



# SOUTHERN PORTS – ESPERANCE

## ANNUAL ENVIRONMENT QUALITY MONITORING REPORT

1 October 2018 to 30 September 2019

### Document History and Status

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## EXECUTIVE SUMMARY

This report fulfils the annual (1 October 2018 to 30 September 2019) environmental quality reporting requirements of the Operating Licence (L5099/1974/14) issued to Southern Ports-Esperance (SPE) by the Department of Water and Environmental Regulation (DWER).

During the 2018/19 reporting year a total of 8.5 Mt of various commodities were moved through the Port of which 5.4Mt was associated with Category 58 activities representing a 28% decrease on the previous year. Lower export tonnages of iron ore was the main reason for the tonnage decrease. Maximum daily average throughput for Category 58 products of 51,661 tonnes/day coincided with loading on both Berths 2 and 3.

Product quality sampling and analysis is conducted by SPE's clients and the results are assessed by SPE against the Licence Conditions. The nickel and copper concentrate received from IGO at SPE was fully compliant with all product quality requirements in the Licence. The spodumene received from SPE client Galaxy was fully compliant with the product quality criteria on the Licence. Alita (Lithco No 2/Tawana), which also exports spodumene through SPE was mostly compliant with the Licence requirement, with the exception of the months between November 2018 and February 2019, where the weekly moisture reports were below the Dust Extinguishable Moisture (DEM) at the mine site conveyor. However, following wetting down of the product in the Qube shed (outside the boundary of the prescribed premises of the Port) the product was shipped within 0.1% of the DEM.

Iron Ore is received at SPE from MRL which commenced exporting iron ore through the Port in December 2018. The SPE moisture meter has been experiencing issues with accuracy due to the variation in the colour of iron ore from wagon to wagon. For the purpose of comparison against the DEM for this report, the more accurate "Certificate of Quality" supplied by MRL were used. These certificates indicate the moisture of the iron ore sampled before reaching the Berth 3 shiploader was generally below the DEM. Airborne dust was managed to acceptable levels by dust suppression sprays operating on the end of the shiploader and the rest of the iron ore circuit being enclosed. Despite this increased levels of iron on PM10 were noted at the five monitoring sites when iron ore was being handled through the Port but significant sources of iron in PM10 other than iron ore handling were also noted.

During the 12-month reporting period, there were six PM<sub>10</sub> exceedances over only four days with four being due to bushfires, one due to offsite construction works and one due to dust from onsite unsealed roads and grain shiploading but none from loading of Category 58 products handled by the port. The Berth 3 road at the hairpin bend was also sealed in April 2019 in part to assist in minimising dust emissions from the Port's unsealed roads. Future sealing of onsite gravel roads are also planned over the next five years which will assist in reducing dust emissions at the port. Bulk handling and hygiene controls and procedures for all products are audited to try to minimise dust emissions where possible.

Concentrations of lithium also did not increase significantly from background, even though there was a 129% increase in the tonnages of spodumene exported, and this can be attributed to the loading controls and to clients' adherence to product quality requirements for mica and moisture. Additional loading of spodumene via Berth 3 shiploader by new client PMI was commenced via trial shipment process in January 2019. A licence amendment was submitted in August 2019 along with various air monitoring reports and it is expected DWER will finalise any changes to the licence by mid-January 2020.

Concentrations of airborne nickel and copper remained well below set licence criteria and trends in concentrations did not significantly increase despite the increased export tonnages of Rotabox shipments of nickel and copper. This emphasises the successful controls used in exporting these products in bulk.

Analytical results of stormwater sampled indicated concentrations of dissolved metals including copper, nickel, lithium and sulphur were all below the relevant port adopted ANZECC-ARMCANZ (2000) 'stretch' targets for the marine environment. There are no set criteria for stormwater on the licence. There was one elevated copper value in Sump 2 during October sampling, but previous copper concentrations have not identified the source. Bulk nickel and copper exports (via Rotabox) on Berth 2, have not been associated with any significant increases in concentrations of nickel or copper in stormwater. This reflects the increased containment using this loading technique and the high standards of industrial hygiene being implemented before and after shipments.

Nutrients of total nitrogen and total phosphorus in stormwater sumps, not drains, were often elevated above the conservative 'stretch' targets. Although there were exceedances of these targets, the nutrient inputs from the Port to the harbour are quickly dissipated due to the high flushing rates into the Southern Ocean and so impacts on algal growth would be minimal. Southern Ports will however continue to work particularly with fertiliser, grain and woodchip clients, stevedores and cleaning contractors to reduce nutrient inputs into the stormwater system. Construction of a stormwater detention and filtration system at Sumps 3 and 4 had to be postponed due to reduction in port trade and need to spend capital in other areas associated with new trade clients.

## 1. INTRODUCTION

This annual report presents the results for product quality, air, meteorological, stormwater and wastewater monitoring that have been collated by Southern Ports – Esperance (SPE). The annual report includes monitoring results collected from 1 October 2018 to 30 September 2019 and will be referred to as the ‘reporting period’. This reporting is done in accordance to Southern Ports – Esperance’s operating licence L5099/1974/14 (‘the licence’) issued by the Department of Water and Environment Regulation (DWER). This reporting is a statutory requirement issued under Part V of the WA Environmental Protection Act (1986) administered by DWER.

### 1.1 Licence Conditions and Reporting Scope

The content of this report is defined by the conditions of the “Licence” (L5099/1974/14) within the reporting period. During the reporting period three Licence Amendments were received:

1. Trial Notification Conditions 2 to 7 were added on 2/10/2018;
2. Modification of the existing rail car dumper for iron ore was added in conditions 8 to 12 on 22/10/2018; and
3. Addition of annual representative sampling of respirable silica, nickel disulphide and nickel sub sulphide in nickel products following the ruling of the Appeals Convenor, as Conditions 16 and 17 (Table 3, Row 2) on 6/08/2019. This is the only change that alters (adds) to the existing annual reporting requirements.

The annual reporting requirements of the new licence are described by Condition 36 as follows:

- Condition 36 (a): amount and type of materials specified in Column 1 of Table 10 in Schedule 2;
- “Condition 36 (b) was clarified by DWER (Email correspondence from Clarrie Green 24 October 2018) and should read: monitoring data for the Annual Period required by conditions:
  - 16: Product quality testing for nickel subsulfide ( $\text{Ni}_3\text{S}_2$ )
  - 17: Product quality testing for nickel (refer to Table 3);
  - 20: No xanthate odours
  - 21: Product quality testing for spodumene (refer to Table 4);
  - 24: Operation of water sprays at Berth 3 ship loader where dust is visibly escaping the ship’s hold
  - 25: Product quality testing for iron ore (refer to Table 5);
  - 26: Ambient air quality monitoring (refer to Table 6);
  - 31: Closure of StormDMT filter system discharge in event of copper spill

- 32: Stormwater and industrial washwater monitoring (refer to Table 7); and
  - 33: Meteorological monitoring (refer to Table 8)
- As part of a Licence Amendment submitted to DWER on 26 August 2019, it has been requested that Condition 36 (b) is corrected.
- Condition 36 (c) copies of the reports for representative samples specified in Tables 3 and 4;
  - Condition 36 (d) a summary of Reportable Events and Limit exceedances; and
  - Condition 36 (e) a summary of complaints received under Condition 34;
  - Condition 36 (f) logbook records of emptying Hume interceptors including the reason for emptying and the volume recorded; and
  - Condition 36 (g) logbook records of wet sweeping conducted on sealed areas on berths.

## 2. AMOUNT AND TYPE OF MATERIALS

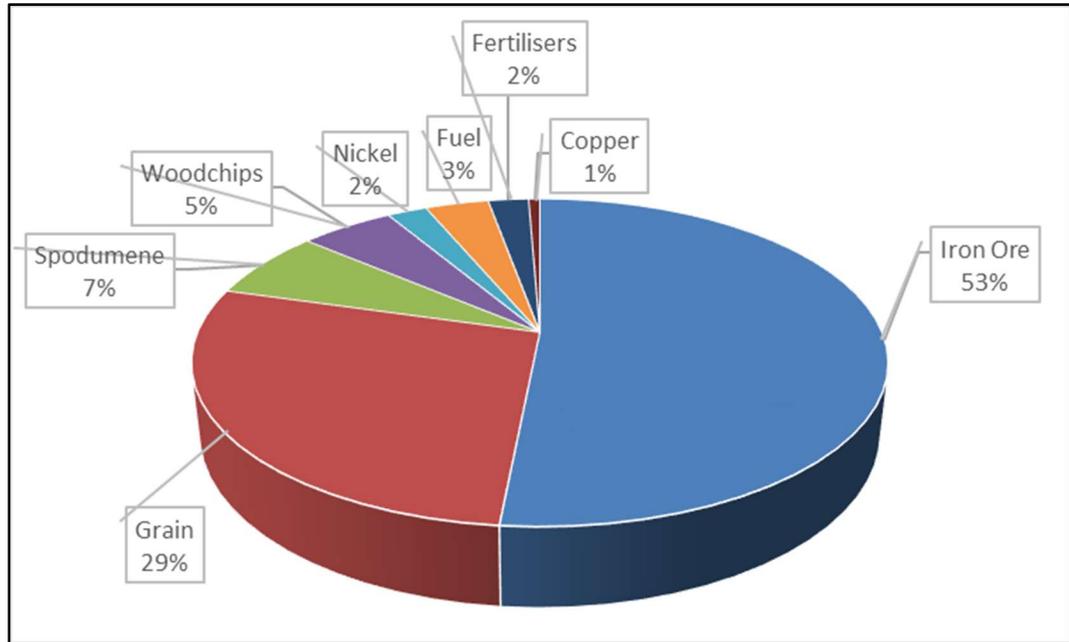
This section presents a broad summary of Category 58 imports and exports at the SPE during the reporting period towards compliance of Condition 36a of the licence. Note that specific information on changes to trade of individual mineral products are described in the results section for the relevant key indicator. This approach was taken to help correlate changes in trade to potential changes in emissions.

During the reporting period SPE had a total throughput of 8.5Mt of various commodities, a 28% decrease on the previous reporting period of 11.8Mt in 2017/18. A percentage breakdown of the various commodities (imports and exports) is shown in Figure 1. Of this total 5.6MT was of Category 58 products loaded in bulk (see Table 1).

Total exports declined 31% overall on the previous period to 7.75Mt. This was predominately due to a 55% drop in iron ore tonnage with lower exporting rates for the new iron ore client during the reporting period. There was also a 10% decline in grain tonnages for the reporting period.

The export products of spodumene, woodchips, nickel and copper concentrate increased as the respective companies increased export volumes. The largest increase of these was due to spodumene exports which increased 129% on the previous reporting period with a new spodumene client exporting the product via a trial shipment process in bulk on Berth 3.

Total imports declined 5% to 0.44Mt down from 0.46Mt 2017/18. Fertiliser imports increased and fuel imports decreased from the previous reporting period.



**Figure 1: 2018/19 Percentage of Southern Ports - Esperance Exports and Imports**

There was a mix of bulk and containerised product bought into the Port prior to export. Product transported by container into Port and exported in container has not been included. The following products were inloaded in bulk into to SPE sheds onsite during the reporting period:

- 4,649,389 tonnes of iron ore from 622 trains was inloaded;
- 462,665 tonnes of bulk spodumene from 5,461 trucks for three clients was inloaded (doesn't include containers); and
- 7020 tonnes of pollucite from 110 trucks.

In fulfilment of Condition 36a the amount and type of Category 58 materials as listed on the licence (in Table 10 of Schedule 2) are shown in Table 1 with the maximum average daily loading rates for each product listed. The maximum daily throughput for Category 58 occurs when loading of iron ore and spodumene coincides on Berths 2 and 3. The maximum daily Category 58 loading rates when loading consecutively on Berths 2 and 3 during this the reporting period and ranged from 15,130 to 51,661/day.

**Table 1: Summary of Category 58 Throughput for Southern Ports - Esperance**

Category 58 Product	Import/Export	Tonnage	Maximum Average Daily Throughput/ Year
Iron Ore	Export	4,569,302	56,361
Spodumene	Export	546,978	31,554
Fertilisers	Import	198,584	3,496
Nickel*	Export	100,071	11,010
Copper	Export	50,098	12,100
<b>TOTAL</b>		<b>5,465,032</b>	

\* doesn't include containerised nickel

### 3. MONITORING METHODS AND ASESMENT CRITERIA

Various methods are required for product quality testing, air quality, meteorological, stormwater and wastewater monitoring to satisfy the requirements of the operating licence. All are monitored to meet the licence conditions as outlined in section 1.1 and to meet the reporting requirement listed under Condition 36 of the Licence (L5099/1974/14). Note that all calibration certificates for equipment used in these methods are attached in Appendix 4.

#### 3.1 Product Quality Testing for Nickel and Copper

The Port's client conduct sampling and analyses at their mine site for both their nickel and copper sulphide concentrates in accordance with Condition 17: Product quality testing for nickel and copper (refer to Table 3);

#### 3.2 Product Quality Testing for Spodumene

The Port's clients conduct sampling and analyses at their mine site for spodumene in accordance with Condition 21: Product quality testing for spodumene (refer to Table 4);

#### 3.3 Product Quality Testing for Iron Ore

SPE license Condition 25 (refer to Table 5) requests that the licensee must undertake moisture content monitoring of iron ore received at the Premises using a moisture meter located on CV09 for the purpose of comparison against the DEM level of each iron ore product" and in accordance with Table 5.

Calibration of the CV09 near infrared iron ore moisture analyser to ISO 3087-2011 standard has been undertaken on an annual basis by NeoMet Engineering. These Certificates are attached in Appendix 12.

Measurement by CV09 moisture meter has been ineffective due to calibration to only two ore types as opposed to six received and this has been discussed with DWER in various email correspondence (most recent on 25/11/2019 to Fiona Sharpe). An assessment was conducted using the more accurate “Certificates of Quality” that report iron ore moisture levels to the purchasers.

The moisture meters are not effective as the type and colour of the ore from MRL varies from wagon to wagon within the same rake and the meter can only set and compare one ore type per rake to the ore’s DEM and therefore causes significant inaccuracies in the moisture results.

