Proposed Separation of Environmental Responsibilities Chloride Process Pigment Plant - Kemerton

Nufarm-Coogee Pty Limited and SCM Chemicals Limited

Report and Recommendations of the Environmental Protection Authority

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I. Summary And Recommendations

On 25 August 1987 the Minister for Environment issued a "Statement that a Proposal May Be Implemented (Pursuant to the Provisions of the Environmental Protection Act 1986)" for a proposal by SCM Chemicals Limited to produce Titanium Dioxide Pigment by a chloride process at Kemerton and Australind. The approval was subject to a number of conditions and commitments made by the proponent during the environmental impact assessment process.

The conditions imposed in the Minister's Statement placed the environmental responsibilities for the whole proposal on SCM Chemicals. A proposal has now been made that Nufarm-Coogee Pty Ltd should be the operators of the chlor-alkali plant. Nufarm- Coogee have submitted a Notice of Intent in support of a separation of environmental responsibilities, and seeking minor changes in some of the commitments based on their experience of operating such plants.

The proposal involves:

a) Separation of conditions and commitments in the Statement, devolving those related to the Chlor-Alkali Plant to Nufarm- Coogee, with the remainder continuing to be the responsibility of SCM;

b) Changing commitments for - a foam suppression system in the chlorine storage area, remotely operated valves on the liquified chlorine line, and excess flow valves on the liquified chlorine line; and,

c) Deletion of 30,000 tonne salt stockpile.

The Authority has assessed the proposal and finds it to be environmentally acceptable. Some of the existing conditions need to be reworded to ensure adequate coverage of both plants.

Recommendation 1

The Environmental Protection Authority concludes that there are no unacceptable environmental consequences in the proposal to devolve environmental management responsibility for the Chlor-Alkali Plant at Kemerton from SCM Chemicals Limited to Nufarm- Coogee Pty. Ltd. and recommends that it should proceed subject to the Authority's recommendations in this Report. The Environmental Protection Authority further recommends that those environmental conditions, which have been imposed on SCM Chemicals Ltd. and which relate to the Chlor-Alkali Plant, be removed from SCM Chemicals Ltd.'s responsibility and be placed on Nufarm-Coogee Pty. Ltd. as appropriate.

Recommendation 2

The Environmental Protection Authority recommends that:

- **disposal of wastes from the chlor-alkali plant be carried out to the satisfaction of the Environmental Protection Authority; and,**
- **monitoring of emissions from the chlor-alkali plant be carried out to the satisfaction of the Environmental Protection Authority.**

Recommendation 3

The Environmental Protection Authority finds that there would be no increase in overall risk levels from the plant should the proposed changes to commitments be implemented, and recommends agreement to the changes.

These involve:

- **deletion of a foam suppression system in the chlorine storage area and its replacement with a requirement for a fully-enclosed building vented to the chlorine scrubber;**
- **deletion of remotely operated valves on the liquid chlorine line;**

- requirement for use of a U-channel for carrying liquid chlorine pipework; and,
- deletion of excess flow valves on the liquid chlorine line.

Recommendation 4

The Environmental Protection Authority accepts as a commitment that the proposed 30,000 tonne salt stockpile is no longer required. Should this proposal be reactivated at any site in relation to this chlor-alkali plant, it should be referred to the Environmental Protection Authority.

1. Background

SCM Chemicals Ltd (SCM) submitted to the Environmental Protection Authority a Notice of Intent for a chloride-process pigment plant at Kemerton on 10 June 1987. The Authority prepared an assessment report on the proposal, Bulletin 283 dated July 1987. On 25 August 1987 the Minister for Environment issued a "Statement that a Proposal May Be Implemented (Pursuant to the Provisions of the Environmental Protection Act 1986)" for SCM's proposed operations at Kemerton and Australind, subject to a number of conditions and commitments made by the proponent in the Notice of Intent.

Conditions were attached to the Statement in relation to the chlor-alkali plant, making SCM responsible for the environmental performance of this part of the proposal. SCM have proposed Nufarm-Coogee Pty. Ltd. as operators of the chlor-alkali plant. Nufarm-Coogee is a joint venture company which has been formed to construct and operate the chlor-alkali plant. The partners are Nufarm Limited (80%) and Coogee Chemicals Pty Ltd (20%). Nufarm- Coogee have submitted a Notice of Intent in support of a separation of environmental responsibilities, and seeking minor changes in some of the commitments based on their experience of operating such plants.

