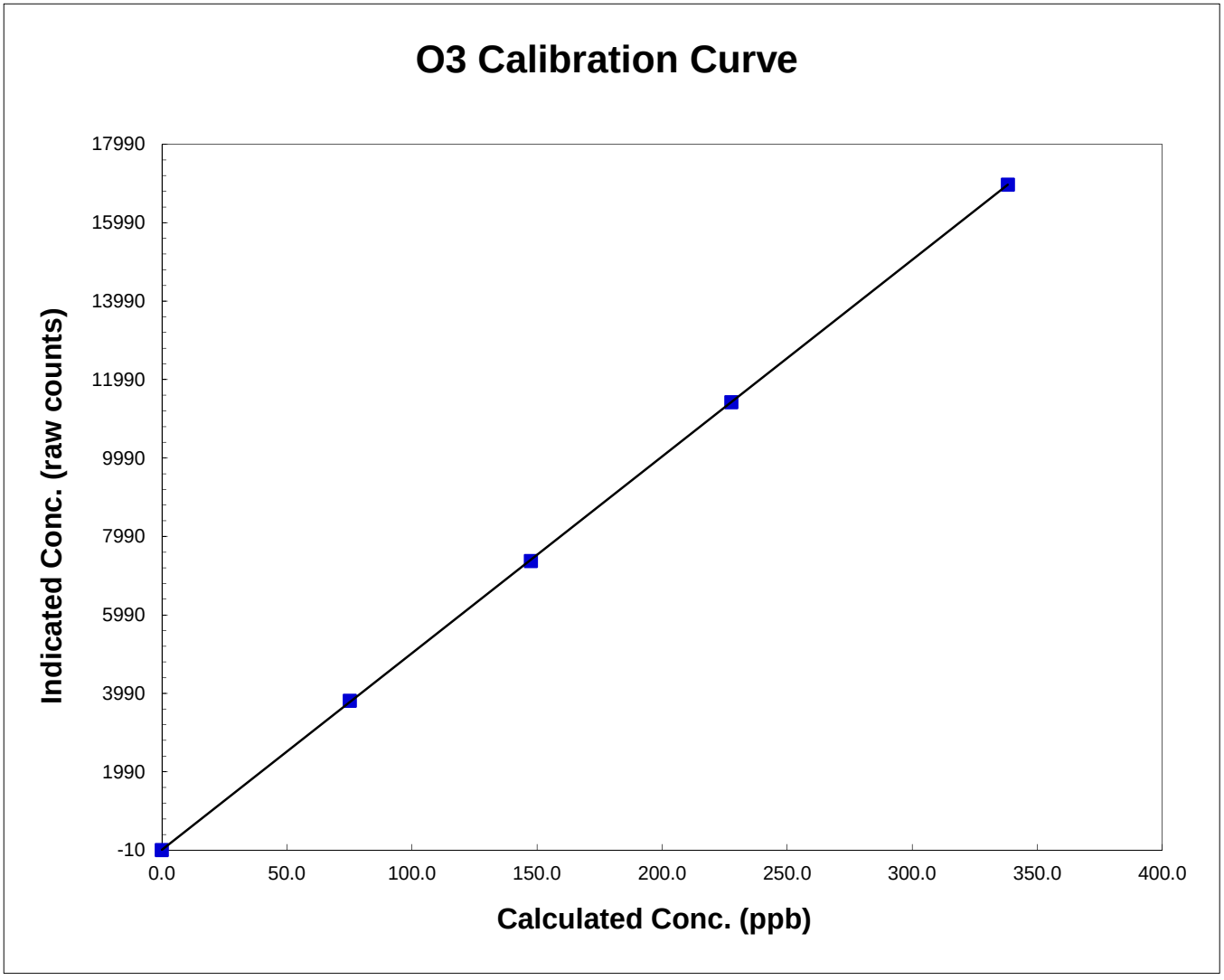
FOCUS AIR QUALITY MONITORING

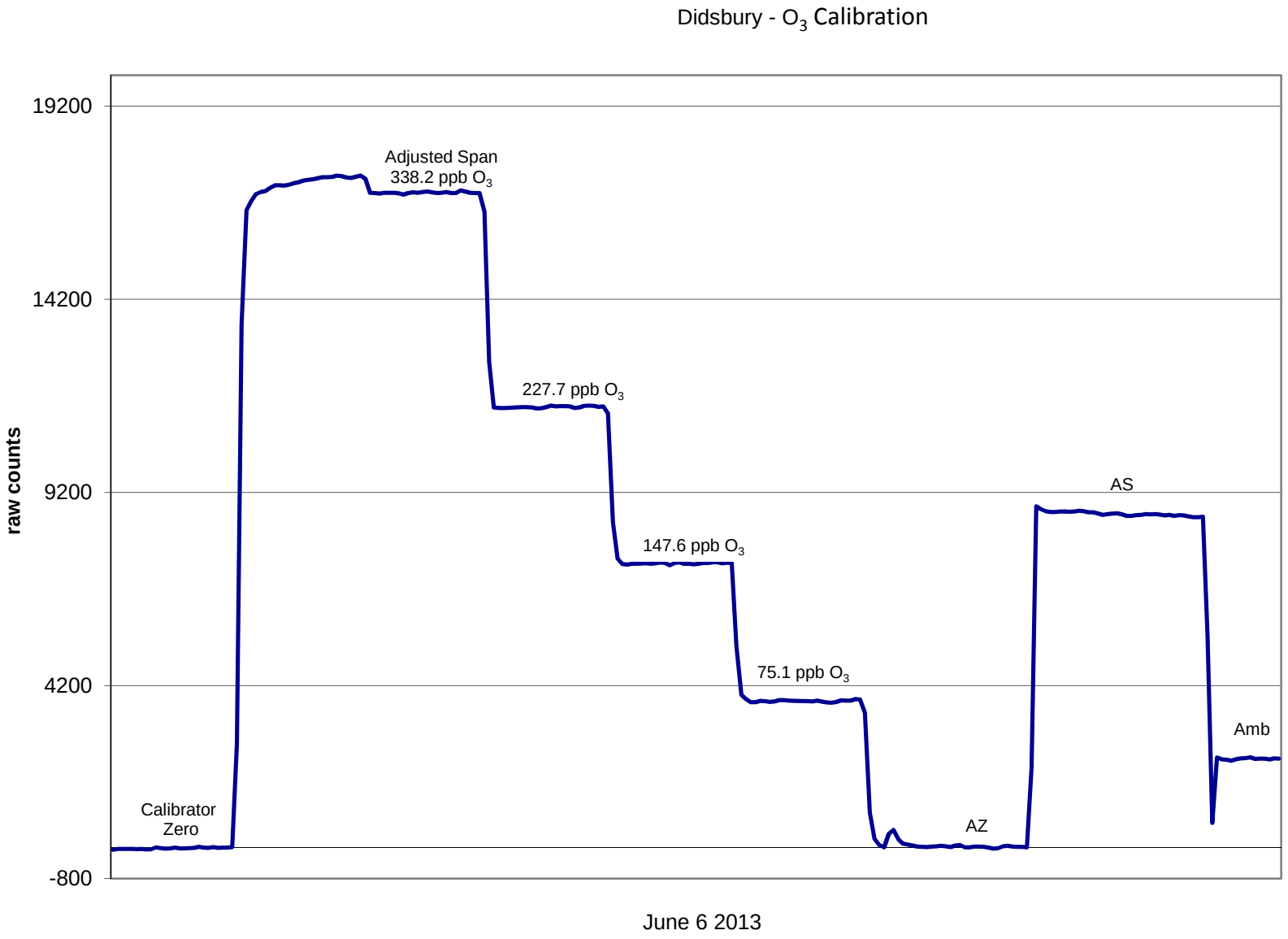
Station Information

Calibration Date	June 6 2013	Previous Calibration	NA
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	8:30	End Time (MST)	12:30
Analyzer make/model	API 400A	Analyzer serial #	489

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-8.7	0.0000		
338.2	16961.4	0.0199	Correlation Coefficient	0.999986
227.7	11414.5	0.0200		
147.6	7365.2	0.0200	Slope	0.019948
75.1	3800.3	0.0198		
			Intercept	-0.004754




Didsbury - O_3 Calibration
19200
14200
9200
4200
-800
raw counts
Adjusted Span
338.2 ppb O_3
227.7 ppb O_3
147.6 ppb O_3
75.1 ppb O_3
AS
Amb
Calibrator
Zero
AZ
June 6 2013

Calibration Report

Parameter O_3

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	July 10 2013	Previous Calibration	June 6 2013
Station Name	Martha	Station Location	Didsbury

Reason: Routine | Install | **Removal** | Other:

Start Time (MST)	8:30	End Time (MST)	12:30
Barometric Pressure	679 mmHg	Station Temperature	22.0 Deg C
Calibrator	Sabio 2010	Serial Number	3951108
DACS make	Campbell Scientific CR3000	DACS serial No.	6778
DACS voltage range	0 - 5 volt	DACS channel #	4
	Before		After
Calculated slope	0.019948	Calculated slope	0.020605
Calculated intercept	-0.004754	Calculated intercept	-0.454335

Analyzer make	API 400A	Analyzer serial # 489

	before		after	
Concentration range	0 - 500	ppb	0 - 500	ppb
Slope	0.906		NA	
Offset	-0.8	ppb	NA	ppb
Pressure	25.3	in Hg	NA	in Hg
Flow	626.0	ccm	NA	ccm
O3 Meas	2918.3	mV	NA	mV
O3 Ref	2919.4	mV	NA	mV
Photo Lamp	52.0	Deg C	NA	Deg C
Box Temp	31.9	Deg C	NA	Deg C

Calibration Data

Dilution air flow rate (cc/min)	Ozone Set Point (Actual)	Calculated concentration (ppb)(CC)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
5031	0.00v (0.107v)	0.0	-0.6	N/A
5031	0.95v (0.822v)	336.9	337.6	0.9979
5031	0.67v (0.581v)	229.8	228.3	1.0067
5031	0.47v (0.412v)	147.5	147.5	1.0002
5031	0.30v (0.260v)	74.6	76.1	0.9805
5031	0.0	0.0	-0.2	AF Zero
5031	0.95v (0.822v)	336.9	327.3	AF Span
			Average Correction Factor	0.9963

Calculated value of As Found Response: 327.5 ppb Percent Change of As Found: -2.8%

	before calibration		after calibration	
Auto zero	0.5	ppb	NA	ppb
Auto span	173.0	ppb	NA	ppb

Notes: Removal of statoin.

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **O3**

Air Monitoring Network **PAMZ**

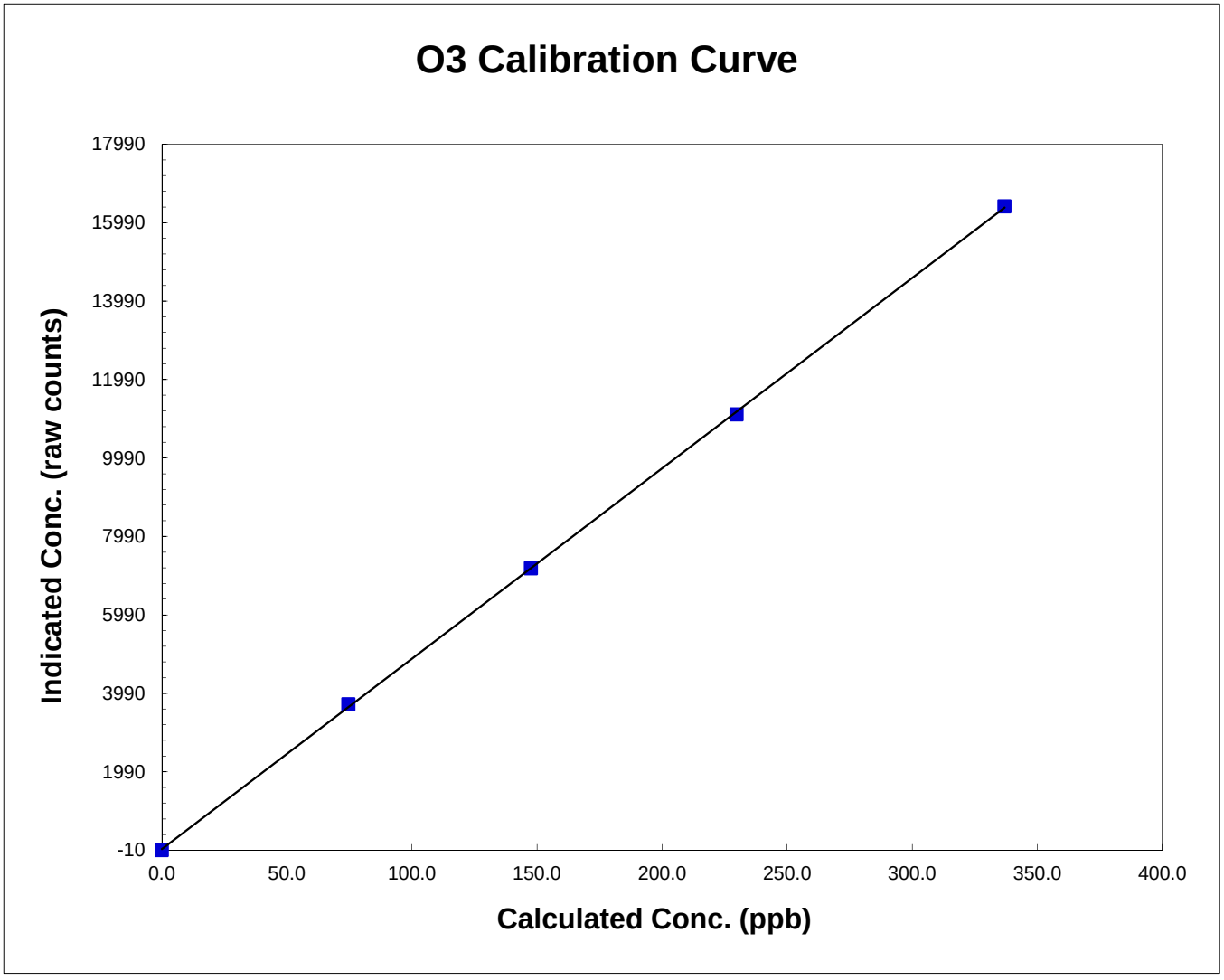
FOCUS AIR QUALITY MONITORING

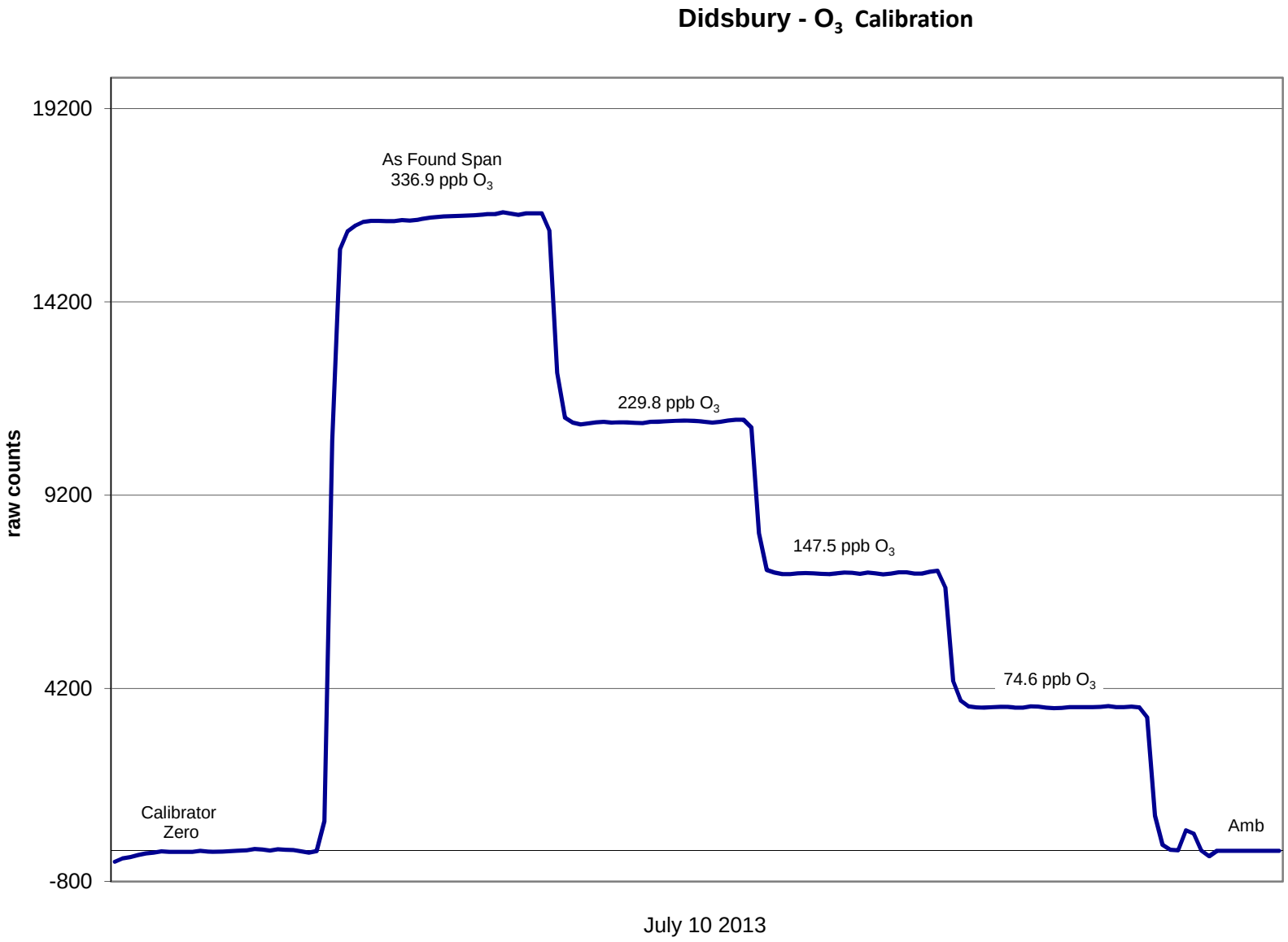
Station Information

Calibration Date	July 10 2013	Previous Calibration	June 6 2013
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	8:30	End Time (MST)	12:30
Analyzer make/model	API 400A	Analyzer serial #	489

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-9.0	0.0000		
336.9	16406.9	0.0205	Correlation Coefficient	0.999921
229.8	11101.0	0.0207		
147.5	7179.0	0.0205	Slope	0.020605
74.6	3714.7	0.0201		
			Intercept	-0.454335




Didsbury - O_3 Calibration
19200
14200
9200
4200
-800
raw counts
As Found Span
336.9 ppb O_3
229.8 ppb O_3
147.5 ppb O_3
74.6 ppb O_3
Calibrator
Zero
Amb
July 10 2013

PAMZ | Parkland Airshed Management Zone

Hourly Averages

PM2.5 ($PM_{2.5}$) - $\mu g/m^3$

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 37.7 $\mu g/m^3$ on Jul 2 11:00

Maximum Daily Average: 19.8 $\mu g/m^3$ on Jul 2

Minimum Value: 0 $\mu g/m^3$ on Jun 11 01:00

Minimum Daily Average: 6.4 $\mu g/m^3$ on Jun 9

Maximum Diurnal Average: 15.4 $\mu g/m^3$ at hour 10

Minimum Diurnal Average: 6.6 $\mu g/m^3$ at hour 23

Monthly Average: 10.56 $\mu g/m^3$

Percentiles: P_1 = 0.8 P_{10} = 4.8 Q_1 = 7.2 Median = 9.9 Q_3 = 13.4 P_{90} = 17.3 P_{99} = 25.9

