

**BIRKENHEAD ANNUAL STACK
MONITORING REPORT**

Oct 2015 – Sept 2016

Version: 1

Submitted: 31st October 2016

EPA LICENCE NO: 1126

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Certified By: Tim Radimissis

Annual Report Oct 2015 –Sept 2016

Monitoring Objective

The aim of the Annual Monitoring Report is to identify and report on emissions to compare actual emissions from Adelaide Brighton Cement Birkenhead Works against the Environment Protection (Air Quality) Policy 1994, Authorisation 1126 and Exemption Authorisation 12368. Furthermore the aim of the report is to continuously monitor and provide reasons for the particulate emissions exceeding reporting limits in order to establish key areas where opportunities lie for process and mechanical improvements to reduce the level of stack dust emissions from the site.

Monitoring Plan

Monitoring of stacks 4A and 4B on the Birkenhead site is performed using Durag Dust and Opacity Meters. These meters provide continuous % opacity and this is converted to mg/Nm^3 using a calibration curve. The results are then summarized as one hourly averages based on 10 minute averages for the purpose of this report.

The license that Adelaide Brighton Cement operates under in regard to stack emissions is summarized below.

Environment Protection (Air Quality) Policy

- Schedule 1 (1) - limit of $250\text{mg}/\text{Nm}^3$ stack 4A and 4B
- Exemptions under schedule 6
 - Kiln or calciner light up &/or purge – max 10 minutes
 - Level 3 combustibles trip – max 5 minutes
 - Power failure – duration of emergency situation

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- Stack emissions testing for calibration of opacity meter – provided that an EPA authorised officer is on site
- Reporting Levels
 - All emissions in excess of 80 mg/m³ (Stack 4B) and 150 mg/m³ (Stack 4A)

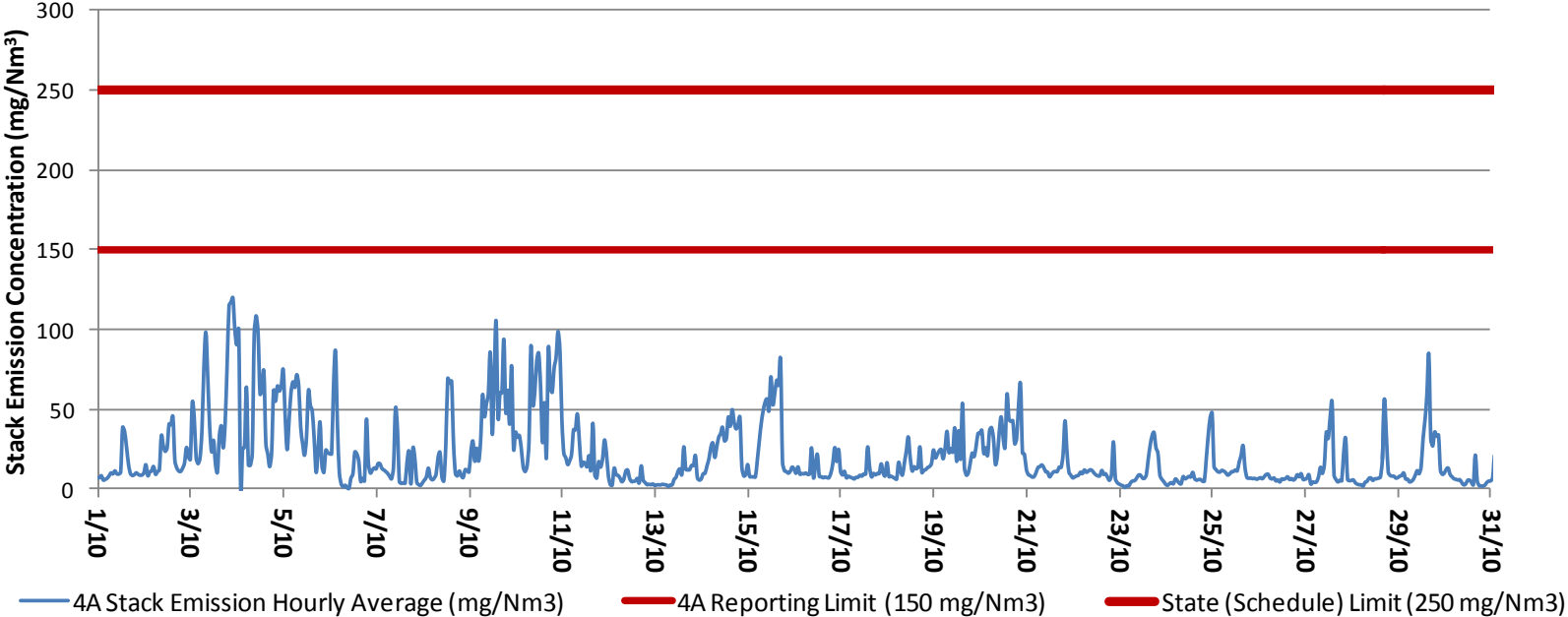
The Environmental Protection Authority (EPA) must be notified as soon as practicably possible of all emissions in excess of the Schedule 1 (1) limit or reporting limit and cause as well as remedial actions must be communicated. Where particulate emissions exceed the Schedule 1(1) limit and the cause is not explicitly covered by the Schedule 6 exemptions an investigation will be carried out by the EPA to ensure that ABC Birkenhead has taken all reasonable and practicable measures to reduce the emissions.

Monitoring Results

Presentation of Results

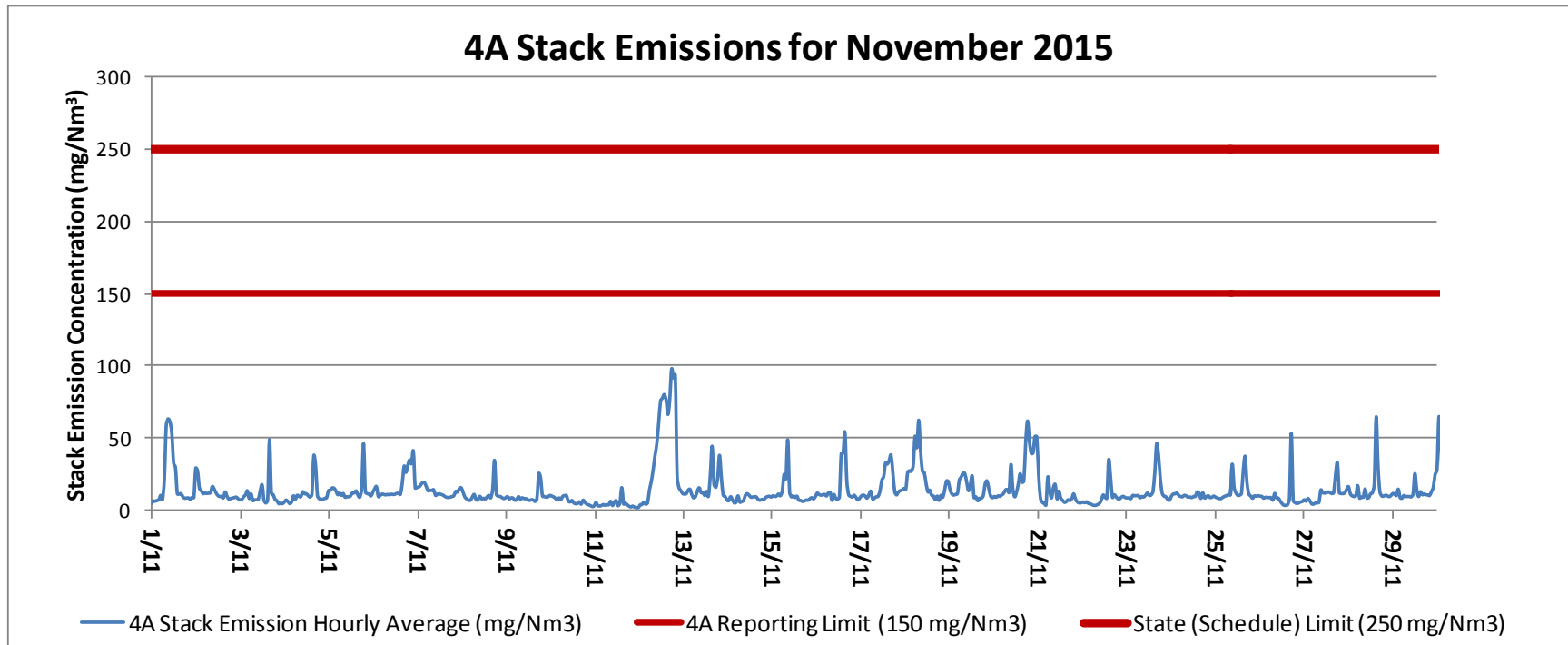
The graphs below detail, the hourly averages of 10 minute averages of stack emissions from 4A and 4B stacks. For each month there is a graph for 4A stack and 4B stack. The thin red line indicates the ABC Birkenhead license reporting level and the heavy red line indicated the Air Quality Policy Schedule 1 limit. The tables below each chart show the results of RCA (root cause analysis) that was undertaken for hourly average particulate emissions above the Air Quality Policy Schedule 1 limit or the ABC Birkenhead license reporting levels. RCA on particulate emissions above the ABC Birkenhead license reporting levels are also conducted.