2. Proposal

The proposal which Nufarm-Coogee has submitted for assessment is as follows:

a) Separation of conditions and commitments in the Statement, devolving those related to the Chlor-Alkali Plant to Nufarm- Coogee, with the remainder continuing to be the responsibility of SCM;

b) Changing commitments for

- a foam suppression system in the chlorine storage area,
- remotely operated valves (ROVs) on the liquified chlorine line, and
- excess flow valves on the liquified chlorine line; and,

c) Salt stockpile of 30,000 tonnes is no longer required.

Information provided by Nufarm-Coogee in support of the proposal to change commitments is discussed in Section 4 of this report.

3. Environmental Assessment Procedure

SCM's commitments in respect of the chlor-alkali plant were incorporated into Conditions attached to the Minister's Statement of 25 August 1987. Subsequently SCM have obtained Works Approval No. 32 for construction of the plant.

The Minister has accepted SCM's proposal for implementing Condition 6 "Environmental Responsibility". In a letter dated 15 September 1987, SCM agreed to retain this responsibility during the construction phase.

Nufarm-Coogee originally approached the Environmental Protection Authority in November 1987 seeking some changes to the commitments made by SCM and initiating the transfer of responsibilities. On the advice of the Authority, Nufarm-Coogee prepared a Notice of Intent dated 24 March 1988 providing the necessary documentation to propose the transfer and the changes to commitments.

The Environmental Protection Authority has assessed the proposal which is described in the Notice of Intent. The purpose of this Assessment Report is to evaluate the implications of changes to commitments for the chlor-alkali plant as proposed by Nufarm- Coogee. This Report also contains recommended sets of conditions for the chlor-alkali plant, and for the chloride-process pigment plant which will remain under SCM's control.

Should the Minister agree to issue separate 'Statement(s) that a Proposal May Be Implemented', then separate Works Approvals and Licences will be required under Part V of the Environmental Protection Act.

The documentation provided by Nufarm-Coogee in the Notice of Intent:

- sought separation of responsibilities for the chlor-alkali plant;
- indicated desired changes to commitments;
- provided assessment by a risk consultant of changes to commitments;and,
- gave information on Nufarm-Coogee Pty Limited.

4. Environmental Issues

4.1 Separation Of Responsibilities

The Environmental Protection Authority has assessed this part of the proposal and believes that there are no significant environmental issues involved with the division of responsibilities.

Recommendation 1

The Environmental Protection Authority concludes that there are no unacceptable environmental consequences in the proposal to devolve environmental management responsibility for the Chlor-Alkali Plant at Kemerton from SCM Chemicals Limited to Nufarm- Coogee Pty. Ltd. and recommends that it should proceed subject to the Authority's recommendations in this Report. The Environmental Protection Authority further recommends that those environmental conditions, which have been imposed on SCM Chemicals Ltd. and which relate to the Chlor-Alkali Plant, be removed from SCM Chemicals Ltd.'s responsibility and be placed on Nufarm-Coogee Pty. Ltd. as appropriate.

All conditions imposed in the original Statement have been reviewed. Some minor changes in wording of existing conditions are necessary for consistency. The Table 1 shows how the conditions have been divided.

Table 1. Separation Of Conditions

ORIGINAL NUMBER	NEW NUMBER FOR NUFARM-COOGEE	NEW NUMBER FOR SCM
1	1*	1*
2	2	2
3	3	
4	4	
5	5*	
6		
7	6	3
8		4
9		5
10	7	
11	8*	6
12		7
13		8
14		9
15		10
16		11
17		12
18		13
19		14
20		15
21		16
22		17
23	9	18
24		19
	10**	

* denotes reworded from original ** denotes new condition

Appendix 1 and Appendix 2 indicate, for Nufarm-Coogee and SCM respectively, the Authority's suggested wordings for Conditions and Commitments.

As required, SCM have submitted proposals for disposal of all waste streams from the pigment plant. There is a need to ensure that adequate arrangements are made to dispose of any solid and liquid wastes from the chlor-alkali plant, and that emissions from the plant are monitored. These are incorporated as Conditions 8 and 11 in Appendix 1.

The original condition (condition 24) relating to the payment of costs equivalent to a full time professional officer is to be retained as a condition on SCM only, rather than on both companies. Nufarm-Coogee and SCM have agreed that apportioning of the costs between the two companies should be subject to separate negotiation and agreement between the two parties.