Hours in Service:	839
Hours of Data:	822
Hours of Missing Data:	17
Hours of Calibration:	11
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	C	C	7	5	6	3	2	7	7	--	7.2
6-Jun	4	4	7	5	5	5	4	5	9	14	11	8	9	8	9	8	7	9	9	8	6	11	9	8	7.7	14.1
7-Jun	10	12	9	8	11	11	11	11	8	6	5	6	10	11	7	5	8	6	5	5	7	7	9	8	8.2	12.4
8-Jun	10	11	8	6	8	9	8	7	10	9	8	9	7	5	4	7	8	7	6	8	9	8	7	2	7.6	10.8
9-Jun	1	8	8	5	7	11	10	10	10	9	6	5	8	8	5	3	4	5	9	7	3	4	5	4	6.4	10.8
10-Jun	3	3	3	3	5	7	7	7	9	16	12	9	7	6	6	6	10	11	8	11	10	8	5	1	7.2	15.6
11-Jun	0	0	1	8	9	9	8	7	8	9	16	12	10	14	14	10	10	P	7	8	12	10	7	9	8.7	15.6
12-Jun	13	11	17	14	10	12	9	11	15	18	17	11	10	16	11	8	9	11	10	12	12	9	6	4	11.6	18.1
13-Jun	4	9	7	7	7	4	5	7	13	20	14	10	8	9	7	5	9	10	11	9	7	6	6	8	8.5	20.1
14-Jun	8	7	6	5	5	4	10	11	13	14	9	7	8	8	8	7	2	3	5	6	6	5	9	6	7.2	14.0
15-Jun	2	5	10	6	2	4	4	5	9	8	10	8	6	7	6	4	9	12	9	9	8	6	3	1	6.5	11.8
16-Jun	1	5	7	6	7	5	7	12	12	19	12	7	9	9	9	10	11	11	P	6	7	6	4	4	8.2	19.4
17-Jun	7	9	7	4	4	4	9	17	16	24	19	14	15	15	11	9	13	10	6	5	1	0	4	8	9.6	24.0
18-Jun	8	11	12	8	7	13	13	15	15	13	21	13	14	11	21	23	18	17	20	11	8	8	10	10	13.4	22.7
19-Jun	10	9	10	14	11	18	16	19	13	14	11	21	9	14	11	13	20	12	11	12	11	13	11	11	13.2	20.7
20-Jun	14	19	15	17	20	18	13	9	12	14	18	14	AC	AC	AC	13	7	1	5	C	0	1	7	9	11.3	19.9
21-Jun	12	16	15	10	6	4	2	6	7	7	8	9	9	34	24	18	16	14	10	6	6	5	4	10	10.6	33.9
22-Jun	10	8	10	11	7	7	12	16	16	21	19	18	18	14	11	10	9	15	11	10	8	6	7	9	11.8	21.2
23-Jun	10	7	14	13	9	10	11	11	12	16	12	9	9	12	14	13	10	6	6	8	7	6	4	6	9.8	16.0
24-Jun	10	12	11	8	12	10	8	8	13	13	10	8	12	12	11	11	13	11	10	12	12	12	9	8	10.6	13.2
25-Jun	8	11	11	13	12	11	9	10	11	9	10	11	13	16	10	8	9	8	9	8	5	4	6	7	9.6	16.1
26-Jun	7	11	9	7	10	7	5	6	7	11	9	8	9	9	9	7	8	12	9	7	9	7	2	0	7.8	12.2
27-Jun	2	7	6	1	5	7	7	9	15	21	11	13	9	6	13	13	14	11	8	14	17	11	3	2	9.4	21.1
28-Jun	6	7	7	6	7	9	11	11	13	14	15	13	12	13	16	15	14	14	12	12	17	16	11	12	11.8	16.5
29-Jun	12	15	16	13	13	13	14	13	16	21	18	13	14	14	16	14	14	17	13	10	9	13	9	2	13.4	20.6
30-Jun	2	4	5	10	9	6	12	14	14	13	15	13	13	15	13	18	15	17	14	9	12	7	2	7	10.8	17.9
1-Jul	8	10	11	10	14	12	10	11	17	21	12	20	20	20	18	21	22	18	18	21	13	10	13	15	15.2	22.4
2-Jul	19	19	15	16	16	13	18	16	21	35	38	28	31	32	15	24	14	17	P	P	P	P	2	8	19.8	37.7
3-Jul	7	5	3	9	9	5	4	8	10	14	15	14	13	17	13	16	16	21	20	18	12	12	19	17	12.3	21.3
4-Jul	14	13	13	12	13	14	11	17	19	17	20	18	17	21	18	17	15	11	9	10	9	4	4	6	13.3	21.4
5-Jul	4	21	9	9	9	15	14	11	11	16	15	22	15	13	17	12	8	11	13	11	12	8	6	6	12.0	22.3
6-Jul	8	10	8	5	10	10	8	7	9	13	14	15	13	10	6	3	8	10	20	5	6	3	0	0	8.4	19.8
7-Jul	2	5	13	13	9	12	12	10	13	16	19	22	16	19	19	18	13	11	24	5	9	9	12	7	12.9	24.3
8-Jul	13	17	14	12	11	11	13	18	18	16	15	13	9	10	11	12	13	23	10	13	12	10	7	8	12.8	23.1
9-Jul	9	17	13	12	11	12	12	14	11	13	23	27	C	19	17	13	12	17	21	13	9	8	4	5	13.5	26.6
10-Jul	9	12	10	7	7	11	10	19	22	28	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	27.5
	7.5	10.0	9.8	8.9	9.1	9.5	9.7	11.2	12.8	15.4	14.4	13.2	12.0	13.5	12.2	11.6	11.4	11.6	11.1	9.6	8.6	7.5	6.6	6.7	Diurnal Average	
	19.0	20.6	17.2	17.0	19.9	18.0	17.8	19.4	21.9	34.6	37.7	28.2	31.0	33.9	23.9	23.8	22.4	23.1	24.3	20.7	16.7	15.6	18.6	17.4	Diurnal Maximum	

C - Calibration P - Power Failure NS - Not in service AC - Audit Calibration

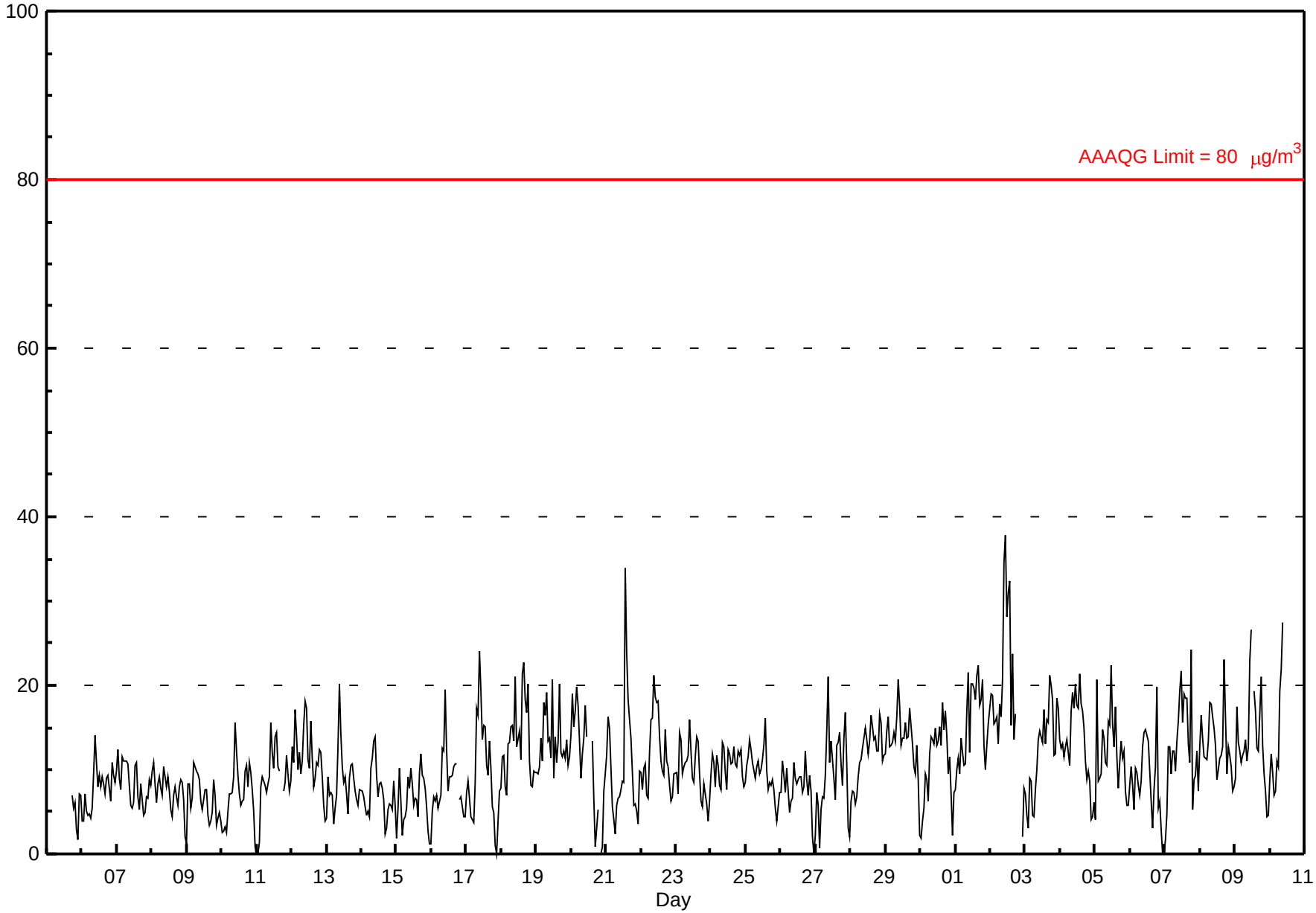
Alberta Ambient Air Quality Guidelines (AAAQG): 1-hr 80 $\mu g/m^3$ Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

PAMZ | Parkland Airshed Management Zone

Hourly Averages

PM2.5 ($PM_{2.5}$) - $\mu g/m^3$

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Met One BAM PM2.5 Calibration

FOCUS AIR QUALITY MONITORING

STATION:	Martha	OPERATOR:	Christopher Hendrickson
LOCATION:	Didsbury	DATE:	June 5 2013
START TIME (MST):	11:25	END TIME (MST):	11:33

MONITOR INFO / PARAMETER VALUES:

Make/Model	Met One BAM	Audit Device Model	Delta Cal
Configuration	PM2.5	Audit Device S/N	682 (AMU1788)
Serial Number	F4644	Certification Date	20-Jun-12

AUDIT / CALIBRATION RESULTS:

		Ambient Temp. (^{U}C)	Ambient Pres. (mmHg)	Leak Check (L/min)	Flow Rate (lpm)	Time settings (hh:mm)
	Audit values (I)	21.8	668	1.00	16.7	11:27
As Found Data	MEASURED (AF)	22.8	671	0.20	16.75	11:27
	AF Difference (AF-I)	1.0	3	-0.80	0.05	0:00
Adjusted Data	MEASURED (M)	21.8	668	0.20	16.75	11:27
	Adj Difference (M-I)	0	0	-0.80	0.05	0:00
	LIMITS	*± 4.0 ^{0}C*	*5 mm Hg*	*1.0 L/min*	*± 1.0 L/min*	*±2 min*

Sample Head Inspect/Cleaning: Sample head looked good and clean

Status of sampling tape: Sample tape is 3/4 full

Nozzle Inspection / cleanliness: No tape debris on nozzle or seat.

COMMENTS:

Install calibration due to station move.

Met One BAM PM2.5 Calibration

FOCUS AIR QUALITY MONITORING

STATION:	Martha	OPERATOR:	Christopher Hendrickson
LOCATION:	Didsbury	DATE:	July 10 2013
START TIME (MST):	10:00	END TIME (MST):	10:16

MONITOR INFO / PARAMETER VALUES:

Make/Model	Met One BAM	Audit Device Model	Delta Cal
Configuration	PM2.5	Audit Device S/N	682 (AMU1788)
Serial Number	F4644	Certification Date	20-Jun-12

AUDIT / CALIBRATION RESULTS:

		Ambient Temp. (^{U}C)	Ambient Pres. (mmHg)	Leak Check (L/min)	Flow Rate (lpm)	Time settings (hh:mm)
	Audit values (I)	21.8	670	1.00	16.7	10:10
As Found Data	MEASURED (AF)	22.8	671	0.30	16.93	10:11
	AF Difference (AF-I)	1.0	1	-0.70	0.23	0:00
Adjusted Data	MEASURED (M)	22.8	671	0.30	16.93	10:11
	Adj Difference (M-I)	1	1	-0.70	0.23	0:01
	LIMITS	*± 4.0 ^{0}C*	*5 mm Hg*	*1.0 L/min*	*± 1.0 L/min*	*±2 min*

Sample Head Inspect/Cleaning: Sample head looked good and clean

Status of sampling tape: Sample tape is 1/4 full

Nozzle Inspection / cleanliness: No tape debris on nozzle or seat.

COMMENTS:

Removal calibration due to station move.

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Total Hydrocarbons (THC) - ppm

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 3.16 ppm on Jul 1 05:00 Maximum Daily Average: 2.08 ppm on Jul 8

Minimum Value: 1.7 ppm on Jun 8 13:00 Minimum Daily Average: 1.80 ppm on Jun 8
Maximum Diurnal Average: 2.08 ppm at hour 5 Minimum Diurnal Average: 1.83 ppm at hour 17
Monthly Average: 1.922 ppm Percentiles: P_1 = 1.76 P_{10} = 1.80 Q_1 = 1.84 Median = 1.88 Q_3 = 1.97 P_{90} = 2.10 P_{99} = 2.30

Hours in Service:	795
Hours of Data:	747
Hours of Missing Data:	48
Hours of Calibration:	44
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	--	1.94
7-Jun	A	2.1	2.3	2.0	2.0	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.88	2.31
8-Jun	A	1.9	1.8	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.80	1.86
9-Jun	A	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.82	1.91
10-Jun	A	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.83	1.95
11-Jun	A	2.1	2.2	2.0	2.2	2.0	2.0	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	1.9	1.9	1.96	2.20
12-Jun	A	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.88	2.01
13-Jun	A	1.9	2.0	2.1	1.9	2.1	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.89	2.15
14-Jun	A	2.2	2.2	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.87	2.17
15-Jun	A	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.82	1.86
16-Jun	A	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.3	2.0	1.91	2.33
17-Jun	A	2.2	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	1.94	2.22
18-Jun	A	2.0	2.0	2.2	2.3	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	1.9	1.9	2.2	1.98	2.32
19-Jun	A	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.88	2.00
20-Jun	A	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.9	AC	AC	AC	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.88	1.97
21-Jun	A	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.93	1.99
22-Jun	A	2.0	2.1	2.1	2.0	2.0	2.1	2.1	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	2.1	2.1	2.5	2.4	1.99	2.49
23-Jun	A	2.0	2.0	2.1	2.0	2.0	1.9	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.4	2.0	1.9	2.0	2.0	1.93	2.36
24-Jun	A	2.1	2.0	2.0	2.1	2.1	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.88	2.11
25-Jun	A	1.9	1.9	2.0	2.2	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	1.91	2.22
26-Jun	A	2.4	2.0	2.1	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.88	2.37
27-Jun	A	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.92	2.05
28-Jun	A	2.1	1.9	2.0	2.1	2.0	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.1	1.92	2.11
29-Jun	A	2.0	2.1	2.1	2.1	2.2	2.2	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.8	1.9	2.0	1.95	2.17
30-Jun	A	2.1	2.2	2.0	2.0	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	2.2	2.3	2.2	2.2	1.99	2.34
1-Jul	A	2.3	2.3	2.3	3.2	2.6	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	2.04	3.16
2-Jul	A	2.0	2.0	2.2	2.0	2.2	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	P	P	P	P	2.0	1.9	1.97	2.17
3-Jul	A	2.0	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.3	2.2	2.3	2.2	1.94	2.26
4-Jul	A	2.3	2.3	2.3	2.2	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.97	2.34
5-Jul	A	2.0	2.1	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.9	1.8	2.0	1.9	1.9	2.0	2.0	1.9	1.92	2.19
6-Jul	A	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	2.2	2.3	2.3	1.94	2.33
7-Jul	A	2.1	2.2	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.1	2.1	2.4	2.03	2.44
8-Jul	A	2.3	2.4	2.4	2.4	2.5	2.3	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.2	2.08	2.48
9-Jul	A	2.1	2.1	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	C	C	C	C	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	2.16
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	2.03	2.03	2.05	2.08	2.03	1.97	1.93	1.89	1.86	1.85	1.84	1.84	1.84	1.83	1.83	1.83	1.83	1.85	1.88	1.94	1.96	1.99	2.00	Diurnal Average	
	--	2.37	2.36	2.37	3.16	2.56	2.28	2.12	2.02	2.01	2.00	1.93	1.99	1.94	1.91	1.91	1.93	1.95	2.05	2.36	2.26	2.34	2.49	2.44	Diurnal Maximum	

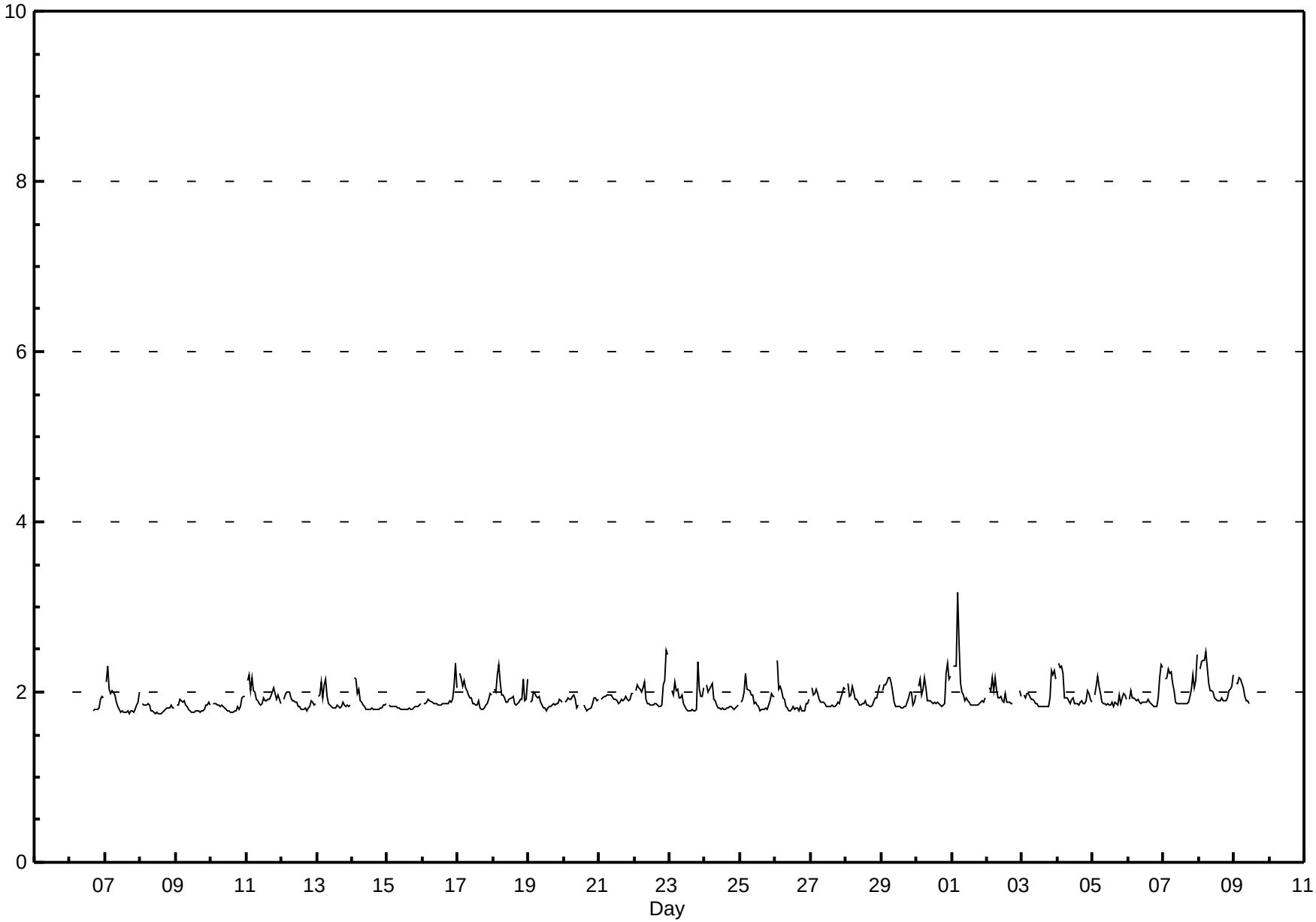
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Total Hydrocarbons (THC) - ppm

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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Hourly Maximums

Total Hydrocarbons (THC) - ppm

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 23.31 ppm on Jul 1 05:00

Maximum Daily Average: 3.10 ppm on Jul 1

Minimum Value: 1.8 ppm on Jun 8 13:00

Minimum Daily Average: 1.87 ppm on Jun 15

Maximum Diurnal Average: 2.96 ppm at hour 5

Minimum Diurnal Average: 1.94 ppm at hour 18

Monthly Average: 2.159 ppm

Percentiles: P_1 = 1.80 P_{10} = 1.86 Q_1 = 1.92 Median = 2.02 Q_3 = 2.21 P_{90} = 2.53 P_{99} = 3.63