4A Stack Emissions for October 2015



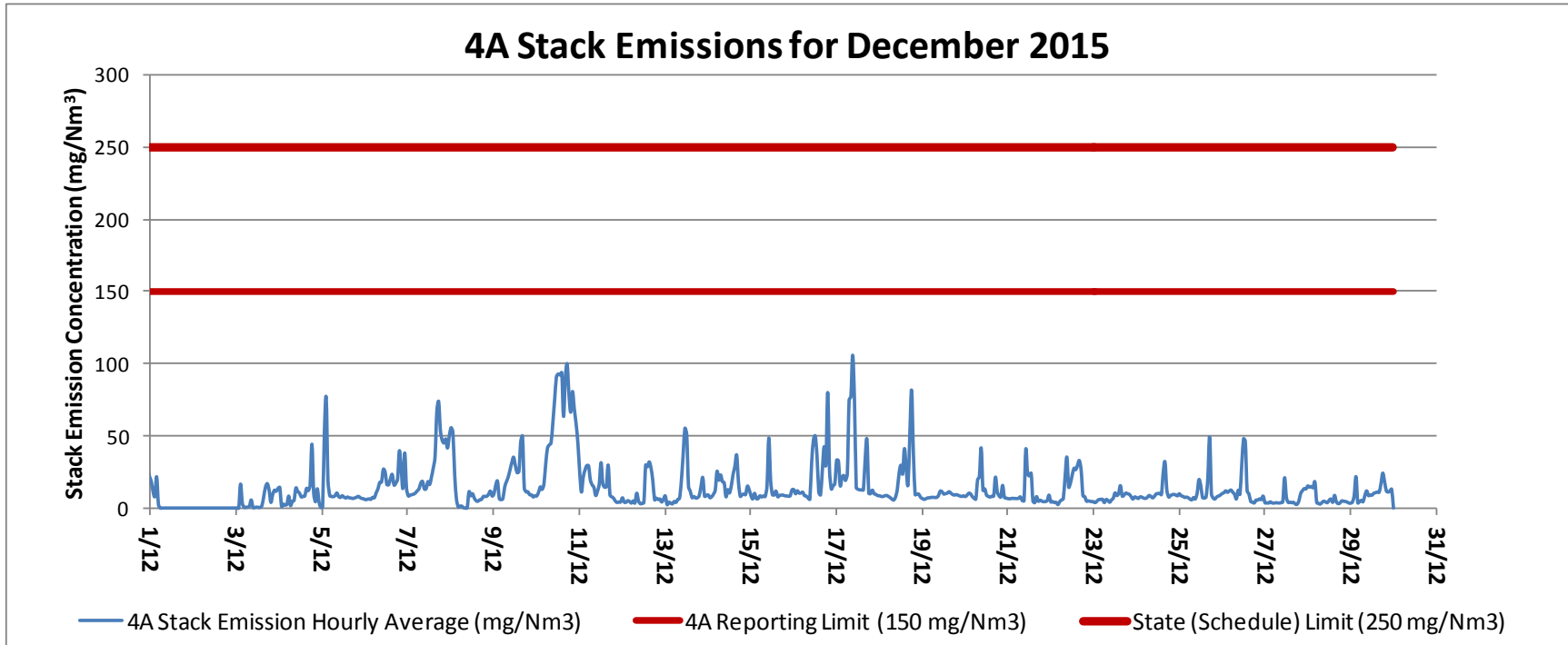
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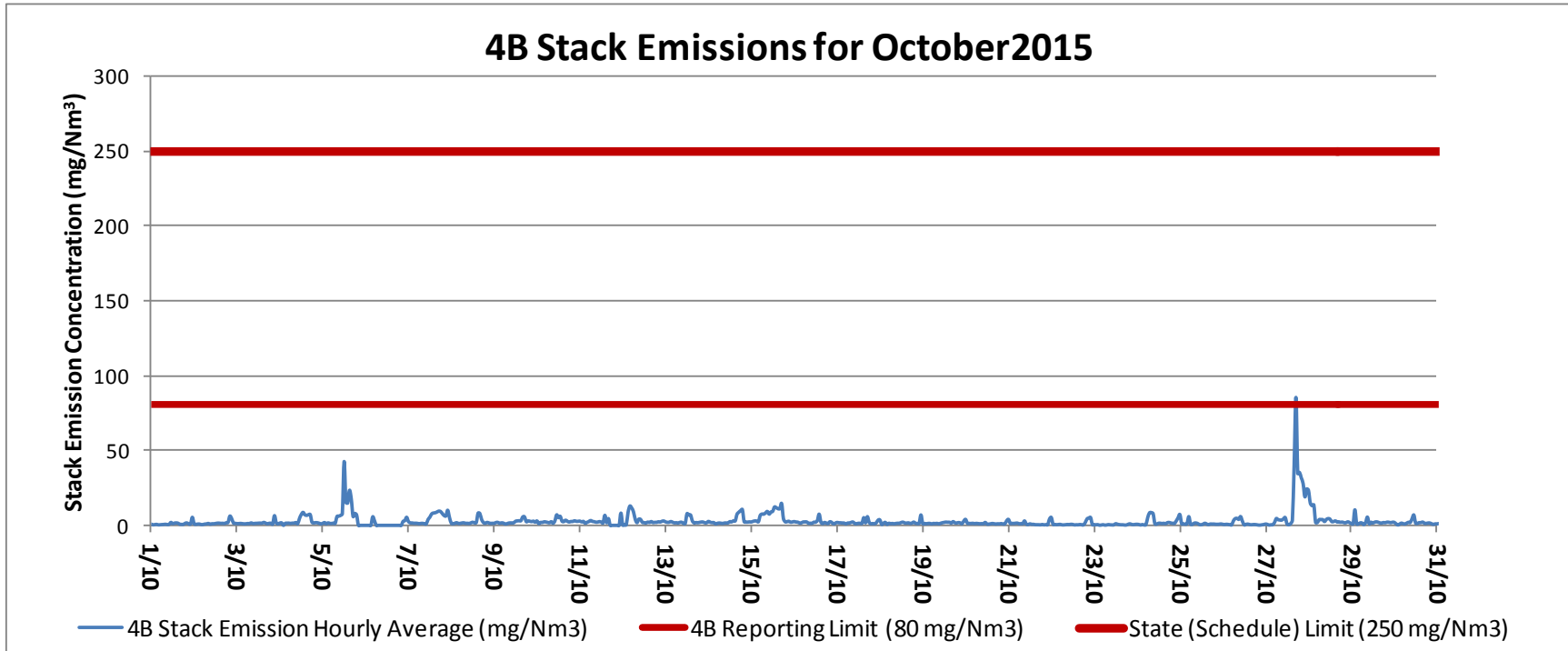
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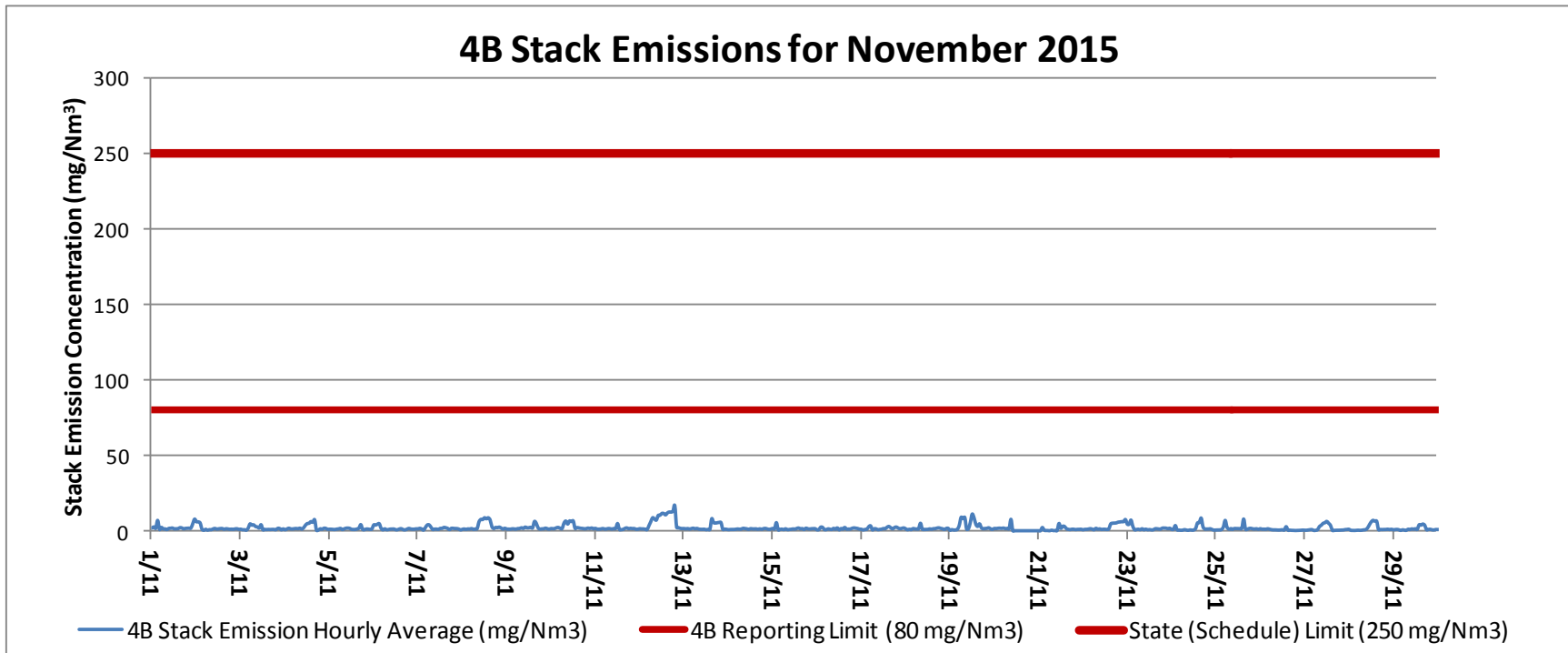
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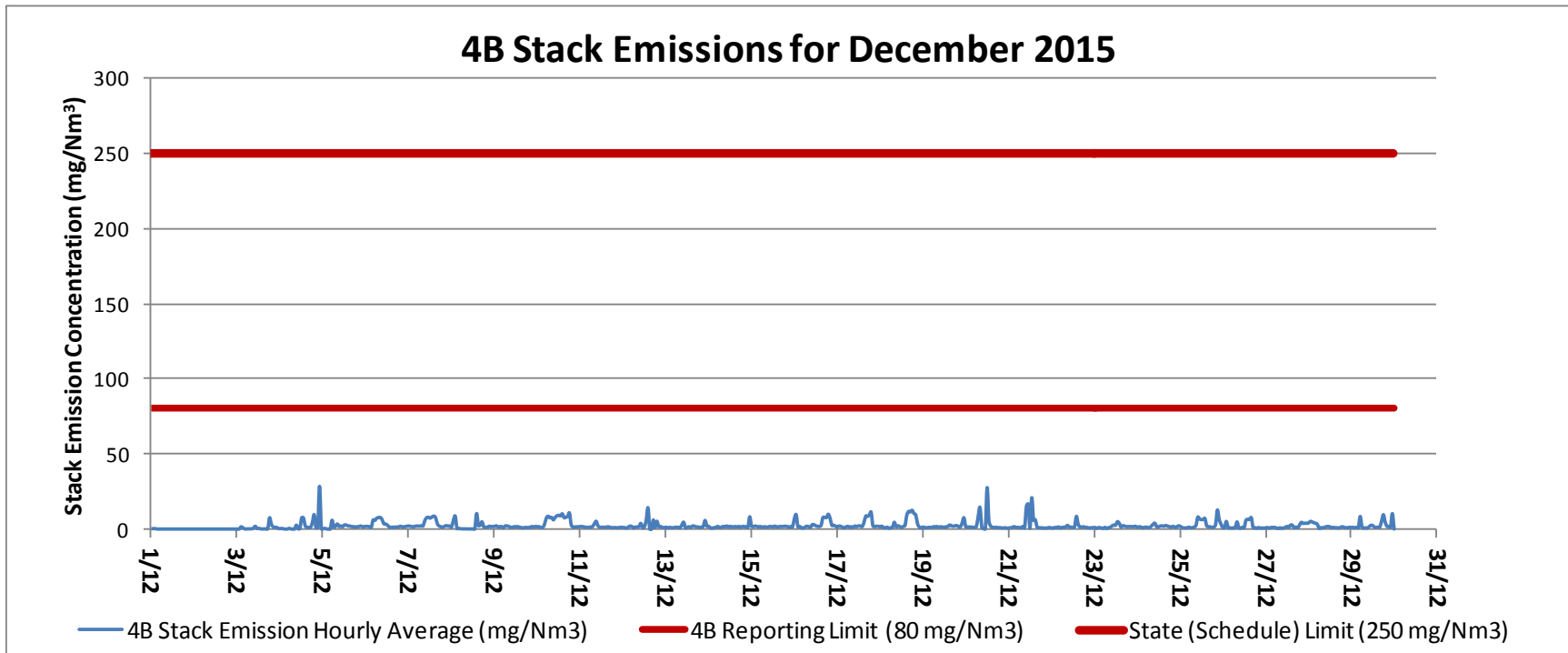
