Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Licensee: Cristal Pigment Australia Ltd

Licence: L8870/2014/1

Registered office:	4 Old Coast Road AUSTRALIND WA 6233
ACN:	008 683 627
Premises address:	Kemerton Titanium Dioxide Processing Plant 869 Marriott Road WELLESLEY WA 6233 Being part of Lot 1 on Plan 73196
Issue date:	Tuesday, 30 December 2014
Commencement date:	Tuesday, 30 December 2014
Expiry date:	Sunday, 29 December 2019

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER) has decided to issue an amended licence. DER considers that in reaching this decision it has taken into account all relevant considerations and that the Licence and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by:	Amine Callegari Licensing Officer
Decision Document authorised by:	Jonathan Bailes. Delegated Officer

Contents

1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986.* Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

2 Administrative summary

Administrative details		
Application type	Works Approval ☐ New Licence ☐ Licence amendment ☒ Works Approval amendment ☐	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	31: Chemical manufacturing	125,000 tpa
	87: Fuel burning	1,140 kg/hr
	61: Liquid waste facility	600,000 tpa
Application verified Application fee paid	Date: N/A Date: N/A	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☐ No☒	
Commercial-in-confidence claim outcome		
Is the proposal a Major Resource Project?	Yes☐ No☒	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☒ No☐	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☒
Is the proposal subject to Ministerial Conditions?	Yes☒ No☐	Ministerial statement No: 225 EPA Report No: 176-1
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)?	Yes☐ No☒ Department of Water consulted Yes ☐ No ☒	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☒ No☐ Environmental Protection (Swan Coastal Plain Lakes) Policy 1992		
Is the Premises subject to any EPP requirements? Yes☐ No☒		

3 Executive summary of proposal and assessment

Cristal Pigment Australia Ltd (Cristal) operates a titanium dioxide (TiO_2) processing plant (the Plant) under licence L8870/2014/1. The plant was established in 1988 by SCM Chemicals in the Kemerton Industrial Park. In 2007 the plant was acquired by Saudi Arabian-based company National Titanium Dioxide Company and currently trades as a wholly owned subsidiary known as Cristal Pigment. The closest sensitive receptor is a rural residence approximately 2 km south-east of the plant. There is also a residential subdivision approximately 3 km west of the plant. The site is considered a major hazard facility under Dangerous Goods legislation due to the industrial use of chlorine, which is highly toxic and a strong oxidiser in gaseous form.

The plant manufactures titanium dioxide pigment using the chloride process. The process involves the production, and oxidation of, titanium tetrachloride, to yield titanium dioxide and liquid chlorine. Chlorine gas is recovered and returned to the front end of the process. The titanium dioxide is slurried and transported to Cristal's finishing plant at Australind where it is chemically treated. The key environmental considerations include air emissions, water discharges and solid wastes.

The main air emissions are carbon monoxide, carbonyl sulfide and sulfur oxides from the main stack. Off gas from the chlorinator unit passes through a mixed scrubbing system (spray tower, venturi and packed tower) prior to dilution with other process off gas streams and discharge to the atmosphere via a 66 m stack. The plant has chlorine sensors in the process stream gas that trigger a quench caustic scrubbing system if required; the plant is also interlocked to shut down in the event that chlorine is detected in the process vent.

The main emissions to water are from the discharge of treated effluent to the Indian Ocean via a discrete ocean outfall in the Leschenault Peninsula. All liquid waste streams from pigment production, the air separation plant and adjacent Chlor-Alkali Plant are directed into the premises neutralisation plant for treatment prior to discharge of the resulting effluent via the ocean outfall pipeline. Treated solid residues (TSR) remaining from the liquid waste treatment process are slurried then transported via road tankers to an approved disposal location at the Banksia Road Landfill Site, Dardanup (L7439/1998/9). A double lined containment cell has been established at the landfill for disposal of TSR remaining from liquid waste treatment at the Kemerton TiO_2 Processing Plant and the Australind TiO_2 Finishing Plant (L6046/1967/15), both operated by Cristal. The containment cell has a leachate recovery system to collect all leachate and contaminated stormwater generated from the TSR containment cell. The collected leachate is transported by road tankers back to the neutralisation plant at the Premises for treatment prior to discharge through the ocean outfall with the Plant's treated effluent stream.