Recommendation 2

The Environmental Protection Authority recommends that:

- **disposal of wastes from the chlor-alkali plant be carried out to the satisfaction of the Environmental Protection Authority; and,**
- **monitoring of emissions from the chlor-alkali plant be carried out to the satisfaction of the Environmental Protection Authority.**

4.2 Changes to Commitments

The Environmental Protection Authority has reviewed the points listed in Nufarm-Coogee's letter of 12 November 1987, and supported by the letter of Cremer and Warner dated 8 January 1988. The Authority's assessment is as follows.

4.2.1 Foam Suppression System.

Nufarm-Coogee have questioned the advisability of using a foam blanket on a spill contained within the chlorine storage building on the following bases:

a) Nufarm-Coogee's calculations show that the chlorine vaporisation rate for 25 tonnes of liquid chlorine at -34 degrees (a catastrophic failure of one tank) would be a maximum of 30 kg/hr;

b) The storage building is vented to the scrubber; and,

c) The water introduced with the foam will increase the vaporisation rate and make recovery of the chlorine more difficult.

The Authority accepts these arguments; therefore a foam blanket will not be required in the event of a contained spillage in the tank storage building, as the building itself provides adequate safeguards.

4.2.2 Remote Operated Valves Between Liquifier and Storage Tanks.

The Environmental Protection Authority's purpose in requesting consideration of this item was to minimise the amount of chlorine lost due to failure of the line. Nufarm-Coogee contends that valves are unnecessary and undesirable for the following reasons:

a) The valves would make little difference to the amount of chlorine released because of the small amount of chlorine actually in the line (about 30kg) and other controls which prevent major losses from other parts of the plant in the event of a failure in this line; and,

b) The line should be kept as short as possible with the minimum number of pipe bends, flanges etc, with maximum effort being made to protect the line from mechanical damage.

The Authority accepts these arguments and remotely operated valves will not be required in the liquid chlorine line. The Authority notes, and strongly supports, the comments by Cremer and Warner on use of a U-channel for carrying the chlorine pipework. The channel would direct any

spillages away from inappropriate areas, such as roadways, to areas where containment and clean-up can be achieved. It is recommended that a requirement to use such a channel should be included as a Condition and a Commitment.

4.2.3 Excess Flow Valves in the Liquid Chlorine Line

Nufarm-Coogee's objection to this requirement is based on experience of operational problems such as sticking valves and faulty actuation, and on the grounds noted in 4.2.2. This results in frequent dismantling of the line with potential for accidental release.

The Authority is prepared to revise its requirements in this regard, and so excess flow check valves will not be required on the liquid chlorine discharge line.

4.2.4 The Authority's Findings

The Environmental Protection Authority has examined the implications of these proposed changes and considers that they would not increase the overall risk levels predicted for the chlor-alkali plant.

Recommendation 3

The Environmental Protection Authority finds that there would be no increase in overall risk levels from the plant should the proposed changes to commitments be implemented, and recommends agreement to the changes. These involve:

- **deletion of a foam suppression system in the chlorine storage area and its replacement with a requirement for a fully-enclosed building vented to the chlorine scrubber;**
- **deletion of remotely operated valves on the liquid chlorine line;**
- **requirement for use of a U-channel for carrying liquid chlorine pipework; and,**
- **deletion of excess flow valves on the liquid chlorine line.**

These changes have been incorporated in the suggested conditions for the chlor-alkali plant in Appendix 1.

4.3 Salt Stockpile

The Authority also notes that there is no longer a requirement, at this stage, for establishment of a 30,000 tonne salt stockpile. Salt will be brought in on a daily basis from the source, Lake Deborah East, and stored on a concrete pad capable of holding about 2,000 tonnes. The pad is to be drained to the brine unit. This is regarded as a commitment. The Authority's advice must be sought should this proposal be reactivated in future.

Recommendation 4

The Environmental Protection Authority accepts as a commitment that the proposed 30,000 tonne salt stockpile is no longer required. Should this proposal be reactivated at any site in relation to this chlor-alkali plant, it should be referred to the Environmental Protection Authority.

5. Conclusion and Recommendations

The Environmental Protection Authority has assessed the proposal for Nufarm-Coogee to assume environmental responsibility for the chlor-alkali plant at Kemerton from SCM, with some minor changes to commitments. The Authority finds the proposal to be environmentally acceptable. Recommended conditions are contained in Appendix 1 and Appendix 2 of this Report.