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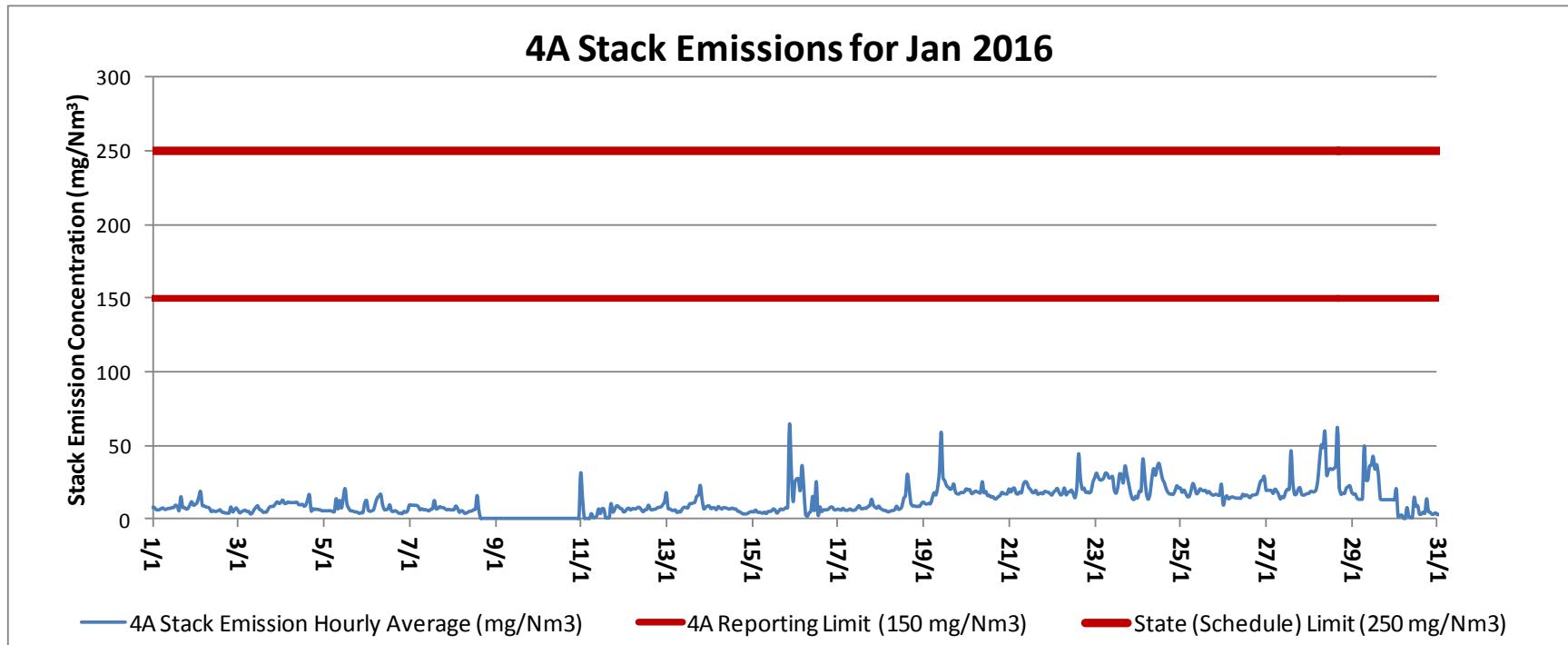
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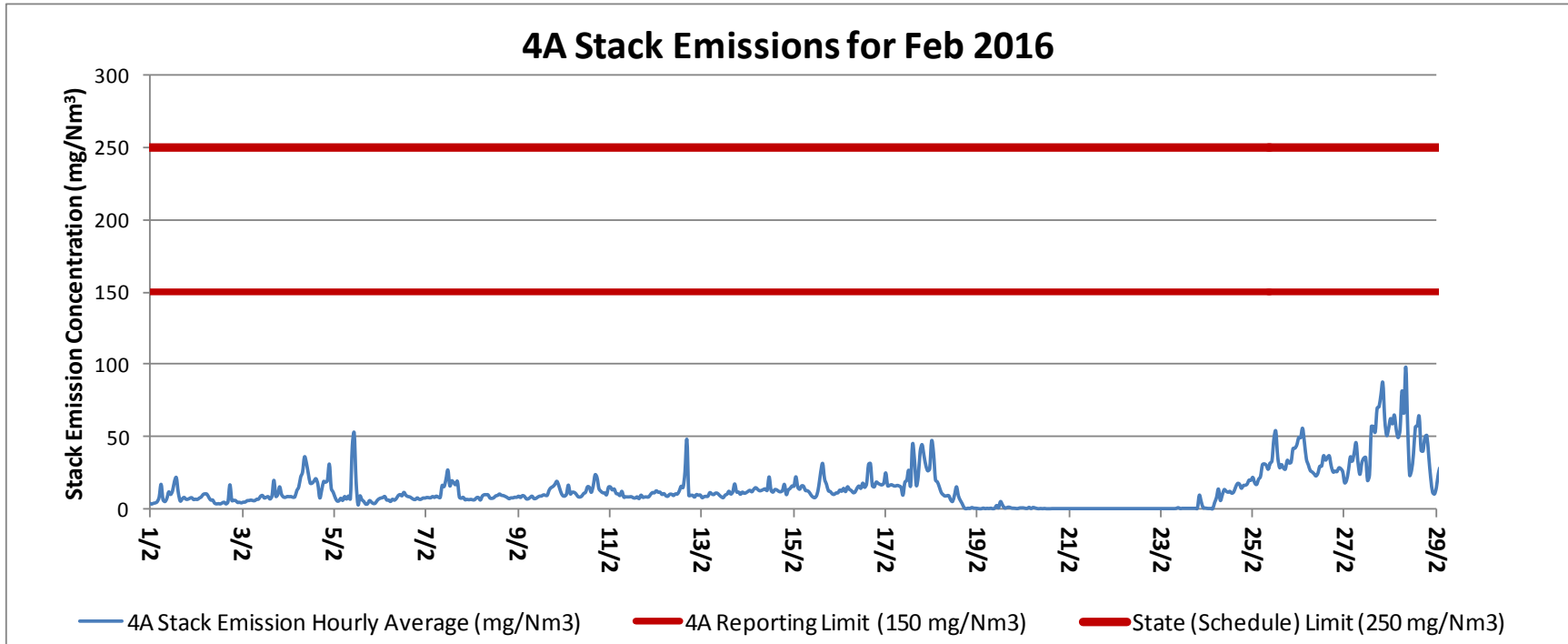
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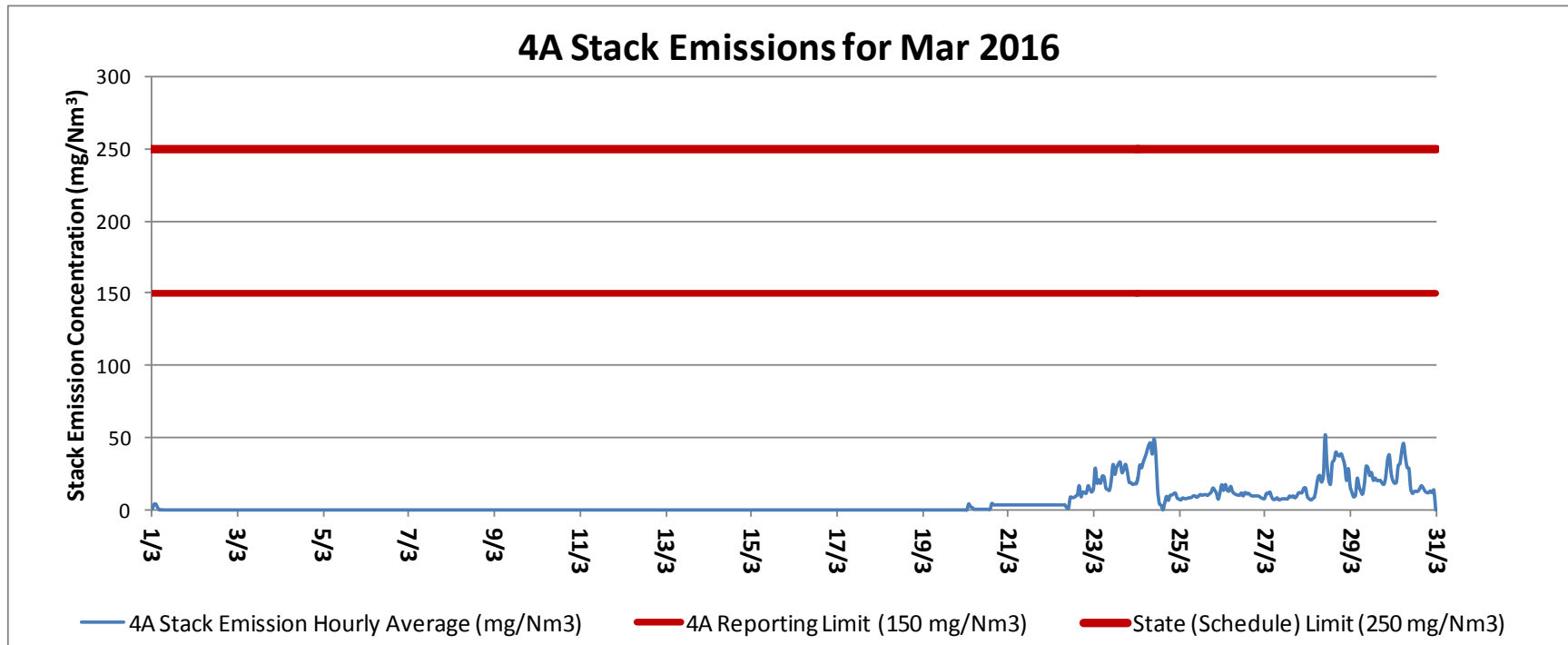