This decision document assesses the inclusion of Category 61: Liquid Waste Facility on the licence to authorise acceptance of waste water from the Kemerton Silicon Smelter (L6341/1988/10) and leachate from the Banksia Road Landfill Site (L7439/1998/9). A review of groundwater monitoring locations has also been undertaken to remove monitoring locations which are located on the adjacent Chlor-Alkali Plant and are monitored by the licensee of that premises. As part of this amendment DER has not reassessed the acceptability or impact of emissions and discharges from the Premises or re-visited any existing emission control levels other than those which relate to the inclusion of Category 61 on the licence. Changes to conditions consistent with the current DER licence format have also been included in the amendment along with correction of administrative errors.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
General Conditions		Previous condition 1.2.3 has been removed in accordance with DER policy.	NA
Premises Operation	L1.3.1-L1.3.3	Emission Description *Emission:* Discharge of liquid wastes including TSR leachate returned from the Cristal TSR cell at Banksia Road Landfill, and treated wastewater from Kemerton Silicon Smelter, to the marine environment via Cristal Kemerton's ocean outfall pipeline. *Impact:* Potential for contamination of the marine environment if liquid wastes accepted on the premises do not meet defined water quality criteria or are not appropriately treated to meet the defined water quality criteria prior to discharge via the ocean outfall pipeline. TSR leachate in particular has the potential to influence water and sediment chemistry if it does not receive treatment prior to discharge due to the presence of radionuclides and bio-accumulating metals. Overloading of the water treatment and discharge system could occur if too much liquid waste or non-specified liquid waste is accepted on the premises. *Controls:* The proponent has an agreement with Kemerton Silicon Smelter relating to acceptance criteria for wastewater discharged to the site. The acceptance criteria are based on the licence limits for point source discharges to surface water. The transfer pump will trip in the event water monitoring results do not meet the acceptance criteria. The agreement also allows Cristal to stop water transfer if required, such as during maintenance or when water quality criteria are not met. Cristal will also have a sampling point adjacent to the Clean Effluent Pond to validate water quality.	Application supporting documentation W5286/2012/1 - Application

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		Cristal has an established program of continuous monitoring of wastewater discharge via the ocean outfall pipeline. They also implement process controls to divert wastewater back to the effluent treatment stage in the event discharge limits are exceeded. Risk Assessment *Consequence*: Moderate *Likelihood:* Unlikely *Risk Rating:* Moderate Regulatory Controls Condition 1.3.2 has been added to the licence to specify the liquid waste types and quantities which can be accepted on the premises to ensure that only the nominated liquid wastes are accepted on the premises. Specifications have also been included describing the source of the waste and discharge location to ensure those wastes which require further treatment are discharged at an appropriate point in the wastewater treatment system. Requirements for infrastructure which will contain wastewater on the premises are specified in existing condition 1.3.3. The Kemerton Silicon Smelter will establish a continuous monitoring system on the discharge pipeline (regulated via the Kemerton Silicon Smelter licence) which will control wastewater flows to the clean effluent pond. Wastewater discharge will cease in the event that water quality parameters fall outside of Cristal's limits. Existing licence conditions 2.3.2 and 3.3.1 specify discharge limits and monitoring requirements for the Kemerton ocean outfall and an established marine monitoring program is also specified in condition 3.4.1. The aim of the program is to monitor whether marine discharge is impacting on ambient water, sediment or biomonitors.	

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		The monitoring requirements in condition 3.3.1 have been amended to ensure a suitable monitoring frequency is defined for all parameters for which limits on discharge to water have been defined in condition 2.3.2. The condition has also been amended to include quarterly metals analysis which was previously incorrectly included in the ambient surface water quality monitoring in table 3.4.1. Residual Risk *Consequence:* Minor *Likelihood:* Unlikely *Risk Rating:* Moderate	
Point source emissions to air	2.2.1-2.2.5	Emission Description *Note – Full reassessment of point source emissions to air has not been undertaken. The following justification includes information relating to the removal of point source emission to air targets.* *Emission:* Process gases from the chlorinator unit process scrubber vent stack containing potentially high levels of sulfur dioxide, carbonyl sulphide, carbon monoxide, chlorine and hydrogen chloride. Impact: Reduced local air quality and potential to impact on the health and amenity of nearby sensitive receptors, neighbouring industrial premises or workers. *Controls:* Off gases pass through a mixed scrubbing system and dilution to remove and dilute contaminants prior to discharge to the atmosphere. CEMS monitoring of process gases is in place prior to gases entering the stack. The process gases are diluted by over 100% through the addition of air in the process stack. Chlorine sensors are located in the main vent stack to trigger caustic scrubbing in the event of chlorine being detected. The plant is interlocked to shut down in the event that chlorine in detected in the process vent. Cristal has internal process controls including on line monitoring via a distributed control system and operators and emergency shutdown procedures in place to monitor,	Cristal Kemerton Plant Annual Environmental Report 2014 Correspondence – Cristal to DER – February 2013 L6078/1988/13 Environmental Assessment Report 2010