Appendix 1

Nufarm-Coogee Pty Ltd - Conditions Related to the Chlor-alkali Plant

Recommended Conditions for Ministerial 'Statement that a proposal may be implemented'

This proposal may be implemented subject to the following conditions:

1. Adherence by the proponent to all the relevant commitments made by SCM Chemicals Limited (SCM) in the ERMP, in the SCM's response to issues raised in the submissions and those raised by the Environmental Protection Authority and in the Notice of Intent for the Kemerton proposal (copy of commitments attached), except where specifically altered by the Notice of Intent for transfer of responsibilities to Nufarm-Coogee.

2. The preparation by the proponent in stages, of a comprehensive and integrated hazard and risk management strategy, to the Authority's satisfaction.

This shall consist of the following with the results being forwarded progressively when completed to the Authority:

- the HAZOP study to be completed and submitted before construction commences and to be conducted in a manner approved by the Authority. This HAZOP study should especially discuss the risk effects of the safeguards removed due to the plant being located at Kemerton;
- a final risk analysis report incorporating the plant design after HAZOP and (taking into consideration any additional safeguards/modifications arising out of the HAZOP analysis), to be submitted soon after construction;
- a hazard analysis update (including a fire safety study, and a study detailing the management of the commissioning stage and a study of emergency procedures) to be submitted before plant commissioning; and
- an audit of risk and hazards to be submitted to the Authority upon request. An audit request by the Authority shall require the concurrence of the Minister for Environment.

3. No more than 50 tonnes of chlorine shall be stored at the Kermerton plant location. Containers shall not exceed three in number nor 25 tonnes capacity each.

4. No sale of chlorine from the Kemerton site shall be permitted without a further specific assessment by the Authority, and the management of the transport of chlorine for commissioning should be discussed with the relevant Government agencies prior to commissioning as well as meeting appropriate statutory requirements.

5. Safeguards for the Kemerton proposal shall be the same as those required for the CSBP chlor-alkali plant at Kwinana (EPA Bulletin 216) to the extent that these requirements provide an equivalent measure of safeguards as those at Kwinana and are relevant to the Kemerton proposal as determined by the Authority. In addition commitments made by the proponent, to install the following, shall be implemented:

- full height concrete bunding;
- additional insulation to be applied to the concrete bunds; and,
- full enclosure of the storage area and venting of the building to the chlorine scrubber.

6. The proponent's emergency plan and procedures be integrated with the proposed State Emergency Services' Bunbury Regional Counter Disaster Plan. In addition, the proponent shall participate in the development of a fire management strategy for the Kemerton region and contribute materially towards its implementation.

7. The proponent shall install a chlorine scrubbing system on the chlor-alkali plant with sufficient

back-up capacity to be able to absorb all of the chlorine produced at the full production rate for half an hour at the maximum projected plant output of 17000 tonnes of chlorine per annum.

8. The proponent shall submit to the Authority, prior to commissioning of the plant, a plan for the disposal of solid and liquid wastes from the plant to the satisfaction of the Authority.

9. The proponent shall liaise with the Department of Conservation and Land Management to ensure that the Company's operation and Management Programme for the Kemerton plant site is compatible with the Management objectives developed for the Kemerton Community Park concept.

10. The proponent shall submit to the Authority, prior to commissioning of the plant, a programme for monitoring emissions to the air and waters from the plant to the satisfaction of the Authority.

Environmental Commitments

Note: '*' indicates additional commitments made in Notice of Intent dated 24 March 1988

1. Aesthetics/noise/odour

- Ongoing control of dust would be implemented.
- Noise levels within the plant would be in accordance with statutory requirements.
- The plant site would be attractively landscaped, and buildings would be aesthetically designed.
- There should be negligible odour impact to surrounding residential areas arising from the proposed development.
- Odours would not originate from the proposed plant during normal operation.

2. General

- The plant would undergo regular preventative maintenance.
- All waste products would be disposed of in an environmentally safe manner and in accordance with statutory requirements.
- A detailed final risk analysis would be undertaken in conjunction with the plant designers to confirm or improve upon the recommendations made in the risk assessment (Cremer and Warner, 1986) (See also Sections 3 and 4).
- A full hazards and operability study would be commissioned, and plant personnel would be trained in safe operating practices and emergency procedures.
- * The proposal for a 30,000 tonne salt stockpile has been abandoned and salt will be delivered on a regular daily basis.

3. Safety Features (S 10.4, ERMP)

The newly proposed plant will contain tried and proven control technology and will be a very modern safe plant, equivalent to the latest installations effected elsewhere in the world.