Hours in Service:	795
Hours of Data:	747
Hours of Missing Data:	48
Hours of Calibration:	44
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	1.9	1.8	1.8	1.9	1.9	2.2	2.3	2.1	--	2.30
7-Jun	A	2.6	2.7	2.5	2.6	2.4	2.2	2.2	1.9	1.8	1.8	1.9	1.8	1.8	1.9	1.9	1.8	1.9	1.8	1.9	1.9	1.9	2.0	2.2	2.06	2.74
8-Jun	A	1.9	2.0	1.9	1.9	1.9	2.2	1.8	1.8	1.9	1.8	2.1	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.1	2.1	1.9	1.9	1.91	2.16
9-Jun	A	1.9	1.9	2.2	2.0	2.0	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.8	1.8	1.9	1.9	1.9	2.1	1.9	1.91	2.19
10-Jun	A	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	2.8	1.8	2.1	2.1	2.1	2.3	1.95	2.81
11-Jun	A	2.5	2.6	2.3	2.7	2.3	2.2	2.1	2.1	1.9	1.9	2.0	2.4	2.0	2.1	2.1	2.0	2.2	2.4	2.5	2.0	2.1	2.0	1.9	2.18	2.65
12-Jun	A	2.0	2.3	2.1	2.0	2.0	2.1	1.9	2.0	2.0	2.9	1.9	2.0	1.8	1.8	1.9	1.9	1.8	1.9	2.0	2.3	2.0	1.9	2.0	2.03	2.89
13-Jun	A	2.2	2.1	2.4	2.0	2.3	2.4	2.2	1.9	2.0	1.9	2.0	2.1	1.9	2.0	1.9	2.1	1.9	2.1	1.9	1.9	2.0	1.9	1.9	2.04	2.43
14-Jun	A	2.5	2.9	2.2	2.3	2.0	2.0	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.1	1.9	2.00	2.85
15-Jun	A	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.8	2.0	1.9	1.9	1.9	1.9	2.0	1.87	1.96
16-Jun	A	1.9	1.9	2.0	2.1	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	1.9	2.1	2.0	2.0	2.2	2.5	2.9	2.2	2.03	2.85
17-Jun	A	2.8	2.4	2.2	2.3	2.2	2.2	2.1	2.1	2.0	1.9	2.0	2.0	2.0	2.2	1.9	2.0	1.9	1.9	2.0	2.0	2.2	2.7	2.1	2.13	2.81
18-Jun	A	2.3	2.2	2.6	2.5	2.4	2.1	2.2	2.1	2.1	2.0	2.2	2.1	2.2	2.0	2.1	1.9	2.0	2.2	2.3	3.2	2.2	2.1	2.5	2.24	3.19
19-Jun	A	2.0	2.0	2.4	2.9	2.5	2.1	2.1	2.0	2.0	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.04	2.89
20-Jun	A	1.9	1.9	2.1	2.0	2.0	2.0	2.0	2.0	1.9	2.1	AC	AC	AC	1.9	2.0	1.8	1.8	1.9	2.1	2.1	2.1	2.1	2.0	1.99	2.14
21-Jun	A	2.0	2.1	2.1	2.2	2.2	2.0	2.0	2.3	2.0	2.0	2.0	2.0	1.9	2.1	2.1	2.0	2.0	2.2	2.0	2.0	2.0	2.1	2.2	2.06	2.31
22-Jun	A	2.2	2.3	2.4	2.3	2.4	2.5	2.4	2.0	2.0	1.9	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.4	2.7	2.9	3.4	2.22	3.37
23-Jun	A	2.1	2.0	5.7	2.4	2.3	2.1	2.0	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	7.8	3.5	2.4	2.2	2.3	2.50	7.78
24-Jun	A	2.3	2.2	2.2	2.4	2.4	2.0	2.0	2.0	1.9	2.0	1.8	1.9	1.9	1.9	2.0	1.9	2.0	2.3	1.9	1.9	2.0	1.9	1.9	2.02	2.38
25-Jun	A	2.0	2.0	2.4	2.7	2.3	2.1	2.1	2.1	2.0	2.1	1.9	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.2	2.7	2.3	2.1	2.2	2.12	2.73
26-Jun	A	2.7	2.3	2.3	2.2	2.0	2.1	1.9	1.9	2.0	2.0	2.0	2.3	2.2	2.1	2.2	1.9	2.2	1.8	1.9	1.9	2.0	2.0	2.2	2.09	2.73
27-Jun	A	2.3	2.2	2.1	2.3	2.2	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.4	2.3	1.9	1.9	2.1	2.1	1.9	2.2	2.5	2.3	2.3	2.12	2.49
28-Jun	A	2.6	2.1	2.2	2.4	2.2	2.0	2.0	2.1	1.9	1.9	2.1	2.0	2.2	2.1	2.0	1.9	1.9	1.9	2.0	2.1	2.0	2.5	2.6	2.12	2.63
29-Jun	A	2.1	2.3	2.3	2.4	2.8	2.5	2.4	2.2	2.1	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.1	2.3	2.6	2.3	2.1	2.1	2.3	2.18	2.79
30-Jun	A	2.4	2.6	2.2	2.3	2.4	2.3	2.0	2.1	2.1	2.4	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	3.8	4.0	3.0	2.6	2.33	4.02
1-Jul	A	2.6	2.7	2.8	23.3	3.4	2.4	2.2	2.2	1.9	2.0	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.1	3.10	23.31
2-Jul	A	4.2	2.3	3.4	2.4	2.5	2.3	2.2	2.1	2.1	2.1	2.1	4.3	2.1	2.1	2.0	2.0	2.0	P	P	P	P	2.2	2.1	2.45	4.26
3-Jul	A	2.1	2.0	2.1	2.1	2.3	2.1	2.1	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.4	3.4	2.7	3.4	2.7	2.20	3.44
4-Jul	A	2.6	2.6	2.7	2.5	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	1.9	2.0	2.1	1.9	2.0	2.7	3.2	2.3	2.1	1.9	2.20	3.17
5-Jul	A	2.1	2.6	2.6	2.8	2.5	2.1	2.0	1.9	1.9	2.3	2.2	1.9	3.8	1.9	2.0	1.9	1.9	2.9	2.0	2.1	2.2	2.2	2.0	2.25	3.80
6-Jul	A	2.2	2.4	2.0	2.0	2.1	2.0	2.1	2.0	1.9	1.9	2.0	1.9	2.8	1.9	1.9	1.9	1.9	1.9	1.9	2.8	2.6	2.7	2.7	2.15	2.83
7-Jul	A	2.3	2.5	2.6	2.6	2.5	2.4	2.2	2.0	1.9	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.6	2.7	3.0	2.2	2.4	3.0	2.28	3.05
8-Jul	A	3.2	3.3	2.6	3.2	3.5	2.9	2.3	2.1	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.6	2.0	2.0	2.1	2.2	2.5	2.4	2.5	2.41	3.47
9-Jul	A	2.3	2.2	2.3	2.2	2.3	2.2	2.0	2.0	2.0	1.9	C	C	C	C	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	2.34
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	2.32	2.28	2.42	2.96	2.30	2.15	2.06	2.02	1.96	1.99	1.96	2.04	2.05	1.95	1.95	1.95	1.94	2.05	2.24	2.33	2.23	2.26	2.23	Diurnal Average	
	--	4.22	3.27	5.73	23.31	3.47	2.89	2.43	2.31	2.26	2.89	2.21	4.26	3.80	2.31	2.16	2.58	2.24	2.85	7.78	3.83	4.02	3.44	3.37	Diurnal Maximum	

C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

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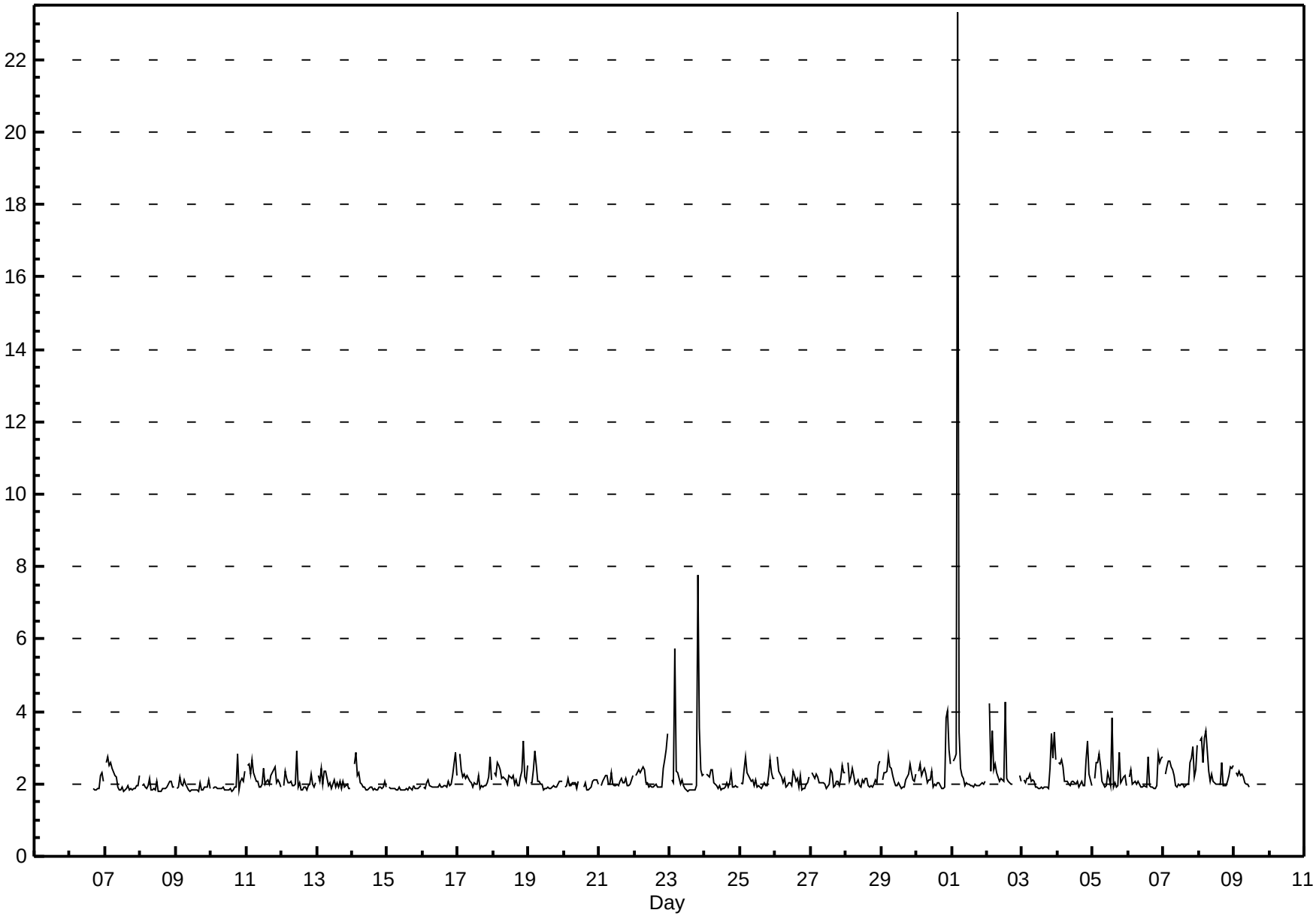
Hourly Maximums

Total Hydrocarbons (THC) - ppm

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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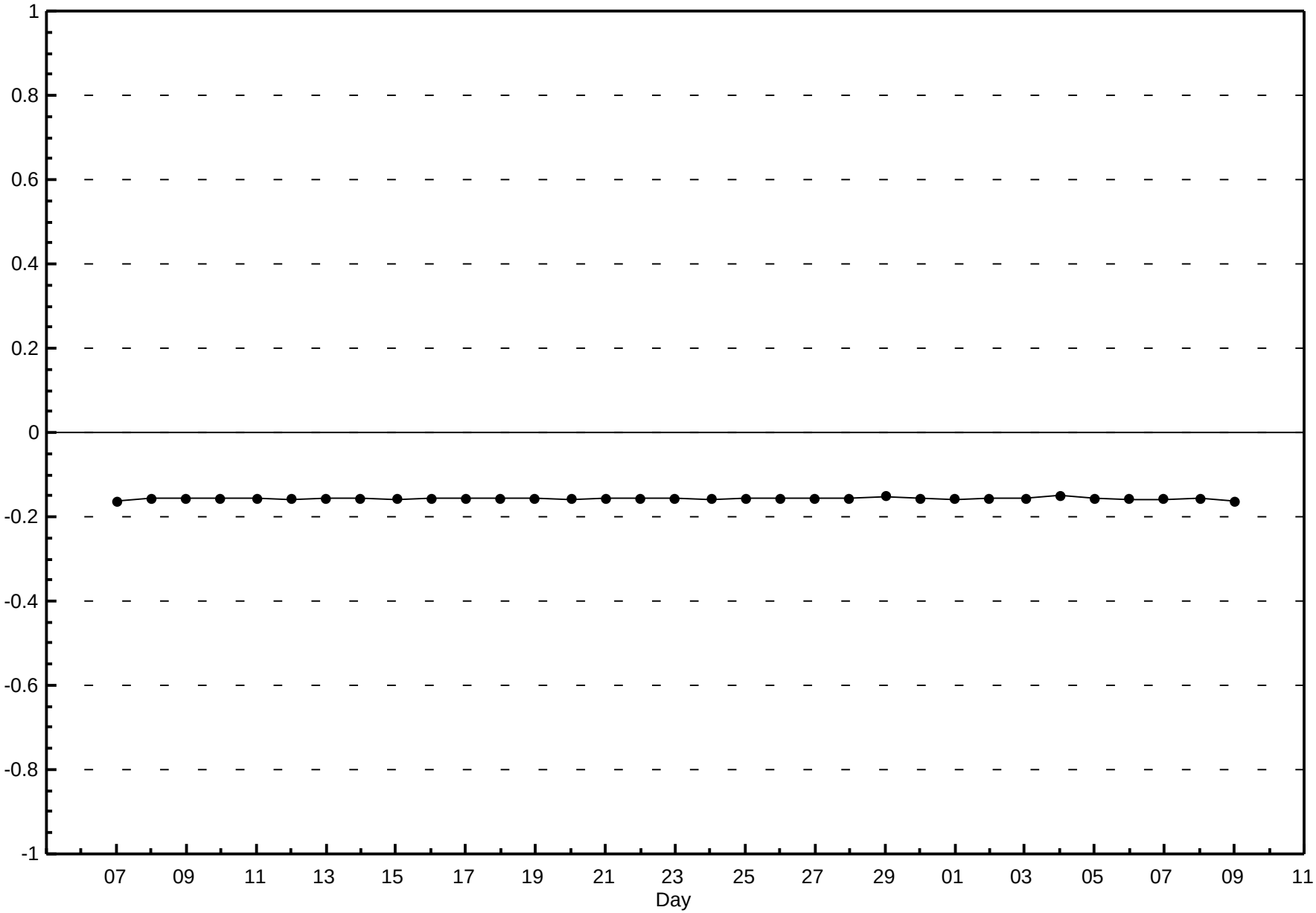
Zero Responses

Total Hydrocarbons (THC)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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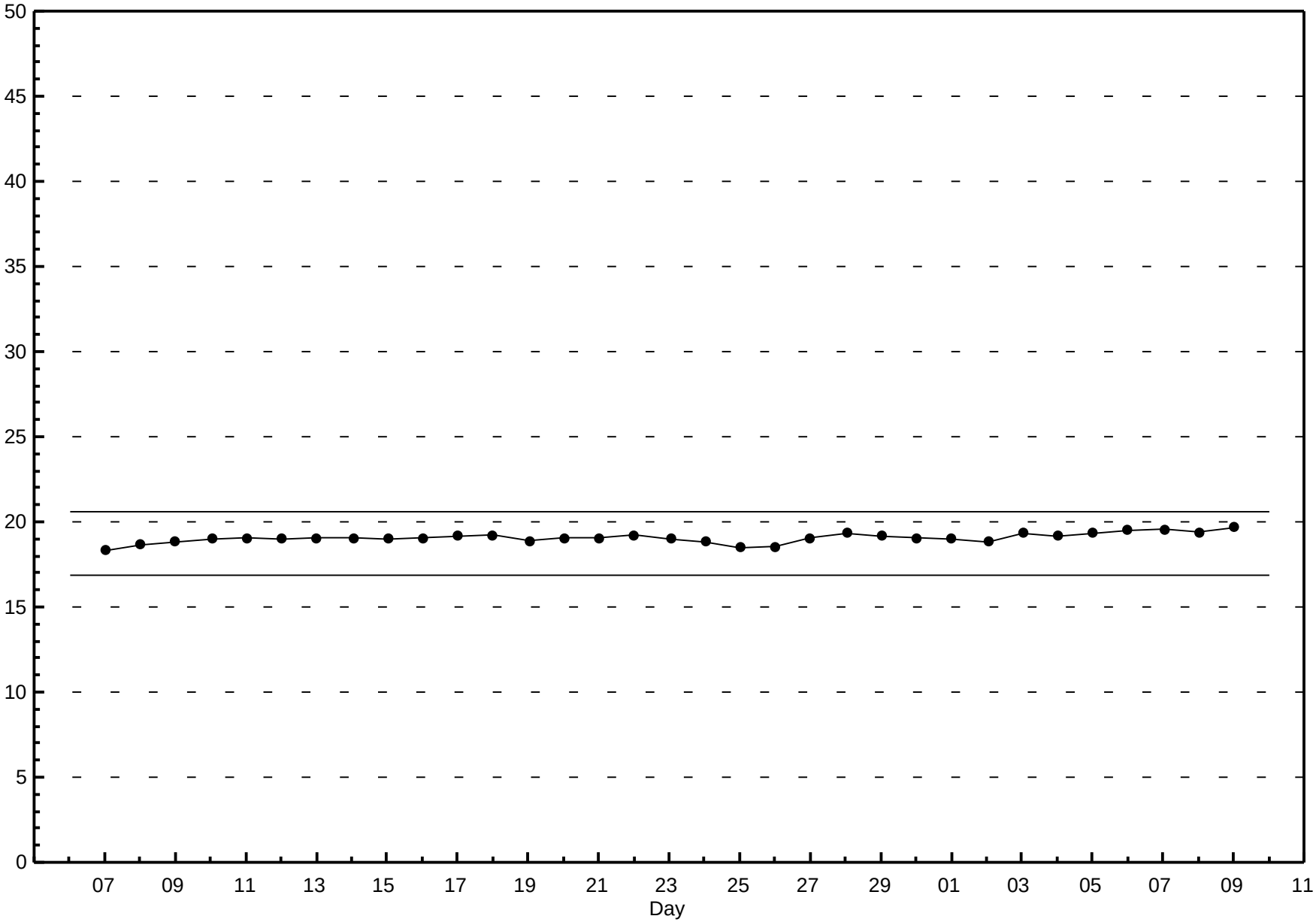
Span Responses

Total Hydrocarbons (THC)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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Hourly Averages

Methane (CH_4) - ppm

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 2.95 ppm on Jul 1 05:00 Maximum Daily Average: 2.03 ppm on Jul 8

Minimum Value: 1.7 ppm on Jun 8 13:00 Minimum Daily Average: 1.77 ppm on Jun 8
Maximum Diurnal Average: 2.01 ppm at hour 5 Minimum Diurnal Average: 1.80 ppm at hour 17
Monthly Average: 1.880 ppm Percentiles: P_1 = 1.73 P_{10} = 1.76 Q_1 = 1.80 Median = 1.85 Q_3 = 1.92 P_{90} = 2.03 P_{99} = 2.33

Hours in Service:	795
Hours of Data:	747
Hours of Missing Data:	48
Hours of Calibration:	44
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	--	1.90
7-Jun	A	2.1	2.1	1.9	1.9	2.0	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.83	2.08
8-Jun	A	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.77	1.83
9-Jun	A	1.8	1.8	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.79	1.87
10-Jun	A	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.9	1.9	1.9	1.80	1.91
11-Jun	A	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.90	2.09
12-Jun	A	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.9	1.8	1.8	1.8	1.84	1.97
13-Jun	A	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.85	2.00
14-Jun	A	2.1	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.82	2.06
15-Jun	A	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.79	1.83
16-Jun	A	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.2	2.0	1.87	2.20
17-Jun	A	2.2	2.1	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.91	2.18
18-Jun	A	2.0	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.9	1.9	2.0	1.90	2.08
19-Jun	A	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.84	1.93
20-Jun	A	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	AC	AC	AC	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.85	1.93
21-Jun	A	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.89	1.94
22-Jun	A	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.4	2.4	1.93	2.40
23-Jun	A	2.0	1.9	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	2.3	2.0	1.9	1.9	2.0	1.89	2.33
24-Jun	A	2.0	2.0	2.0	2.0	2.1	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.84	2.07
25-Jun	A	1.9	1.9	2.0	2.1	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.9	1.9	1.9	1.86	2.07
26-Jun	A	2.1	2.0	2.0	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.7	1.8	1.7	1.7	1.7	1.8	1.8	1.9	1.83	2.06
27-Jun	A	2.0	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	2.0	1.88	2.01
28-Jun	A	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.1	1.88	2.06
29-Jun	A	2.0	2.1	2.1	2.1	2.1	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.9	1.90	2.10
30-Jun	A	2.0	2.0	1.9	2.0	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.2	2.3	2.1	2.2	1.93	2.31
1-Jul	A	2.3	2.2	2.2	2.9	2.3	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.98	2.95
2-Jul	A	2.0	2.0	2.1	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	P	P	P	P	2.0	1.9	1.92	2.13
3-Jul	A	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.2	2.2	2.2	2.1	1.91	2.23
4-Jul	A	2.3	2.3	2.3	2.2	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.9	2.0	1.9	1.9	1.8	1.94	2.31
5-Jul	A	1.9	2.0	2.2	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.88	2.15
6-Jul	A	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.1	2.2	1.89	2.20
7-Jul	A	2.1	2.1	2.2	2.2	2.2	2.1	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.2	2.0	2.1	2.4	1.99	2.40
8-Jul	A	2.2	2.3	2.3	2.3	2.4	2.2	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.03	2.39
9-Jul	A	2.0	2.1	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.8	C	C	C	C	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	2.11
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	1.98	1.98	1.99	2.01	1.98	1.92	1.89	1.85	1.83	1.82	1.81	1.80	1.80	1.80	1.80	1.80	1.80	1.81	1.84	1.89	1.92	1.94	1.96	Diurnal Average	
	--	2.31	2.31	2.32	2.95	2.39	2.24	2.06	1.98	1.98	1.96	1.89	1.89	1.88	1.87	1.87	1.89	1.90	1.95	2.33	2.23	2.31	2.39	2.40	Diurnal Maximum	