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		detect and react to high emission levels in the process cent stack. Risk Assessment *Consequence:* Minor, the nearest sensitive receptor is 2km away; historic emissions modelling demonstrates emissions are not expected to exceed NEPM or other relevant ambient air standards. *Likelihood*: Unlikely, real time monitoring and emergency shutdown procedures are in place to react to high emission levels. *Risk Rating:* Moderate Regulatory Controls Point source emission to air targets, which were previously included in condition 2.2.4, table 2.2.3 and condition 2.2.7, table 2.2.5, have been removed from the licence. Related management actions in condition 2.2.4 have also been removed. Cristal has internal process controls (on line monitoring via a distributed control system and emergency shutdown procedures) in place to monitor, detect and react to high emission levels. The point source air emission targets were based on expected plant performance under normal operating conditions and were a trigger for the Licensee to review operating conditions. It is therefore more appropriate that these are implemented as internal process control alerts rather than as a condition of the Licence. Licence limits for the chlorinator unit process scrubber vent stack are retained in condition 2.2.2 of the licence. Condition 2.2.3 also specifies an exemption from the limits in the case of specified management actions in condition 2.2.4 being implemented in response to an exceedance. The licence has included limits on emissions to air from the chlorinator unit process scrubber vent stack since it was first issued. The limits have been based on expected performance of the emission scrubbing system, acceptable ground concentration levels and air emission modelling. Reassessment of the limits is not within the scope of this	

DECISION TABLE

<table>
<tr><th>Works Approval / Licence section</th><th>Condition number
W = Works Approval
L= Licence</th><th>Justification (including risk description & decision methodology where relevant)</th><th>Reference documents</th></tr>
<tr><td></td><td></td><td>amendment. Monitoring requirements for point source emissions to air are specified in condition 3.2.1 and to validate compliance with emission limits.

<table>
<tr><th colspan="4">Table 2.2.3: Point source emission targets to air</th></tr>
<tr><th>Emission point reference</th><th>Parameter</th><th>Target (including units)</th><th>Averaging period</th></tr>
<tr><td rowspan="4">A1</td><td>Sulfur dioxide</td><td>5,700 mg/m^3</td><td>Derived measurement (60 minute average)
Stack test (min. 30 minute average)</td></tr>
<tr><td>Carbonyl sulfide</td><td>11,500 mg/m^3</td><td>Derived measurement (60 minute average)
Stack test (180 minute average)</td></tr>
<tr><td>Carbon monoxide</td><td>172,000 mg/m^3</td><td>Derived measurement (8 hour average)
Stack test (30 minute average)</td></tr>
<tr><td>Chlorine</td><td>200 mg/m^3</td><td>CEMS (60 minute average)
Stack test (30 minute average)</td></tr>
</table>

Residual Risk
Consequence: Minor
Likelihood: Unlikely
Residual Risk Rating: Moderate</td><td></td></tr>
<tr><td>Ambient quality monitoring</td><td>L3.4.1</td><td>Condition 3.4.1, Table 3.4.3 details the ambient groundwater monitoring requirements for the licence. It has been identified that a number of the monitoring bores which were included in the table are located on the adjacent premises which are operated, maintained and monitored by the neighbouring Licensee (Coogee Chlor Alkali Pty Limited) in accordance with their licence conditions (L6036/1988/13). The bores were originally installed in the late 1980's to monitor and recover a saline groundwater plume caused by activities on the neighbouring premises. The affected bores have been removed via this amendment as monitoring requirements in the Coogee Chlor Alkali Pty Limited Licence are adequate to cover the affected bores GQ3 (KM3), GQ10-GQ12 (KM10-KM12) and GQ16 (KM16).</td><td>Application supporting documentation

Environmental Protection Act Licence L6036/1988/13</td></tr>
</table>

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
10 September 2015	Proponent sent a copy of the draft amended instrument and decision document.	Comments received 25/9/2015. Minor change to monitoring analysis requirements requested based on current practices.	Minor change to allow for in-house analysis of two discharge water parameters.

6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High