SP is attempting to overcome this by investigating a colour-detecting camera to automate selection of the appropriate calibration for each of the six ore colour-groups (see Appendix 12). This approach would be a first for the iron ore industry and is still very much in the research and development phase, not ideal for a legal compliance requirement. The shipping moisture certificates (as per Utah Point, Port Hedland Licence) are more suited to compliance reporting and a request to amend the Licence has been lodged.

### 3.4 Meteorological

A meteorological station at MET7 that records rainfall, barometric pressure (not required by the licence), temperature (not required by the licence), wind speed and wind direction is installed on the Berth 3 finger groyne away from surrounding influences (see Figure 2). The meteorological station is compliant to Australian Standard 3580.14-2014.

The monitoring station samples wind data on an anemometer at 5 minute intervals. This data is then averaged and used to calculate hourly wind speed, wind direction and to produce the wind roses for annual and exceedance reporting. Rainfall is recorded on a tipping rain gauge and measured in increments of 0.2mm.

### 3.5 Air Quality

As required by the Licence, ambient air quality monitoring is being undertaken at four locations (Sites 1 to 4) surrounding the SPE operations (Figure 2) and one location in the community approximately 1.6 km from the Port (Site 5). Siting of monitoring equipment is undertaken as far as practicable according to Australian Standard AS 3580.1.1-2016 Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment.

The devices (refer to Figure 2) installed at the five monitoring locations consist of:

- Five Beta Attenuation Monitors (BAM) units at Sites 1 to 5; and
- Five HVAS units monitoring PM<sub>10</sub> at Sites 1 to 5.

Other air quality monitoring devices and their locations consist of:

- Four MetOne E-Samplers (EP5, EP6, EP7 and EP8) installed in 2008 within the Port precinct to estimate PM<sub>10</sub> in real time using light scatter (not required by the licence). These E-samplers are also used as low volume samplers to indicate concentrations of nickel, copper and lithium in PM<sub>10</sub> onsite and dispersion ratios to the boundary. The units are mobile to enable them to be placed strategically around the site and close to berths according to wind conditions during rotating container or bulk trial operations.

Air quality provider, Ecotech is contracted by SPE to service, calibrate and maintain all air and meteorological monitoring equipment according to relevant monitoring standards and the servicing manuals of the equipment. In addition to regular calibration of equipment, maintenance of the instrument, access, security, communications, and power supply is required.

Samples are collected from the network of air quality monitoring stations (refer to Figure 2) according to the following regime:

- 24-hour average PM<sub>10</sub> concentrations are calculated from real-time BAM measurements. This data is supplied to and then validated by Ecotech. This data runs from midnight to midnight (calendar day) in accordance with the NEPM; and
- 24-hour metals concentrations in PM<sub>10</sub> are analysed from filter papers deployed on HVAS machines at Sites 1 to 5. The filters are deployed at approximately midday to midday plus or minus 2 hours and collected every one day in six, or daily if nickel or copper is being loaded.

All PM<sub>10</sub> concentrations for the full reporting period were measured on beta attenuation machines (BAM's) as calendar days (midnight to midnight). These were changed from TEOM machines in late May and early June 2018 for sites 1 to 4, and in mid-September 2018 for site 5.

The following ambient air quality criteria, listed in the licence, have been used for comparison to the measured concentrations of contaminants in air and dust. The criteria are applicable at all sensitive receptors located outside the port boundary. They are as follows:

- 50 µg/m<sup>3</sup> as a maximum 24-hour average concentration for PM<sub>10</sub> (NEPC, 2016 and Licence L5099/1974/14) collected on BAM machines;
- 0.14 µg/m<sup>3</sup> as a maximum 24-hour average concentration target for nickel (from Licence L5099/1974/14) collected on HVAS machines; and
- 1.0 µg/m<sup>3</sup> as a maximum 24-hour average concentration target for copper (from Licence L5099/1974/14) collected on HVAS machines.

In addition to comparison to these licence criteria, spatial and temporal aspects of the data are also discussed to identify any emerging trends that may require management action.



**Figure 2: Location of HVAS, BAM and E-sampler Air Quality Monitoring and Meteorological Stations at the Southern Ports - Esperance**

### 3.6 Stormwater

Stormwater sampling is undertaken inline at four Hume Interceptor pits referred to as Sumps 1 to 4 and at the stormwater outlets of Drains 1, 2 and 3 (Figure 3). The sumps drain Berths 1 and 2 and larger catchments including the CBH lease area. Drains 1, 2 and 3 receive run-off from areas not likely to be contaminated with bulk minerals, including the CBH Offices car park and road area (Drain 1), Shed 8, car park and road (Drain 2) and the roof of Iron Ore Shed 2 and road (Drain 3).

All stormwater sampling occurs randomly within a storm event or prior to the end of the calendar month, however SPE aims to capture the first flush (first 11mm) if practical. Should no rainfall occur within reasonable working hours during the month, only the Hume Interceptors will be sampled if they contain water. In the instance where Hume Interceptors do not contain water, no stormwater sampling is possible.

Samples are collected in line with the Australian Standard AS 5567.1 – 1998 Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples and Australian Standard 5567.10 – 1998 Water Quality – Sampling – Guidance on Sampling of Waste Waters. The samples are then sent for laboratory analysis (see section 3.11 for further information). The pH meter used for in-house pH analysis of stormwater and wastewater samples is calibrated each time prior to collection with a series of buffer solutions.

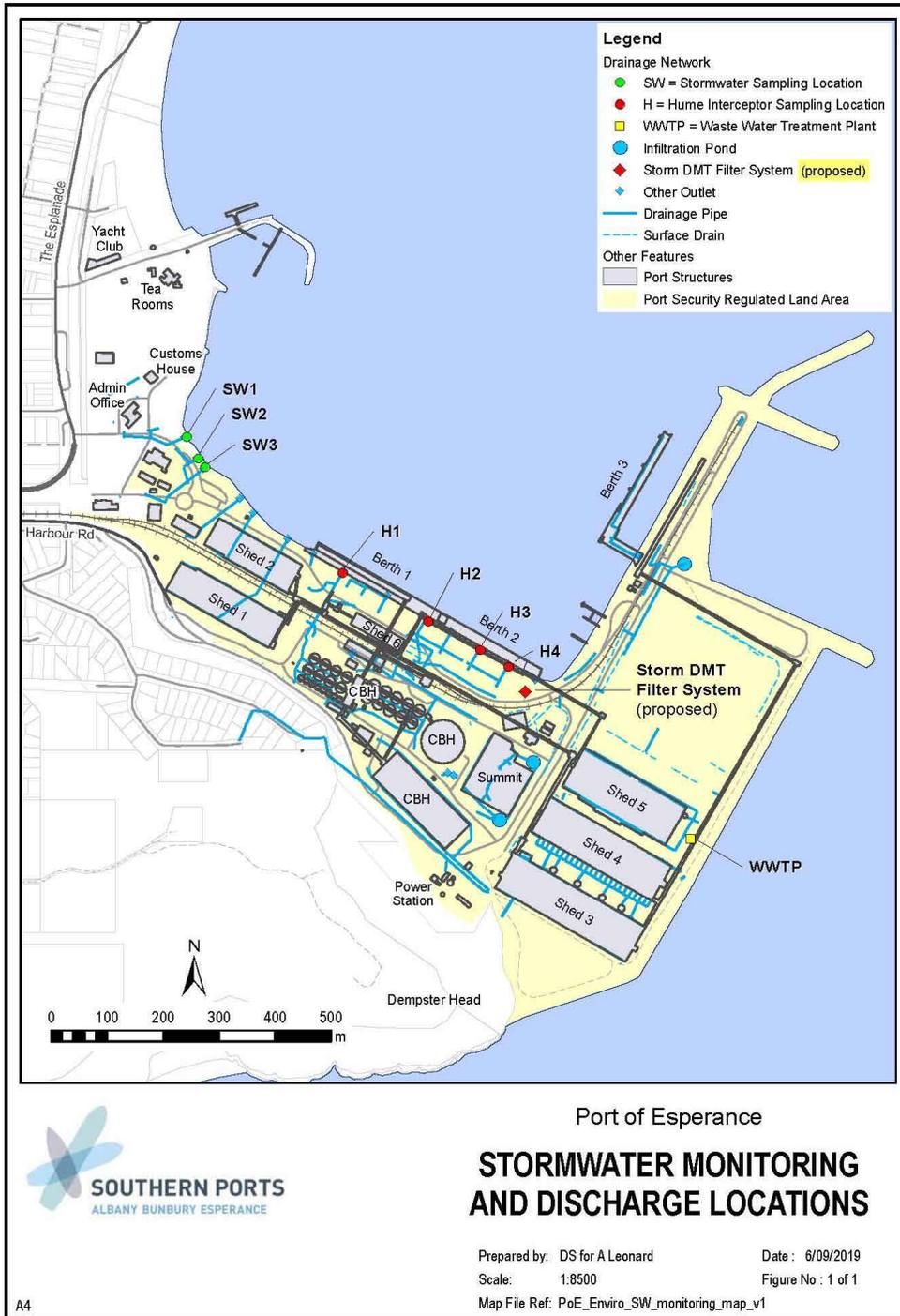
Berth surfaces are wet swept regularly between products in accordance with Licence Condition 36(g) to minimise transfer of bulk product into the stormwater system (refer to Appendix 7 for berth sweeping logs).

Acceptable toxicological risks from contaminants in stormwater to the ambient marine environment are assessed by comparison to ambient water quality criteria from the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC/ARMCANZ, 2000) and using guidance from the Environment Assessment Guideline for Protecting the Quality of Western Australia's Marine Environment (EAG15) (EPA, 2015). Comparisons of stormwater quality to the selected criteria (refer to Table 2) help identify when upgrades in stormwater treatments are likely to be required to assist SPE in planning expenditure. This is a conservative approach since stormwater from the terrestrial environment is always going to be carrying higher concentrations of contaminants into the ambient marine environment but in the absence of better criteria these were adopted.

The selected criteria were 80 percentile Marine Species Protection Trigger Values (SPTVs) which are appropriate for Low Ecological Protection Areas (LEPAs) around marine discharges after initial dilution has occurred (>tenfold) (EPA, 2015). Marine Species TVs have had a ten-fold dilution factor applied to account for initial dilution

into harbour waters, given the samples are collected inline within Hume Interceptor pits. The selection of these criteria is based on the receiving waters being highly modified since these discharges occur in the berthing pocket of the inner harbour. Metals and ammonia analysed in the stormwater samples have associated Trigger Values (TVs) for Marine Species Protection except for iron and sulphur, for which no reliable TVs have been developed on account of their low toxicity. The concentrations of dissolved contaminants (filtered through a 0.45µm filter) were compared to the TVs.

Trigger values for total nitrogen and total phosphorous are sourced from Chapter 3, Table 3.3.6 for waters of south-west Australia (ANZECC/ARMCANZ, 2000). The adopted trigger values for storm water samples are provided below in Table 2 (ANZECC, 2000) and have a conservative dilution factor of ten-fold applied. These TVs are based on ambient regional (background) data collected and do not reflect toxicity impacts on species.



**Figure 3: Southern Ports - Esperance Stormwater Sampling Locations**

**Table 2: Stormwater Adopted Water Criteria**

Analyte	Value Range/ Maximum Value	Units
<b>Storm Water Adopted Trigger Values</b>		
Total Suspended Solids	10 to 20	NTU
Total Nitrogen	2.3	mg/L
Total Phosphorous	0.20	mg/L
Ammonia	17	mg/L
Copper	0.08	mg/L
Nickel	5.6	mg/L
Lithium & Sulphur	No guidelines	n/a
<small>Note: *Requires site specific assessment            Note: Storm water TVs are 80%TV's and have a ten-fold dilution factor applied to account for initial dilution of storm water in seawater</small>		

### 3.7 Wastewater

The Wastewater Treatment Plant (WWTP) currently treats washwaters with relatively low concentrations of contaminants from around the Port, including those generated from roadsweep, stormwater pit cleaning and first flush waters from multi-user Berth number 2. Previously washwaters from sulphur operations were treated but since the suspension of sulphur imports no sulphur washwaters have been treated since September 2017.

Between 100-200 KL of contaminated waters are transferred annually to the WWTP as general washwaters. A brief schematic of the WWTP process is provided in Figure 3. In summary the water is held in a sump to precipitate solids, filtered through a zeolite mineral filter and then stored in rainwater tanks. The treated water is then tested.

Sampling is conducted in accordance with licence requirements by taking samples of the treated water from the final storage tank of the WWTP each month (see Figure 2) only if “during discharges to the Reclaim Area” as noted by reporting condition 32 (Table 7). This was confirmed by contacting the waste water contractor as typically infiltration onto the Reclaim Area only occurs during the winter months when all the rainwater storage tanks are full.