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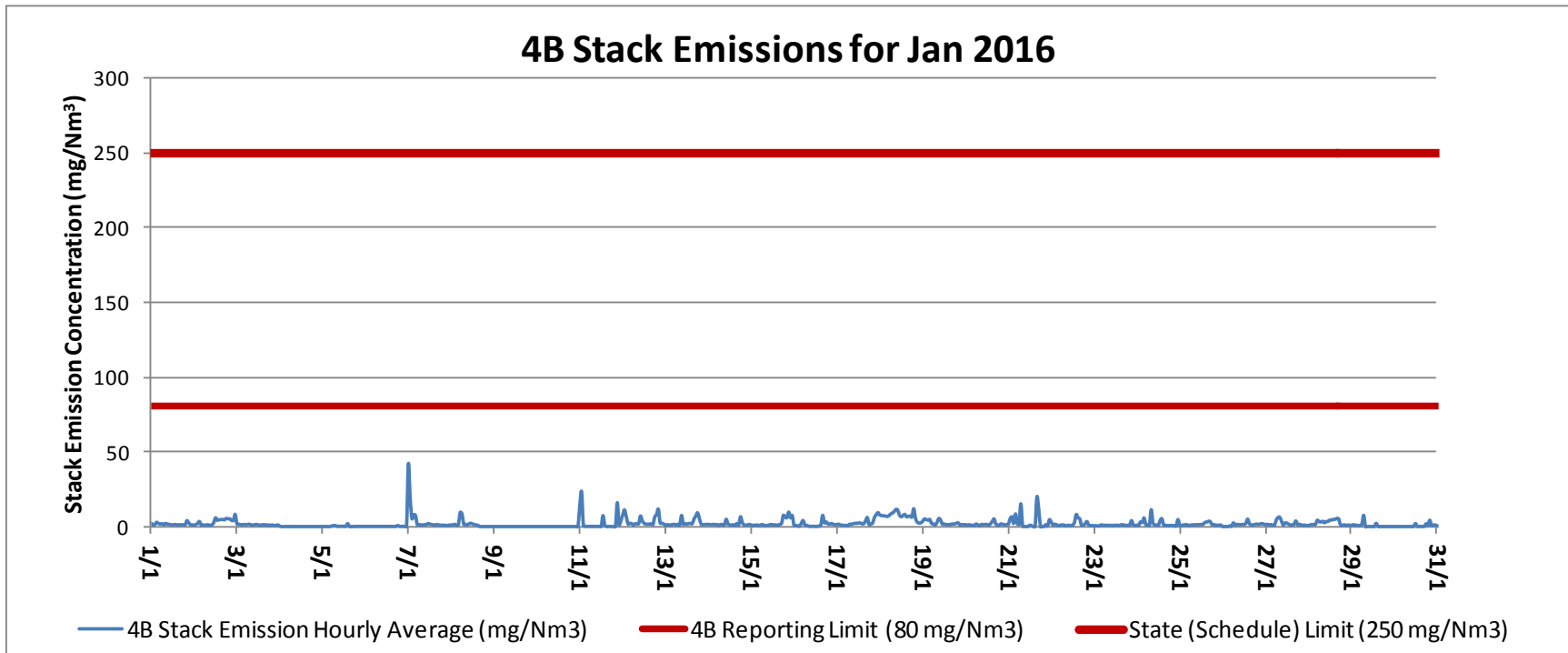
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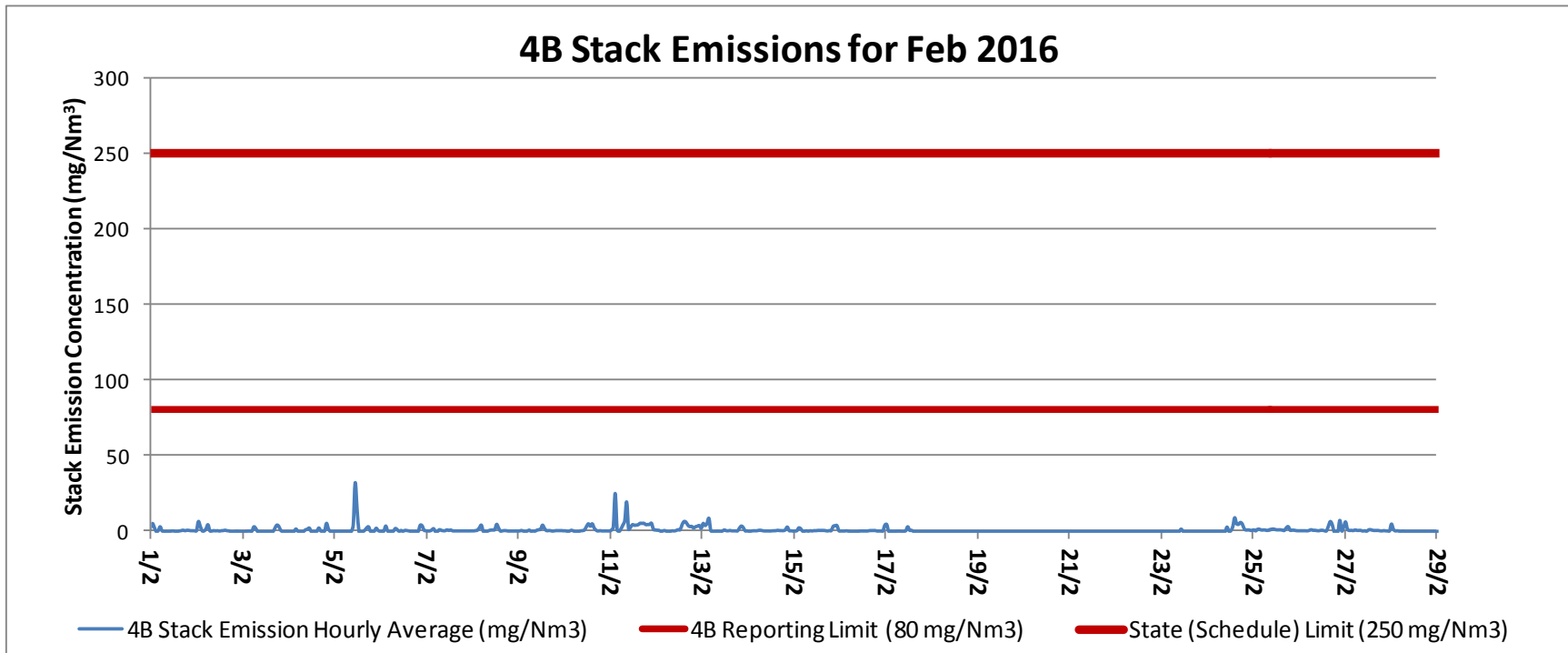
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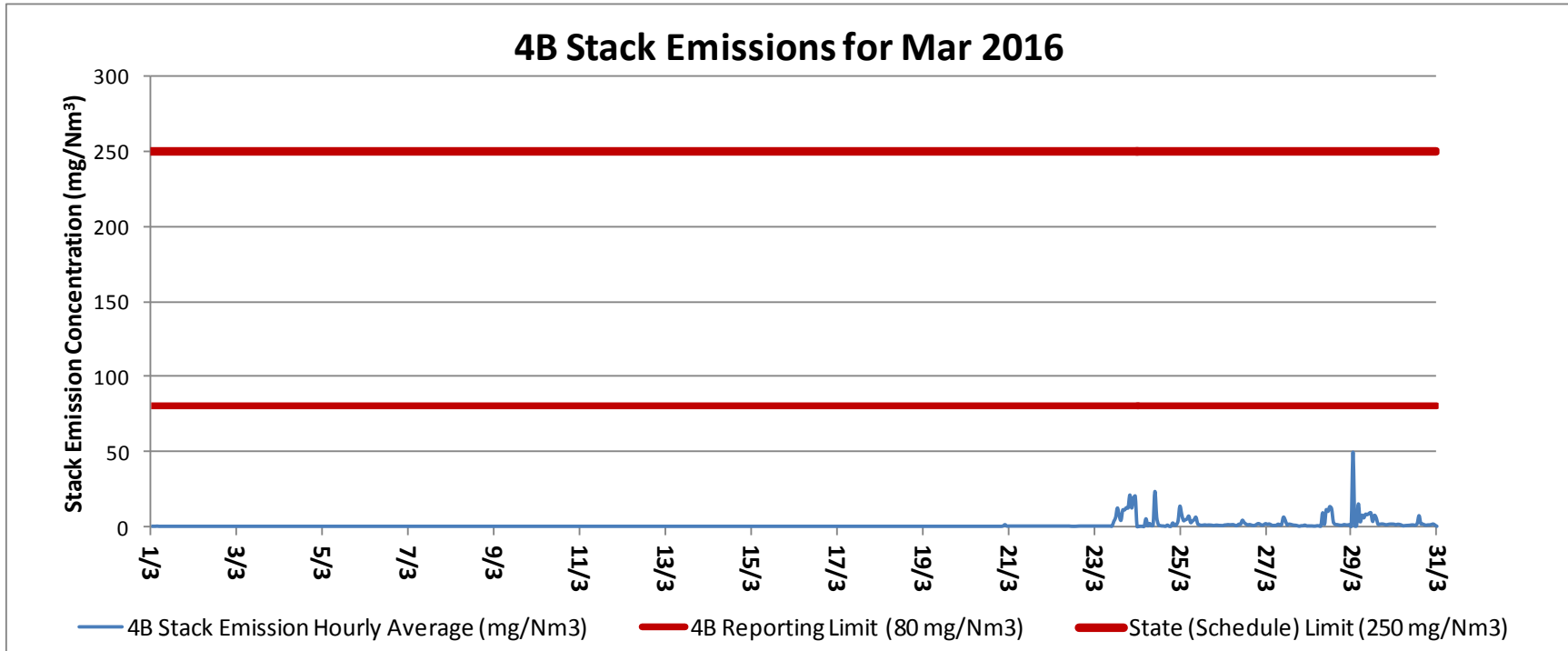
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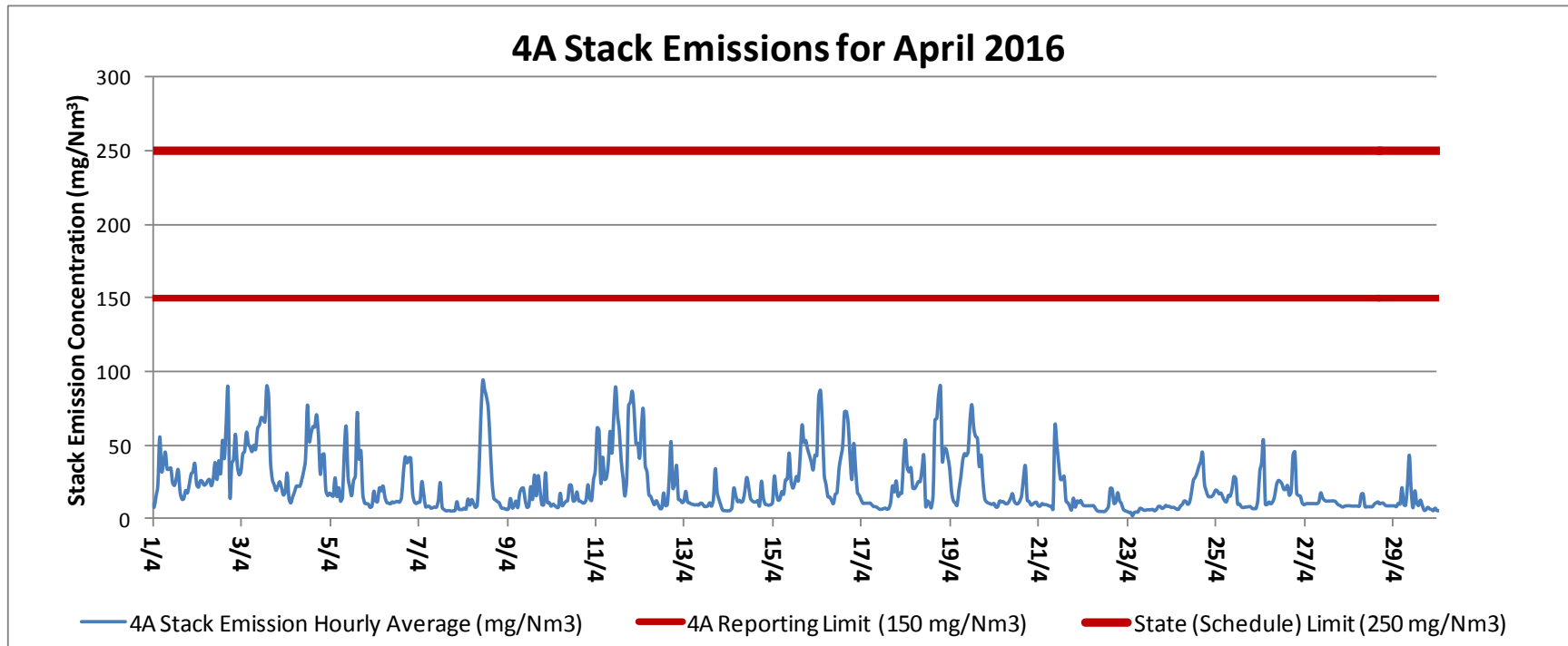