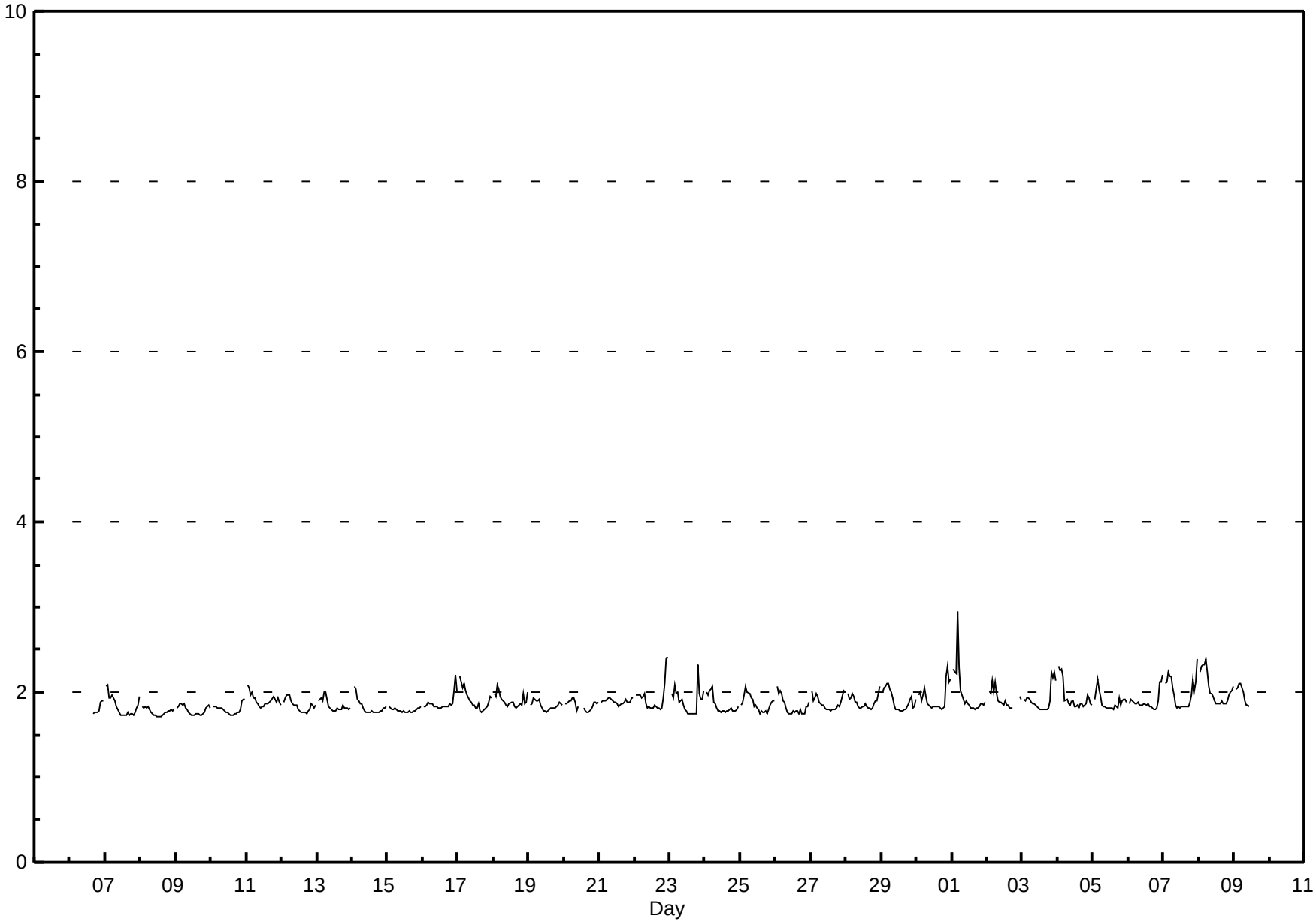
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Methane (CH_4) - ppm

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Methane (CH_4) - ppm

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 17.42 ppm on Jul 1 05:00

Maximum Daily Average: 2.76 ppm on Jul 1

Minimum Value: 1.7 ppm on Jun 8 13:00

Minimum Daily Average: 1.82 ppm on Jun 15

Maximum Diurnal Average: 2.64 ppm at hour 5

Minimum Diurnal Average: 1.87 ppm at hour 17

Monthly Average: 2.050 ppm

Percentiles: P_1 = 1.75 P_{10} = 1.81 Q_1 = 1.85 Median = 1.93 Q_3 = 2.06 P_{90} = 2.34 P_{99} = 3.53

Hours in Service:	795
Hours of Data:	747
Hours of Missing Data:	48
Hours of Calibration:	44
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daily Average	Daily Maximum
5-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Jun	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	1.8	1.8	1.8	1.8	1.8	2.2	2.1	2.0	--	2.16
7-Jun	A	2.5	2.3	2.1	2.6	2.4	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.96	2.58
8-Jun	A	1.9	1.8	1.9	1.8	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.7	1.8	1.7	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.83	1.91
9-Jun	A	1.8	1.9	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.83	1.96
10-Jun	A	1.8	1.8	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	2.2	1.86	2.22
11-Jun	A	2.4	2.3	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	2.0	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.0	2.0	1.9	1.9	2.00	2.42
12-Jun	A	1.9	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	2.6	1.9	1.9	1.8	1.8	1.9	1.9	1.8	1.9	1.9	2.1	1.9	1.9	2.0	1.95	2.58
13-Jun	A	2.0	2.0	2.0	2.0	2.2	2.1	2.0	1.9	2.0	1.8	1.8	2.0	1.8	1.9	1.9	2.0	1.8	2.1	1.9	1.9	1.9	1.8	1.8	1.94	2.18
14-Jun	A	2.3	2.5	2.0	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.89	2.46
15-Jun	A	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.82	1.91
16-Jun	A	1.8	1.8	1.9	2.0	1.9	1.9	1.9	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.6	2.6	2.2	1.96	2.58
17-Jun	A	2.8	2.3	2.1	2.2	2.2	2.1	2.0	2.0	1.9	1.9	2.1	1.9	1.9	2.1	1.8	1.8	1.8	1.8	1.8	2.0	2.0	2.5	2.0	2.05	2.78
18-Jun	A	2.1	2.2	2.3	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.8	1.9	1.9	2.0	2.0	2.5	2.0	2.0	2.2	2.02	2.52
19-Jun	A	2.0	1.9	2.1	2.4	2.1	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.93	2.42
20-Jun	A	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.9	AC	AC	AC	1.9	1.9	1.8	1.8	1.9	1.9	2.0	1.9	2.0	1.9	1.90	1.98
21-Jun	A	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	2.0	2.0	1.96	2.04
22-Jun	A	2.0	2.0	2.1	2.1	2.0	2.1	2.2	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.9	2.1	2.6	2.9	3.3	2.08	3.33
23-Jun	A	2.1	2.0	5.5	2.2	2.2	2.0	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	9.6	3.2	2.3	2.2	2.2	2.50	9.62
24-Jun	A	2.1	2.2	2.1	2.3	2.3	2.0	1.9	2.0	1.8	2.0	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.3	1.9	1.9	1.9	1.8	1.9	1.98	2.32
25-Jun	A	2.0	2.0	2.3	2.4	2.2	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.8	2.0	2.3	2.0	2.1	2.0	1.99	2.36
26-Jun	A	2.5	2.2	2.1	2.1	2.0	2.0	1.9	1.8	1.8	1.8	1.9	2.2	2.0	2.0	2.0	1.9	2.4	1.8	1.8	1.8	1.9	2.0	2.1	2.00	2.46
27-Jun	A	2.3	2.0	2.0	2.0	2.1	1.9	1.9	2.0	1.9	1.9	1.8	1.9	1.8	1.9	1.9	1.9	2.0	2.0	1.9	2.2	2.5	2.3	2.3	2.03	2.48
28-Jun	A	2.1	2.0	2.1	2.3	2.1	1.9	1.9	1.9	1.8	1.9	2.1	2.0	2.1	2.1	2.0	1.9	1.8	1.8	1.9	2.0	2.0	2.6	2.5	2.03	2.64
29-Jun	A	2.1	2.3	2.3	2.3	2.9	2.2	2.1	2.0	2.0	1.9	1.9	2.0	1.8	1.8	1.8	1.8	1.8	2.1	2.2	2.2	2.0	2.0	2.2	2.08	2.88
30-Jun	A	2.1	2.1	1.9	2.3	2.2	2.1	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.9	3.6	4.7	3.1	2.6	2.21	4.66
1-Jul	A	2.6	2.6	2.7	17.4	3.3	2.3	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.9	1.9	2.0	1.9	2.0	2.76	17.42
2-Jul	A	4.4	2.4	3.7	2.4	2.4	2.2	2.2	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	1.9	1.9	P	P	P	P	2.0	1.9	2.30	4.37
3-Jul	A	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.8	2.4	3.3	2.7	3.2	2.7	2.10	3.29
4-Jul	A	2.5	2.5	2.8	2.5	2.1	2.0	1.9	1.9	2.0	2.0	1.9	1.9	2.0	1.9	2.0	1.9	1.9	1.9	2.5	3.1	2.2	2.0	1.9	2.14	3.12
5-Jul	A	2.0	2.5	2.6	2.6	2.4	1.9	1.9	1.9	1.8	1.9	1.9	1.9	2.1	1.8	2.0	1.9	1.9	2.6	1.9	2.1	1.9	2.0	1.9	2.07	2.64
6-Jul	A	1.9	2.0	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	2.5	2.6	2.3	2.5	2.00	2.58
7-Jul	A	2.2	2.5	2.6	2.6	2.4	2.2	2.0	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	2.5	3.0	2.1	2.3	3.0	2.20	2.98
8-Jul	A	3.1	3.3	2.6	2.9	2.9	2.8	2.3	2.1	2.1	2.1	2.0	2.0	1.9	2.0	2.0	2.4	1.9	1.9	2.0	2.1	2.3	2.1	2.2	2.30	3.25
9-Jul	A	2.1	2.1	2.1	2.2	2.1	2.1	2.0	1.9	1.9	1.8	C	C	C	C	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	2.16
10-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
	--	2.22	2.16	2.29	2.64	2.17	2.02	1.96	1.91	1.88	1.89	1.88	1.89	1.88	1.88	1.88	1.87	1.88	1.93	2.20	2.20	2.17	2.15	2.15	Diurnal Average	
	--	4.37	3.25	5.50	17.42	3.27	2.76	2.26	2.06	2.12	2.58	2.08	2.22	2.14	2.14	2.04	2.42	2.36	2.64	9.62	3.61	4.66	3.23	3.33	Diurnal Maximum	

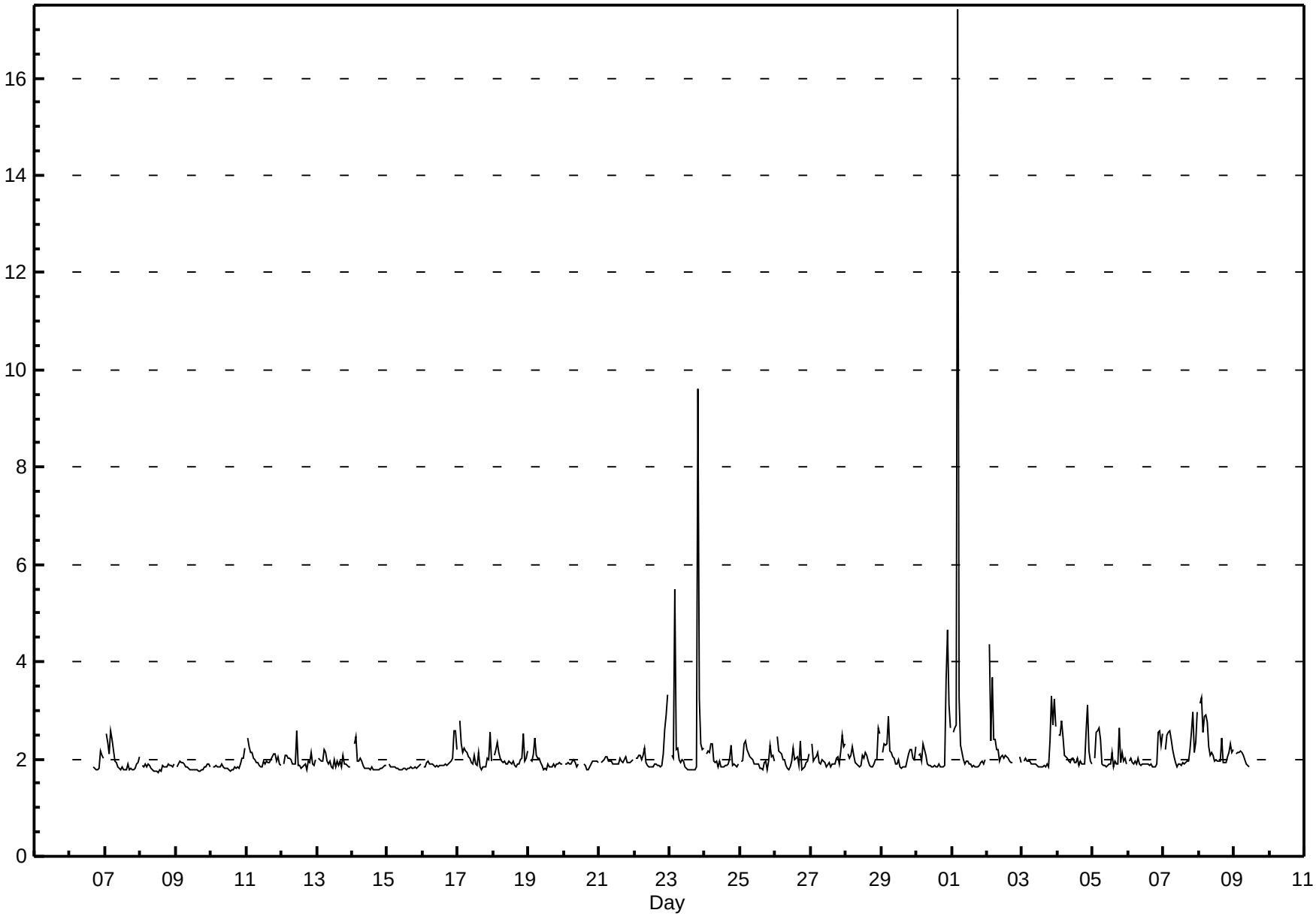
C - Calibration P - Power Failure NS - Not in service A - Automated Daily Zero Span AC - Audit Calibration

PAMZ | Parkland Airshed Management Zone

Hourly Maximums

Methane (CH_4) - ppm

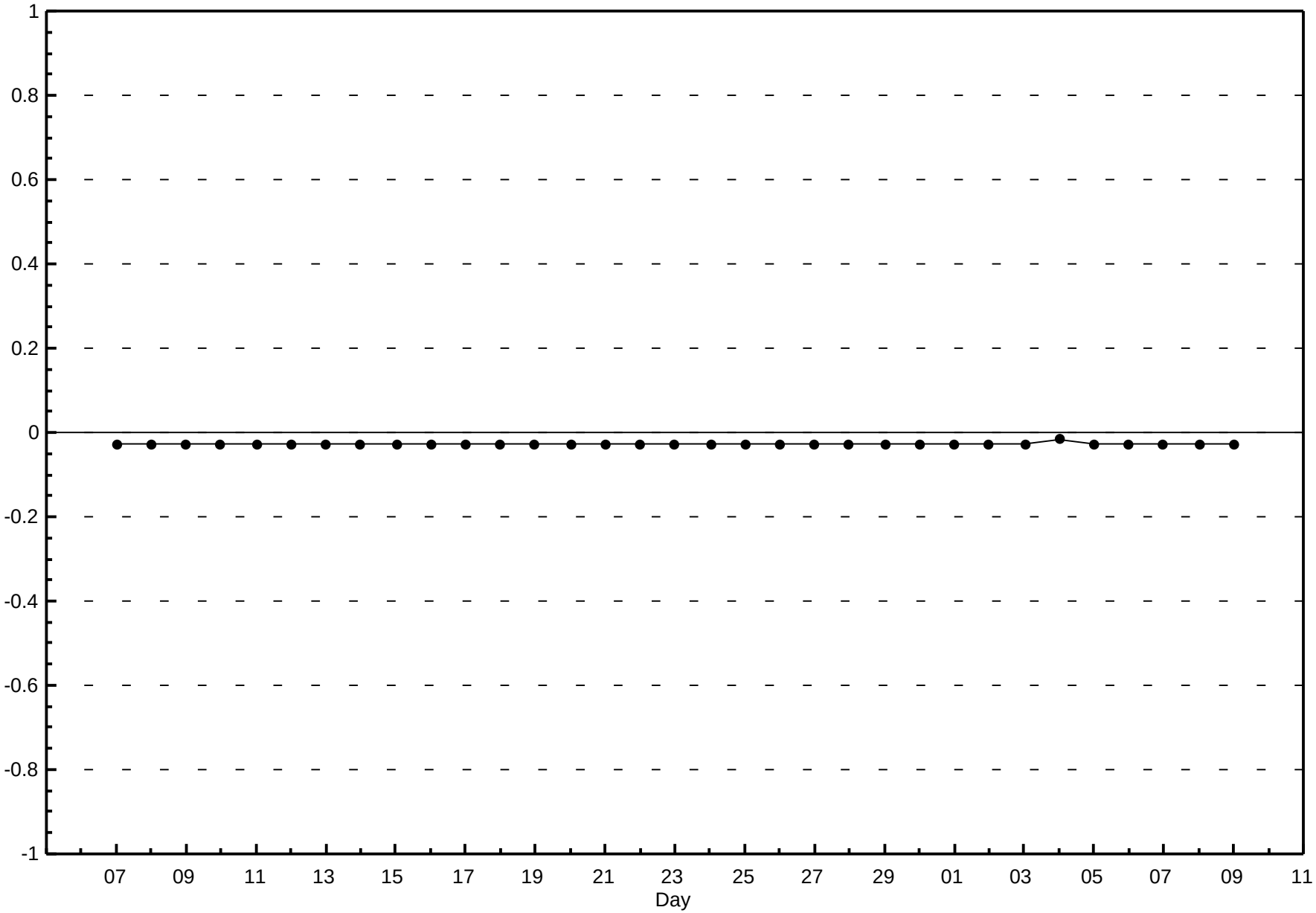
Didsbury West - Jun 5, 2013 to Jul 11, 2013