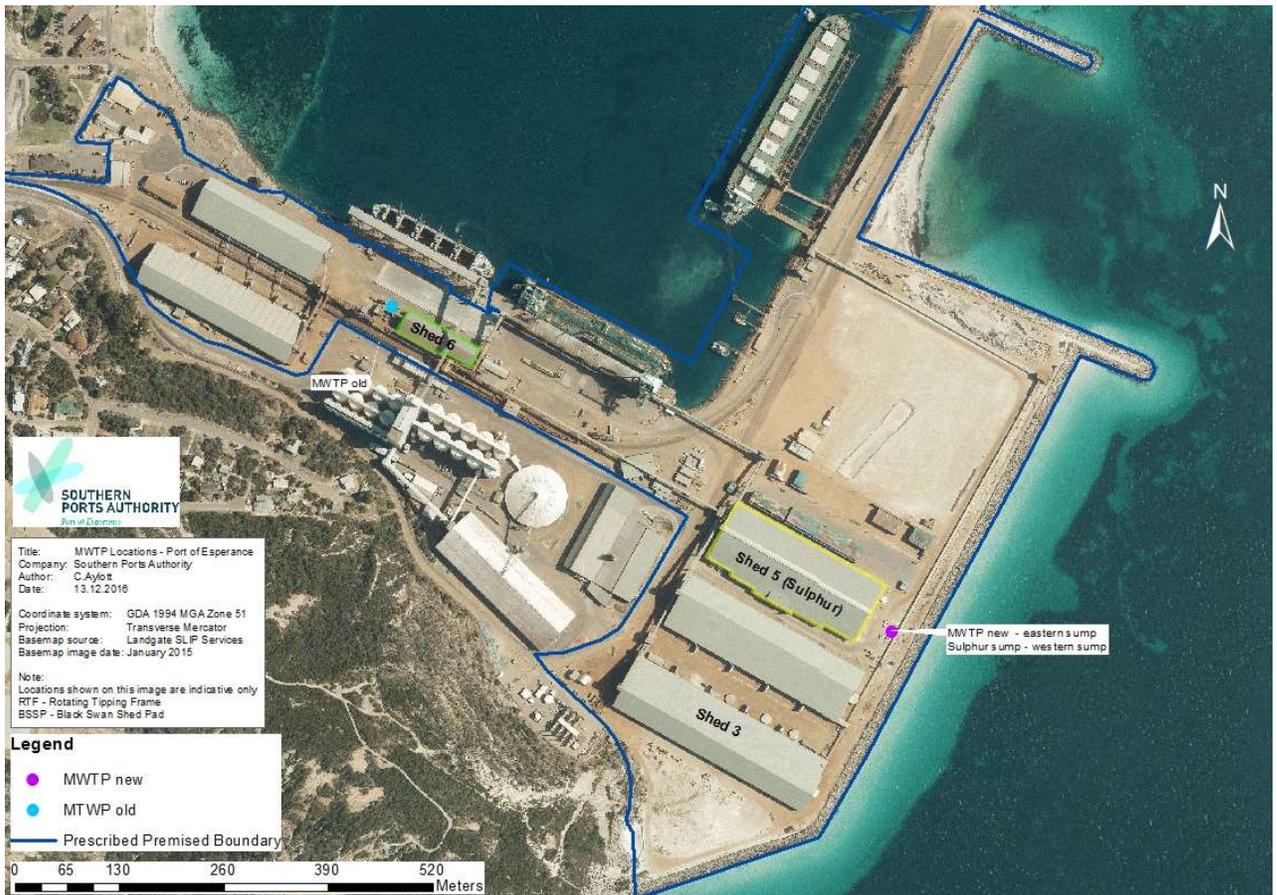
Wastewater samples are sent for analysis at a NATA accredited laboratory and work on adherence to the following standards:

- AS 5567.1 – 1998 Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples

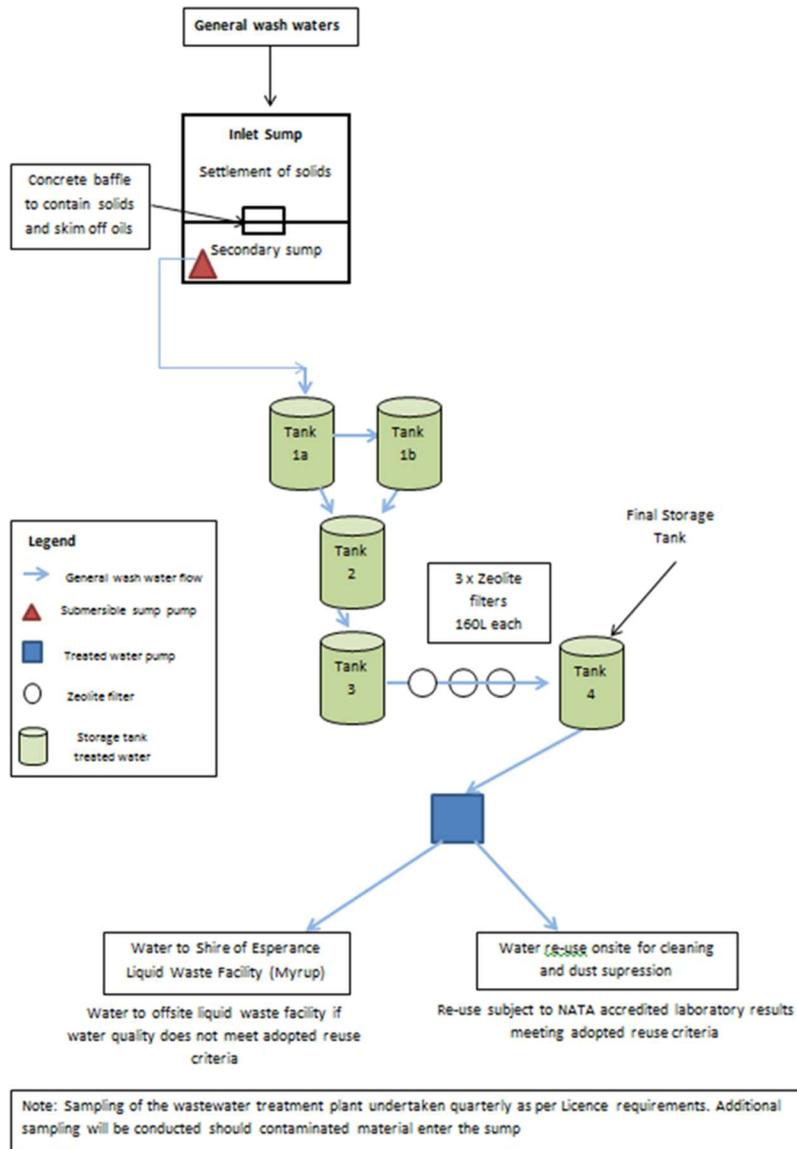
➤ AS 5567.10 – 1998 Water Quality – Sampling – Guidance on Sampling of Waste Waters

The water is generally suitable for reuse, but in the event sampling demonstrates it does not meet the adopted reuse criteria or washwaters are expected to contain higher concentrations of contaminants (e.g. nickel, copper or nutrients) the wastewater is transferred by a licenced carrier to the Shire of Esperance Myrup Liquid Waste Facility as controlled waste.

Additional sampling was conducted if wash waters were generated from a non-routine process and waters stored until sampling results confirmed their suitability for either onsite reuse or transferred to Myrup Liquid Waste Facility. Sludges out of the WWTP are cleaned out periodically, dried in geotextile dewatering bags, tested and disposed at an appropriate landfill facility.



**Figure 4: Southern Ports - Esperance Location of Wastewater Treatment Plant**



**Figure 5: Schematic of General Wastewater Treatment Process**

The adopted targets for the treated waters (ANZECC-ARMCANZ, 2000, Chapter 9) were selected by SPE as the short-term (20 year) irrigation water TVs (mg/L) for irrigation and general use as targets for reuse. Reuse of treated water on site is used for road sweeping and dust suppression. Adopted re-use criteria for treated water are provided below in Table 3. These general reuse targets were developed for agricultural reuse of irrigation water, so are only used for indicative purposes on the acceptability of the water for reuse. For example, if nickel levels exceeded the criteria it would not exclude the use of this water for cleaning the nickel conveyor system.

**Table 3: Wastewater Adopted Reuse Criteria**

Analyte	Value Range/ Maximum Value	Units
pH	6 to 9	pH units
Total Nitrogen	25 to 125*	mg/L
Total Phosphorous	0.8 to 12*	mg/L
Copper	5.00	mg/L
Nickel	2.00	mg/L
Lithium	2.50	mg/L
Sulphur	No guidelines	n/a
<small>Notes: Data from ANZECC-ARMCANZ, 2000 Chapter 9 <i>Australian Water Quality Guidelines for Fresh and Marine Waters, National Water Quality Management Strategy.</i></small>		
<small>*Requires site specific assessment</small>		

### 3.9 Laboratory Analysis

Monitoring is undertaken according to the requirements of the licence conditions including adherence to relevant standards. A reputable laboratory is used with each analysis preferably accredited by the National Association of Testing Authorities (NATA) (see Table 4).

**Table 4: List of NATA Accredited Laboratories Used for Analysis**

Laboratory	NATA Accreditation Number	Sample Analysis
MPL Laboratories	2901	HVAS Filter Papers – analysed for PM <sub>10</sub> , nickel, iron, lithium and copper
Ecotech	14184	Validation of data PM <sub>10</sub> from BAMs
	19650	Weighing of filter papers for HVAS PM <sub>10</sub> monitoring
ChemCentre	8	Analysis of filter papers for HVAS PM <sub>10</sub> monitoring for iron, nickel, lithium and sulphur
Microanalysis Australia	No accreditation	Quarterly Respirable Silica for Galaxy Lithium Australia Ltd & Lithco No 2 Pty Ltd (Tawana), IGO nickel and copper concentrate  DEM for IGO Ni & Cu, Lithco,  Semi-quantitative X-Ray Diffraction (XRD) with spike analysis for IGO (nickel subsulphide & disulphide):
	No accreditation	
	No accreditation	
Nagrom	No accreditation	In-house developed mica analysis for Galaxy Lithium Australia Ltd, spodumene
SGS Australia Pty Ltd	No accreditation	In-house developed mica analysis for Lithco No 2 Pty Ltd (Tawana) spodumene.
		Moisture % analysis for iron ore (MRL)
Intertek Testing Services (Australia) Pty Ltd	No accreditation	Moisture content during shiploading – spodumene Galaxy and Lithco
Jenike & Johanson Pty Ltd	No accreditation	DEM for Galaxy and MRL Iron Ore
		Method based on AS 4156.6-2000
Bureau Veritas Minerals Pty Ltd	No accreditation	Pre-shipment moisture for IGO (Ni & Cu). Moisture determined in accordance with ISO 10251 standard.
Galaxy	No accreditation	In-house weekly moisture conducted in line with the site standards L10 and AS1289.2.1.1-2005
ALS	825	Stormwater analytical suite – pH, TSS, TDS, lithium, nickel, copper, sulphur, TN & TP
		Wastewater analytical suite – pH, TSS, TDS, lithium, nickel, copper, sulphur, TN & TP

## 4. RESULTS AND DISCUSSION

All missing or non-compliant data was recorded in the relevant appendices

### 4.1 Product Quality Testing

The following section aims to demonstrate compliance with relevant conditions in Licence (L5099/1974/13) on reporting of product quality on bulk minerals exported through the Port of Esperance. These conditions include:

- Condition 36 ( c ) for copper, nickel and spodumene; and
- Condition 25 for moisture of iron ore.

#### 4.1.1 Nickel and Copper

SPE clients exporting nickel and copper via Rotabox are required by the Licence to provide analytical results according to Table 3 (Condition 17) of the Licence. To comply with Condition 15, a Dust Extinguishable Moisture (DEM) report is required.

SPE currently only has one nickel client, IGO who were complaint with the requirements listed in Table 3:

- IGO provided SPE with the weekly moisture results for nickel and copper and all product was above DEM which complies with Condition 15.
- 'Semi-quantitative XRD analysis with spike' report indicated that there was no nickel subsulphide and nickel disulphide detected in the nickel concentrate which complies with Condition 16, 17 and Table 3.
- No xanthate odours were detected during the 2018-2019 annual reporting year, which complies with Condition 20 of the Licence.
- IGO also provided a report on respirable silica (in order to comply with the sampling methodology outlined in Table 3 of the Licence).

Certificates of Moisture were also provide to SPE for each shipment of nickel and copper. All shipment moisture reports, which are sampled prior to loading, indicate the product was above the DEM in accordance with Condition 18. For the reporting period, all product quality complied with the Licence Conditions (see Appendix 13 for reports).

#### 4.1.2 Spodumene

SPE clients (Galaxy Alita) exporting spodumene in rotaboxes are required by the Licence to provide analytical results according to Condition 21 of the Licence. This includes weekly moisture and muscovite (mica) content, quarterly reports on respirable silica quartz, and an assessment of DEM.

##### Galaxy

Galaxy exports spodumene through SPE in rotaboxes and were compliant with the requirements listed in Table 4 including:

- All monthly reports with the weekly moisture and mica results, quarterly respirable silica reports and pre-shipment moisture reports (See Appendix 14 for reports);
- The moisture of the spodumene product sent through the Port was above DEM and below 5% mica, complying with Conditions 21(i) and 21(j) respectively;
- The quarterly respirable silica results were all below 1%, complying with Condition 21(k); and
- In addition SPE is also provided a pre-shipment moisture reports from samples taken prior to loading for each shipment of spodumene which assists SPE in determining compliance with Condition 23.

Alita (also known as Lithco No. 2 and Tawana)

Alita also exports spodumene through SPE in rotaboxes and were *mostly* compliant with the requirements listed in Table 4, including:

- All monthly reports on weekly moisture and mica results, quarterly respirable silica, pre-shipment moisture reports from samples taken during loading for each shipment of spodumene and a DEM report (see Appendix 15);
- The respirable silica reports were all below 1%, therefore complying with Condition 21(k).
- All mica results were below 5% and in compliance with Condition 21(j).
- For the months between November 2018 and February 2019, the weekly moisture reports were below the DEM at the mine site but the product was shipped within 0.1% of the DEM:
  - SPE were informed by Alita that the samples were taken from the product conveyor at the mine site were wetted to the DEM in the Qube shed (outside the boundary of the prescribed premises of the Port). The shipment moisture reports provided to SPE for samples taken during loading of three shipments between November 2018 and February 2019 were ranged between 0.02% and 0.09% below the DEM.
  - Excluding these three shipments, all other product quality complied with the Licence Conditions.

In August 2019, Alita ceased trading due to financial issues, therefore, the last monthly report received from Alita was for the July 2019 analysis and the last shipment occurred in May 2019. (See Appendix 15 for reports).

Bulk spodumene that is exported through Berth 3 is not included in the Annual Report as this is undergoing a 12 month trial period that commenced in January 2019 for Process Minerals International (PMI) and is currently outside the scope of the Annual Reporting requirements. A number of trial reports have been

submitted to DWER during 2019 which includes the product quality reports required for the trial conditions.

#### 4.1.3 Iron Ore

As discussed in Section 3.3, the method to practically achieve compliance to Condition 25 of the Licence had been changed to provision of Certificates of Quality. These Certificates provide more accurate moisture information allowing comparison to the DEM.

##### Mineral Resources Limited (MRL)

MRL are currently SPE's sole iron ore client and commenced exporting iron ore through the Port in December 2018.

The Certificates of Quality indicated the moisture in the ore sampled in the outloading circuit before the Berth 3 shiploader were generally below the DEM (between 0.08 and 1.8% below). However, dust suppression sprays on the end of the shiploader suppress airborne dust to acceptable levels. SPE is working proactively with MRL to increase the moisture level of the iron ore before it is received at the Port.