The safety features that would be incorporated into the plant are summarised as follows:

3.1 Chlor-alkali Plant

- Automatic tripping of direct current power to the membrane cells.
- Duplication of pumps, provision of back-up emergency power supply and appropriate instrument monitoring of the chlorine absorption plant.
- Plant design to the standards of the Chlorine Institute (United States) and the Bureau International Technique du Chlor (Europe).
- Gravity feeding of brine from storage tanks to membrane cells.
- Monitoring of brine feed to individual cells.
- Fitting of brine head tanks to cells to maintain differential pressure across the membrane in the event of sudden loss of brine flow.
- Installation of emergency buttons in the cell room; controlled shut-down of chlorine manufacturing and liquefaction facilities.
- Provision of a back-up absorption column.
- Minimum instrumentation of absorption unit to consist of monitoring alarms for caustic

concentrations and flows, chlorine concentration in the vent streams, low caustic levels in recirculation tanks and high temperature in the column(s) liquor.

- Height of absorption unit column to be 46 metres.
- Absorption unit that allows for electrical voltage fluctuations and power failures; provision of a diesels generator as a back-up to drive the caustic recirculation pumps and extraction fans.
- Provision of double remote acting block valves to isolate all chlorine pumps.
- * All pipes carrying liquid chlorine shall be located in separate U-shaped pipe racks to prevent unconfined spillages in the event of pipe failure.

3.2 Storage

- Total storage capacity of approximately 100 tonnes of liquid chlorine as intermediate storage between the two process plants with average storage of 50 tonnes.
- Design of storage vessels and supports to withstand the worst foreseeable earthquake loading.
- Fully refrigerated liquid chlorine storage at -34 degC.
- Insulation of storage vessels, and operation at ambient temperature.
- Except for a blanked drain connection, no bottom connections on the chlorine storage vessels.
- Elimination of the possibility of hydrogen/chlorine explosions in chlorine storage tanks by appropriate design of the membrane cell plant.
- Liquid chlorine will be pumped to the storage tank at -34 degC and maintained at that temperature by withdrawing vapour to the hypo scrubber, thereby making storage temperature maintenance independent of refrigeration plant failure.
- Design of storage vessel instrumentation and relief facilities in accordance with recognised codes of practice (eg Bureau International Technique du Chlor).
- Chlorine storage tanks will be individually bunded to full height with concrete bunds.
- The bunds will be lined with additional insulation to prevent rapid heat transfer from the bund to the liquid chlorine.
- Provision of double remote acting block valves to isolate all chlorine pumps.
- * Full enclosure of storage area in a building with venting of building to chlorine scrubber.

3.3 Layout

- Location of hydrogen away from chlorine compression and liquefaction areas.
- Location of liquid chlorine pipelines away from the bottom rung on pipe tracks, particularly across roads.
- Protection of storage vessel areas by traffic barriers (kerbing).
- Design of layout such that cranes may remove items for maintenance without having to lift over storage vessels.
- Design of plant such that close coupling of each section to minimise chlorine inventory is ensured.

3.4 Maintenance

- Preventative maintenance scheme to replace vulnerable equipment before a failure becomes likely.
- Clearing and testing of the chlorine sensor in the tail gas line once per eight-hour shift, with

provision to inject caustic into the scrubber, should chlorine be detected.

- Regular and frequent maintenance and testing of all sensors as required by service duty.

3.5 General

- Use of corrosion monitoring techniques such as ultra-sonic thickness surveys.
- Ability to operate plant from the control room for sufficient time to enable safe shut-down from there.
- Installation of chlorine detectors at appropriate points of the plant site.

4. Emergency Plan

- The proponent's emergency plan and procedures will be integrated with the proposed State Emergency Services' Bunbury Regional Counter Disaster Plan.
- The proponent will afford all practical co-operation in the formulation of public emergency and contingency plans.

5. Monitoring and Auditing

- Regular safety audits would be conducted to monitor the effectiveness of the proponent's commitments to safeguard people and property, and to ensure that they were being completely executed.
- Hazard and risk management programmes are in place at all sites and are monitored and audited.

6. Decommissioning

Unlike a mineral development project whose life-span is limited to the period over which a particular resource can be exploited, the proposed plant does not have a planned operational life, although the proponent estimates this to be at least fifty years.

Decommissioning might simply involve the plant being used for other purposes, in which case another environmental impact study would be required; or could involve dismantling and removal of the facilities from the site.