Zero Responses

Methane (CH_4)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



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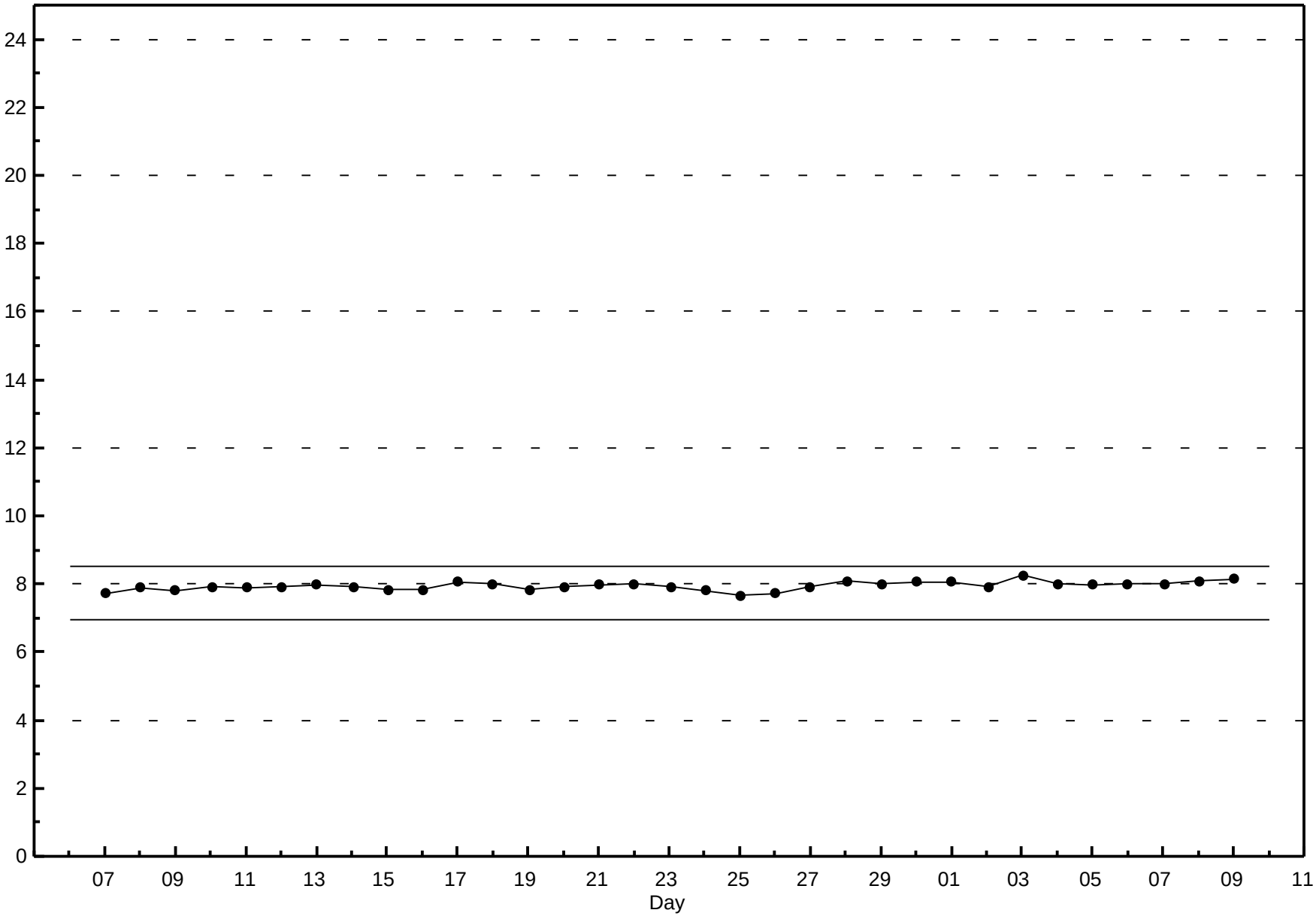
Span Responses

Methane (CH_4)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Calibration Report

Parameter **CH_4 / THC**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	June 6 2013	Previous Calibration	NA
Station Name	Martha	Station Location	Didsbury
Reason:	Routine / Install / Removal / Other:		
Start Time (MST)	11:15	End Time (MST)	15:45
Barometric Pressure	670 mm Hg	Station Temperature	24.0 Deg C
Calibrator	Enveronics 6100	Serial Number	3474
Cal Gas CH4 Conc	402 ppm CH4	Cal Gas Expiry Date	03/28/2014
Cal Gas C3H8 Conc	199 547.25 ppm CH4	Cal Gas Cylinder #	LL28503
DACS make	Campbell Scientific CR3000	DACS serial No.	6778
DACS voltage range	0 - 5 VDC	DACS channel #	12, 13, 14
Analyzer make	TEI 55C	Analyzer serial #	0524112611

	before		after	
Concentration range	0-20 (CH4); 0-40 (THC)	ppm	0-20 (CH4); 0-40 (THC)	ppm
Air pressure	NA	PSI	36.3	PSI
Fuel pressure	NA	PSI	28.5	PSI
Carrier pressure	NA	PSI	30.5	PSI
Column Air Temp	NA	degC	71	degC
Flame Sensor	NA	degC	284	degC
CH4 cal factor	NA		7.47	
NMHC cal factor	NA		23.06	

CH4 Calibration Data

Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
2530	0.00	0.00	-0.03	N/A
2530	85.00	13.07	13.05	1.0013
2530	60.00	9.31	9.33	0.9986
2530	35.00	5.49	5.49	0.9988
2530	15.00	2.37	2.39	0.9907
				As Found Zero
				As Found Span
			Average Correction Factor	0.9973

Calculated value of As Found Response: NA

Percent Change of As Found: NA

	Before		After
Calculated slope	NA	Calculated slope	0.019845
Calculated intercept	NA	Calculated intercept	-0.005965

Final Zero/Span Data

	before calibration		after calibration	
Auto zero	NA	ppm	-0.03	ppm
Auto span	NA	ppm	7.73	ppm

THC Calibration Data

Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
2530	0.00	0.00	-0.16	N/A
2530	85.00	30.86	30.78	1.0025
2530	60.00	21.99	22.01	0.9993
2530	35.00	12.95	13.05	0.9925
2530	15.00	5.59	5.72	0.9782
				As Found Zero
				As Found Span
			Average Correction Factor	0.9931

Calculated value of As Found Response: NA

Percent Change of As Found: NA

	Before		After
Calculated slope	NA	Calculated slope	0.019860
Calculated intercept	NA	Calculated intercept	-0.136252

Final Zero/Span Data

	before calibration		after calibration	
Auto zero	NA	ppm	-0.16	ppm
Auto span	NA	ppm	18.32	ppm

Notes: Install calibration due to station move

Made adjustment and forgot to hit run on analyzer. Dropped second point and realized. Restarted high point.

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **THC**

Air Monitoring Network **PAMZ**

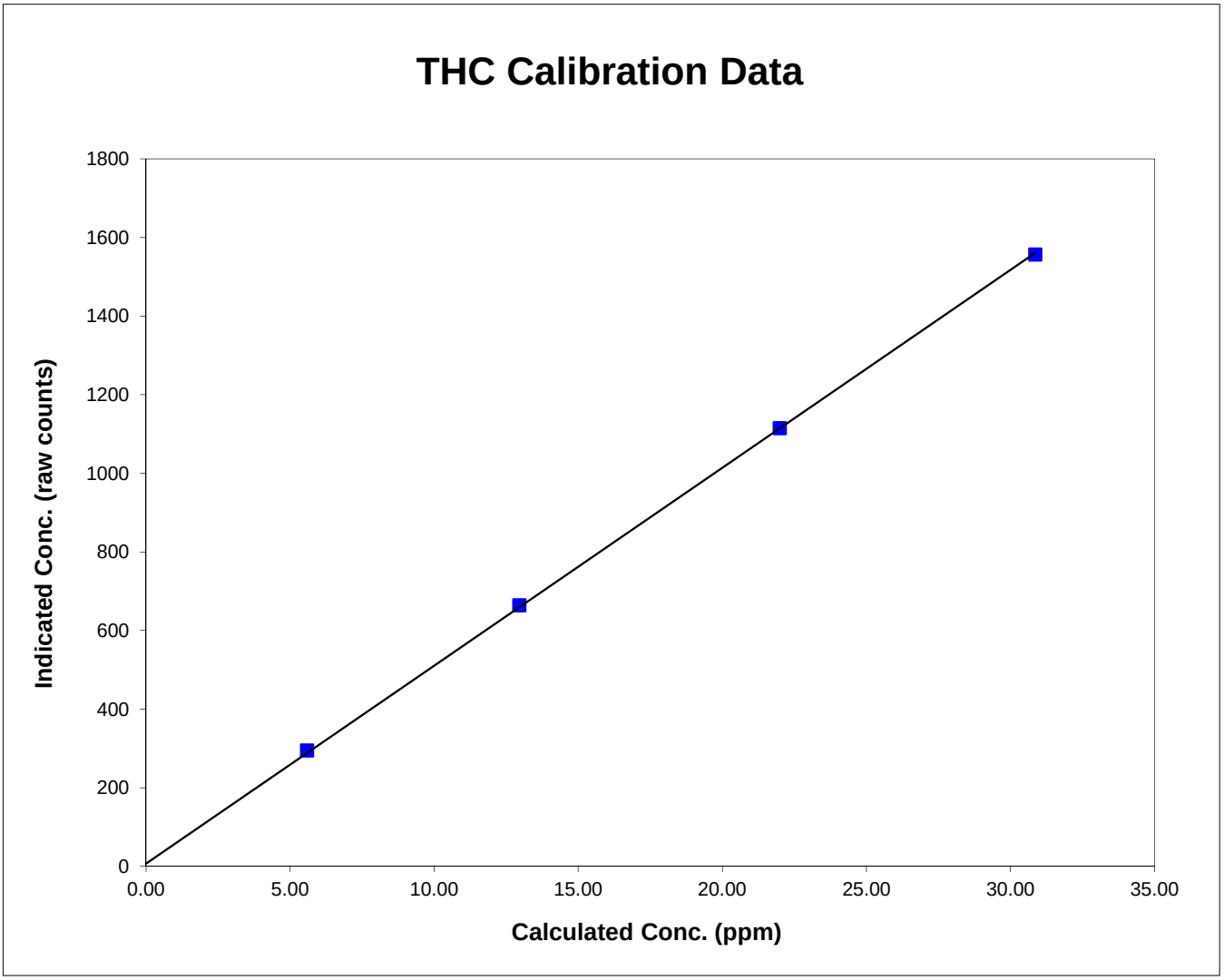
FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	June 6 2013	Previous Calibration	NA
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	11:15	End Time (MST)	15:45
Analyzer make/model	TEI 55C	Analyzer serial #	0524112611

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.000	-1.286	N/A		
30.86	1556.619	0.0198	Correlation Coefficient	0.999906
21.99	1114.952	0.0197		
12.95	664.000	0.0195	Slope	0.019860
5.59	294.857	0.0190		
			Intercept	-0.136252



Calibration Summary

Parameter **CH4**

Air Monitoring Network **PAMZ**

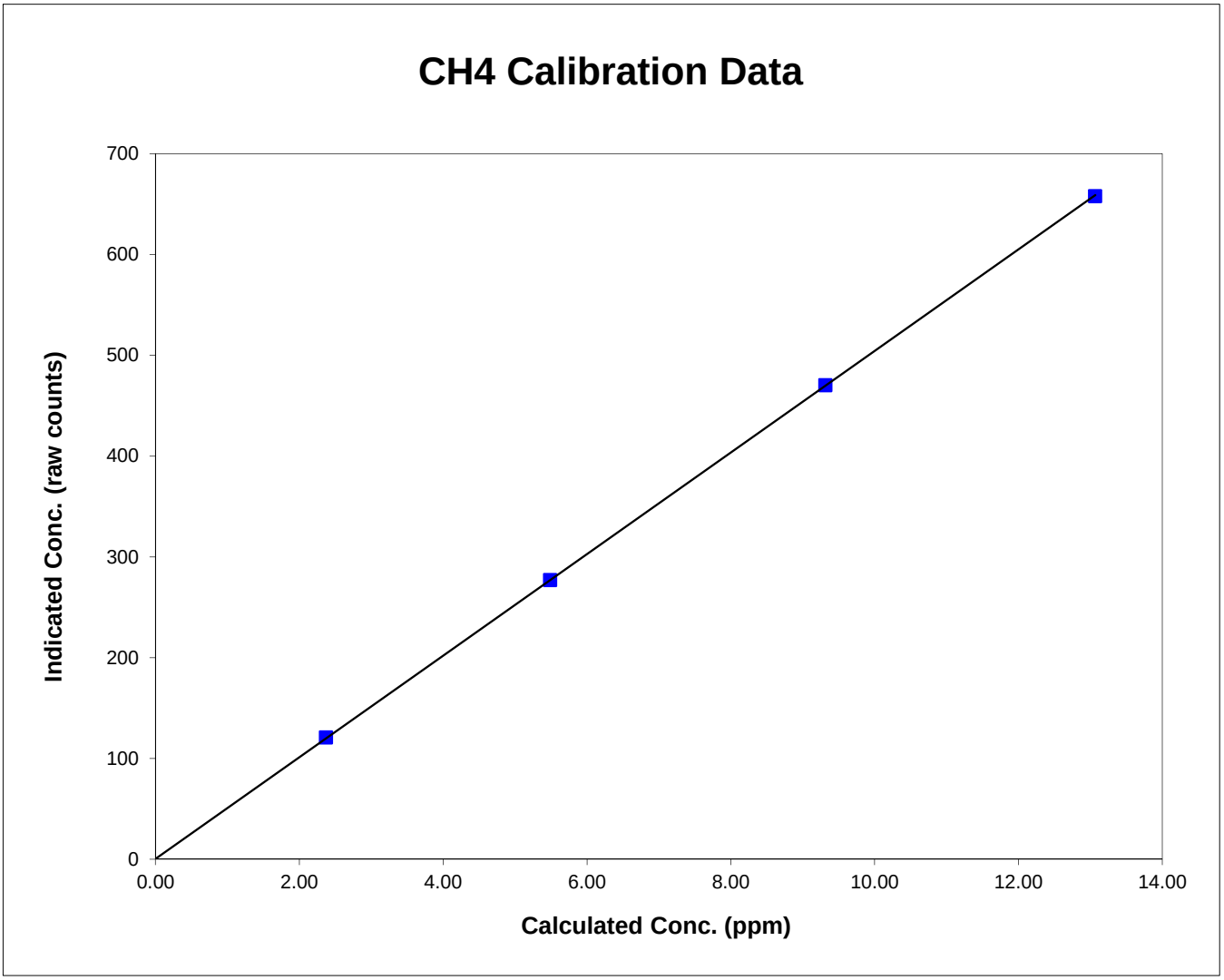
FOCUS AIR QUALITY MONITORING

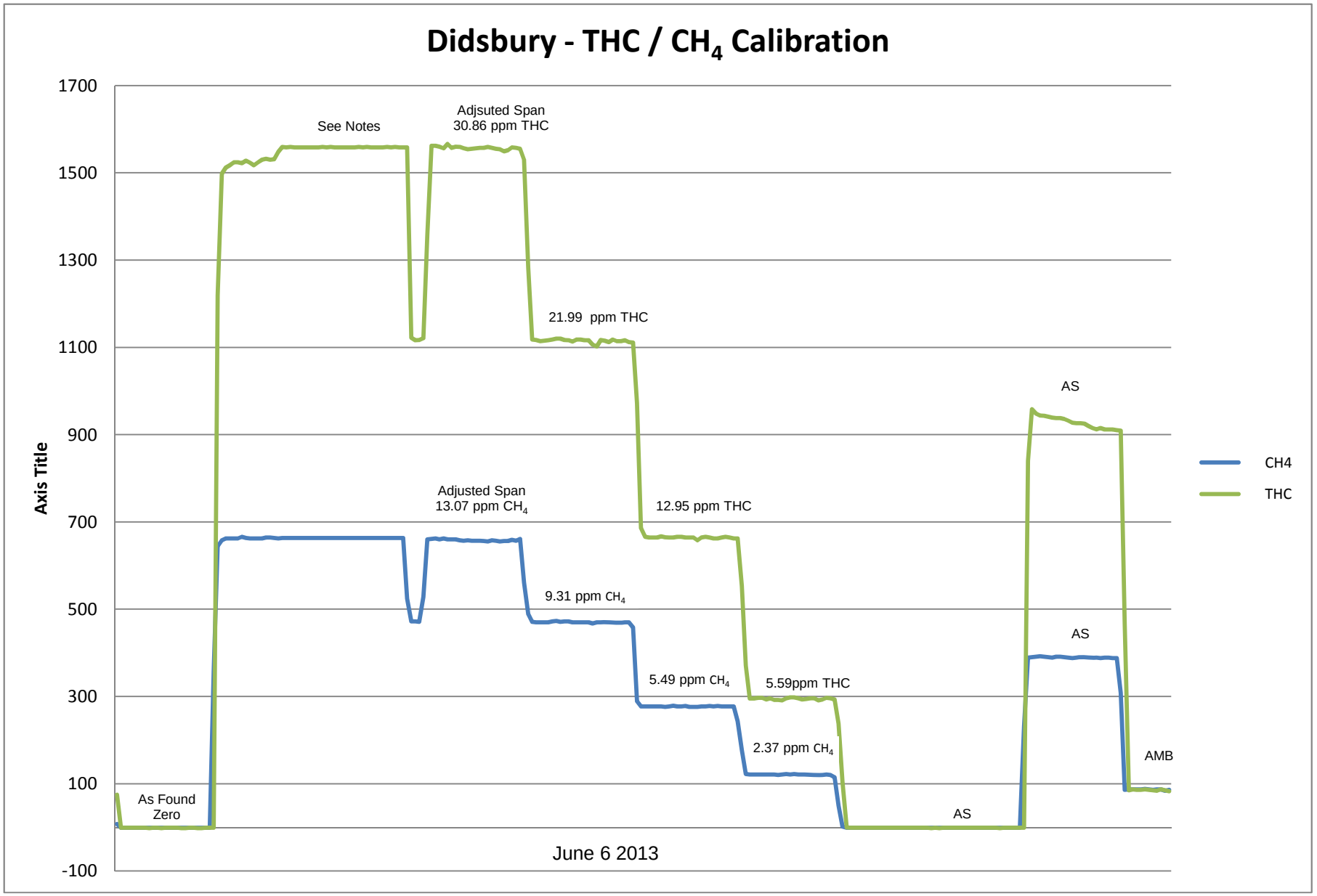
Station Information

Calibration Date	June 6 2013	Previous Calibration	NA
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	11:15	End Time (MST)	15:45
Analyzer make/model	TEI 55C	Analyzer serial #	0524112611

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-1.000	N/A		
13.07	657.905	0.0199	Correlation Coefficient	0.999985
9.31	470.238	0.0198		
5.49	277.048	0.0198	Slope	0.019845
2.37	120.810	0.0196		
			Intercept	-0.005965




Didsbury - THC / CH4 Calibration
1700
1500
1300
1100
900
700
500
300
100
-100
Axis Title
See Notes
Adjsuted Span
30.86 ppm THC
21.99 ppm THC
AS
Adjusted Span
13.07 ppm CH4
12.95 ppm THC
9.31 ppm CH4
AS
5.49 ppm CH4
5.59ppm THC
2.37 ppm CH4
AMB
As Found
Zero
AS
June 6 2013
CH4
THC

Calibration Report

Parameter **CH_4 / THC**

Air Monitoring Network **PAMZ**

FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	July 9 2013	Previous Calibration	June 6 2013
Station Name	Martha	Station Location	Didsbury
Reason:	Routine / Install / Removal / Other:		
Start Time (MST)	11:15	End Time (MST)	15:45
Barometric Pressure	670 mm Hg	Station Temperature	24.0 Deg C
Calibrator	Enveronics 6100	Serial Number	3474
Cal Gas CH4 Conc	402 ppm CH4	Cal Gas Expiry Date	03/28/2014
Cal Gas C3H8 Conc	199 547.25 ppm CH4	Cal Gas Cylinder #	LL28503
DACS make	Campbell Scientific CR3000	DACS serial No.	6778
DACS voltage range	0 - 5 VDC	DACS channel #	12, 13, 14
Analyzer make	TEI 55C	Analyzer serial #	0524112611

	before		after	
Concentration range	0-20 (CH4); 0-40 (THC)	ppm	0-20 (CH4); 0-40 (THC)	ppm
Air pressure	36.3	PSI	NA	PSI
Fuel pressure	28.5	PSI	NA	PSI
Carrier pressure	30.5	PSI	NA	PSI
Column Air Temp	71	degC	NA	degC
Flame Sensor	284	degC	NA	degC
CH4 cal factor	7.47		NA	
NMHC cal factor	23.06		NA	

CH4 Calibration Data

Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
2500	0.00	0.00	0.03	N/A
2500	85.00	13.22	13.23	0.9993
2500	60.00	9.42	9.43	0.9997
2500	35.00	5.55	5.53	1.0028
2500	15.00	2.40	2.37	1.0109
2500	0.00	0.00	-0.02	As Found Zero
2500	85.00	13.22	13.16	As Found Span
			Average Correction Factor	1.0032

Calculated value of As Found Response: 13.190 ppm Percent Change of As Found: 0.2%

	Before		After
Calculated slope	0.019845	Calculated slope	0.019858
Calculated intercept	-0.005965	Calculated intercept	0.048337

Final Zero/Span Data

	before calibration		after calibration	
Auto zero	-0.03	ppm	NA	ppm
Auto span	7.73	ppm	NA	ppm

THC Calibration Data

Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
2500	0.00	0.00	0.00	N/A
2500	85.00	31.21	31.18	1.0012
2500	60.00	22.25	22.27	0.9990
2500	35.00	13.11	13.18	0.9941
2500	15.00	5.66	5.60	1.0106
2500	0.00	0.00	-0.15	As Found Zero
2500	85.00	31.21	31.10	As Found Span
			Average Correction Factor	1.0012

Calculated value of As Found Response: 31.244 ppm Percent Change of As Found: -0.1%

	Before		After
Calculated slope	0.019860	Calculated slope	0.019818
Calculated intercept	-0.136252	Calculated intercept	0.009822

Final Zero/Span Data

	before calibration		after calibration	
Auto zero	-0.16	ppm	NA	ppm
Auto span	18.32	ppm	NA	ppm

Notes:

