Report Number R002740

Emission Testing Report
Industrial Galvanizers, Girraween
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1 EXECUTIVE SUMMARY

Ektimo was engaged by Industrial Galvanizers to perform emission testing to determine the emissions to air as detailed below;

Results from this stack emission monitoring program indicate that Industrial Galvanizers was compliant with requirements of Licence 1895 during the sampling period.

Monitoring was performed as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Test Date</th>
<th>Test Parameters*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Stack</td>
<td>9 May 2016</td>
<td>Solid particles, zinc</td>
</tr>
<tr>
<td>Spinning Mill Baghouse Stack</td>
<td>9 May 2016</td>
<td>Solid particles, zinc</td>
</tr>
</tbody>
</table>

* Flow rate, velocity, temperature and moisture were determined unless otherwise stated

The sampling methodologies chosen by Ektimo are those recommended by the NSW Office of Environment and Heritage (as specified in the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, January 2007).

All results are reported on a dry basis at STP. Unless otherwise indicated, the methods cited in this report have been performed without deviation.

Plant operating conditions have been noted in the report.

2 LICENCE COMPARISON

<table>
<thead>
<tr>
<th>EPA No.</th>
<th>Location Description</th>
<th>Pollutant</th>
<th>Units</th>
<th>Licence limit</th>
<th>Detected values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main Stack</td>
<td>Solid particles</td>
<td>mg/m³</td>
<td>100</td>
<td>&lt;2</td>
</tr>
<tr>
<td>2</td>
<td>Spinning Mill Baghouse Stack</td>
<td>Solid particles</td>
<td>mg/m³</td>
<td>100</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Note: All analytes highlighted in green are below the licence limit set by the NSW EPA as per licence 1895 (last amended on 22/09/2015).
# RESULTS

## 3.1 Main Stack

<table>
<thead>
<tr>
<th>Date</th>
<th>Client</th>
<th>Report</th>
<th>Stack ID</th>
<th>Licence No.</th>
<th>Location</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/05/2016</td>
<td>Industrial Galvanizers</td>
<td>R002740</td>
<td>Main Stack</td>
<td>1895</td>
<td>Girraween</td>
<td>NSW</td>
</tr>
</tbody>
</table>

**Ektimo Staff**

David Hill & Ryan Collins

**Process Conditions**

Please refer to client records.

### Sampling Plane Details

- **Sampling plane dimensions**: 1200 mm
- **Sampling plane area**: 1.13 m²
- **Sampling port size, number**: 4” BSP (x2)
- **Access & height of ports**: Elevated work platform 25 m
- **Duct orientation & shape**: Vertical  Circular
- **Downstream disturbance**: Exit 15 D
- **Upstream disturbance**: Junction 12 D
- **No. traverses & points sampled**: 2 12
- **Compliance of sample plane to AS4323.1**: Ideal

**Comments**

The discharge is assumed to be composed of dry air and moisture.

### Stack Parameters

- **Moisture content, %v/v**: 1.8
- **Gas molecular weight, g/g mole**: 28.8 (wet) 29.0 (dry)
- **Gas density at STP, kg/m³**: 1.28 (wet) 1.29 (dry)

### Gas Flow Parameters

- **Measurement time (hhmm)**: 0945
- **Temperature, °C**: 31
- **Velocity at sampling plane, m/s**: 20
- **Volumetric flow rate, discharge, m³/s**: 22
- **Volumetric flow rate (wet STP), m³/s**: 20
- **Volumetric flow rate (dry STP), m³/s**: 20
- **Mass flow rate (wet basis), kg/hour**: 92000

### Isokinetic Sampling Parameters

- **Sampling time, min**: 60
- **Isokinetic rate, %**: 100
- **Velocity difference, %**: <1

### Isokinetic Results

<table>
<thead>
<tr>
<th>Sampling time</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>0955-1055</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Concentration mg/m³</th>
<th>Mass Rate g/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Particles</td>
<td>&lt;2</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.069</td>
<td>0.081</td>
</tr>
</tbody>
</table>
### 3.2 Spinning Mill Baghouse Stack

<table>
<thead>
<tr>
<th>Date</th>
<th>9/05/2016</th>
<th>Client</th>
<th>Industrial Galvanizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report</td>
<td>R002740</td>
<td>Stack ID</td>
<td>Spinning Mill Baghouse Stack</td>
</tr>
<tr>
<td>Licence No.</td>
<td>1895</td>
<td>Location</td>
<td>Girraween</td>
</tr>
<tr>
<td>State</td>
<td>NSW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ektimo Staff</td>
<td>David Hill &amp; Ryan Collins</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Process Conditions
Please refer to client records.

#### Sampling Plane Details
- **Sampling plane dimensions**: 450 mm
- **Sampling plane area**: 0.159 m²
- **Sampling port size, number**: 4” BSP (x2)
- **Access & height of ports**: Elevated work platform 3 m
- **Duct orientation & shape**: Vertical Circular
- **Downstream disturbance**: Exit 12 D
- **Upstream disturbance**: Junction 2 D
- **No. traverses & points sampled**: 12
- **Compliance of sample plane to AS4323.1**: Compliant but non-ideal⁽¹⁾

#### Comments
The discharge is assumed to be composed of dry air and moisture.

#### Stack Parameters
- **Moisture content, %v/v**: 1
- **Gas molecular weight, g/g mole**: 28.9 (wet) 29.0 (dry)
- **Gas density at STP, kg/m³**: 1.29 (wet) 1.29 (dry)