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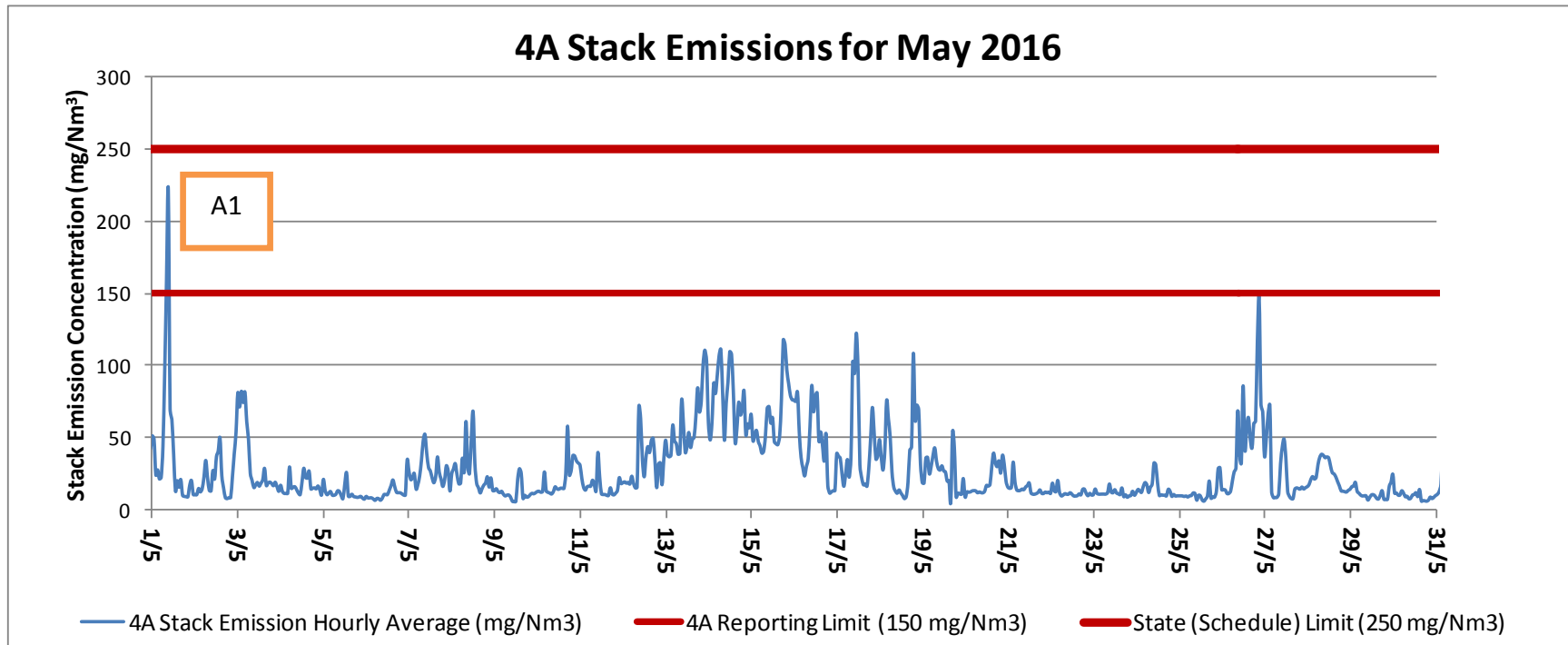
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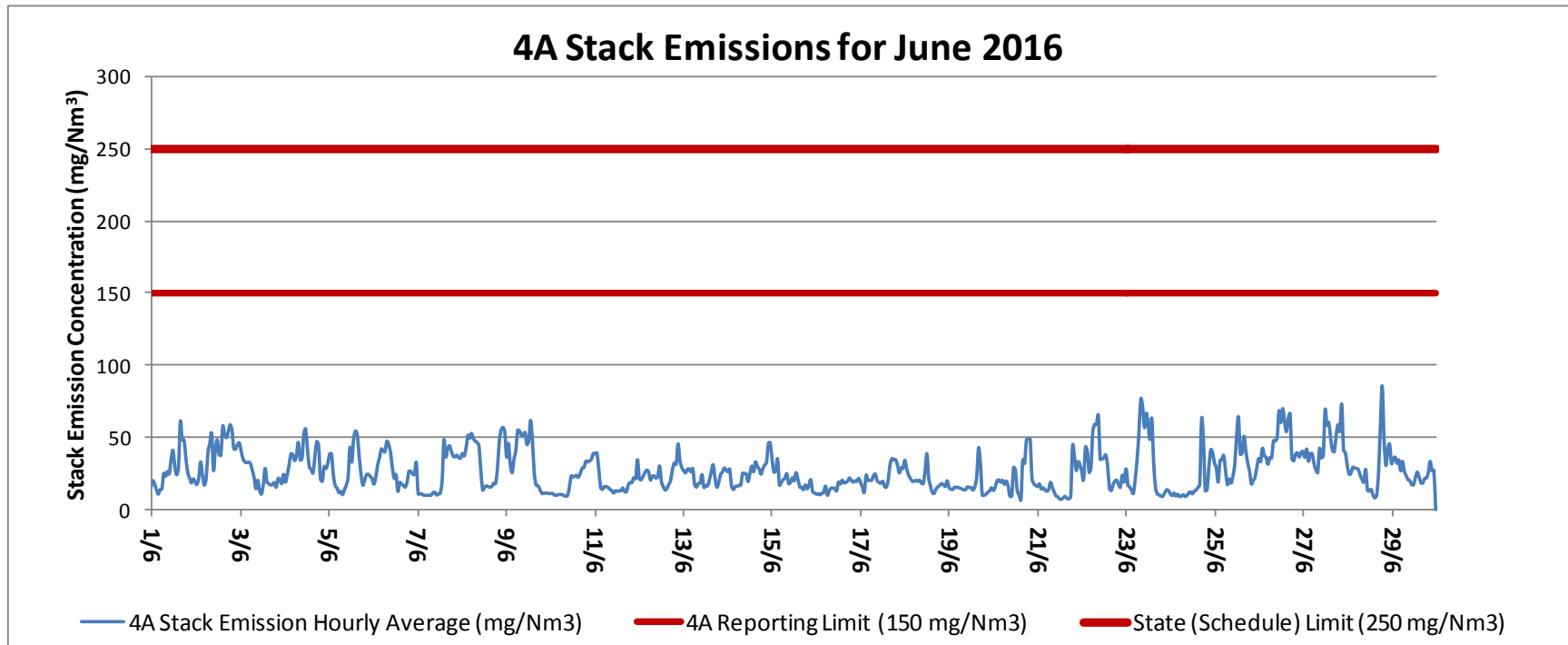
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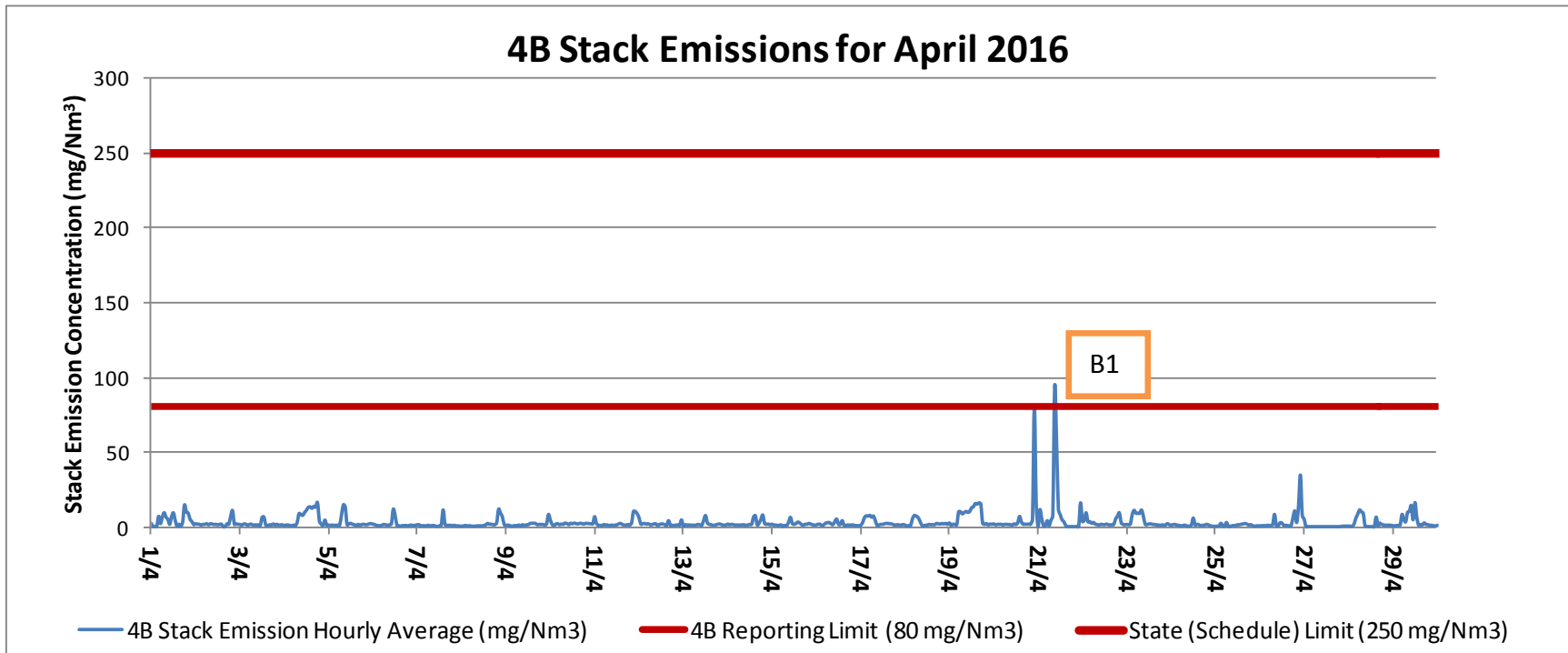
Tag	Description
A1	4A field failure – kiln taken offline.