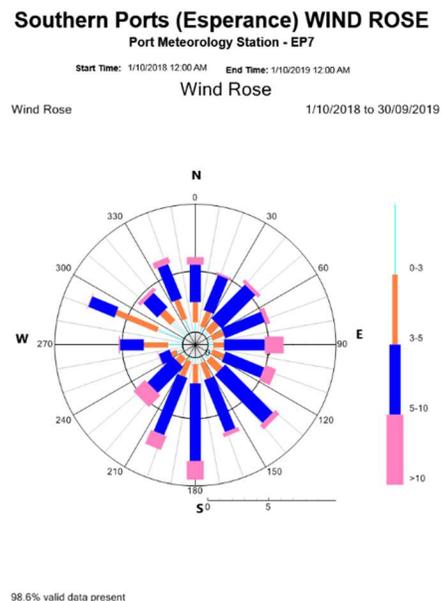
## 4.2 Wind Speeds and Directions

This section summarises the recorded wind speed and wind direction data recorded during the reporting period. Condition 33 and Table 8 of the licence outlines the requirements of meteorological monitoring during the reporting period. There was a 98.6% data capture rate for wind speed and direction recorded during the reporting period with the SPE anemometer.

The annual wind rose measured during the reporting period indicates variable wind directions throughout the year, with winds recorded at each compass point ranging from 5% to 9% (refer to Figure 6). The annual wind rose for the reporting period had similar distribution of wind direction for the 2017/18 reporting period with only minor differences between each quadrant. Wind data collected showed a bias towards more southerly wind directions including an arc from south easterly to south south-westerly winds. There was also a higher percentage of west north-westerly winds recorded. The overall wind conditions between the two years are comparable.

The seasonal wind roses for the monitoring period are presented in Figures 6 to 11 and incorporates data from the months of October and November 2018. The wind rose for September 2019 is shown separately (see Figure 11) as it falls in a different calendar year, but is still within the reporting period. A description of the seasonal wind trends is provided below in comparison to the last reporting period. The wind roses of the previous annual report can be viewed by downloading the document from the Southern Port's website ([www.southernports.com.au](http://www.southernports.com.au)).

These figures show that in 2017/18 a typical shift in prevailing wind direction occurred between the seasons, notably from the east to south-east in spring and summer to a more westerly and to a stronger north-westerly direction in winter and spring 2018. Winds in autumn were typically calmer and in a variety of directions.



**Figure 6: Annual Wind Rose from 1st October 2018 to 30th September 2019**

The winds in October and November were in all directions and typical of spring conditions. The most predominant arc was from E to SW (Figure 7). Winds during spring were fairly strong and got above 10.0 m/s in some directions, but mostly in the southerly and easterly direction. The wind direction was similarly concentrated in the easterly and southerly directions but included less north-easterly directions in the same period as last year.

In summer (December 2018 to February 2019), the majority of the winds were located in an arc between easterly and southerly winds with winds (>10%) blowing predominately (>10%) in the south easterly direction (see Figure 8) which is typical of summer winds in Esperance. Winds were very similar to the previous year.

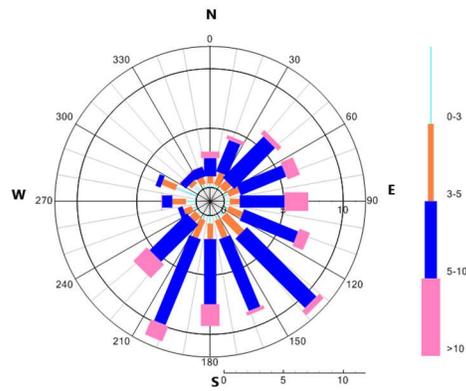
Winds in autumn (March to May 2019) were very variable and the wind speeds were lower than the previous year which was more typical of a low wind autumn period. The main difference in wind direction from summer was that winds shifted from the predominately eastern to southerly directions to between south-east to south-westerly in the autumn (see Figure 9). There were a number of winds in northerly directions as well.

**Southern Ports (Esperance) WIND ROSE**  
Port Meteorology Station - EP7

Start Time: 1/10/2018 12:00 AM End Time: 1/12/2018 12:00 AM

Wind Rose

Wind Rose 1/10/2018 to 30/11/2018



96.2% valid data present

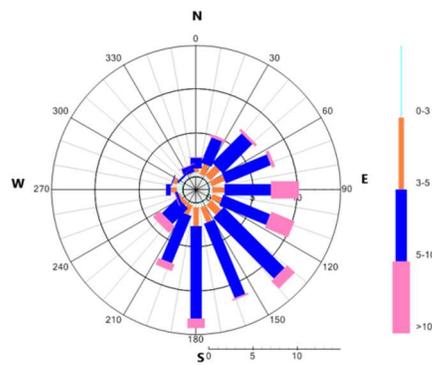
**Figure 7: Spring Wind Rose (1st October to 30th November 2018)**

**Southern Ports (Esperance) WIND ROSE**  
Port Meteorology Station - EP7

Start Time: 1/12/2018 12:00 AM End Time: 1/03/2019 12:00 AM

Wind Rose

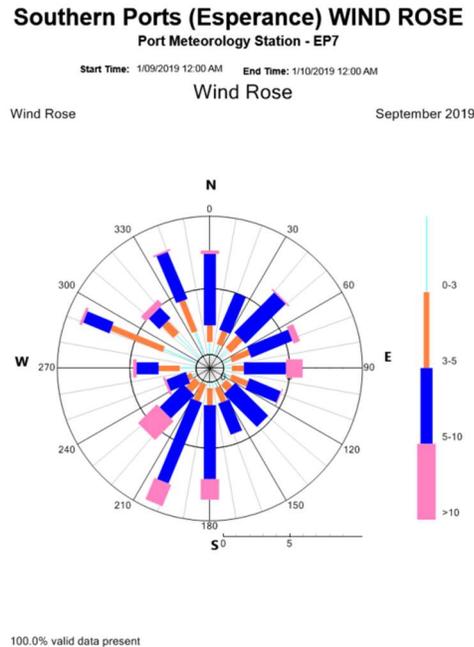
Wind Rose 1/12/2018 to 28/02/2019



99.8% valid data present

**Figure 8: Summer Wind Rose (30th November 2018 to 28th February 2019)**





**Figure 11: September 2019 Wind Rose (1st to 30th September 2019)**

The winter winds of June to August 2019 were more in an arc from westerly to northerly direction but predominately in WNW direction (see Figure 10) and very similar to the previous year. Winds in the 2018/19 winter period were similar in strength to the 2017/18 period.

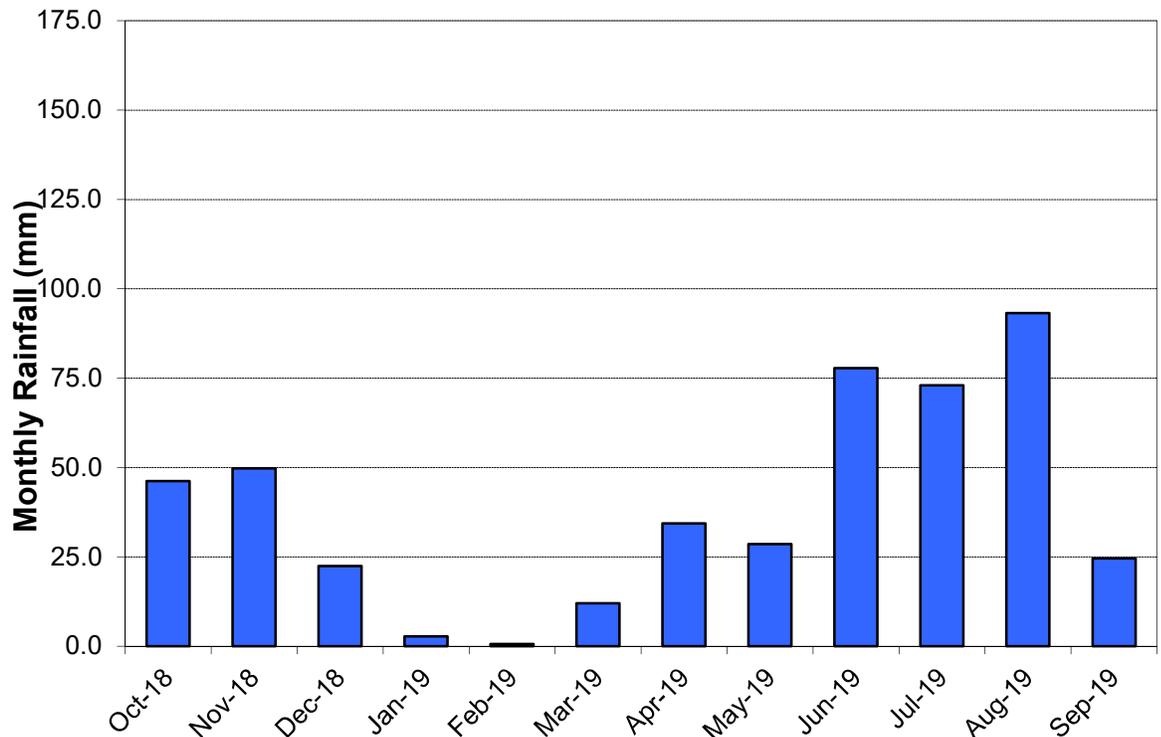
The winds in September 2019 month were very variable (see Figure 11) and in all directions, more like autumn winds. Northerly and southerly winds were more dominant. September 2019 was vastly different to the previous year when winds were more concentrated in the south-westerly directions.

### 4.3 Rainfall

SPE has been collecting rainfall data from a tipping rain gauge as part of their onsite meteorological station (at MET7) since October 2014. Prior to this rainfall data was taken from the Fairfield Street BOM station in Esperance approximately 10kms away and the rainfall differences between sites were quite marked, especially precipitation associated with scattered storms. A new updated rain gauge was installed in September 2019.

The annual rainfall recorded at SPE's meteorology station for 2018/19 reporting period was a 465.4mm (see Figure 12). This rainfall was slightly

above the 448.2mm received in the last reporting period but well below the 632.6mm that fell during the 2016/17 period as well. This is one of the lowest annual rainfalls recorded since October 2009 when rainfall data was reported to DWER in annual reports. Rainfall data for previous years can be viewed by downloading the documents from the Southern Port’s website ([www.southernports.com.au](http://www.southernports.com.au)).



**Figure 12: Monthly Rainfall from October 2018 to September 2019**

#### 4.4 Total Dust as PM<sub>10</sub>

Dust as PM<sub>10</sub> is considered to be a more suitable measure of health risks than Total Suspended Particulates (TSP) as it measures the smaller respirable dust particles. This is the first annual report that focuses on the PM<sub>10</sub> measure of dust rather than reporting on TSP and dust deposition due to a less distinct relationship to direct exposure and health risks. It is also the full reporting period where PM<sub>10</sub> concentrations were measured on BAM machines as calendar days (midnight to midnight).

Average daily particulate matter of less than 50µm (PM<sub>10</sub>) is presented as a time series scatter plot in Figure 13. Validated average daily PM<sub>10</sub> concentrations are also available in Appendix 1. PM<sub>10</sub> dust concentrations were compared to the licence assessment criteria of 50µg/m<sup>3</sup> as a maximum 24-hour average concentration for PM<sub>10</sub> (NEPC, 2016 and Licence L5099/1974/14);

The PM<sub>10</sub> concentrations showed a seasonal trend and were generally higher over the warmer, drier months of November through to April (which coincided with strong summer winds) and lower in the wetter months of May through to September. This trend was less pronounced in the reporting period due to a drier winter period.

The overall data capture rate of the BAMs across the five sites was 83%. This was down on the previous reporting period, but this is most likely due to the loss of data at sites 2 and 4 due to machine issues with air heater at Site 2 and issues with retraction of the nozzle on Site 4 BAM. Both issues were resolved. Other data loss was due to zero filters being run to check performance and some power loss issues. BAMs at Sites 1, 3 and 5 had between 95 to 99% PM<sub>10</sub> data capture rate. Whilst BAM 2 was 62% and BAM Site 4 was 72%. All missing data issues and errors are listed in the reports in Appendix 5.

Schedule 2 of the National Environment Protection (Ambient Air Quality) Measure (NEPM, 2016) has a set of standards and goals, one of which is the standard average yearly PM<sub>10</sub> shouldn't be more than 25µg/m<sup>3</sup>. All five sites met that goal during the 2018/19 reporting period (see Table 5).

**Table 5: Summary Annual Average PM<sub>10</sub> Concentrations - October 2018 to September 2019**

<b>BAM Site</b>	<b>Average Annual PM<sub>10</sub> Concentration (µg/m<sup>3</sup>)</b>	<b>Meets NEPM Goal of &lt;25µg/m<sup>3</sup></b>
Site 1	21.4	YES
Site 2	20.9	YES
Site 3	21.4	YES
Site 4	18.0	YES
Site 5	15.3	YES

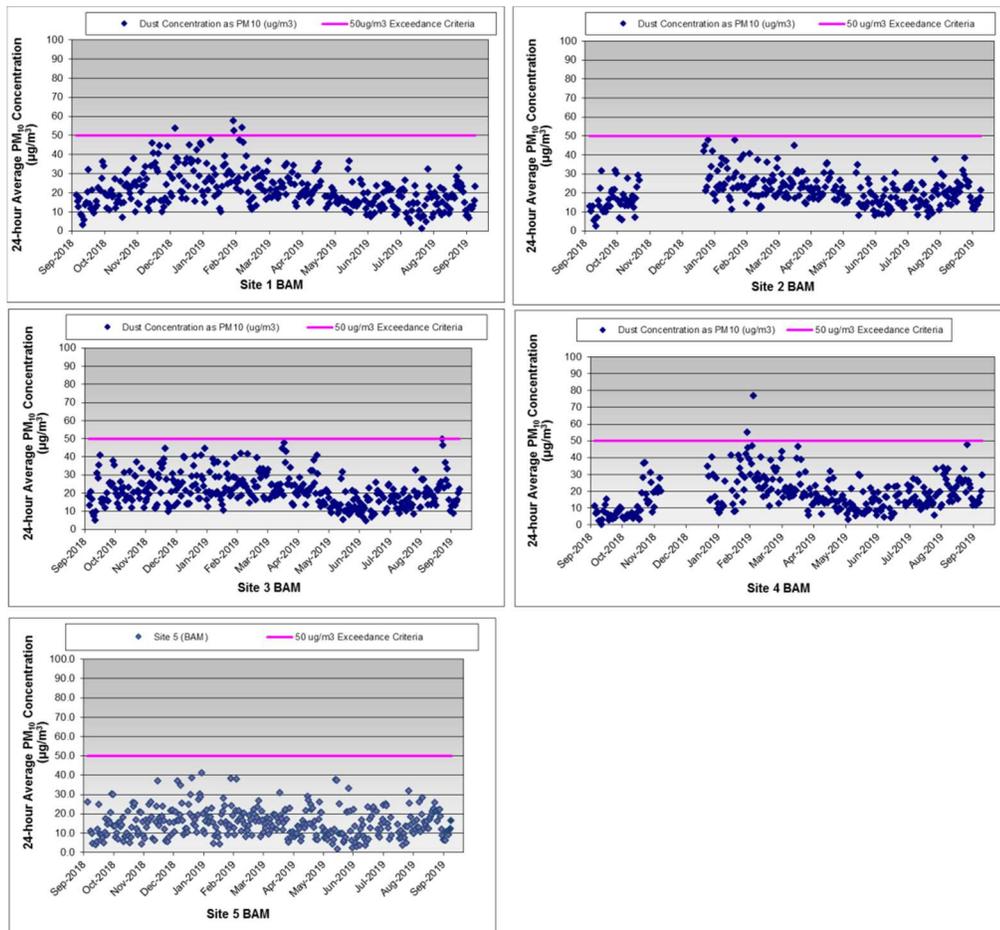


Figure 13: Daily PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>) from October 2018 to September 2019

#### 4.4.1 Summary of PM<sub>10</sub> Exceedances

There were six PM<sub>10</sub> exceedances over a period of five days during the 2018/19 reporting period. A summary of the PM<sub>10</sub> exceedance events are provided in Table 6. Three exceedance days (four occurrences) during mid to late February 2019 were likely to be attributable to bushfires burning in the region at the time combined with dry, windy conditions.