Calibration Performed By: Christopher Hendrickson

Calibration Summary

Parameter **THC**

Air Monitoring Network **PAMZ**

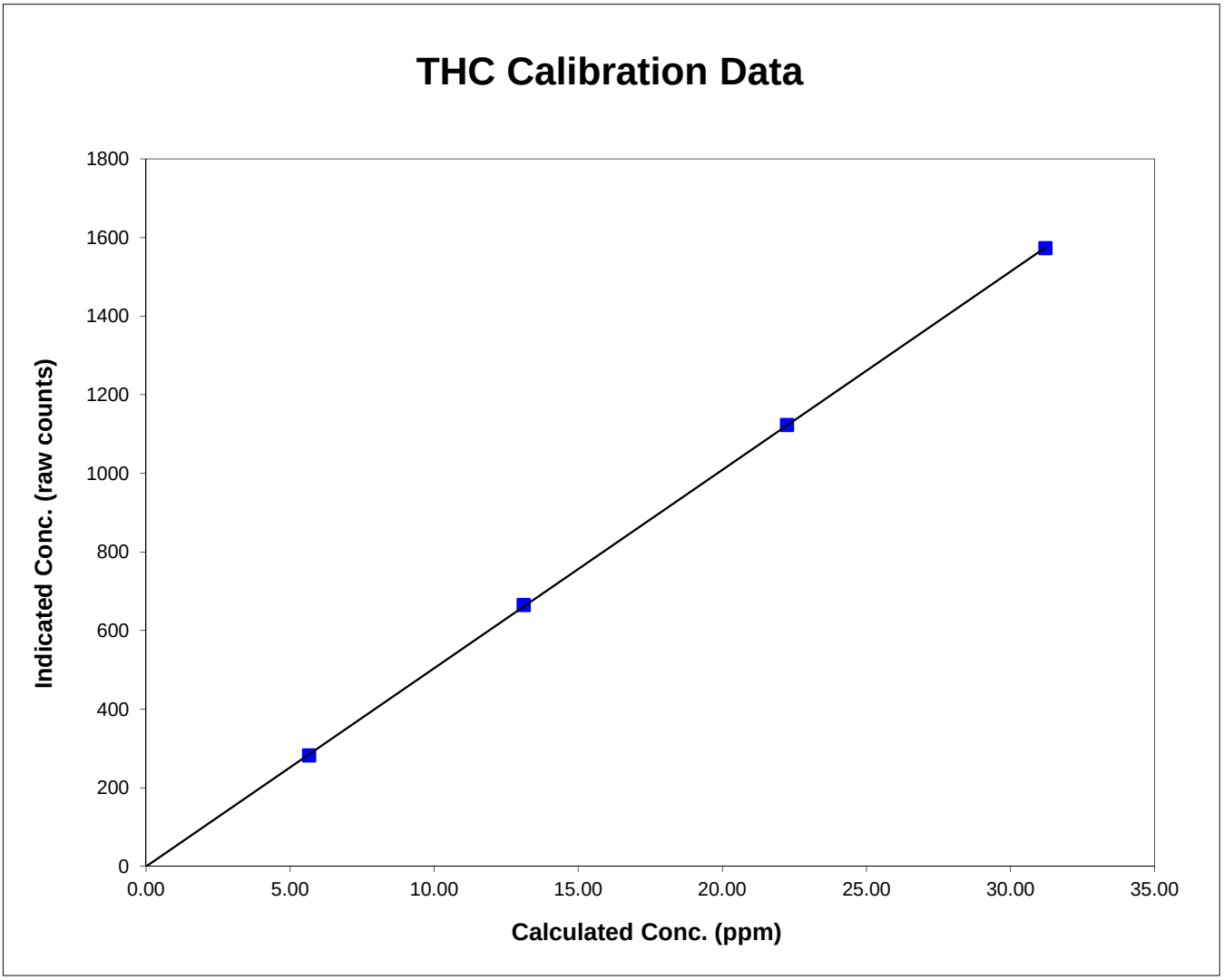
FOCUS AIR QUALITY MONITORING

Station Information

Calibration Date	July 9 2013	Previous Calibration	June 6 2013
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	11:15	End Time (MST)	15:45
Analyzer make/model	TEI 55C	Analyzer serial #	0524112611

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.000	-0.619	N/A		
31.21	1572.619	0.0198	Correlation Coefficient	0.999982
22.25	1123.238	0.0198		
13.11	664.762	0.0197	Slope	0.019818
5.66	282.190	0.0201		
			Intercept	0.009822



Calibration Summary

Parameter **CH4**

Air Monitoring Network **PAMZ**

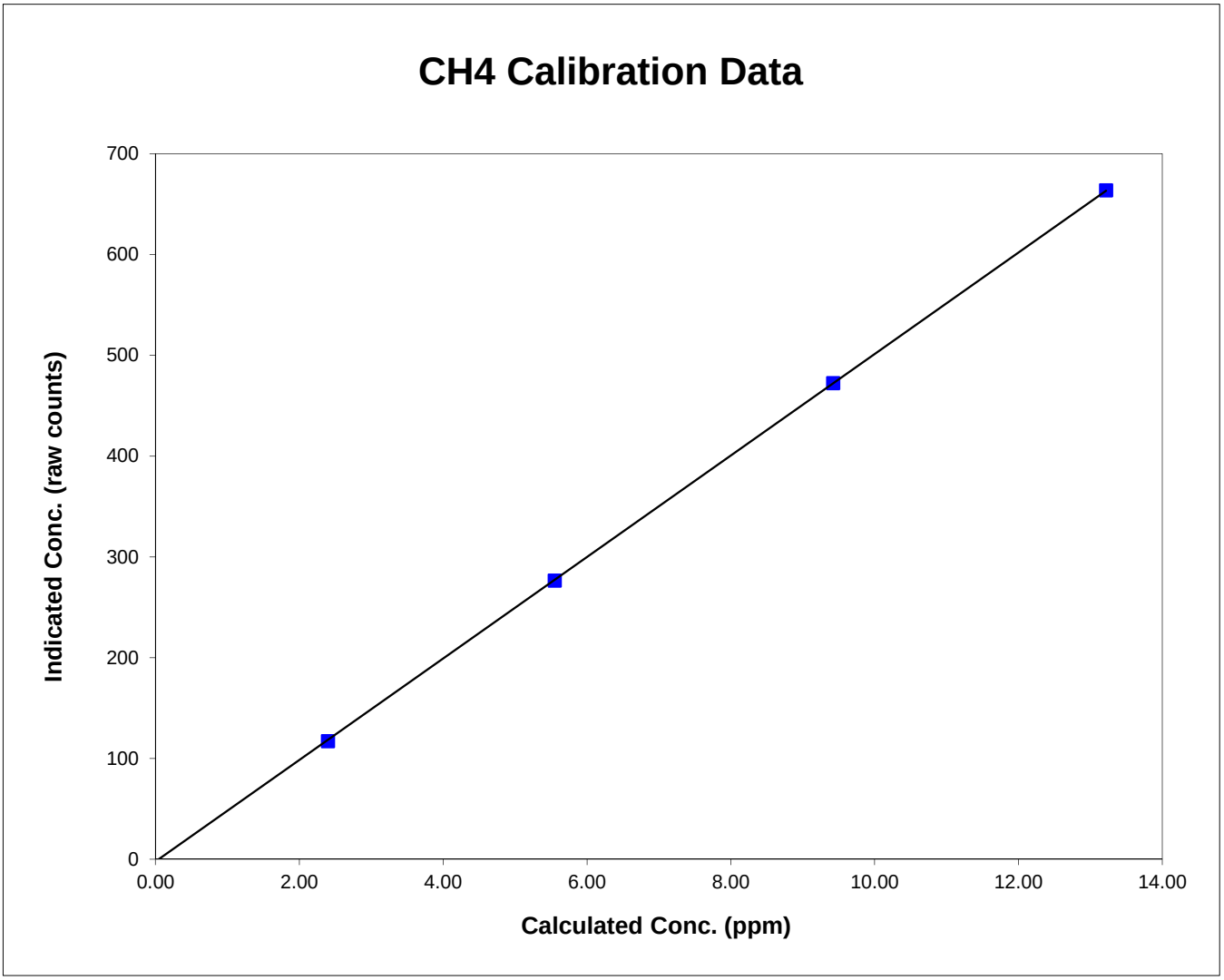
FOCUS AIR QUALITY MONITORING

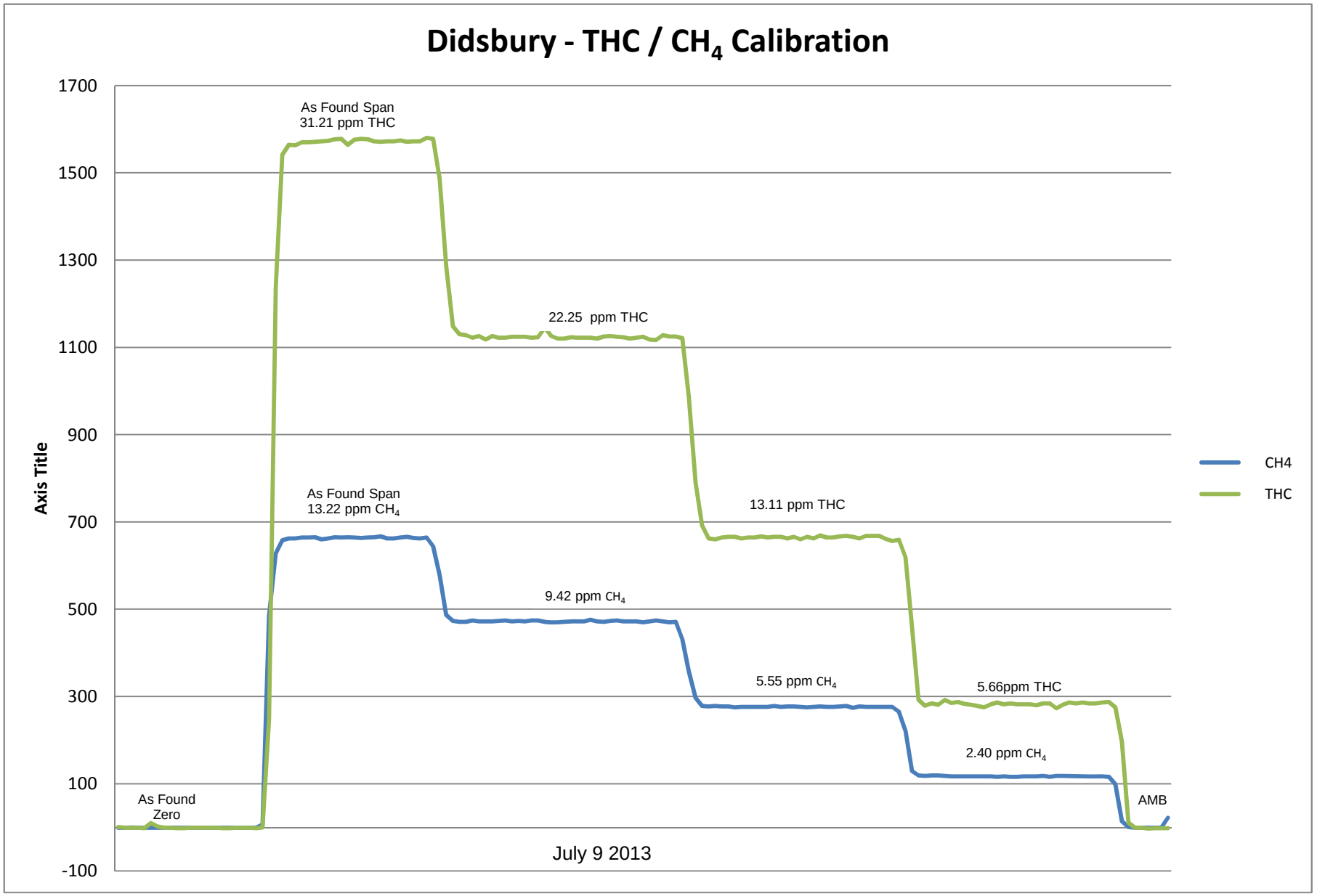
Station Information

Calibration Date	July 9 2013	Previous Calibration	June 6 2013
Station Number	Martha	Station Location	Didsbury
Start Time (MST)	11:15	End Time (MST)	15:45
Analyzer make/model	TEI 55C	Analyzer serial #	0524112611

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (raw counts) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.952	N/A		
13.22	663.667	0.0199	Correlation Coefficient	0.999983
9.42	472.190	0.0200		
5.55	276.286	0.0201	Slope	0.019858
2.40	117.000	0.0205		
			Intercept	0.048337




Didsbury - THC / CH4 Calibration
1700
1500
1300
1100
900
700
500
300
100
-100
Axis Title
As Found Span
31.21 ppm THC
22.25 ppm THC
As Found Span
13.22 ppm CH4
13.11 ppm THC
9.42 ppm CH4
5.55 ppm CH4
5.66ppm THC
2.40 ppm CH4
As Found
Zero
AMB
July 9 2013
CH4
THC

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Hourly Averages

Wind Speed (km/h)
Wind Direction (deg)
Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Speed: 23 km/h on Jun 17 11:00

Maximum Daily Speed Average: 14 km/h on Jun 15

Minimum Speed Value: 1 km/h on Jun 30 00:00

Minimum Daily Speed Average: 1 km/h on Jun 25

Maximum Diurnal Speed Average: 3 km/h at hour 4

Minimum Diurnal Speed Average: 0 km/h at hour 11

Monthly Average Velocity: 1.0 km/h 229.5 deg

Percentiles: P_1 = 1.0 P_{10} = 2.3 Q_1 = 3.8 Median = 6.2 Q_3 = 10.0 P_{90} = 14.2 P_{99} = 20.7

Hours in Service:	849
Hours of Data:	808
Hours of Missing Data:	41
Percent Operational Time:	95.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
5-Jun	14NNE	14NE	13NE	12NE	11NE	12NE	13NE	12NE	11NE	7NE	4NNE	12N	15NNE	20NE	15NE	12ENE	9WSW	11WSW	9NW	6NW	8NW	6WNW	8NW	5WNW	7NNE	20NE
6-Jun	3W	3W	5WSW	8SW	10SW	9SW	11SW	6SW	3WSW	6SSE	15SSE	18SSE	16SE	17ESE	18SE	20SE	21SE	20SE	16SE	14ESE	5E	5ESE	5SE	7SSE	8SSE	21SE
7-Jun	1SSW	1WNW	4WNW	6W	2WSW	2NNE	1NNE	2SE	4S	8S	4SSE	C	C	8NNE	4NNE	4N	4N	7NW	12NW	11WNW	10WNW	8WNW	8W	5WSW	3WNW	12NW
8-Jun	10WNW	12WNW	7WNW	8W	9W	7W	9WNW	10WNW	10WNW	6NW	4NNW	4N	3NNE	3NNE	2ENE	3SSE	2NNE	4NNW	4NNE	1NE	2WNW	6WNW	8WNW	5W	5WNW	12WNW
9-Jun	6SW	5WSW	4W	6WNW	6WNW	2WNW	4W	6WNW	4NW	3N	3N	3NW	8W	10W	9W	10W	14WNW	13W	9WSW	11W	6W	8WNW	10WNW	13WNW	7W	14WNW
10-Jun	8W	13WNW	14WNW	13WNW	11WNW	14WNW	16NW	15WNW	16WNW	16WNW	14WNW	11WNW	9WNW	6NW	5NW	5NW	3NNW	4N	6N	4NNE	4NNE	4NNE	N	N	9NW	16WNW
11-Jun	N	N	N	N	N	N	N	2NNE	3ENE	3ENE	2NE	2NE	2NE	3NNE	3NNE	4NNE	5NNE	4NNE	N	N	N	N	6SE	12ESE	----	12ESE
12-Jun	9ESE	8ESE	5E	6ESE	8ESE	8SE	14SE	15SSE	16SSE	13SSE	8SSE	3SE	12WNW	6NW	5E	8ESE	5SE	7NW	5N	7WNW	2N	2NNW	5NW	4N	3SE	16SSE
13-Jun	9WNW	6W	6W	5WSW	4WSW	2WNW	2W	2NNW	3N	5NNE	4NNE	4NE	2NW	7W	6W	2S	3E	14SE	12SSE	3SW	4NW	14WNW	11W	4WNW	2W	14WNW
14-Jun	1NE	1WSW	4WSW	7W	4W	7WNW	8W	10W	14WNW	15WNW	9WNW	5NW	5NW	14W	15WNW	21WNW	16WNW	10WNW	11WNW	12WNW	12W	12W	14W	8W	9WNW	21WNW
15-Jun	10W	12WNW	12WNW	14WNW	12WNW	12WNW	20WNW	21WNW	21WNW	19WNW	15WNW	15WNW	18WNW	11WNW	15WNW	15WNW	12WNW	13WNW	14WNW	9WNW	12WNW	13WNW	12WNW	11WNW	14WNW	21WNW
16-Jun	12WNW	13WNW	12WNW	11WNW	11WNW	10WNW	14WNW	15WNW	13WNW	10WNW	8NW	9NW	6NW	5NNW	6NNW	6NNW	5N	5N	6NNE	4NNE	N	N	5SSE	6SSE	7WNW	15WNW
17-Jun	9SSW	5SSW	7S	10SSW	8S	9S	10SSE	15SE	20SE	22SE	23SE	21SE	21SE	22SE	15SSE	14ESE	17ESE	16ESE	16ESE	17ESE	16SE	16SE	11S	17S	13SE	23SE
18-Jun	14SSW	12SSW	2SW	2W	6WNW	7WNW	8WNW	7W	5NW	5WNW	4NW	4W	2WNW	2NNW	3NNE	4NNE	4NE	3NNE	3NNE	2NNE	4NNE	3NNE	5NNE	4NNE	2NW	14SSW
19-Jun	2NNE	8NNE	6NNE	2NE	8SSE	5SSE	N	4NNE	6NNE	5NNE	5NE	3NE	6NE	8NNE	7NNE	8NNE	9NNE	7NNE	9NNE	13NNE	12NNE	12NNE	9NNE	8N	6NNE	13NNE
20-Jun	8N	9NNE	9N	10NNE	9N	10N	13NNE	16NNE	14NNE	7NNE	7NNE	9NNE	9NNE	9NNE	10NNE	9NNE	7NE	7NE	5ENE	5NE	9NNE	8NNE	4N	2NNW	8NNE	16NNE
21-Jun	2NW	2NW	2NW	4NNE	4NNE	5NNE	5N	7N	7N	9N	10N	6N	5N	5NNW	3NNW	3SSE	4WSW	6SW	7S	6WSW	4SW	6WSW	6WSW	6WSW	3NW	10N
22-Jun	5W	5W	5W	5W	5W	7WSW	3WSW	2W	6W	6WNW	6WNW	6NW	5NNW	5WNW	6W	3N	4N	4N	3N	N	N	4S	8SSW	8SSW	4W	8SSW
23-Jun	6SSW	8SSW	9SSW	6SW	7SSW	7SSW	4W	3NW	1SW	7WSW	11W	8W	10WNW	9WNW	6WNW	9WNW	14WNW	8WNW	5W	3SSW	5SSE	7S	9S	N	5WSW	14WNW
24-Jun	8SSW	10SSW	7SW	5SW	4SW	6SW	4SSW	3S	3E	6ESE	9ESE	8ESE	13SE	14ESE	14SE	17SE	15SE	5S	5ESE	9SE	10SE	10SE	8SE	8ESE	7SE	17SE
25-Jun	6SSE	9SE	7S	5SSW	N	3ESE	6SSE	2SW	1NE	1NNE	1NNE	1NE	2NE	8WSW	6WNW	9WNW	4WNW	4SSE	N	4E	2E	2E	1NNW	3NW	1S	9WNW
26-Jun	2W	6SW	8SW	10SSW	7SW	7SW	7SW	5WSW	6WSW	7WSW	5SW	3S	5SE	5ESE	4SE	5SE	10SSW	16S	9W	8WSW	6WSW	9SW	6WSW	6SW	5SW	16S
27-Jun	2NW	3WSW	5WSW	7SW	12SSW	9SW	5W	4WNW	3WSW	5SSE	3E	6ESE	11ESE	13ESE	13ESE	11S	9SW	5W	1NNE	3WNW	6W	5SW	9SW	10SW	3SSW	13ESE
28-Jun	5WSW	5W	8WNW	7W	3WSW	4SW	7WSW	4WSW	5WNW	3NW	2NW	2E	1ESE	4SSE	5ESE	6ESE	6E	8ESE	9ESE	9ESE	7SE	6SE	7SE	6SE	2SSE	9ESE
29-Jun	5SSE	10S	6SSE	4SSE	4SE	1SSE	5S	4S	4SSE	3ESE	6ESE	6ESE	8ESE	8E	15ESE	18ESE	16ESE	14ESE	5E	2ENE	1N	17WNW	1NW	1N	5SE	18ESE
30-Jun	1NW	2WNW	5WNW	6WNW	N	N	N	8WNW	9WNW	6WNW	4NW	3NW	3NNW	3NNE	3NNE	3NNE	3NNE	2NE	2ENE	3E	2SE	2SSE	3S	6SSW	2NW	9WNW
1-Jul	8SSW	4S	3SSE	2S	3SSE	3SE	7SE	9SE	12ESE	15ESE	16ESE	17ESE	18ESE	18ESE	18ESE	20ESE	18ESE	18SE	15SE	12SE	12SE	12SE	10SE	10SE	11SE	20ESE
2-Jul	10SSE	4SE	5SE	6SSE	3SE	3SSE	6SSW	11SSW	11SSW	11SSW	10S	10SSE	13SSE	15SE	19SE	20SE	20SE	18SE	12SSE	4SSW	4SW	7WSW	5W	7NW	8SSE	20SE
3-Jul	9WNW	10WNW	2NW	5WNW	7WNW	9WNW	9WNW	5NW	5NW	4NW	4NNW	3N	3N	3N	2N	3ENE	3NNE	2NNE	2ENE	4ESE	5SSE	2SSE	6SSE	6S	2NW	10WNW
4-Jul	N	1SSW	4S	4S	9SSE	14SSE	18SSE	17SSE	18SE	16SSE	14SE	14SE	14SE	15SE	3ENE	8NNE	9NNE	4NE	2NNE	2NNW	4WNW	4NW	4NW	6WNW	5SE	18SE
5-Jul	5WNW	5W	N	N	N	N	8WNW	9WNW	5NW	4NW	3NNW	4N	3N	3N	2N	2NW	3NNE	3E	10S	10SW	7SW	3W	4WNW	3WNW	3WNW	10S
6-Jul	6WNW	6WNW	5WNW	5WNW	4WNW	3WNW	3WNW	1N	2NNW	2NNW	3NNE	2NNE	4NNW	5NW	14WNW	2NNW	4W	8WNW	N	N	N	N	N	5SW	4NW	14WNW
7-Jul	5SW	2WSW	2SW	4SW	2SW	3SW	2SW	4W	5WNW	5WNW	3WNW	2NW	2NNE	3NE	2NE	2NNE	2ENE	1E	2ENE	3ESE	2SSE	5S	9SSW	6SSW	1SW	9SSW
8-Jul	10S	3SSW	5SSW	N	N	N	N	N	8ESE	12SE	14SSE	9S	5SSW	3SSW	2SSW	2SSE	4SSE	13S	9SSW	6SW	3S	6S	9S	9SSW	6S	14SSE
9-Jul	10SSW	9SSW	13SSW	13SSW	12SSW	10SSW	8SW	7SW	5WSW	4WSW	2NW	3NE	2E	5SE	7ESE	8ESE	11ESE	17SE	13SE	13SE	11SSE	11S	12SSW	10SW	6S	17SE
10-Jul	11SW	3WSW	4W	5W	4W	3W	5WSW	3SSW	3SE	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	----	11SW
	3WSW	3WSW	3WSW	3WSW	3WSW	3WSW	3WSW	2W	1W	1WSW	0S	1E	1ENE	2E	2E	2ESE	1ESE	2SE	1ESE	1SSE	1SSW	2WSW	3SW	3SW	Diurnal Average	
	14SSW	14NE	14WNW	14WNW	12SSW	14WNW	20WNW	21WNW	21WNW	22SE	23SE	21SE	21SE	22SE	19SE	21WNW	21SE	20SE	16ESE	17ESE	16SE	17WNW	14W	17S	Diurnal Maximum	