Appendix 2

Recommended Conditions for SCM

SCM Chemicals Ltd Proposed Operations at Kemerton and Australind

Removal of Conditions Related to the Chlor-alkali Plant

Recommended Conditions for Ministerial 'Statement that a proposal may be implemented'

This proposal may be implemented subject to the following conditions:

1. Adherence by the proponent to all the relevant commitments made in the ERMP, in the proponent's response to issues raised in the submissions and those raised by the Environmental Protection Authority and in the Notice of Intent for the Kemerton proposal (copy of commitments attached), except those related to the chlor-alkali plant.

2. The preparation by the proponent in stages, of a comprehensive and integrated hazard and risk management strategy, to the Authority's satisfaction.

This shall consist of the following with the results being forwarded progressively when completed to the Authority:

- the HAZOP study to be completed and submitted before construction commences and to be conducted in a manner approved by the Authority. This HAZOP study should especially discuss the risk effects of the safeguards removed due to the plant being located at Kemerton;
- a final risk analysis report incorporating the plant design after HAZOP and (taking into consideration any additional safeguards/modifications arising out of the HAZOP analysis), to be submitted soon after construction;
- a hazard analysis update (including a fire safety study, and a study detailing the management of the commissioning stage and a study of emergency procedures) to be submitted before plant commissioning ; and
- an audit of risk and hazards to be submitted to the Authority upon request. An audit request by the Authority shall require the concurrence of the Minister for Environment.

3. The proponent's emergency plan and procedures be integrated with the proposed State Emergency Services' Bunbury Regional Counter Disaster Plan. In addition, the proponent shall participate in the development of a fire management strategy for the Kemerton region and contribute materially towards its implementation.

4. The underflow from the thickener at the Kemerton site shall be treated in such a manner as to prevent the likelihood of groundwater contamination.

5. The proponent shall not cause or allow any wastewater discharge to the Wellesley River. Accordingly, the proponent shall submit a proposal for an ocean wastewater discharge to the Authority for its assessment prior to construction.

6. The Company's proposal for solid waste management and disposal from both sites be submitted to the Authority for assessment prior to completion of construction of the Kemerton plant.

7. The disposal site(s) for solid waste, including that generated during concurrent operation of both plants, must be approved by appropriate Government agencies including the Radiological Council prior to construction of the Kemerton plant.

8. A radiation management programme shall be developed by the proponent for the commissioning and operation of the proposed plant to the satisfaction of the Radiological Council.

9. The proponent shall be responsible for ensuring that a detailed water supply proposal for the

project is referred to the Authority for assessment prior to construction.

10. The transport of reagents, especially titanium tetrachloride, shall be undertaken in a safe manner. The proponent is responsible for preparing appropriate transport safeguards and to this end shall prepare a contingency plan to the satisfaction of the Authority and other relevant Government agencies.

11. The safeguards required for the storage of titanium tetrachloride at the Australind site required by the relevant Government agencies shall be taken into consideration in a HAZOP analysis.

12. The wastewater discharge to the Collie River from the Australind site shall conform with the marine and estuarine water quality criteria in Schedule 7(2) of the DCE Bulletin 103 (1981) for the maintenance and preservation of aquatic ecosystems.

13. The proponent shall undertake periodic wastewater monitoring including:

- temperature of the wastewater discharge and of the surface waters of the Collie River an appropriate distance upstream and downstream from the point of discharge;
- pH, total dissolved solids, level of radioactivity, levels of chromium and manganese, and total suspended solids of the effluent;
- baseline (that is pre-discharge) and post-discharge characterisation of the benthos of the Collie River in the vicinity of the outfall; and
- volume and velocity of flow of the Collie River under low flow conditions.

The proponent shall also develop a monitoring programme in consultation with the Leschenault Inlet Management Authority and to the satisfaction of the Authority.

14. The proponent shall prepare a contingency plan at both the Australind and the Kemerton sites in consultation with the Leschenault Inlet Management Authority and to the satisfaction of the Authority, which addresses the management actions to be taken in the event of failure of any part of the effluent management or chemical containment and handling systems of the proposed plant as they may impact upon the Collie River or the Leschenault Inlet, or the ocean.

15. Notwithstanding the requirements of the pipeline for effluent discharge during the period of concurrent operations, the pipeline across Leschenault Peninsula shall be maintained until monitoring results of wastewater effluent discharge to the Collie River demonstrate to the Authority's satisfaction that unacceptable environmental impacts have not occurred.