#### Gas Flow Parameters
- **Measurement time (hhmm)**: 1130
- **Temperature, °C**: 32
- **Velocity at sampling plane, m/s**: 23
- **Volumetric flow rate, discharge, m³/s**: 3.7
- **Volumetric flow rate (wet STP), m³/s**: 3.3
- **Volumetric flow rate (dry STP), m³/s**: 3.2
- **Mass flow rate (wet basis), kg/hour**: 15000

#### Isokinetic Sampling Parameters
- **Sampling time, min**: 60
- **Isokinetic rate, %**: 100
- **Velocity difference, %**: -2

#### Isokinetic Results

<table>
<thead>
<tr>
<th>Sampling time</th>
<th>Concentration</th>
<th>Mass Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1140-1240</td>
<td>g/m³</td>
<td>g/min</td>
</tr>
<tr>
<td>Solid Particles</td>
<td>2.8</td>
<td>0.55</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.18</td>
<td>0.035</td>
</tr>
</tbody>
</table>

⁽¹⁾ The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D.

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"Ektimo Report R002740 prepared for Industrial Galvanizers, Girraween"

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4 PLANT OPERATING CONDITIONS
Unless otherwise stated, the plant operating conditions were normal at the time of testing. See Industrial Galvanizers’s records for complete process conditions.

5 TEST METHODS
All sampling and analysis was performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sampling Method</th>
<th>Analysis Method</th>
<th>Method Detection Limit</th>
<th>Uncertainty*</th>
<th>NATA Accredited Sampling</th>
<th>NATA Accredited Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NSW TM-1</td>
<td>NA</td>
<td>NA</td>
<td></td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Moisture content</td>
<td>NSW TM-2-22</td>
<td>NSW TM-22</td>
<td>0.004</td>
<td>19%</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Temperature</td>
<td>NSW TM-2</td>
<td>NA</td>
<td>0°C</td>
<td>2%</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Flow rate</td>
<td>NSW TM-2</td>
<td>NA</td>
<td>Location specific</td>
<td>8%</td>
<td>✓</td>
<td>NA</td>
</tr>
<tr>
<td>Velocity</td>
<td>NSW TM-2</td>
<td>NA</td>
<td>2m/s-1</td>
<td>7%</td>
<td>✓</td>
<td>NA</td>
</tr>
<tr>
<td>Solid particles</td>
<td>NSW TM-15</td>
<td>NSW TM-15</td>
<td>0.001g/m³</td>
<td>5%</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Zinc</td>
<td>NSW TM-12, NSW TM-13, NSW TM-14</td>
<td>Envirolab inhouse</td>
<td>Analyte specific</td>
<td>15%</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

1 Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 19 May 2016 in report number 146478

6 QUALITY ASSURANCE/ QUALITY CONTROL INFORMATION
Ektimo (EML) and Ektimo (ETC) are accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA’s website www.nata.com.au.

Ektimo (EML) and Ektimo (ETC) are accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories. ISO/IEC 17025 requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Compliance Manager.

NATA is a member of APLAC (Asia Pacific Laboratory Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through the mutual recognition arrangements with both of these organisations, NATA accreditation is recognised world-wide.

A formal Quality Control program is in place at Ektimo to monitor analyses performed in the laboratory and sampling conducted in the field. The program is designed to check where appropriate; the sampling reproducibility, analytical method, accuracy, precision and the performance of the analyst. The Laboratory Manager is responsible for the administration and maintenance of this program.
7 DEFINITIONS

The following symbols and abbreviations may be used in this test report:

**STP**  
Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.

**Disturbance**  
A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.

**VOC**  
Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.

**TOC**  
The sum of all compounds of carbon which contain at least one carbon to carbon bond, plus methane and its derivatives.

**OU**  
The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).

**PM<sub>2.5</sub>**  
Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (μm).

**PM<sub>10</sub>**  
Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (μm).

**BSP**  
British standard pipe

**NT**  
Not tested or results not required

**NA**  
Not applicable

**D<sub>50</sub>**  
‘Cut size’ of a cyclone defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. The D<sub>50</sub> method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D<sub>50</sub> of that cyclone and less than the D<sub>50</sub> of the preceding cyclone.

**D**  
Duct diameter or equivalent duct diameter for rectangular ducts

<  
Less than

>  
Greater than

≥  
Greater than or equal to

~  
Approximately

**CEM**  
Continuous Emission Monitoring

**CEMS**  
Continuous Emission Monitoring System

**DER**  
WA Department of Environment & Regulation

**DECC**  
Department of Environment & Climate Change (NSW)

**EPA**  
Environment Protection Authority

**FTIR**  
Fourier Transform Infra Red

**NATA**  
National Association of Testing Authorities

**RATA**  
Relative Accuracy Test Audit

**AS**  
Australian Standard

**USEPA**  
United States Environmental Protection Agency

**Vic EPA**  
Victorian Environment Protection Authority

**ISC**  
Intersociety committee, Methods of Air Sampling and Analysis

**ISO**  
International Organisation for Standardisation

**APHA**  
American public health association, Standard Methods for the Examination of Water and Waste Water

**CARB**  
Californian Air Resources Board

**TM**  
Test Method

**OM**  
Other approved method

**CTM**  
Conditional test method

**VDI**  
Verein Deutscher Ingenieure (Association of German Engineers)

**NIOSH**  
National Institute of Occupational Safety and Health

**XRD**  
X-ray Diffractometry