C - Calibration N - Not Valid NS - Not in service

All monthly, daily, and diurnal averages have been calculated using vector methods

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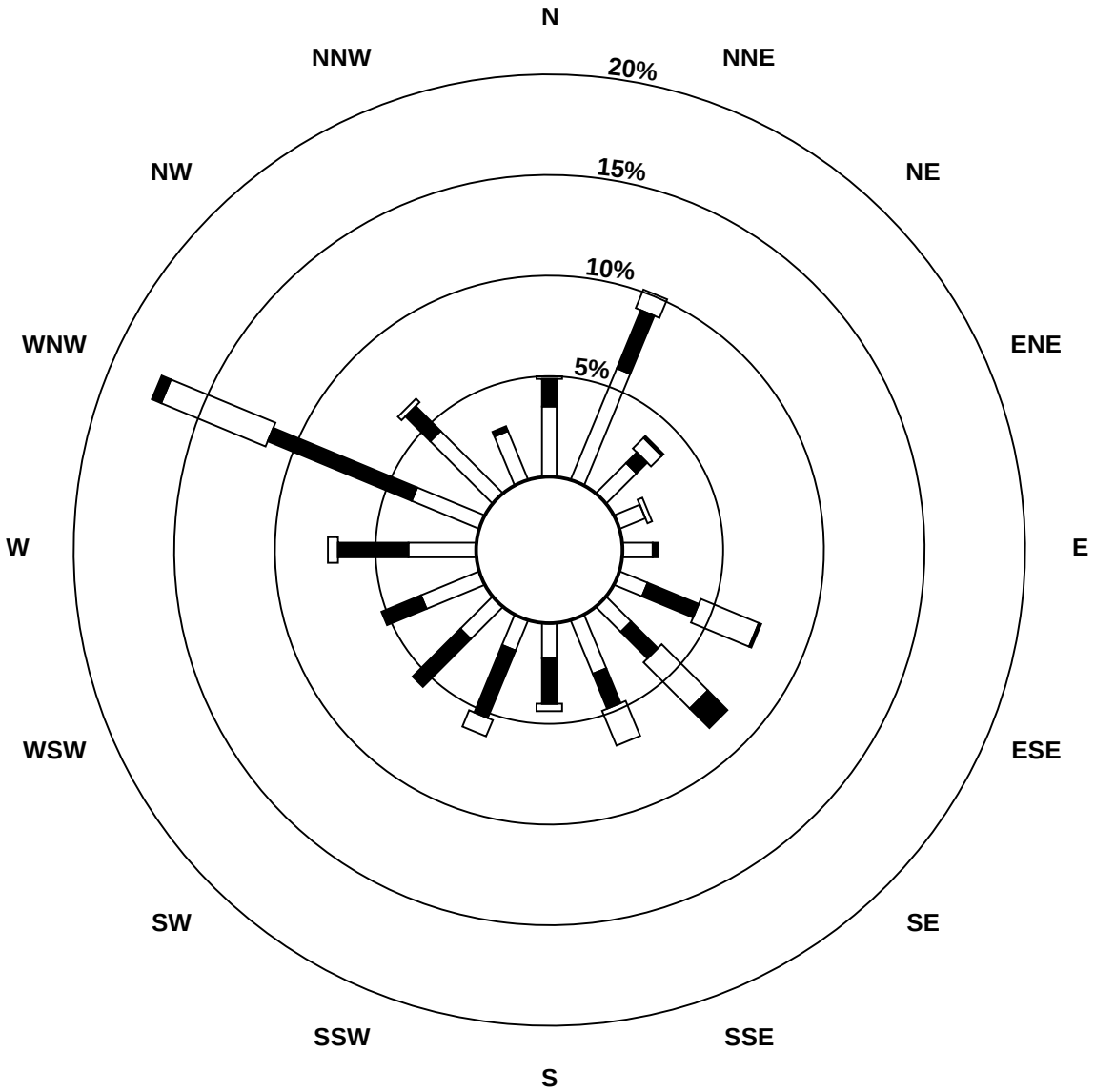
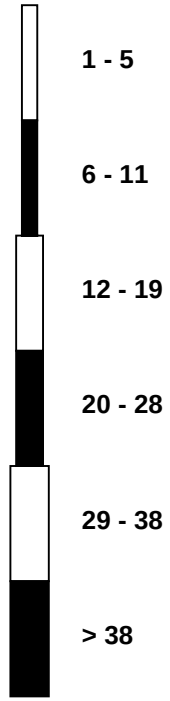
Wind Rose

Wind Speed (WS) (km/h)

Didsbury West - Jun 5, 2013 to Jul 11, 2013



Wind Speed Classes (km/h)



PAMZ | Parkland Airshed Management Zone

Hourly Standard Deviations

Wind Direction (WD) - deg

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Maximum Value: 174.5 deg on Jun 21 11:00

Minimum Value: 2.0 deg on Jul 3 01:00

Percentiles: P_1 = 2.8 P_{10} = 4.8 Q_1 = 7.1 Median = 13.7 Q_3 = 60.8 P_{90} = 120.7 P_{99} = 165.7

Hours in Service:	849
Hours of Data:	808
Hours of Missing Data:	41
Hours of Calibration:	2
Percent Operational Time:	95.4

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
5-Jun	4	3	3	3	3	5	3	6	8	19	140	166	92	16	10	14	51	19	5	6	4	5	3	22	166.3
6-Jun	5	5	14	7	9	10	8	13	42	46	17	13	16	15	13	13	9	5	8	6	13	19	13	10	46.0
7-Jun	89	108	31	5	83	136	96	70	41	15	62	C	C	8	104	145	150	126	3	3	3	8	8	6	150.2
8-Jun	8	5	6	11	5	8	8	7	6	12	143	149	141	118	113	83	121	151	74	64	45	18	4	30	150.7
9-Jun	10	6	15	9	5	42	14	8	104	144	151	119	30	17	14	9	6	12	10	6	8	10	3	3	151.4
10-Jun	13	4	3	4	3	3	3	3	5	6	6	13	13	68	118	92	140	157	156	122	6	6	N	N	157.0
11-Jun	N	N	N	N	N	N	N	65	61	28	46	26	90	99	71	43	5	6	N	N	N	N	13	10	98.8
12-Jun	8	10	17	17	8	12	6	12	11	15	46	72	47	104	59	30	83	89	163	52	143	125	129	131	163.1
13-Jun	7	12	6	11	21	91	58	151	146	73	80	112	115	88	54	75	44	30	6	77	75	10	19	22	150.7
14-Jun	110	86	29	7	26	5	6	6	5	5	14	106	101	8	9	4	4	6	6	4	4	6	6	6	110.5
15-Jun	5	7	4	5	4	6	4	4	3	5	5	5	5	5	10	8	4	4	4	5	4	4	5	5	9.7
16-Jun	3	3	4	7	4	5	4	5	4	6	6	7	43	72	98	143	154	160	40	11	N	N	9	15	160.1
17-Jun	12	37	5	7	15	10	8	5	8	9	8	10	11	8	11	20	10	11	7	8	5	11	13	5	36.5
18-Jun	4	5	95	93	7	8	9	25	125	91	93	100	92	146	143	80	19	87	121	85	5	7	5	84	145.8
19-Jun	141	126	77	56	21	48	N	122	6	7	13	18	11	5	5	5	4	6	3	3	3	4	44	123	141.2
20-Jun	157	95	76	43	169	147	44	3	5	4	7	4	4	4	5	8	10	7	73	82	4	5	169	142	169.4
21-Jun	47	81	66	153	43	43	170	172	173	162	175	126	167	145	123	75	22	27	31	30	98	10	4	5	174.5
22-Jun	8	4	5	65	69	35	86	82	10	17	46	43	120	108	38	147	156	154	139	N	N	10	8	8	155.9
23-Jun	34	18	7	15	7	21	32	63	108	28	16	14	10	38	9	13	6	10	21	28	8	15	13	N	108.1
24-Jun	8	11	15	55	17	11	39	76	50	27	13	17	14	11	14	10	12	51	42	12	5	8	6	14	75.9
25-Jun	6	9	18	29	N	27	40	84	88	121	135	109	93	41	12	6	62	37	N	22	66	77	119	103	134.8
26-Jun	98	23	9	9	12	17	10	12	16	18	25	73	66	28	48	21	58	12	8	16	7	10	10	23	97.6
27-Jun	63	25	7	17	4	6	53	15	29	37	54	21	15	14	18	46	22	12	125	66	35	12	8	7	124.9
28-Jun	6	17	6	20	12	9	6	50	11	85	113	104	101	45	39	27	17	10	6	5	10	10	9	12	112.7
29-Jun	27	6	32	25	26	61	10	23	23	29	17	25	14	12	11	9	11	13	17	120	151	54	114	123	151.2
30-Jun	116	7	3	6	N	N	N	7	8	10	13	107	152	150	136	79	45	25	26	12	21	9	10	12	152.1
1-Jul	9	31	16	12	18	9	8	12	9	10	10	11	10	11	10	9	7	7	7	5	5	5	5	4	31.3
2-Jul	4	12	11	13	26	19	47	10	7	7	8	13	7	9	5	4	3	4	12	21	16	23	34	4	47.1
3-Jul	2	4	96	5	4	3	4	5	12	69	110	156	150	154	145	66	116	111	26	24	13	15	15	19	156.4
4-Jul	N	78	24	20	17	5	3	6	7	8	9	9	11	11	32	104	8	95	127	118	43	90	39	8	127.3
5-Jul	11	14	N	N	N	N	5	7	54	88	128	154	148	156	157	118	90	54	21	10	9	8	12	9	156.9
6-Jul	6	14	12	7	6	66	52	138	131	141	147	17	133	121	54	146	71	13	N	N	N	N	N	10	147.1
7-Jul	7	10	30	51	65	74	53	13	10	38	88	119	131	102	86	127	34	99	24	16	18	7	11	33	130.7
8-Jul	8	57	46	N	N	N	N	N	14	7	13	5	25	38	35	29	20	10	8	12	20	7	8	6	56.8
9-Jul	5	8	4	4	7	6	7	8	10	22	133	80	66	35	12	14	13	6	5	4	11	7	6	11	133.3
10-Jul	6	72	10	6	26	20	12	70	43	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	71.9
	157.1	125.9	96.0	152.8	169.4	147.0	169.9	172.4	173.1	162.1	174.5	166.3	167.3	156.3	156.9	146.6	155.9	160.1	163.1	121.8	151.2	124.8	168.6	142.4	

C - Calibration N - Not Valid NS - Not in service

PAMZ | Parkland Airshed Management Zone

Hourly Averages

External Temperature (ET) - °C

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 28.5 °C on Jul 2 14:00 Maximum Daily Average: 20.9 °C on Jul 2

Minimum Value: 2 °C on Jun 11 00:00 Minimum Daily Average: 6.6 °C on Jun 11
Maximum Diurnal Average: 16.2 °C at hour 13 Minimum Diurnal Average: 6.7 °C at hour 5
Monthly Average: 11.72 °C Percentiles: P_1 = 3.0 P_{10} = 5.6 Q_1 = 8.1 Median = 11.1 Q_3 = 15.1 P_{90} = 18.5 P_{99} = 25.8

Hours in Service:	849
Hours of Data:	847
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.8

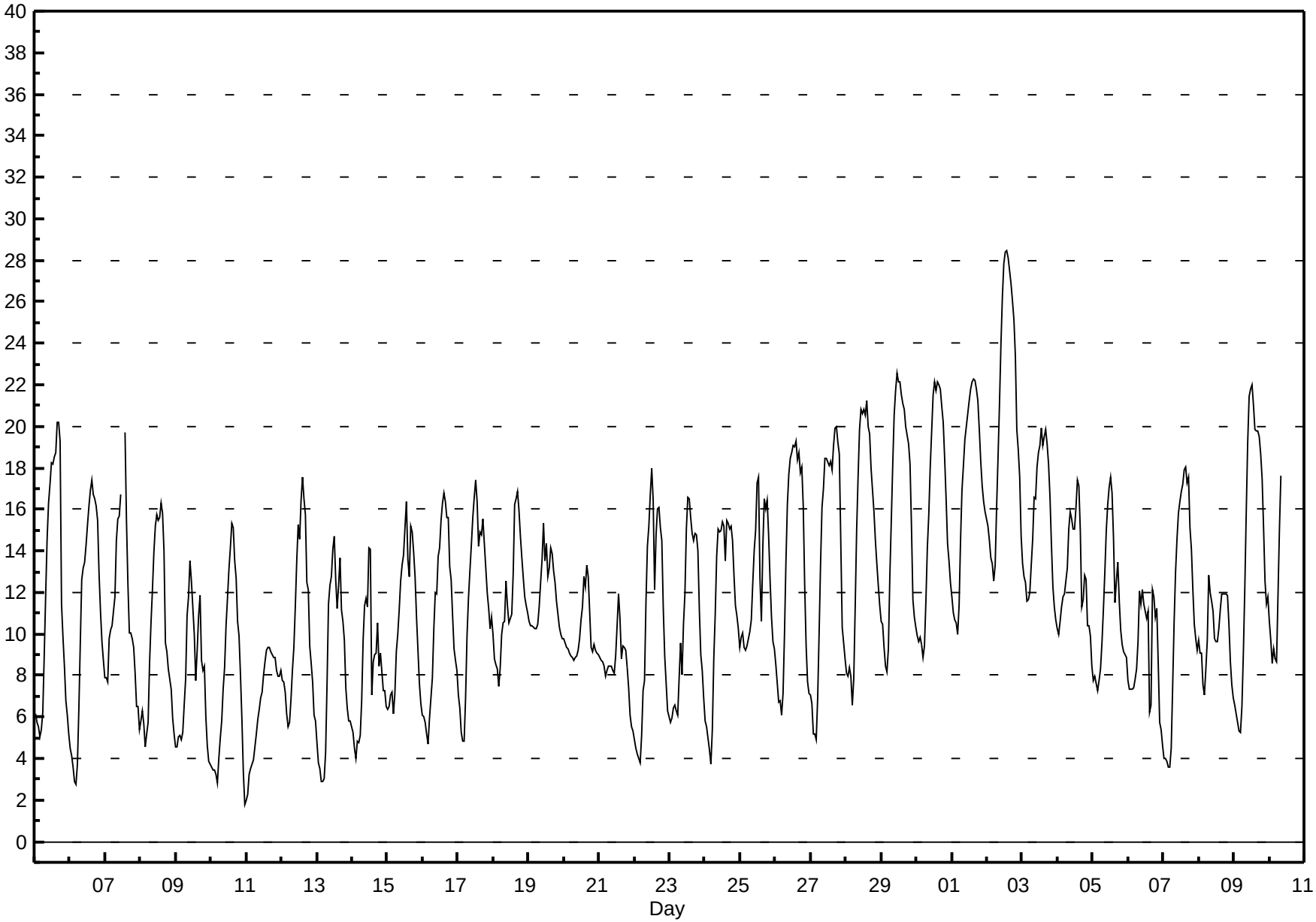
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
5-Jun	6	6	6	5	5	6	9	12	15	16	17	18	18	19	19	20	20	19	11	10	8	7	6	5	11.8	20.2
6-Jun	4	4	4	3	3	4	6	10	13	13	13	14	15	16	17	17	17	17	16	15	13	11	10	9	11.0	17.4
7-Jun	8	8	8	10	10	10	12	15	16	16	17	M	M	20	15	12	10	10	10	9	8	7	6	5	11.0	19.7
8-Jun	6	6	6	5	5	6	9	11	12	14	15	16	15	16	16	16	14	10	9	8	8	7	6	5	10.0	16.3
9-Jun	5	5	5	5	5	5	7	8	11	12	14	13	10	8	9	11	12	9	8	8	6	5	4	4	7.7	13.5
10-Jun	4	3	3	3	3	4	5	6	7	8	10	12	13	14	15	15	14	13	11	10	8	6	3	2	8.0	15.3
11-Jun	2	2	3	4	4	4	5	5	6	6	7	7	8	9	9	9	9	9	9	9	8	8	8	8	6.6	9.3
12-Jun	8	8	7	6	6	6	7	8	9	11	13	15	15	16	18	17	16	12	12	9	9	8	6	6	10.3	17.5
13-Jun	5	4	4	3	3	3	4	8	11	12	13	14	15	13	11	12	14	11	11	10	7	6	6	6	8.5	14.7
14-Jun	5	4	4	5	5	5	7	10	11	12	11	14	14	7	9	9	9	11	8	9	8	7	7	6	8.3	14.1
15-Jun	6	6	7	7	6	7	9	10	11	13	13	14	15	16	14	13	15	15	14	13	11	9	8	7	10.8	16.4
16-Jun	6	6	6	5	5	6	8	10	12	12	14	14	15	16	17	16	16	16	13	13	11	9	9	8	11.0	16.8
17-Jun	7	6	5	5	5	7	10	12	13	14	16	17	17	16	14	15	15	16	14	13	12	11	10	11	11.7	17.4
18-Jun	10	9	9	8	7	8	10	11	11	13	11	11	11	13	16	17	17	16	15	14	13	12	11	11	11.7	16.8
19-Jun	11	10	10	10	10	10	10	11	12	14	15	14	14	13	13	14	14	13	12	12	11	10	10	10	11.9	15.3
20-Jun	10	10	9	9	9	9	9	9	9	9	9	10	11	11	13	12	13	13	9	9	9	9	9	9	9.9	13.3
21-Jun	9	9	9	8	8	8	8	8	8	8	8	9	10	12	11	9	9	9	9	8	7	6	6	5	8.5	11.9
22-Jun	5	4	4	4	4	5	7	8	11	14	15	17	18	16	12	15	16	16	15	15	11	9	8	6	10.7	18.0
23-Jun	6	6	6	7	6	6	8	10	8	10	12	15	17	17	16	15	14	15	15	14	11	9	8	7	10.7	16.6
24-Jun	6	6	5	4	4	5	9	11	14	15	15	15	15	15	14	15	15	15	15	15	13	11	11	10	11.4	15.5
25-Jun	9	10	10	9	9	9	10	11	12	14	15	17	18	13	11	14	17	16	16	15	13	11	10	9	12.4	17.6
26-Jun	8	8	7	7	6	7	10	13	16	18	18	19	19	19	19	18	19	18	18	16	12	9	8	7	13.3	19.3
27-Jun	7	7	5	5	5	7	10	13	16	17	18	18	18	18	18	19	20	20	19	19	15	10	10	9	13.5	20.0
28-Jun	8	8	8	8	7	8	11	15	18	20	21	21	21	21	21	20	20	18	17	16	14	13	12	11	14.9	21.2
29-Jun	11	10	9	8	8	9	13	15	18	21	22	23	22	22	22	21	21	20	19	18	15	12	11	10	15.8	22.5
30-Jun	10	10	10	9	9	9	12	14	16	18	20	21	22	22	22	22	22	21	20	18	17	14	14	12	16.0	22.1
1-Jul	12	11	11	11	10	11	15	17	18	19	20	21	21	22	22	22	22	22	22	21	20	18	17	16	17.3	22.3
2-Jul	15	15	14	13	13	13	16	19	21	24	26	28	28	28	28	27	27	26	25	23	20	19	18	15	20.9	28.5
3-Jul	13	13	12	12	12	12	13	15	17	17	18	19	19	20	19	20	20	19	18	17	14	12	11	11	15.5	19.9
4-Jul	10	10	11	11	12	12	13	15	16	16	15	15	16	17	17	15	11	12	13	13	10	10	10	8	12.9	17.4
5-Jul	8	8	8	7	8	8	10	11	13	15	16	17	18	17	15	12	13	13	12	10	9	9	9	9	11.4	17.6
6-Jul	8	7	7	7	7	8	8	10	12	11	12	11	11	11	6	7	12	12	11	11	9	6	5	5	9.0	12.1
7-Jul	4	4	4	4	4	4	7	11	13	15	16	16	17	17	18	18	17	18	15	14	12	10	10	9	11.5	18.1
8-Jul	10	9	9	8	7	8	10	13	12	12	11	10	10	10	10	11	12	12	12	12	10	9	8	7	10.0	12.8
9-Jul	7	6	6	5	5	7	9	12	16	19	21	22	22	21	20	20	20	19	19	18	15	13	11	12	14.3	22.0
10-Jul	11	10	9	9	9	9	12	15	18	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	17.6
	7.7	7.4	7.2	7.0	6.7	7.5	9.4	11.4	13.1	14.2	15.1	15.7	16.2	16.0	15.6	15.6	15.7	15.1	14.1	13.2	11.4	9.8	9.0	8.3	Diurnal Average	
	15.2	14.5	13.7	13.4	12.6	13.3	16.1	18.6	21.1	23.9	26.2	27.8	28.4	28.5	28.1	27.5	26.8	26.0	25.1	23.4	19.8	18.9	17.6	15.9	Diurnal Maximum	