The dust exceedance at Site 1 of 54.3 µg/m<sup>3</sup> between 01/03/2019 to 2/03/2019 was only marginally above the licence criteria of 50µg/m<sup>3</sup> but was likely to have been caused from construction works being carried out by Shire of Esperance contractors installing a recreational bike track with 100m of the Site 1 BAM monitor in Adventureland Park.

A dust exceedance at Site 1 between 30/12/2018 to 31/12/2018 was mostly attributable to dusty sources directly upwind including grain shiploading and unsealed roads.

Four exceedances at Sites 1 and 4 during late February were believed to be caused by several bushfires burning in the region at the time and following these events. This showed as elevated PM10 levels at the Site 5 reference monitor, although the concentrations were below 50µg/m<sup>3</sup>.

Six PM<sub>10</sub> exceedances was an increase on the five exceedances in the previous reporting period and higher than the one exceedance in 2016/17. Five of the exceedances were between 50 to 58µg/m<sup>3</sup>. The six exceedances over five days meant the Schedule 2 NEPM goal of no allowable PM<sub>10</sub> exceedances above 50µg/m<sup>3</sup> during the year was not met. All the exceedances were considered to be caused by environmental conditions rather than events at Southern Ports – Esperance.

**Table 6: Summary of 24-hour PM<sub>10</sub> Exceedance Events - October 2018 to September 2019**

Sampling Start Date	Sampling End Date	Site	PM <sub>10</sub> Conc. (µg/m <sup>3</sup> )	Possible Cause of Exceedance & Evidence
30/12/18 00:00	31/12/18 00:00	1	54.0	Potentially dusty sources directly upwind of the Site 1 air monitor were unsealed areas including unsealed areas including trafficked roads, grain inloading operations in the CBH lease area and grain shiploading from mid afternoon and dust levels were already elevated before grain loading commenced. Other PM10 concentrations were higher than average suggesting elevated dust levels on that day.
21/02/19 00:00	22/02/19 00:00	1	57.8	Several bushfires were burning around Esperance during the exceedance periods including a fire at Cape Le Grand National Park, south east of the HVAS monitors. The occurrence of a bushfire south east of sites 1 and 4. PM10 dust levels were elevated at other sites, but below the 50µg/m <sup>3</sup> , including reference Site 5.
		4	55.0	
22/02/19 00:00	23/02/19 00:00	1	52.0	Winds were onshore from the SW that doesn't place the Port upwind of the Site 1 monitor suggesting a source of dust not associated with the Port activities or possibly associated with bushfires in the region.
27/02/19 00:00	28/02/19 00:00	4	77.0	Several bushfires had been burning around Esperance during the exceedance period and for the 10 days prior to the day. They were burning north, north-east and north-west of the town. The occurrence of a bushfire ENE of the Site 4 AM site at the Cape Le Grand National Park is likely to have explained the increase in PM10 concentrations. Smoke was also visible through town in this period. This exceedance was likely to be solely associated with bushfire smoke. Other PM10 levels at other sites, including the reference Site 5 were also elevated, but not over the 50µg/m <sup>3</sup> .
1/03/19 00:00	2/03/19 00:00	1	54.3	The Esperance Port was not upwind of Site 1 during the exceedance period. The source was likely to have been from construction works associated with the installation of a recreational bike track by the Shire of Esperance contractors within 100m of the Site 1 BAM monitor which was occurring during the exceedance period in the Adventureland Park.

## 4.5 PM<sub>10</sub> Metal Speciation Analysis

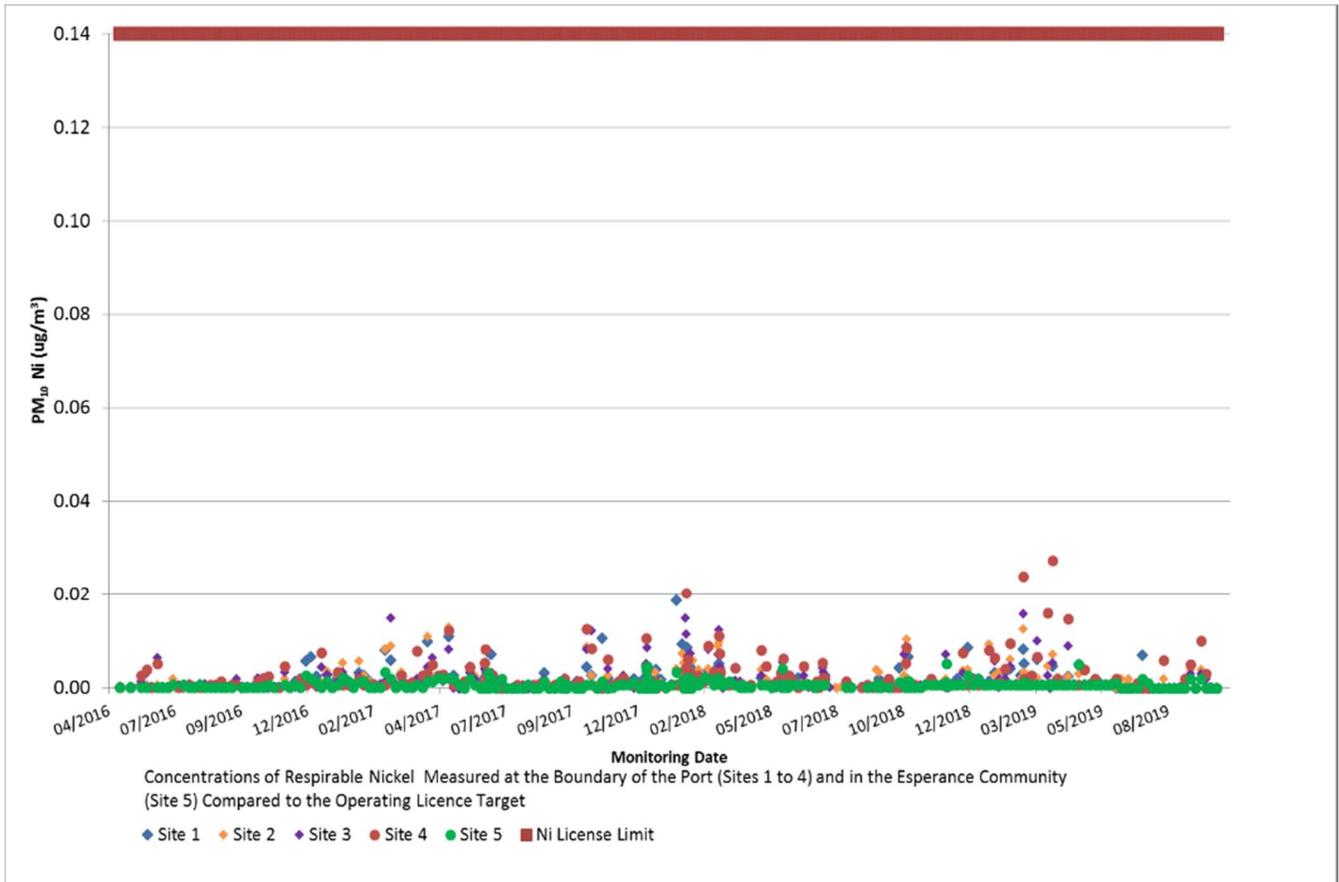
At the start of the reporting period, on 1<sup>st</sup> October 2018 a licence amendment was issued that commenced copper monitoring as PM<sub>10</sub> as a licence requirement following finalisation of trial shipment program (works approval W5840/2015/1). Copper has not previously been included in annual reporting. As part of the licence amendment sulphur ceased being monitored following cessation of sulphur imports at SPE in 2017. The HVAS filter papers for the reporting period were analysed for PM<sub>10</sub> on the allocated compliance days and during nickel and copper shiploading for the metals of iron, nickel, copper and lithium according to Condition 26 (includes Table 6) of the Licence.

### 4.5.1 Nickel as PM<sub>10</sub>

Nickel concentrations of PM<sub>10</sub> throughout the reporting period were all over five-fold below Southern Port's daily licence limit of 0.14 µg Ni/m<sup>3</sup>. The highest nickel value for the reporting period was 0.0273 µg/m<sup>3</sup> at Site 4 between 25/03/2019 and 26/03/2019 (see Appendix 3). This maximum value was recorded in the 24 hours after the loading of a nickel shipment which had left at 25/03/2019 13:06. Only four other concentrations during the reporting period were above 0.01 µg/m<sup>3</sup> (see Figure 14). There was an increase in nickel concentrations in PM<sub>10</sub> during the summer months, the results show the loading controls and post shipment hygiene were effective in mitigating any nickel concentrations close to the licence criterion of 0.14 µg/m<sup>3</sup> during the nine shipments over the reporting period.

SPE handled bulk nickel by unloading trucks or trains into sheds and outloading via a conveyor and bulk shiploader system between the 1970's until 2011 over Berth 2. Between 2012 and 2017 nickel exports/imports were fully containerised. SPE has a long term baseline of concentrations of nickel on Total Suspended Particulates and is in the process of transforming this data to concentrations of nickel on PM10 based on USEPA methodology to preserve this baseline across differing loading practices.

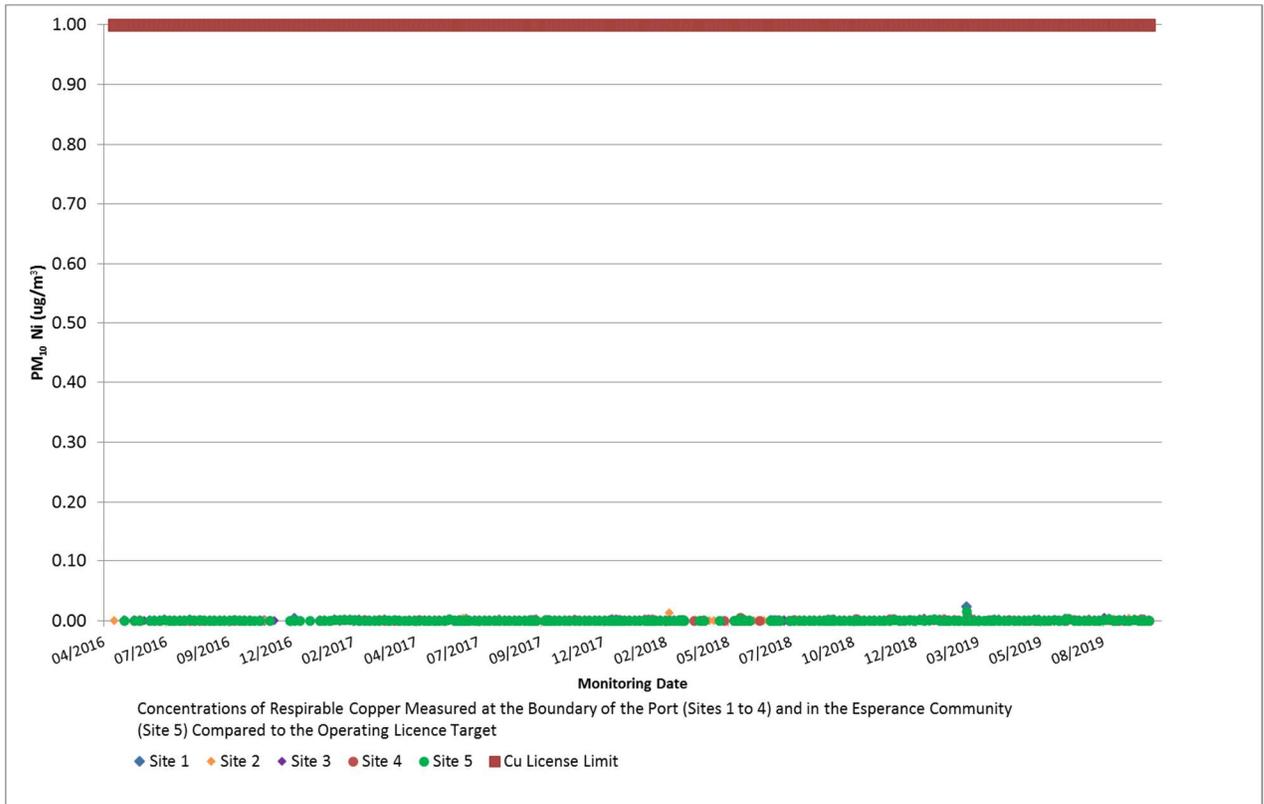
In June 2017 the first shipment of 'bulk' nickel and copper sulphide concentrate commenced using the new rotating container (Rotabox) technology with many layers of additional loading controls. This was undertaken by Qube stevedores for IGO's Nova nickel and copper sulphide concentrate in accordance with Works Approval W5840/2015/1. A trial period of further nine trial vessels were loaded with nickel, up until the end of September 2018, in various wind conditions using the Rotabox technology. Environmental reports concerning these shipments were submitted to DWER towards the Licence amendment for ongoing trade for bulk export of both nickel and copper sulphide concentrates.