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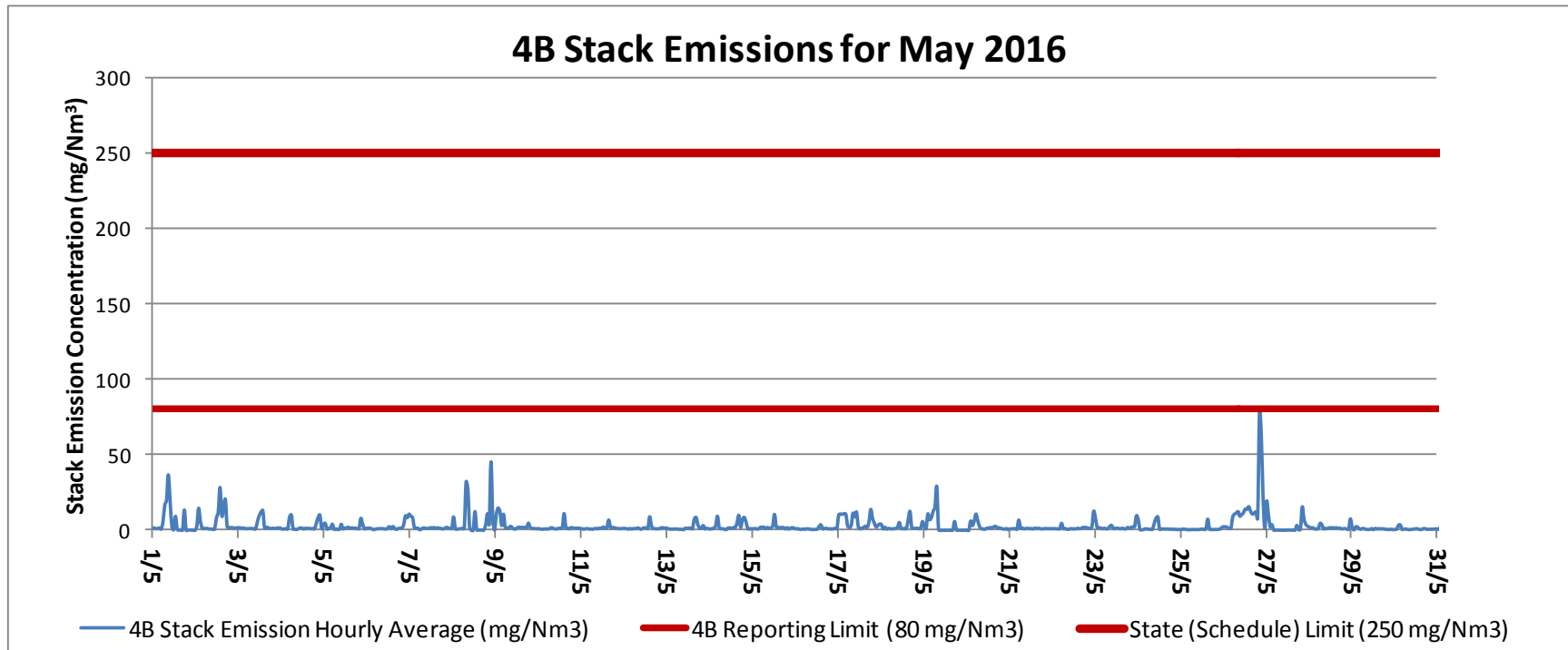
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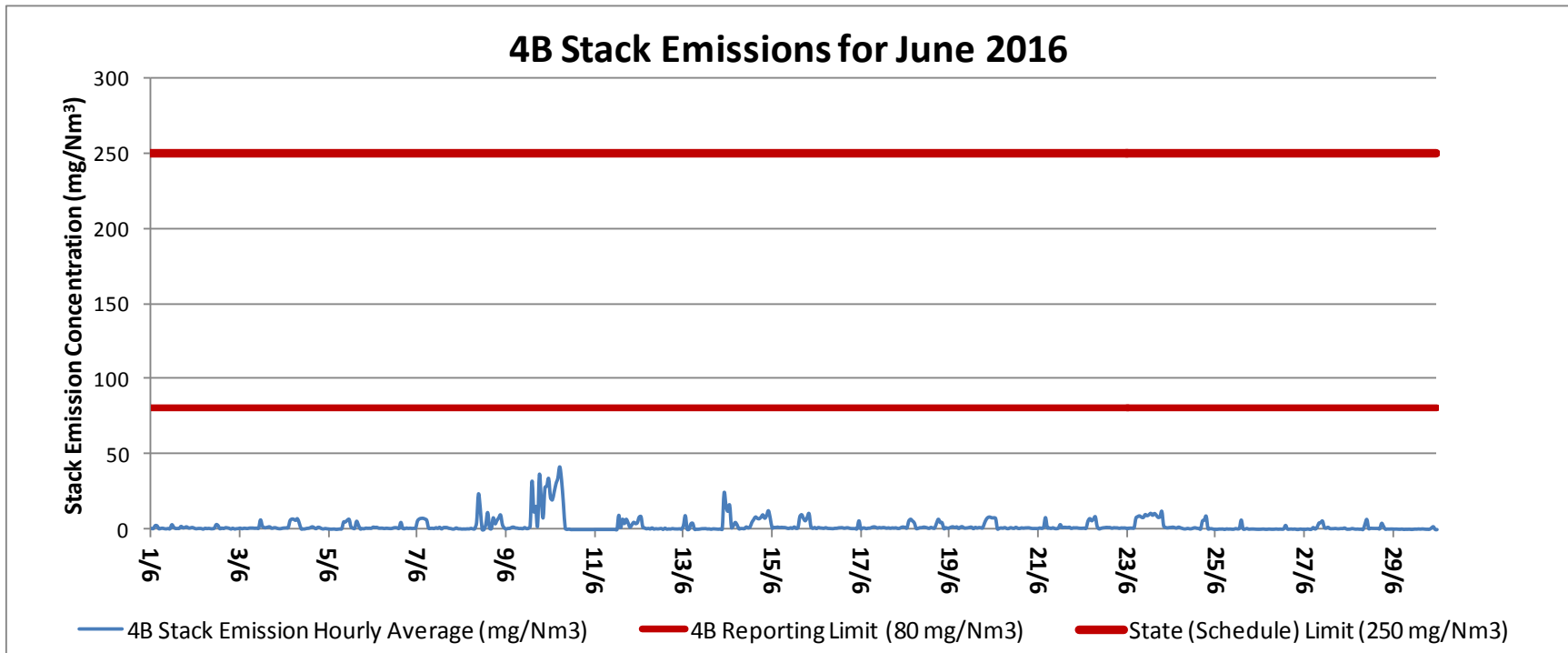
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B1	Kiln/calcliner trip