M - Maintenance NS - Not in service

Hourly Averages

External Temperature (ET) - ^{o}C

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Hourly Averages

Relative Humidity (RH) - %

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 100.0 % on Jun 20 04:00 Maximum Daily Average: 96.4 % on Jun 20

Minimum Value: 36 % on Jun 5 16:00 Minimum Daily Average: 62.4 % on Jun 27
Maximum Diurnal Average: 93.7 % at hour 5 Minimum Diurnal Average: 66.2 % at hour 13
Monthly Average: 80.31 % Percentiles: P_1 = 43.9 P_{10} = 57.2 Q_1 = 69.2 Median = 83.4 Q_3 = 93.5 P_{90} = 98.1 P_{99} = 100.0

Hours in Service:	849
Hours of Data:	847
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.8

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
5-Jun	77	79	82	83	81	79	73	67	60	49	45	45	45	41	41	36	36	38	72	72	78	90	91	90	64.6	90.8
6-Jun	91	90	92	94	94	93	88	79	57	54	55	53	51	49	47	46	49	51	53	57	68	76	81	85	68.8	94.1
7-Jun	88	90	87	65	66	68	65	60	59	55	52	M	M	53	68	79	88	85	84	81	86	93	91	94	75.3	93.6
8-Jun	92	93	93	94	90	89	80	70	66	61	57	54	52	52	51	49	59	90	89	90	93	95	95	95	77.0	95.0
9-Jun	95	95	93	92	94	96	92	87	78	69	60	63	74	86	79	70	66	71	74	73	86	89	92	91	81.9	96.2
10-Jun	90	89	88	88	88	83	77	75	70	67	62	60	57	55	51	51	55	54	60	61	68	78	88	94	71.2	93.5
11-Jun	93	94	93	91	91	90	87	83	80	78	77	76	74	74	73	73	74	76	79	79	82	82	80	79	81.6	94.1
12-Jun	84	85	89	94	96	96	93	88	83	76	65	57	62	50	47	47	50	62	62	73	76	87	97	97	75.7	97.5
13-Jun	98	99	98	98	97	97	97	90	77	72	73	62	59	66	70	64	59	72	73	77	90	93	93	92	81.9	98.8
14-Jun	95	97	98	95	94	94	89	81	74	71	74	69	68	92	90	82	82	76	92	88	88	86	85	87	85.3	98.2
15-Jun	87	87	86	84	88	86	79	76	72	68	67	64	59	58	69	74	59	56	58	65	69	72	79	83	72.6	88.0
16-Jun	85	85	87	88	91	87	83	78	73	74	71	70	66	65	63	62	63	63	72	76	80	86	88	89	76.9	90.8
17-Jun	93	97	99	99	98	94	89	83	78	73	68	65	63	65	76	72	71	68	73	79	85	91	94	93	82.1	99.2
18-Jun	93	94	94	94	99	99	95	93	94	88	92	97	98	94	80	77	77	77	82	86	91	95	96	95	90.8	99.0
19-Jun	96	96	97	97	98	99	100	100	95	88	81	86	83	89	94	88	86	88	91	93	95	98	99	99	93.2	100.0
20-Jun	99	99	100	100	100	100	100	100	100	100	100	100	99	95	89	89	82	82	91	97	98	97	98	99	96.4	100.0
21-Jun	99	100	100	100	100	100	100	100	100	100	100	98	92	83	88	92	93	94	92	94	95	97	99	99	96.4	100.0
22-Jun	99	99	98	98	99	97	94	94	86	73	69	67	64	66	81	72	67	63	63	68	79	85	92	97	82.1	98.9
23-Jun	96	96	94	92	93	92	89	88	92	87	82	71	64	62	66	67	69	66	65	68	77	85	86	93	80.8	96.5
24-Jun	95	95	95	96	98	95	87	81	72	69	71	72	72	75	83	74	72	74	76	77	86	91	93	95	83.1	97.5
25-Jun	97	98	98	98	99	100	99	90	83	77	78	73	71	81	96	85	72	66	66	78	87	96	97	99	86.8	99.6
26-Jun	99	98	97	95	96	92	84	76	63	54	51	45	46	47	45	48	49	53	48	55	61	70	76	78	67.7	99.0
27-Jun	75	76	85	84	86	79	72	64	58	50	44	46	50	52	53	48	43	43	45	50	61	76	77	80	62.4	85.9
28-Jun	81	79	76	78	83	82	75	66	59	52	49	45	44	44	47	52	56	62	68	76	83	84	84	85	67.1	85.0
29-Jun	88	87	91	94	95	93	85	76	69	61	56	55	57	61	62	63	66	70	78	83	91	97	100	100	78.2	100.0
30-Jun	100	100	100	100	100	100	100	93	87	81	76	71	68	68	67	67	67	68	70	77	84	90	93	95	84.3	100.0
1-Jul	97	98	99	100	100	99	93	88	86	81	81	80	80	78	77	76	75	76	79	83	85	88	92	94	86.9	99.8
2-Jul	96	97	99	99	100	99	89	80	76	72	64	54	47	48	52	56	60	68	73	69	67	62	76	89	74.6	99.8
3-Jul	88	89	90	93	94	94	89	84	76	72	66	62	61	60	62	61	62	64	67	74	82	88	90	93	77.5	93.8
4-Jul	95	96	96	95	93	91	85	78	76	78	81	83	83	79	82	86	92	90	85	87	95	96	95	95	87.9	96.0
5-Jul	98	98	98	99	99	99	90	84	75	68	64	63	60	62	70	91	86	75	86	94	96	97	96	94	85.2	99.4
6-Jul	93	93	94	95	96	95	93	91	81	81	78	82	81	84	97	99	82	80	80	78	86	95	97	98	88.8	98.9
7-Jul	98	99	99	99	99	99	92	85	76	68	64	63	61	59	57	57	59	57	71	77	82	86	88	92	78.7	99.3
8-Jul	90	90	91	97	98	96	91	81	84	87	88	93	94	95	93	88	84	83	83	84	90	95	96	97	90.3	98.4
9-Jul	97	97	97	96	95	92	87	81	74	65	55	51	46	50	59	62	66	63	67	71	77	86	91	89	75.7	97.4
10-Jul	89	83	85	80	83	86	80	75	69	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	89.1
	92.5	92.8	93.3	93.0	93.7	92.5	87.7	82.3	76.6	71.9	69.0	67.5	66.2	66.8	69.2	68.7	67.8	69.3	73.4	76.9	82.8	87.7	90.4	92.1	Diurnal Average	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.9	95.2	97.3	98.9	93.3	93.7	92.0	97.2	97.7	98.1	100.0	100.0	Diurnal Maximum	

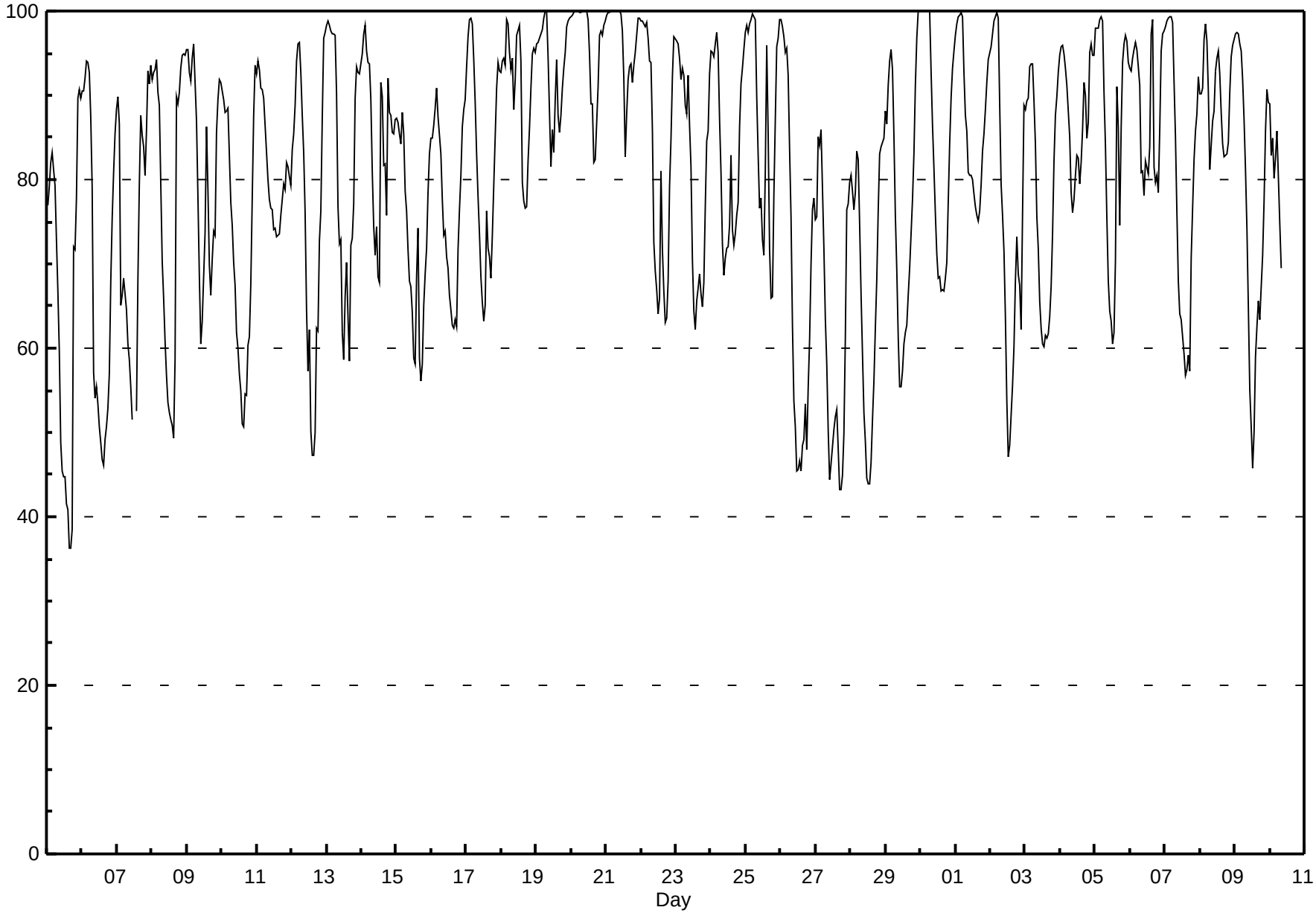
M - Maintenance NS - Not in service

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Relative Humidity (RH) - %

Didsbury West - Jun 5, 2013 to Jul 11, 2013



PAMZ | Parkland Airshed Management Zone

Hourly Averages

Solar Radiation (SR) - W/m^2

Didsbury West - Jun 5, 2013 to Jul 11, 2013

Number of Exceedences (AAAQO): 1-hr: 82 24-hr: 0

Maximum Value: 1289.9 W/m^2 on Jun 15 13:00

Maximum Daily Average: 471.9 W/m^2 on Jul 1

Minimum Value: 0 W/m^2 on Jun 5 01:00

Minimum Daily Average: 117.3 W/m^2 on Jun 20

Maximum Diurnal Average: 893.1 W/m^2 at hour 12

Minimum Diurnal Average: 0.0 W/m^2 at hour 1

Monthly Average: 337.22 W/m^2

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 167.7 Q_3 = 596.8 P_{90} = 984.4 P_{99} = 1230.0

Hours in Service:	849
Hours of Data:	847
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.8

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
5-Jun	0	0	0	0	11	92	333	520	681	641	691	1084	832	909	727	938	849	546	114	70	1	0	0	0	376.6	1083.9
6-Jun	0	0	0	0	5	89	293	488	807	1003	1146	1230	1146	1106	1147	961	435	413	272	174	14	0	0	0	447.0	1229.5
7-Jun	0	0	0	0	3	38	194	422	699	562	581	M	M	1261	127	59	110	274	351	147	18	0	0	0	220.3	1260.7
8-Jun	0	0	0	0	3	125	362	592	808	1000	1163	1200	1001	1002	880	980	159	310	293	45	0	0	0	0	413.5	1200.4
9-Jun	0	0	0	0	0	57	209	350	828	927	1110	635	368	300	543	637	721	86	195	128	10	0	0	0	296.1	1109.7
10-Jun	0	0	0	0	3	150	370	561	807	811	1129	1127	1182	1090	1180	931	585	440	228	161	34	0	0	0	449.6	1181.7
11-Jun	0	0	0	0	1	26	107	186	305	328	296	262	318	292	276	216	136	59	39	12	0	0	0	0	119.2	327.5
12-Jun	0	0	0	0	3	37	219	388	601	918	1163	1069	900	1231	1137	844	510	366	223	47	6	0	0	0	402.6	1230.6
13-Jun	0	0	0	0	0	36	114	340	794	752	813	1181	929	521	372	455	503	229	228	62	2	0	0	0	305.5	1181.1
14-Jun	0	0	0	0	3	55	209	565	735	774	570	1072	667	142	497	324	321	248	203	142	48	0	0	0	273.9	1072.0
15-Jun	0	0	0	0	7	120	466	540	697	957	951	1067	1290	1168	580	832	789	618	393	180	25	0	0	0	445.0	1289.9
16-Jun	0	0	0	0	1	130	366	596	743	561	807	917	974	1143	1160	966	673	631	240	154	18	0	0	0	420.0	1159.6
17-Jun	0	0	0	0	4	151	303	549	781	959	1124	1134	986	385	462	805	813	605	317	177	34	0	0	0	399.5	1134.4
18-Jun	0	0	0	0	0	154	297	201	243	385	95	68	145	604	1024	822	820	449	202	77	35	0	0	0	234.1	1023.7
19-Jun	0	0	0	0	0	8	29	127	345	350	630	224	356	196	314	364	213	110	63	15	0	0	0	0	139.4	630.2
20-Jun	0	0	0	0	0	1	1	10	34	75	83	148	342	378	648	307	480	261	32	15	0	0	0	0	117.3	647.8
21-Jun	0	0	0	0	0	7	30	81	108	129	201	260	439	657	346	364	163	153	113	63	1	0	0	0	129.9	656.8
22-Jun	0	0	0	0	4	40	212	132	598	968	1034	1130	1205	821	358	518	693	606	387	188	23	0	0	0	371.5	1204.5
23-Jun	0	0	0	0	0	54	123	219	91	526	800	1204	1266	863	503	600	630	544	395	184	18	0	0	0	334.1	1265.9
24-Jun	0	0	0	0	4	141	337	546	784	897	730	579	645	506	235	784	411	232	279	139	16	0	0	0	302.7	896.6
25-Jun	0	0	0	0	0	58	143	212	401	513	569	1058	838	66	251	778	802	582	320	180	10	0	0	0	282.6	1058.1
26-Jun	0	0	0	0	1	138	348	562	792	982	1131	1222	1170	985	893	452	823	620	405	205	17	0	0	0	447.9	1222.2
27-Jun	0	0	0	0	3	130	357	582	795	985	1135	1226	1255	1124	657	1004	718	485	326	196	28	0	0	0	458.6	1255.3
28-Jun	0	0	0	0	3	117	346	572	784	948	1125	1220	1192	1226	1157	751	575	295	225	108	28	0	0	0	444.7	1226.3
29-Jun	0	0	0	0	0	106	341	562	775	944	1114	1094	875	927	974	841	704	342	237	87	0	0	0	0	413.5	1113.7
30-Jun	0	0	0	0	1	56	271	537	758	946	1095	1188	1193	1190	1158	967	795	558	377	180	21	0	0	0	470.5	1192.7
1-Jul	0	0	0	0	2	121	340	542	755	940	1085	1196	1202	1181	1105	979	793	584	363	119	18	0	0	0	471.9	1201.8
2-Jul	0	0	0	0	3	116	330	543	751	941	1086	1183	1210	1179	1096	959	770	557	360	173	29	0	0	0	470.2	1210.4
3-Jul	0	0	0	0	0	96	168	418	650	650	902	1051	1133	1121	800	969	792	579	361	167	20	0	0	0	411.5	1132.6
4-Jul	0	0	0	0	0	42	268	526	674	419	360	354	591	949	248	111	272	259	269	114	0	0	0	0	227.3	949.1
5-Jul	0	0	0	0	1	83	291	528	730	938	1099	1237	1138	752	293	83	362	292	57	38	7	0	0	0	330.4	1236.8
6-Jul	0	0	0	0	0	24	77	352	527	355	455	322	381	434	51	277	823	512	284	185	15	0	0	0	211.4	823.1
7-Jul	0	0	0	0	1	78	326	533	754	946	1105	1121	1094	1263	1095	839	647	608	206	145	24	0	0	0	449.5	1263.4
8-Jul	0	0	0	0	3	76	210	460	181	334	179	112	143	170	284	346	405	353	327	205	42	0	0	0	159.6	459.8
9-Jul	0	0	0	0	0	53	307	530	746	940	1090	1189	1231	756	554	528	674	553	364	176	18	0	0	0	404.6	1231.1
10-Jul	0	0	0	0	0	41	304	531	749	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	749.1
	0.0	0.0	0.0	0.0	2.0	79.1	249.9	427.8	619.8	722.9	818.4	893.1	871.7	797.1	660.9	645.5	570.6	410.3	258.6	127.4	16.6	0.0	0.0	0.0	Diurnal Average	
	0.0	0.0	0.0	0.0	10.9	154.2	466.4	595.9	828.4	1002.7	1163.2	1236.8	1289.9	1263.4	1180.4	1004.3	848.6	630.5	405.2	205.5	48.3	0.0	0.0	0.0	Diurnal Maximum	

M - Maintenance NS - Not in service

PAMZ | Parkland Airshed Management Zone

Hourly Averages

Solar Radiation (SR) - W/m^2

Didsbury West - Jun 5, 2013 to Jul 11, 2013