**Figure 14: Concentrations of Nickel as PM<sub>10</sub> (µg/m<sup>3</sup>) from HVAS monitors from May 2016 to September 2019**

#### 4.5.2 Copper as PM<sub>10</sub>

Copper concentrations of PM<sub>10</sub> throughout the reporting period were all below Southern Port’s daily Licence limit of 1.0µg/m<sup>3</sup>. The highest copper value for the reporting period was 0.004µg/m<sup>3</sup> at Sites 1, 2 and 3 on various dates (see Appendix 3). The 0.004µg/m<sup>3</sup> concentration was recorded at Sites 1 and 3 on 4/8/2019 to 5/8/2019 which didn’t coincide with copper shiploading. The 0.004µg/m<sup>3</sup> concentration was recorded four times at Site 2 on various dates including during copper shiploading. This value is however approximately 250 fold lower than the Licence criterion of 1.0µg/m<sup>3</sup> and have remained very low even during copper shiploading events (See Figure 15). There seems to be very little difference in copper concentrations even between seasons and in windy conditions. Overall, the results show the loading controls and post shipment hygiene were effective in mitigating any copper concentrations close to the Licence criterion of 1.0µg/m<sup>3</sup> during the nine shipments over the reporting period.



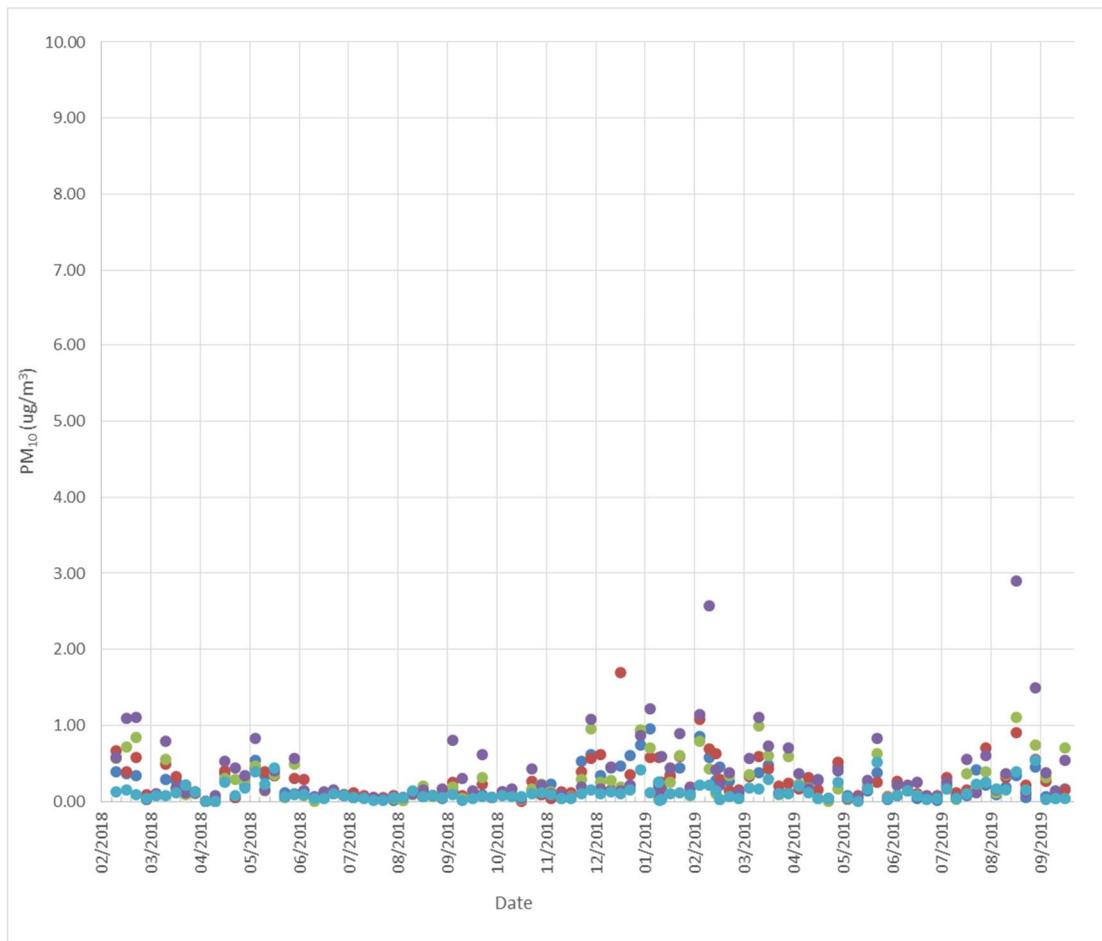
**Figure 15: Concentrations of Copper as PM<sub>10</sub> (µg/m<sup>3</sup>) from HVAS monitors from May 2016 to September 2019**

### 4.5.3 Iron as PM<sub>10</sub>

Shiploading of iron ore from the Koolyanobbing mine owned by Cliffs Natural Resources ceased in late June 2018. Railing in of this same iron ore by new mine owner, Mineral Resources Limited (MRL) re-commenced on the 8<sup>th</sup> of November and shiploading of iron ore started on the 14<sup>th</sup> of December 2018 during the reporting period. Levels of iron in PM<sub>10</sub> were lower during the break in iron ore inloading between late June and November 2018 than in the corresponding period from June to September 2019 (see Figure 16). The highest reading during this period of no iron ore handling or loading was 0.8µg/m<sup>3</sup> at Site 4. Despite it being apparent that iron ore handling does contribute to the levels of iron ore dust around the Port, the data also indicates significant sources of iron other than ore handling and shiploading. It is already known that dust from laterite gravel used on unsealed roads in and around the Port contain up to 10% iron. Actions to minimize this dust and seal roads are discussed in the recommendations section.

Note that increased dust levels between December and May 2018 are consistent with historical seasonal patterns of dust in Esperance across these drier months.

The majority of concentrations of iron in PM<sub>10</sub> over the period were 1.5µg/m<sup>3</sup> or below with only a handful of readings above this. The highest 24-hour average concentration of iron in PM<sub>10</sub> of 2.9µg/m<sup>3</sup> for the reporting period was measured at Site 4 between 28/08/19 12:00 to 29/08/19 12:00 (refer to Appendix 3 & Figure 16). This level of iron represented 10% of the PM<sub>10</sub> dust concentration which was 28µg/m<sup>3</sup> for the 24 hour period. This coincided with iron ore shiploading and a dust incident 24hrs later during this loading event. There is no Licence criteria for iron in PM<sub>10</sub> dust. The highest iron reading at Site 5, the community reference site was 0.44µg/m<sup>3</sup>. Which suggests a more general source of iron is present in the Esperance town.



**Figure 16: Concentrations of Iron as PM<sub>10</sub> (µg/m<sup>3</sup>) from HVAS monitors from February 2018 to September 2019**

#### 4.5.4 Lithium as PM<sub>10</sub>

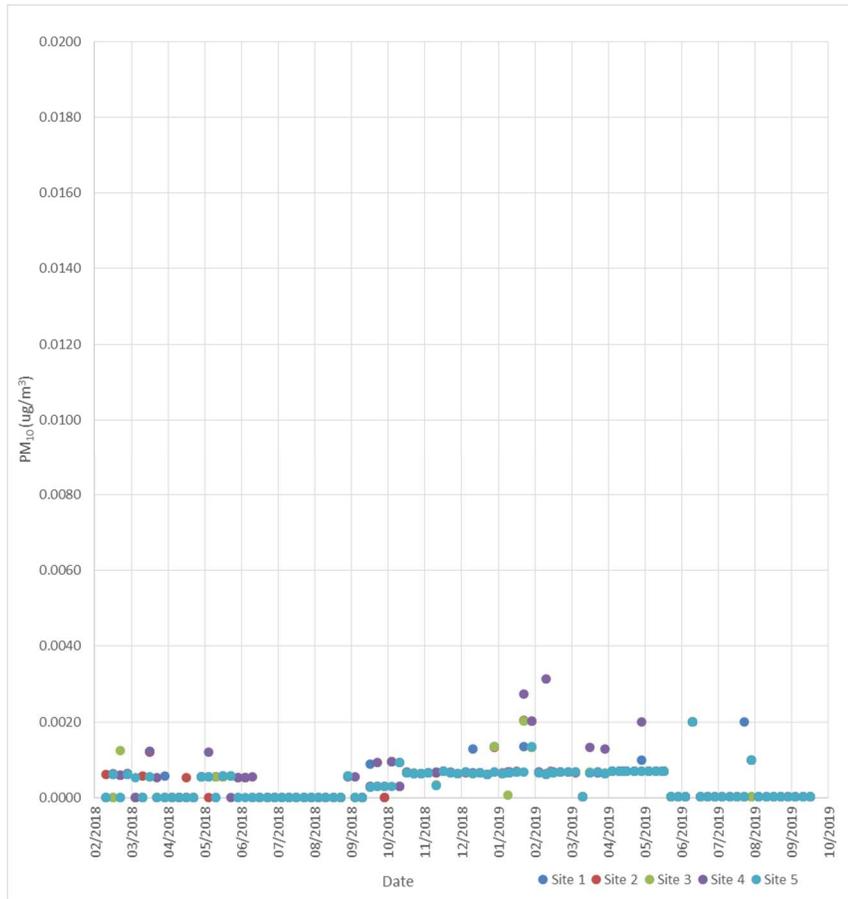
During the reporting period, spodumene (a lithium containing mineral) was exported via:

- Rotabox over Berth 2 from Galaxy Resource's Mount Cattlin mine and from the Bald Hill mine owned by Alita Resources (also known as Lithco No. 2 or Tawana Resources).
- Shiploader over Berth 3 commencing on 23<sup>rd</sup> January 2019 from the Mt Marion Mine owned by Process Minerals International (PMI) under a Trial Notification process (Licence Amendment Application submitted 26/8/2019).

Background monitoring of lithium as PM<sub>10</sub> had commenced in February 2018 following a previous Licence amendment when it had been monitored as TSP.

During the reporting period, the highest lithium concentration in PM<sub>10</sub> was 0.0031µg/m<sup>3</sup> at site 4 on 23/2/19 to 24/2/19 when no spodumene was being loaded at either Berth 2 or Berth 3. This is a relatively low concentration of lithium given the limit of detection is approximately four fold lower at <0.0007µg/m<sup>3</sup>. There are no assessment criteria for lithium in air.

Given the limited amount of lithium in PM<sub>10</sub> data it is difficult to detect trends at this stage or correlate the shipping of spodumene to higher concentrations of lithium. Site 4 does appear to have a slightly higher amount of lithium than other sites. The spodumene grades shipped by Galaxy, Alita Resources or PMI have very little dust associated with their handling on account of the coarse particulates and adequate moisture levels (for more information see section on Product Quality). Alita Resources was suspended from trading in August 2019 due to financial issues and it is unknown when this client may commence trade again.



**Figure 17: Concentrations of Lithium as PM<sub>10</sub> (µg/m<sup>3</sup>) from HVAS monitors from February 2018 to September 2019**

#### 4.6 Stormwater Results

In accordance with the Licence, monthly stormwater sampling was planned for stormwater drains (1 to 3) and sumps (1 to 4) between October 2018 and September 2019 but due to insufficient rainfall during working hours meant that drains could not be sampled for the majority of the reporting period, with the exception of April and September 2019. All the stormwater results for the reporting period are presented in Table 7. The corresponding NATA accredited laboratory reports are provided in Appendix 10.

Stormwater hygiene was improved by regularly wet sweeping between products on berths in accordance with Licence Condition 36(g). Records related to these events are recorded in Appendix 7.

Although not a requirement of the Licence, SPE has compared stormwater sample results to target criteria indicating acceptability to ambient waters (Australian and New Zealand Environment Conservation Council [ANZECC-ARMCANZ, 2000]).

#### 4.6.1 Nutrients

Ambient water criteria for nutrients in stormwater were adopted by Southern Ports as “stretch” targets in the absence of more suitable criteria (see Table 2, section 3.7). The criteria for Total Nitrogen (TN) and Total Phosphorous (TP) are highly conservative and there were a number of exceedances of these targets, as described below and as shown in Table 7.

Sumps 3 and 4 were generally higher in TN nutrients than Sumps 1 and 2 (See Figure 18). Sump 1 drains Berth 1 and surrounds and TN is most likely contributed to from loading of grain and woodchips. Sumps 2, 3 and 4 drains Berth 2 and surrounds and TN concentrations are most likely related to fertiliser unloading such as urea.

The highest TN readings were 494.0 mg/L taken at Sump 4 and 470.0mg/L at Sump 3 both were sampled on 27/06/2019. The highest TN readings at Sumps 1 and 2 was 14.8mg/L sampled on 26/11/2018 and 15.8mg/L sampled on 28/02/2019.

TN levels in Drains 1, 2 and 3 were all lower than the trigger value of 2.3mg/L with the highest value being 0.80mg/L at Drain 3 taken on 30/04/2019.