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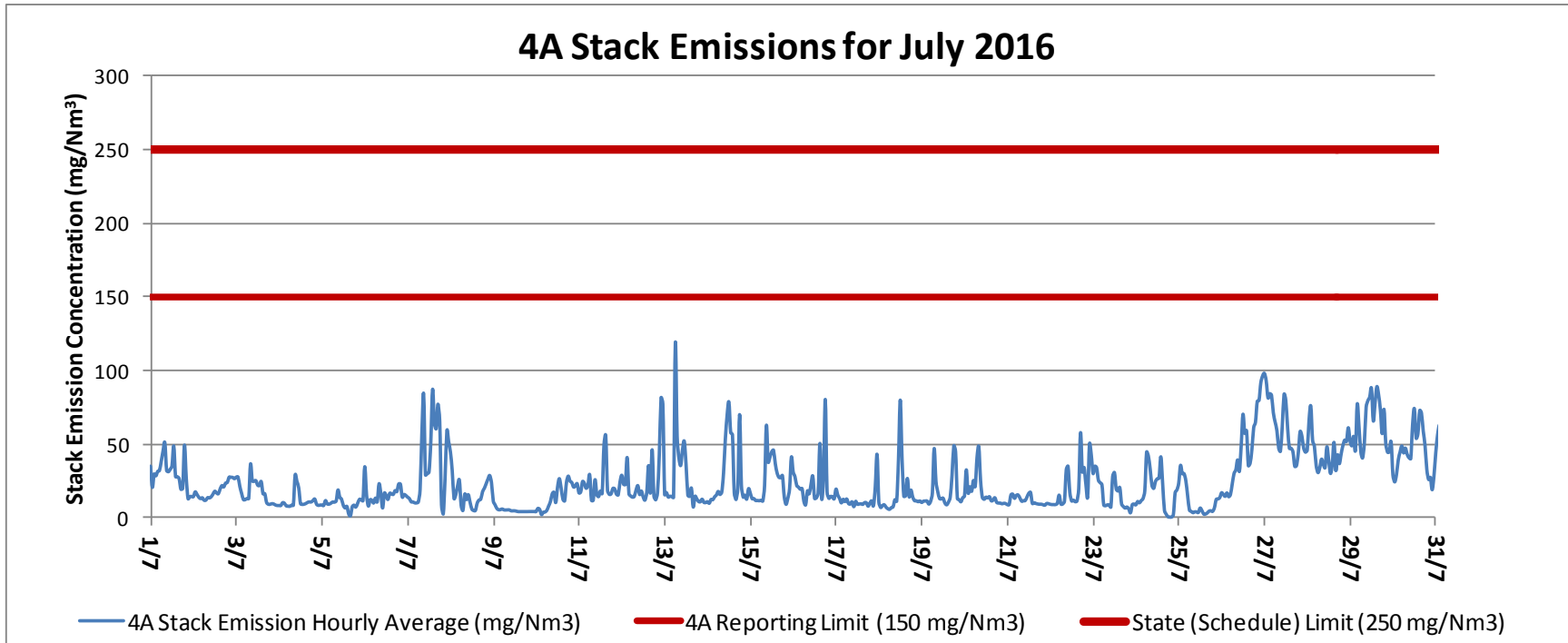
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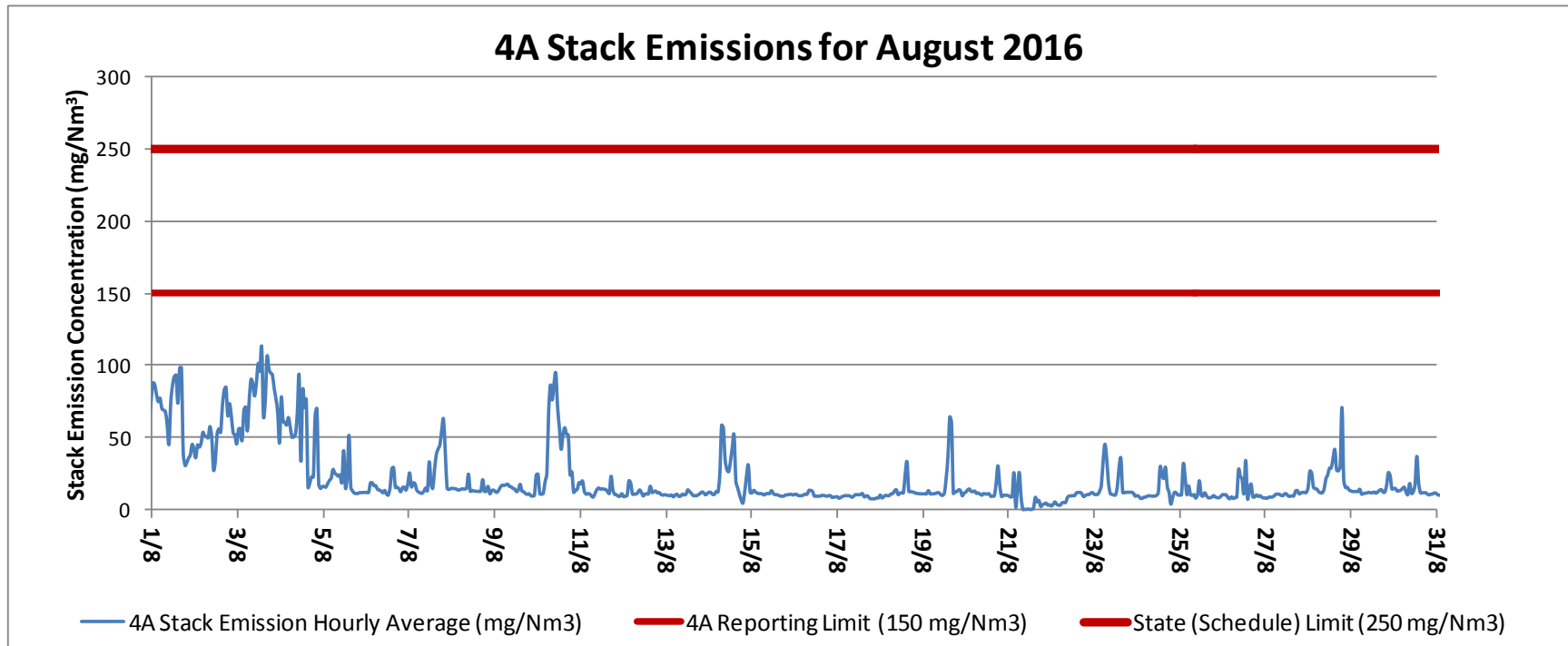
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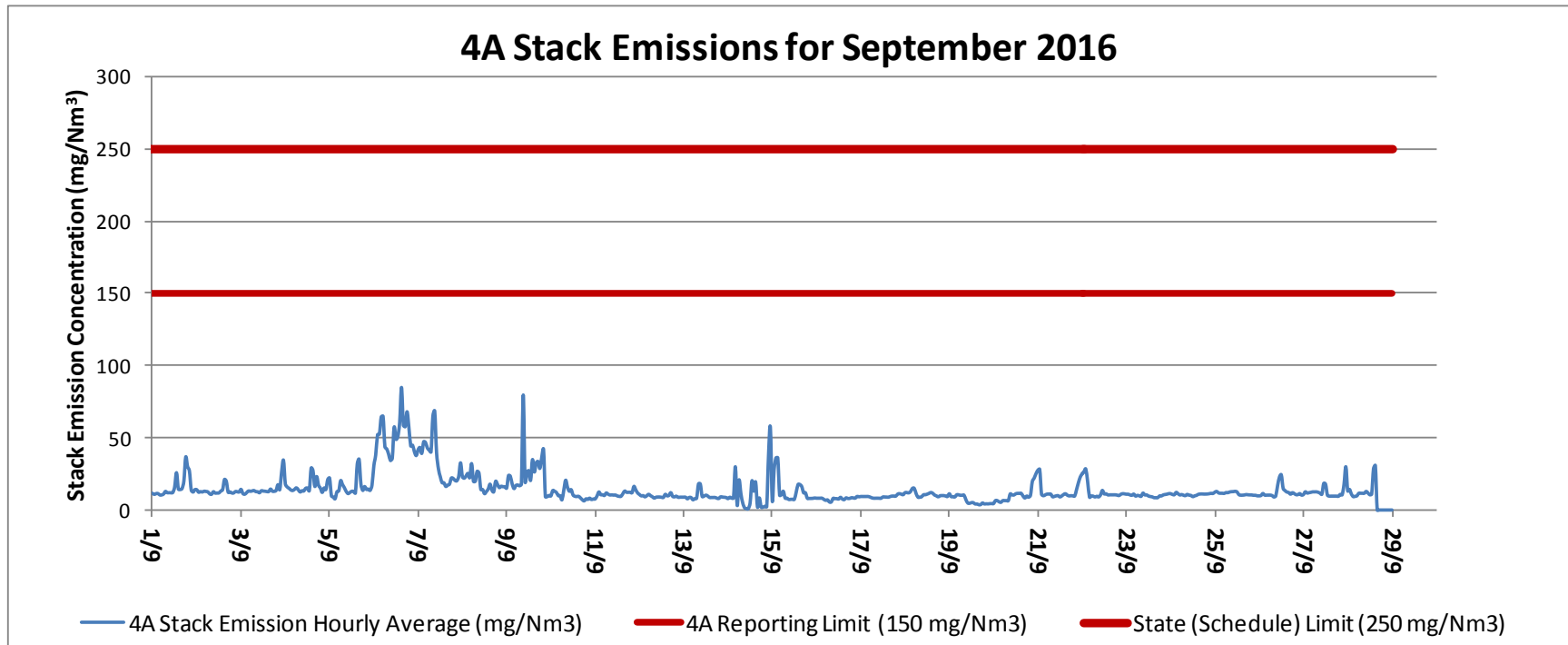
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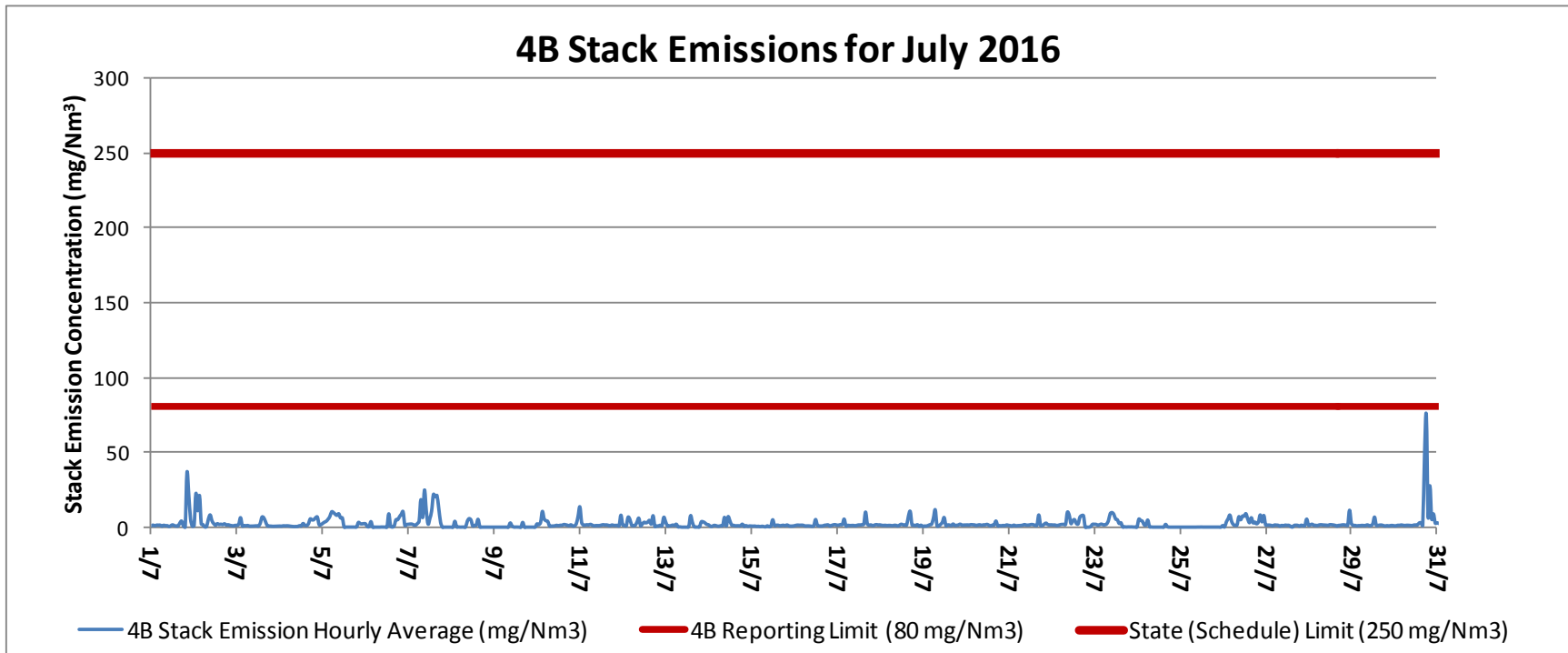
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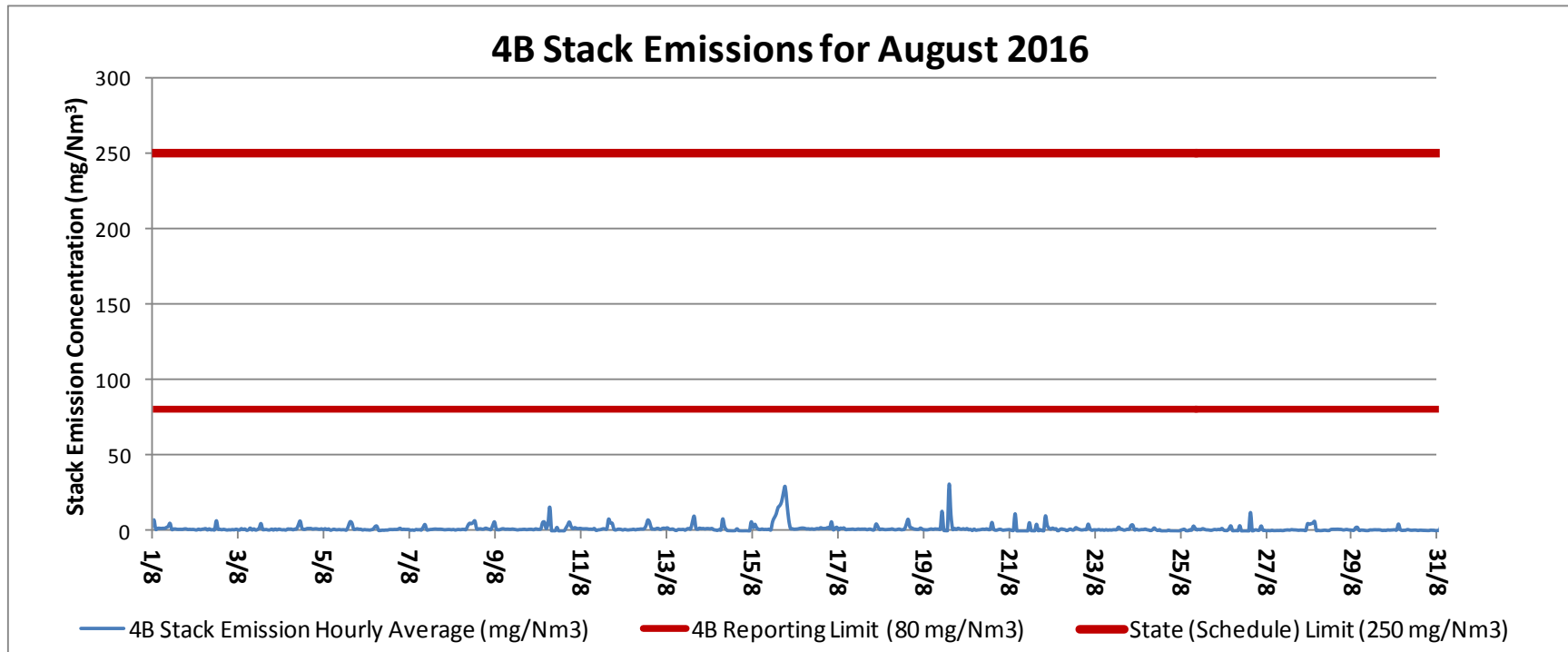
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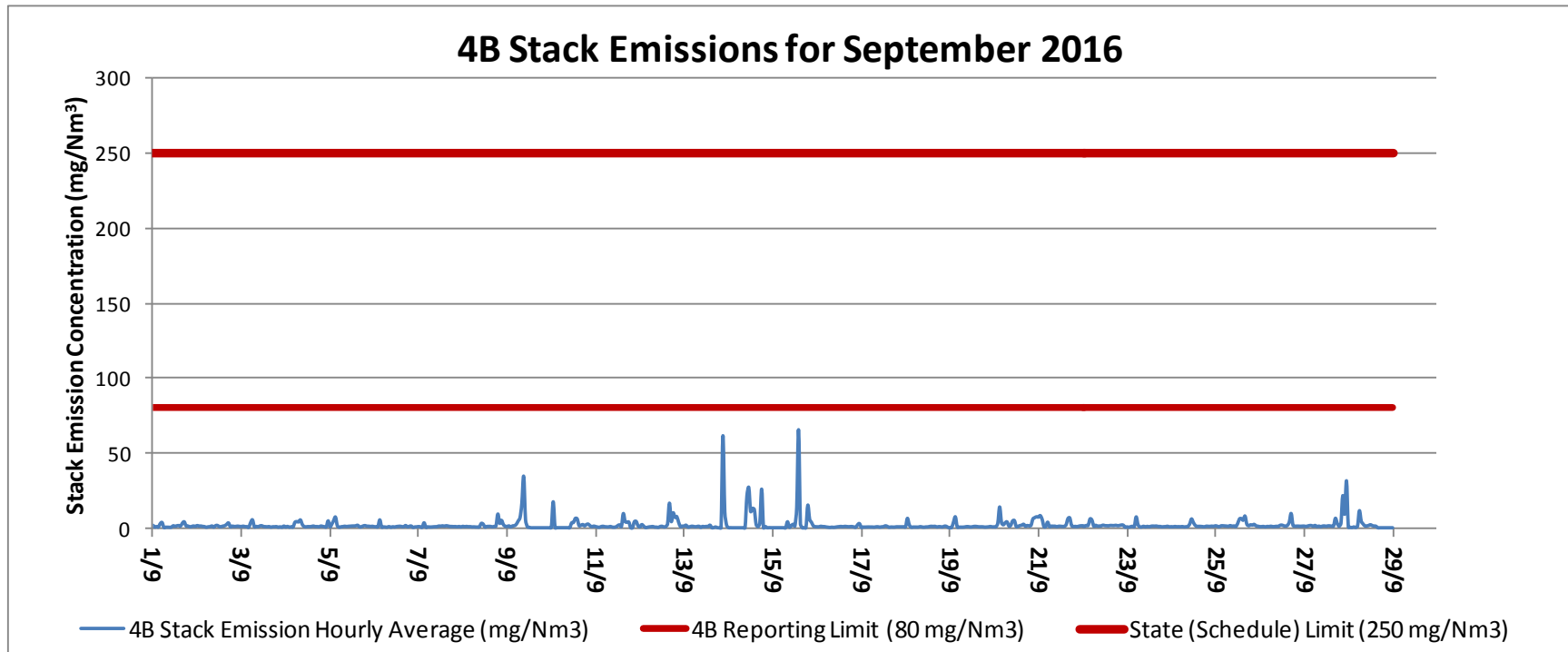
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Monitoring Results – Quality Assurance / Quality Control Evaluation