16. The existing sulphuric acid plant and the existing sulphate- process plant (as described redundant in the ERMP) at Australind shall not operate beyond 30 June 1990 (or at an extension of time determined under the Pigment Factory (Australind) Agreement 1986) unless the Government is satisfied with the environmental performance of the proponent (which may include a period of a further 12 months' testing of performance of the sulphuric acid plant beyond the cessation of the operation of the titanium dioxide sulphate process plant, where such a period is reasonably required to fully evaluate the performance) as measured against the following criteria:

- until 30 December 1987, the sulphur dioxide emissions from the Australind plant should not result in ground level concentrations of sulphur dioxide exceeding 1 000 micrograms per cubic metre averaged hourly in any residential area; and
- from the 1 January 1988, and until the cessation of the concurrent operating period,'the sulphur dioxide emissions from the combined Australind plant should not exceed 1 000 micrograms per cubic metre (averaged over three minutes) in any residential area.

17. The management strategy for liquid effluent disposal on the Peninsula until 30 June 1990 (or an extension of time determined under the Pigment Factory (Australind) Agreement Act 1986) shall maximise the use of existing lagoons and the reactivation of old lagoons so as to avoid further degradation of the northern end of the Peninsula. (The responsibility for this condition rests with the State Government.)

18. The proponent shall liaise with the Department of Conservation and Land Management to ensure that the Company's operation and Management Programme for the Kemerton plant site is compatible with the Management objectives developed for the Kemerton Community Park concept.

19. The proponent shall pay annually into an Environmental Protection Authority trust fund, a sum sufficent to provide the salary and an equivalent sum for necessary administrative support for a Level 6 Environmental Officer, employed (in accordance with the provision of the Public Service Act) for the purposes of environmental protection in the Bunbury region.

Environmental Commitments

1. Construction (S 10.2, ERMP)

- During the construction phase of the project, the proponent would liaise with local authorities to ensure that noise, dust and traffic were minimised.
- All construction materials and practices would be in accordance with the relevant Australian or international codes.

2. Operation (S 10.3, ERMP)

2.1 Wastewater

- The vegetation on the banks of the Collie River adjacent to the plant would be regularly monitored.
- Surface runoff from the plant would be controlled.
- Regular monitoring of the discharge to the Collie River would be implemented to ensure that the system operated as predicted.
- Waste waters can be appropriately discharged, after suitable treatment, to the (Wellesley and) Collie River(s).
- No wastewater will be infiltrated at the site. The proponent will be filtering the thickener underflow to reduce it water content and disposal of the filtrate with the balance of the wastewater.
- The proponent gave a commitment to alter the wastewater treatment process to reduce manganese levels to concentration of the order of (a few) parts per million.
- The alkalinity of the wastewater will be raised to about pH 9.0 in order to precipitate manganese and heavy metals, although the latter are not expected to be present in significant quantities. The pH of the wastewater would then be adjusted to neutral level prior to disposal.
- The lime treatment used to neutralize the wastewater is known to cause effective precipitation of the radionuclides under consideration. The modified wastewater treatment process to remove manganese will further remove radionuclides to levels much less than those discussed in the ERMP.
- The proponent will regularly monitor the wastewater discharge and bed sediments in the Collie River for radionuclides; to assure the relevant authorities that the proposed disposal practice does not cause an unacceptable accumulation of radionuclides.
- Special consideration will be given to controlling the impact of temperature upon marine (aquatic) organisms.
- Commitments have been given to further modify the wastewater treatment should problems be detected. This monitoring will include analysis for heavy metals, even though these are not expected to be pre plant site would be attractively landscaped, and buildings would be aesthetically designed.
- There should be negligible odour impact to surrounding residential areas arising from the proposed development.
- Odours would not originate from the proposed plant during normal operation.

2.2 General

- The plant would undergo regular preventative maintenance.
- All waste products would be disposed of in an environmentally safe manner and in accordance with statutory requirements.

- The plant site would be attractively landscaped, and buildings would be aesthetically designed.
- There should be negligible odour impact to surrounding residential areas arising from the proposed development.
- Odours would not originate from the proposed plant during normal operation.