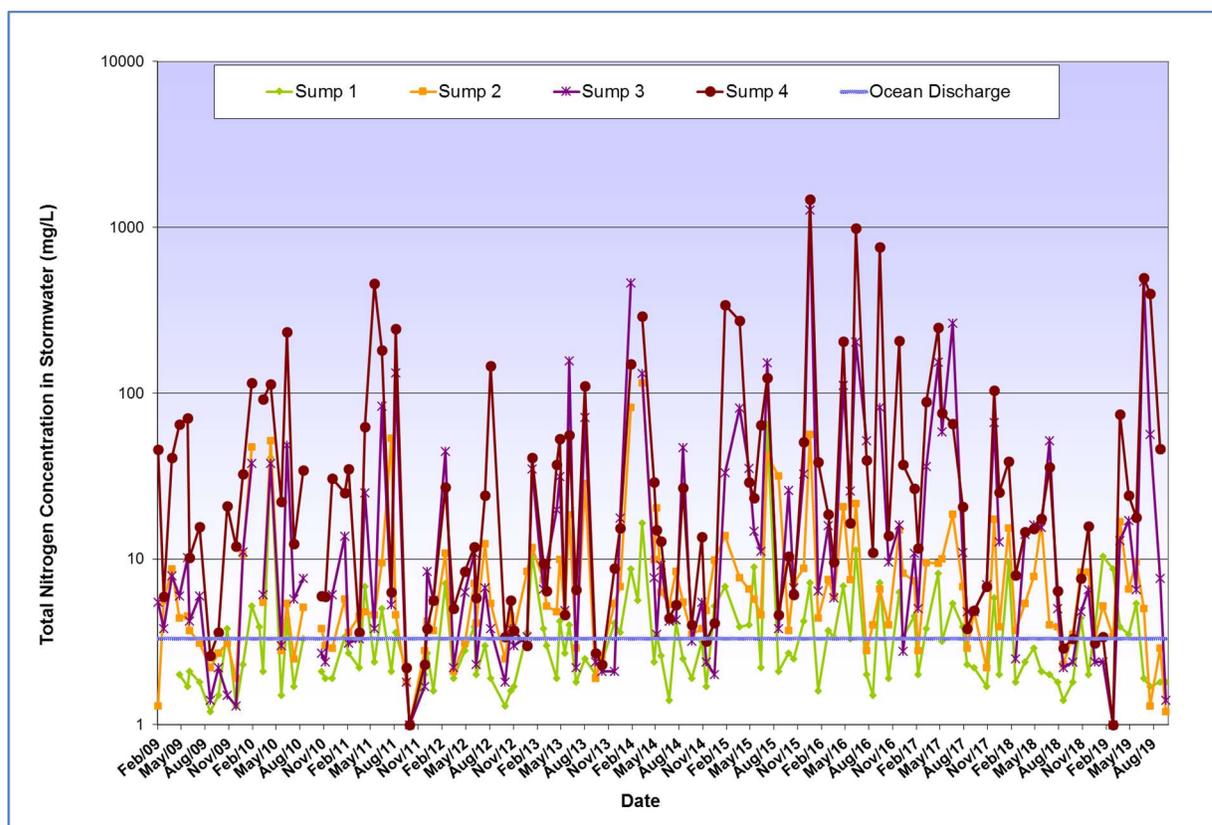
Concentrations of TP in Sumps 1 to 4 were higher than the drains and almost all sumps exceeded the trigger value of 0.20mg/L of TP each month. The highest concentrations were recorded at Sumps 3 and 4 on Berth 2, where phosphorus based fertilisers like mono-ammonium phosphate (MAP) and di-ammonium phosphate (DAP) are unloaded from vessels. The highest TP concentration was recorded at Sump 4 on 28/02/2019 of 67.30mg/L.

**Table 7: Stormwater Quality Monitoring Results of Drains 1 to 3 and Sumps 1 to 4**

Date	Sample type	Site	Trigger values for protecting 80th percentile of marine species with ten fold initial dilution factor applied <sup>2</sup>					Regional trigger values for SW Australia with tenfold initial dilution factor applied <sup>1</sup>			
			Field pH	TDS	TSS	Sulphur	Copper	Nickel	Lithium	Total Nitrogen (TN)	Total Phosphate (TP)
					mg/L					mg/L	
						0.080	5.600		2.30	0.20	
October sampling conducted on 29/10/2018 (sumps only)	Filtered (<0.45 um) Dissolved Metals	Drain 1	Drains 1-3 were not running during October 2018 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling								
		Drain 2									
		Drain 3									
		Sump 1	302	11	2	<0.001	0.097	0.003	3.4	0.50	
		Sump 2	211	16	5	0.083	0.118	0.002	7.3	1.18	
		Sump 3	168	11	8	0.004	0.169	0.013	3.8	0.21	
		Sump 4	270	11	10	0.002	0.419	0.004	6.6	0.52	
November sampling conducted on 26/11/2018 (sumps only)	Filtered (<0.45 um) Dissolved Metals	Drain 1	Drains 1-3 were not running during November 2018 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling								
		Drain 2									
		Drain 3									
		Sump 1	6.46	164	17	7	0.004	0.582	0.007	14.8	0.53
		Sump 2	7.02	510	36	16	0.019	0.030	0.002	2.8	0.43
		Sump 3	6.65	105	31	28	0.009	0.092	0.002	2.3	0.28
		Sump 4	6.17	320	9	21	0.008	0.284	0.004	1.4	0.14
December sampling conducted on 20/12/2018 (sumps only)	Filtered (<0.45 um) Dissolved Metals	Drain 1	Drains 1-3 were not running during December 2018 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling								
		Drain 2									
		Drain 3									
		Sump 1	5.42	162	24	2	0.003	0.030	0.002	2.8	0.43
		Sump 2	5.85	174	<5	6	0.013	0.092	0.002	2.3	0.28
		Sump 3	5.95	131	<5	7	0.011	0.284	0.004	1.4	0.14
		Sump 4	5.75	130	<5	6	0.006	0.295	0.004	2.1	0.37
January sampling conducted on 22/01/2019 (sumps only)	Filtered (<0.45 um) Dissolved Metals	Drain 1	Drains 1-3 were not running during January 2019 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling								
		Drain 2									
		Drain 3									
		Sump 1	5.81	445	83	2	0.001	0.019	0.006	9.4	1.02
		Sump 2	7.44	739	15	16	0.003	0.022	0.006	4.2	0.14
		Sump 3	6.03	115	<5	6	0.002	0.314	0.006	1.4	0.23
		Sump 4	5.71	108	<5	6	0.006	0.431	0.005	2.4	1.17
February sampling conducted on 28/02/2019 (sumps only)	Filtered (<0.45 um) Dissolved Metals	Drain 1	Drains 1-3 were not running during February 2019 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling								
		Drain 2									
		Drain 3									
		Sump 1	5.96	559.00	798.00	5	<0.001	0.015	0.008	7.70	0.88
		Sump 2	7.77	798.00	798.00	16	0.012	0.021	0.006	2.40	0.15
		Sump 3	Sumps 3 and 4 were dry during February 2019 stormwater monitoring and could not be sampled								
		Sump 4									
March sampling conducted on 28/03/2019 (sumps only)	Filtered (<0.45 um) Dissolved Metals	Drain 1	Drains 1-3 were not running during March 2019 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling								
		Drain 2									
		Drain 3									
		Sump 1	5.78	274.00	274	3	<0.001	0.012	0.009	2.90	1.04
		Sump 2	6.18	586.00	586	22	0.007	0.062	0.006	15.80	4.66
		Sump 3	6.35	354.00	354	39	0.007	0.480	0.016	11.90	4.65
		Sump 4	5.98	810.00	810	112	0.004	3.940	0.024	73.30	67.30

			Trigger values for protecting 80th percentile of marine species with ten fold initial dilution factor applied <sup>2</sup>					Regional trigger values for SW Australia with tenfold initial dilution factor applied <sup>1</sup>		
Field pH			TSS	S	Copper	Nickel	Lithium	TN	TP	
			mg/L				mg/L			
Date	Sample type	Site			0.080	5.600	2.30	0.20		
April sampling conducted on 30/04/2019	Filtered (<0.45 um) Dissolved Metals	Drain 1	6.66	136	6	0.006	0.005	<0.001	0.70	0.46
		Drain 2	Drain 2 was not running during April 2019 monitoring as sufficient rainfall did not occur to allow for sampling							
		Drain 3	6.53	197	6	0.006	0.013	0.002	0.80	0.55
		Sump 1	6.27	198	6	0.006	0.048	0.012	2.50	1.83
		Sump 2	6.34	232	9	0.014	0.051	0.003	5.60	1.77
		Sump 3	6.42	246	14	0.033	0.148	0.007	16.00	5.49
		Sump 4	6.50	228	18	0.026	0.487	0.008	23.20	10.90
May sampling conducted on 30/05/2019 (sumps only)	Filtered (<0.45 um) Dissolved Metals	Drain 1	Drains 1-3 were not running during May 2019 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling							
		Drain 2								
		Drain 3								
		Sump 1	6.16	294	230	0.002	0.046	0.013	4.40	1.04
		Sump 2	6.58	754	67	0.005	0.017	0.007	8.60	1.19
		Sump 3	6.45	277	6	0.008	0.181	0.007	5.50	1.05
June sampling conducted on 27/06/2019 (sumps only)	Filtered (<0.45 um) Dissolved Metals	Drain 1	Drains 1-3 were not running during June 2019 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling							
		Drain 2								
		Drain 3								
		Sump 1	6.54	64	1	0.002	0.018	0.009	0.90	0.16
		Sump 2	6.42	105	4	0.007	0.031	0.004	4.00	0.48
		Sump 3	7.57	426	22	0.018	0.110	0.006	470.00	2.21
July sampling conducted on 22/07/2019	Filtered (<0.45 um) Dissolved Metals	Drain 1	6.34	534	13	0.001	0.002	0.002	0.20	0.01
		Drain 2	6.81	3050	92	0.001	0.001	0.064	0.30	0.02
		Drain 3	Drain 3 was unable to be sampled during July 2019 stormwater monitoring event due to long wave period swell and unsafe conditions for sampling close to the ocean.							
		Sump 1	8.14	136	3	0.001	0.019	0.003	0.70	0.15
		Sump 2	7.00	214	6	0.024	0.036	0.022	7.00	0.43
		Sump 3	7.28	196	7	0.008	0.052	0.003	55.50	0.78
August sampling conducted on 29/08/2019	Filtered (<0.45 um) Dissolved Metals	Drain 1	8.98	366	13	0.009	0.044	0.004	397.00	2.03
		Drain 2	Drains 1-3 were not running during August 2019 stormwater monitoring as sufficient rainfall did not occur during weekday business hours to allow for sampling							
		Drain 3								
		Sump 1	5.88	134	2	<0.001	0.034	0.020	0.80	0.23
		Sump 2	7.23	630	11	0.043	0.122	0.006	1.90	0.23
		Sump 3	6.54	120	4	0.005	0.040	0.007	6.60	0.16
September sampling conducted on 19/09/2019	Filtered (<0.45 um) Dissolved Metals	Sump 4	6.78	292	14	0.007	0.241	0.007	45.10	0.84
		Drain 1	5.80	104	13	0.002	0.002	<0.001	0.30	0.04
		Drain 2	6.03	50	23	0.002	0.003	0.001	0.20	0.05
		Drain 3	6.56	82	13	0.002	0.005	0.001	0.40	0.05
		Sump 1	5.77	108	58	0.002	0.013	0.009	0.80	0.21
		Sump 2	6.18	160	18	0.006	0.027	0.002	2.30	0.30
Sump 3	6.00	189	215	0.006	0.221	0.007	4.00	0.57		
Sump 4	Drain 4 had insufficient drainage to allow for sampling									

Concentrations of TP in Drains 1, 2 and 3 sampled during the reporting period were all below the reuse criteria of 0.20mg/L with the exception of Drain 3 sampled on 30/4/2019 which recorded a value of 0.46mg/L. This is higher than TP concentrations recorded at Drain 3 in the preceding 12 month period when the highest reading was 0.20mg/L collected on 26/3/2018. The higher TP concentration is possibly due to lower rainfall in the catchment in the months prior until this collection date causing a first flush of TP nutrients.



**Figure 18: Concentrations of Total Nitrogen in Stormwater (mg/L) from Hume Interceptors Draining Berths 1 and 2 from February 2009 to September 2019**

#### 4.6.2 Metals

Stormwater was also analysed for metals including copper, nickel, lithium and sulphur (see Table 7). Dissolved metals are the filtered results where samples are field filtered to remove particulate >0.45µm. The principal contaminants of concern are nickel and copper.

The monthly storm water samples indicated dissolved copper concentrations in all sumps sampled remained below the adopted water quality criteria trigger value of 0.080 mg/L with the exception of samples taken at Sump 2 on 29/10/2018 where dissolved copper was

0.083mg/L. Elevated copper results in Sump 2 have been a regular occurrence before bulk handling of copper commenced. Previous investigations have shown the source of the copper concentrations is not associated with bulk loading activity, although the source remains unknown (see Appendix 8). So although bulk copper shiploading had occurred one month prior in December 2017, it does not necessarily constitute the source of the copper in this sump as it was not observed in any of the other sumps within the catchment of the bulk handling area. In this instance there had been little rainfall and the sampling event was not collected after a first flush rainfall event, but was sampling stagnant water collected during the previous month. Dissolved copper results in sumps samples ranged from 0.001 mg/L (Sump 1) to 0.188 mg/L (Sump 2). Dissolved copper concentration in drains were noticeably lower and ranged from 0.001mg/L to 0.004mg/L.

Dissolved nickel concentrations remained below the storm water quality criteria of 5.6 mg/L in all sumps sampled (See Table 7). Nickel concentrations in drains were a magnitude lower with the majority being lower than 0.6mg/L with the exception of the 3.94mg/L of dissolved nickel concentration in Sump 4 sampled on 28/03/2019. This occurred 3 days after the completion of a March 2019 nickel shiploading event and 12mm of rainfall had fallen after the shiploading event and therefore any residual nickel is likely to be more concentrated given the lower rainfall during the month. All the stormwater sumps were pumped on the 24/02/2019 following the previous month's nickel shipment and a clean of Berth 2 was also carried out. A pre-loading drain clean should have occurred on 21/3/19 but was missed by the contractor. This was reported to DWER (Clarrie Green/Phil Jeffries) by email on 29/3/2019 and the stormwater sumps emptied on this date. The stevedore and contractor were reminded this is a Licence requirement. Additional checks were undertaken by the stevedore on the hygiene standards during the following shiploading event in case this may have contributed to a higher nickel concentration. Overall the loading controls being implemented are keeping nickel concentration levels in stormwater on Berth 2 at acceptable levels.

Total and dissolved sulphur and lithium didn't have any water criteria with which to compare them. The highest recorded dissolved lithium concentration of 0.064mg/L was recorded at Drain 2 on the 22/7/2019. The highest dissolved sulphur concentration was 215mg/L at Sump 3 sampled on 19/09/2019.

#### **4.7 Wastewater Results**

Four wastewater sampling events were undertaken during the reporting period with analytical results collated in Table 8. These can also be verified by the NATA accredited laboratory reports provided in Appendix 11.

Laboratory results for total and dissolved metals for general wastewater samples collected from the final storage tank treated water were below the respective reuse criteria for each analyte indicating the suitability of the treated water for reuse onsite (see Table 8). The highest total nickel concentration was 0.086 mg/L and total copper concentration was 0.003mg/L sampled on 26/6/2019. The highest dissolved lithium concentration was 0.295mg/L. Wastewater monitoring is now being undertaken on dissolved metals only to provide a more accurate assessment of the potential toxicity of the remaining metals in wastewater.