The data shown in the graphs above was calculated using an opacity curve generated by a number of iterations of spot testing by Axiom Air whom are accredited for compliance with ISO/IEC 17025. The opacity meters are also calibrated daily as per the suppliers standard.

Key Process Improvements for the period

(for more detailed analysis of improvement initiatives refer to the quarterly reports)

As part of our continuous improvement commitment the emissions reduction team formed last year has continued to work on new and existing projects to mitigate emissions, including:

Plant Stack Emissions Improvement Team

Following an FLSmith Airtech specialist site visit in November 2015 to review the operability of the site electrostatic precipitators and fabric filter bag house, improvements were trialed and implemented on all of the electrostatic precipitator field controllers. Changes were made to improve the collecting efficiency during process upsets (e.g. Raw mill starts) and during normal operation to reduce the emissions. The change lowered baseline emissions on 4A and 4B electrostatic precipitator during both normal and unstable operating conditions.

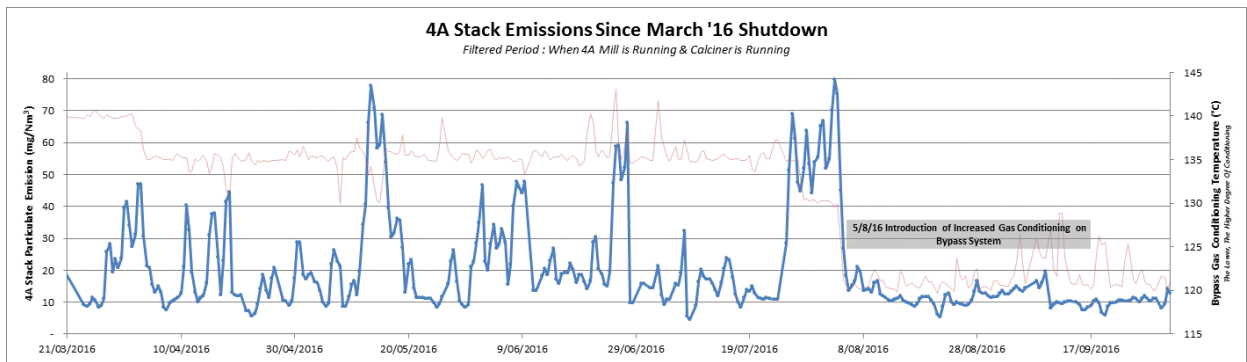
Annual shutdown improvements

- Installation of kiln ventilation fan which allowed for extensive bypass ESP maintenance. The new ventilation infrastructure allowed much greater scope in the bypass ESP, and a significant amount of mechanical work and optimization was performed.
- 4B ESP major maintenance, with regular mechanical maintenance along with major outlet dampening wall replacement.
- Installation of build-up inhibiting kiln ‘blasters’ to prevent process instability from affecting the bypass system. This instability was a major cause of 4A stack excursions.
- New bypass dust handling system installed to eliminate dust blockages and potential excursions in the handling system.

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Bypass Operation Optimisation

The Birkenhead technical and operations team have been analyzing the operation of the bypass system over the past 12 months to investigate how the environment footprint can be minimized as much as possible. The outcome of this investigation was an improvement on the gas conditioning bypass system, which was intended to increase the collection efficiency of the bypass electrostatic precipitator.



The graph above shows the dramatic improvement from the changes made on 5/8/16. The blue line represents the particulate emissions measured on 4A stack, while the red line indicates the bypass temperature control (high resolution version in Q3 quarterly report). The emissions on 4A stack have dropped considerably, and the process is more resilient to disturbances. The change observed has greatly contributed to future project plans for emissions reduction on site.

Cooler Bag Filter trials

New cooler filter bags were trialled in cell 4 of the kiln 4 cooler bag filter during the annual shutdown. This area showed the greatest wear rates in the previous campaign, and so it was determined to be the best location for a trial. The trial bags were made from a higher durability weave, as well as additional designed reinforcement around the cuffs of the bags.

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Conclusion

This is the ninth annual report generated as a result of a new license. There were no incidents with an hourly average particulate concentration above 250mg/Nm³ on 4B or 4B stack. There was one incidents based on a one hourly average over the reporting limit of 150mg/Nm³ on 4A stack where the 4A ESP experienced a field failure. The kiln was taken offline to repair. There was one incident above the reporting limit of 80mg/Nm³ on 4B stack, which was occurred during a combustibles trip on the kiln/calcliner.