Wastewater results for nutrient concentrations for TN and TP were within the range of adopted criteria (see Table 3) with the exception of the sample from 25/7/2019 that was high in total nitrogen with a level of 132.00mg/L. In the previous reporting period higher levels of nutrients have been recorded in wastewaters where stormwater from the berths 1 and 2 Hume Inceptor pits are recovered during monthly cleaning maintenance and taken to the general wastewater sump for treatment. The levels of nutrients are possibly not as high due to regular emptying of stormwater sumps and offsite disposal following nickel and copper shipments on Berth 2. Also lower rainfall occurring over the 2019 winter months compared to previous years and reduced stormwater inputs into the WWTP. There was however an increase in fertiliser imports compared to the previous year, potentially due to improved flushing of the stormwater collection system on Berth 2 as part of the clean-up following fertiliser unloading. SPE requires a thorough berth clean by the fertiliser clients and their stevedores and this is covered under the Fertiliser Clean-up Checklist completed for each vessel. The washwaters from this clean up are transported by a controlled waste carrier to Myrup Liquid Waste Facility and are not put into the onsite WWTP.

**Table 8: General Wastewater Quality Monitoring Results following WWTP Treatment**

Sample ID	Date	pH	TDS	TSS	Total Metals				Dissolved Metals				Nutrients		
					S	Copper	Nickel	Lithium	S	Copper	Nickel	Lithium	TN	TP	
<i>Detection Limits (mg/L)</i>					5.00	1.00	0.001	0.001	0.001					0.10	0.01
<i>Reuse STV<sup>1</sup></i>		6-9	-	-	-	5.000	2.000	2.50					25-125*	0.8-12*	
<i>Units</i>			<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	
Final tank-treated water	26-Jun-19	7.70	940	9	73	0.003	0.086	0.090					46.30	3.72	
	25-Jul-19	8.66	836	19					69	0.002	0.051	0.050	<b>132.00</b>	2.87	
	27-Aug-19	8.15	1060	11					94	0.002	0.044	0.295	70.90	1.69	
	26-Sep-19		959	7					117	0.002	0.059	0.168	86.50	0.69	

Notes: Metals results are for total metals as per reuse guidelines;  
**BOLD** indicates results which exceed Reuse Short-Term Trigger Values;  
 Sampling frequency was quarterly from October 2017 to February 2018 but changed to monthly during discharges to the reclaim area due to a decrease in the volume of influent water  
<sup>1</sup> Reuse Short-term Trigger Value (STV) sourced from Reuse criteria for agricultural irrigation Tabls 9.2.17 in Chapter 9 ANZECC/ARMCANZ (2000)

## **5. SUMMARY OF COMPLAINTS**

The following section satisfies Condition 36 (e) of the Licence by including a summary of complaints received for the 2018-2019 reporting year in Table 9.

Note that:

Substantiated complaints were those directly attributable to activities of SPE.

Unsubstantiated complaints were those attributable to a third party who SPE does not have direct control over, or complaints with insufficient evidence.

Two substantiated and seven unsubstantiated complaints were received for the reporting year, all were investigated and actioned (refer to Table 9).

**Table 9: Summary of Complaints for the 2018-2019 Licence Reporting Year**

Complaint type	Event Date	Event Type	Short Observation	Detailed Observation	Actions Taken	Findings
Substantiated	12/01/2019	Dust	Insufficient dust control on hairpin of unsealed haul road	Red gravel dust settling on yachts increasing cleaning bills. Source of clearly visible from the Yacht club from trucks moving around hairpin.	Environmental Services called to water down the hairpin bend; Projects Team communicated with Yacht Club to describe further works on road being planned to eliminate the loose chips being used on the bitumen	Sealing works on hairpin bend not effective for dust control due to stone chips being crushed to dust that still requires wet down
	21/02/2019	Dust	Complaint of Dust Coming from Berth 3 Shiploader	<ol style="list-style-type: none"> <li>1. A community member phoned about 30 minutes after the event to complain about iron ore dust coming from Berth 3 shiploader. The local resident was standing on The Esplanade when he witnessed this event. The MV Zonda was loading lump iron ore at the time on Berth 3.</li> <li>2. The loading of the vessel was completed just after 10am before the Environment Manager attempted to inspect the loading on the vessel.</li> <li>3. Inspection of the security video footage from the breakwater shows a small amount of dust leaving the ships hold moving along the length of the vessel in a northerly direction, surprising it could be seen from the foreshore;</li> <li>4. Discussions with the Hatchman, Terminal Supervisor and Qube Supervisors indicate the FELs had loaded a dry pocket of dry ore from the East end of Shed 3 that went through the system for a few minutes.</li> <li>5. The Hatchman confirmed that all the sprays were on and working including the misters on the loader which was luffed as low as it could go.</li> </ol>	<ol style="list-style-type: none"> <li>1. Obtained security footage;</li> <li>2. Request SPE GM Port (MC) requested that MRL Managing Director (DG) notify Port if iron ore outside 3-7% moisture is sent from the mine;</li> <li>3. Request Operations Superintendent (TT) to water down ore at east end of shed 3 and put moist ore on top</li> <li>4. Repair electronic moisture meters;</li> <li>5. Rang complainant and informed him of the investigation and actions taken</li> </ol>	<ol style="list-style-type: none"> <li>1. The product was received in a dry and dusty condition from the mine</li> <li>2. Insufficient water was put onto the ore in shed 3 to avoid patches of dry product reaching the shiploader and causing a visible dust emission for a few minutes only</li> <li>3. The Hatchman and loading operators had all the available sprays and controls activated</li> <li>4. The moisture reporting system is not working</li> </ol>
Unsubstantiated	26/04/2019	Procedural	Untarped spodumene truck	<ol style="list-style-type: none"> <li>1. Contractor notified Port at 1257 hours about an untarped spodumene truck exiting site that had product in its bin.</li> <li>2. Stated that he had regularly seen trucks untarped. Potential procedural breach as all loaded trucks are supposed to be fully tarped.</li> <li>3. On discussion with product owner it was likely the truck was entering site with full product not leaving and no further action can be taken without registration details;</li> </ol>	Drivers reminded; Trucks observed leaving and entering site for approximately 30 minutes but no untarped trucks were observed	Include observations of trucks in site inspections and record registration details and exact time

19/03/2019	Noise	Complaint about MSC Vessel Engine Noise	A Corry Street resident complained about the engine noise of the MSC Melissa vessel moored at Berth 2. It was claimed the MSC vessels are all very noisy and it is disturbing both during the day and at night and requested a formal complaint was made.	Contact Shipping Agent to speak with vessel captain to try to reduce noise from the vessel that indicated the noise was probably higher during the berthing of the vessel which only finished around 1415hrs, 15 minutes before the berthing process was completed at 1430hrs. Vessel entered into Noisy Ship Register	Noise would have subsided after berthing, complaint was made during berthing process. Duty of care satisfied by contacting vessel's captain
7/03/2019	Noise	Truck Noise Complaint	Local Smith Street resident contacted the Port about excessive noise from a truck that had been driven down the hill from Harbour Road onto Hughes Road using their jake brakes as they entered the Port. The resident provided a description of the truck.	Security footage obtained.	Truck identified as carting grain for CBH. Freightlines Group took responsibility for driver and his driving. Driver informed he needed to change his driving behaviour to limit truck braking noise
26/02/2019	Spillage	Spillage on public and internal roads	Spillage of PMI spodumene from David Campbell's trucks on public (public complaint) and internal roads (CBH complaint)	Notified product owner about leaking trucks.	Truck company indicated a roadsweeper will be operating at 1800 and 0600 hours to recover any spillage on roads as instructed by DMIRS.
20/02/2019	Noise	Wheel squeal from wagons on bend in the track just east of the Twilight Road Bridge	Wheel squeal from wagons complainant on Smith Street	Arc Engineer will investigate corrective actions Previous information from complaints. Monitoring and correspondence with Brookfield Rail passed onto Arc	Works to improve track are required to eliminate noise Train driver behaviour can alleviate the noise to some extent.
22/03/2019			Wheel squeal heard by resident from Dempster Street - Iron ore train heard for 5 minutes from bend in track east of the Twilight Road Bridge	Referred complaint to Arc Infrastructure and Pacific National to respond. I indicated that to complainant that Arc Infrastructure and PN were working together to identify actions to reduce the wheel squeal.	
7/12/2018	Noise	Noise Compliant about Trains Idling on Track on Railway Line Close to Residential housing	A resident in the vicinity of Dempster Street complained about the train noise, vibration and diesel fumes from Pacific National locomotives sitting and idling up the line out the Port gates on the following days and times: 1. 7/12/18 between 8-9pm 2. 10.12.18 between 7-8pm 3. 11/12/18 between 9-9.45pm	The complaint was referred directly to Pacific National	Pacific National train was idling outside Port boundary at various times over the period of a few days causing more noise emission than normal as the train was unusually long and was backed up closer to residential areas.

## **6. MANAGEMENT ACTIONS**

### **6.1 Product Quality Management Actions**

- Environment Team to work proactively with MRL to encourage a trial of a foaming system at the Koolyanobbing crushing plant, although neither MRL's current contract with SP, or SP's current statutory requirements for iron ore requires MRL to add more moisture at the mine site;
- For MRL to provide more realistic predictions of moisture in the train report so it pre-warns of low moisture before receipt of the ore at the Port;
- SP to automate the activation of water sprays and foaming system: Longer term research and development works are being undertaken by the Port's Electrical Engineer to set-up a camera to detect colour of the ore in each wagon that will automate the correct colour-moisture calibration for each of the three main ore colours to maintain a workable level of accuracy. This system is used in other industries but to the best of our knowledge will be its first application for detecting moisture in iron ore.

### **6.2 Air Quality Management Actions**

#### **6.2.1 Dust from Traffic on Roads and Dust on Sealed Roads**

Dust from traffic particularly trucks on roads entering, exiting and traversing around the Port are thought to be a partial contributor to PM<sub>10</sub> dust levels. Unsealed roads are SPE's main responsibility in terms of dust emissions and onsite gravel has been tested and shown to contain up to 10% iron which contributes to iron concentrations captured on air monitors. Truck movements inside the Port occur on 1.7 km of unsealed roads. Since 2010, the application of a dust binding agent (Dustex) has been applied annually and reactivated using applications of water during drier periods. The binding agent is however, ineffective in turning areas that are a large source of the airborne dust. In the absence of a suitable dust binding agent applications of water have been increased until the funds can be allocated to permanently seal these areas. Sealing these roads will not only assist in dust management, but also aid in reducing gravel fines washing into the stormwater system and to ocean during heavy rainfall events.

The following works were completed during the reporting period:

- Sealing of the hairpin bend at the end of Berth 3 has been completed, as reported to DWER by Email (to Clarrie Green) on 18/02/2019, using a two coat seal method in accordance with the previous Licence amendment. Application of a more robust asphalt surface to the hairpin bend is planned by 30<sup>th</sup> June 2020; and
- Regular sweeping of Hughes Road to minimise dust levels particularly during the summer months. Hughes Road, is the 24 hour incoming and outgoing truck route generating a significant amount of dust. This directly impacts dust levels in the residential area that both air monitoring sites 3 and 4 are located.

Works to be completed include sealing the remainder of unsealed gravel roadways by June 2022, in accordance with Row 2 of Table 2, Condition 8 of the Licence.

### 6.2.2 Grain Dust

Grain quality is understood to vary significantly and that influences the number of exceedances in any given year attributed to grain handling. Only one exceedance related to grain dust occurred during the reporting period which is lower than numbers of exceedances in previous years. Overall, grain handling, and specifically vessel loading has a high correlation to dust exceedances at certain monitoring sites.

Despite SPE's limited management control over CBH, the following actions were completed during the reporting period:

- Dust exceedance reports related to grain handling have been shared with CBH along with requested updates on improvement actions; and
- Request CBH improve their loading controls when slicks of grain dust are observed on inner harbour waters.

Actions for the coming reporting year are to continue to work with CBH and DWER to encourage improved loading controls and legislative change to drive improvement in grain dust control.

### 6.2.3 Industrial Hygiene, Handling and Procedures

Actions completed during the reporting period:

- Regular sweeping on Berth 1 (woodchip loading only) and Berth 2 for all bulk loaded materials to minimise dust and products being blown around the Port. Implement product-specific management plans clean-up checklists to be followed by SPE staff, external stevedores and shipping agents. These plans/checklists are product-specific and include iron ore, nickel and copper, spodumene, woodchips and container handling;
- Actions for the coming reporting year are for SPE to continue to work with shipping agents, stevedores and clients to minimise external contamination of various products loaded into containers to be exported; and
- SP to stop dust collectors dumping dust on empty conveyors belts when loading out of Sheds 1 and 2: The technology in the iron ore circuit outloading from Sheds 1 and 2 will be upgraded so that the dust collectors can be re-programmed so accumulated dust is only shed onto a moving conveyor full of iron ore. This is expected to be complete in 2019.

### 6.3 Stormwater Management Actions

Actions completed during the reporting period:

- Regular emptying and maintenance of existing stormwater systems including soaks, pits, Hume Interceptors, mesh covers (woodchip exclusion) and filters including before and after nickel and copper shipments;
- Capture of fertiliser, copper and nickel washwaters and run-off from Berth 2 for disposal as controlled waste at Myrup Liquid waste facility;
- Summit continue to re-use nutrient-contaminated groundwater under their lease with the aim of reducing nitrogen levels. This groundwater moves seawards and may infiltrate into SPE's stormwater system.

Actions to be completed:

- Identification of cost-effective actions from improved loading controls or stormwater treatment to reduce nutrients at Sumps 3 and 4
- Re-assess budget priorities to construct a StormDMT filter described in Condition 8 (Table 2, row 3). Construction of the filter by 31<sup>st</sup> December 2019 is not going to occur due to reallocation of capital expenditure on projects linked to new clients and trade opportunities. It is more likely to occur during the 2022/23 financial year.

### 6.4 Wastewater Management Actions

The wastewater treatment plant will continue to be operated and maintained. It is also planned to restart treatment of sulphur water when the port starts to import sulphur during 2020. Plans for an upgrade to the treatment plant are also part of future capital works planning.

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