2.3 General

- The plant would undergo regular preventative maintenance.
- All waste products would be disposed of in an environmentally safe manner and in accordance with statutory requirements.
- A detailed final risk analysis would be undertaken in conjunction with the plant designers to confirm or improve upon the recommendations made in the risk assessment (Cremer and Warner, 1986) (See also Sections 4 and 5).
- A full hazards and operability study would be commissioned, and plant personnel would be trained in safe operating practices and emergency procedures. Training would be based upon the extensive experience available to the proponent from the existing Australind operations and chloride-process plants operating in the United States of America and the United Kingdom (see also Sections 5 and 6).
- All wastes would be regularly monitored for radio-nuclides.
- A centralised control policy would be implemented, whereby no changes to plant detail could be made until approved by the proponent's worldwide Central Safety Department.
- Groundwater extraction from any surficial aquifers would be conducted in such manner to avoid significant environmental impact on wetlands and their associated vegetation.
- The proponent will advise the Authority of their decision on a chlor-alkali plant operator as soon as this is decided.

3. Safety Features (S 10.4, ERMP)

*The newly proposed plant will still contain tried and proven control technology and will still remain a very modern safe plant, equivalent to the latest installations effected elsewhere in the world by SCM.

The safety features that would be incorporated into the plant are summarised as follows:

3.1 Chloride-Process Plant:

- Design and operation of titanium tetrachloride vaporiser and oxygen preheater in accordance with the British Standard BS 5885 (British Standards Institution, 1980).
- Duplication and frequent replacement of temperature and pressure-sensing instrumentation in the chlorination section.
- Careful process control, accurate temperature and pressure monitoring, even water-cooling of chlorinator and prevention of solids build-up in the overhead mains.
- Maintenance and cleaning of heat exchangers will be done in a well-ventilated open area on a concrete pad whose run-off is directed to the wastewater treatment plant.
- Duplication and frequent routine replacement of sensors in the oxidation section.
- Reliable logic system to control reactor trip system.
- Provision of double remote acting block valves to isolate all chlorine pumps.
- Provision of an on-line scrubbing system for the 'hygiene snake' system (proprietary

equipment), and scrubbing system stacks to be 46 metres high.

3.2 Layout

- Location of air separation plant away from titanium tetrachloride storage areas.
- Location of titanium tetrachloride pipelines away from the bottom rung on pipe tracks, particularly across roads.
- Protection of storage vessel areas by traffic barriers (kerbing).
- Design of layout such that cranes may remove items for maintenance without having to lift over storage vessels.
- Design of plant such that close coupling of each section to minimise chlorine inventory is ensured.

3.3 Maintenance

- Preventative maintenance scheme to replace vulnerable equipment before a failure becomes likely.
- Regular and frequent maintenance and testing of all sensors as required by service duty.

3.4 General

- Use of a non-explosive grade of coke.
- Use of corrosion monitoring techniques such as ultra-sonic thickness surveys.
- Design of fuel management system in accordance with BS 5885 (British Standards Institution, 1980) on prevention of explosions.
- Ability to operate plant from the control room for sufficient time to enable safe shut-down from there.

4. Emergency Plan

- * The proponent's emergency plan and procedures will be integrated with the proposed State Emergency Services' Bunbury Regional Counter Disaster Plan.
- The proponent will afford all practical co-operation in the formulation of public emergency and contingency plans.

5. Monitoring and Auditing (S 10.5, ERMP)

- Regular safety audits would be conducted to monitor the effectiveness of the proponent's commitments to safeguard people and property, and to ensure that they were being completely executed.
- Hazard and risk management programmes are in place at all sites and are monitored and audited currently by the Manager - Loss Prevention in Baltimore. A similar comprehensive programme is being developed for Bunbury, modelled substantially on the well-proven Stallingborough system.
- Significant interchange of appropriate personnel will be required during development of the programmes. Performance thereafter will be audited by Baltimore on a regular basis for hazard, safety and industrial hygiene management standards, as for existing sites.
- A further external audit on operations will take place via a system of "Permission for Change" which operates already on our existing plant, whereby all significant process changes are notified formally to Stallingborough, prior to implementation, for technical and hazard review. No changes are implemented without formal approval from the Hazard and Risk Manager at Stallingborough.

6. Training

- Overseas training will take place at all levels down to, and including, Supervisor/Foreman.
- Senior operator and Shift Supervisor training has commenced locally, utilising 27 and 18 week courses specifically designed in conjunction with Bunbury TAFE.
- Standard operating, process control, maintenance and safety procedures are being developed in conjunction with our Stallingborough and Baltimore site personnel. Full procedure manuals are available from all existing sites and a set of Bunbury specific manuals will be developed well prior to start up, to facilitate training.

7. Decommissioning (S 10.6, ERMP)

Unlike a mineral development project whose life-span is limited to the period over which a particular resource can be exploited, the proposed plant does not have a planned operational life, although the proponent estimates this to be at least fifty years.

Decommissioning might simply involve the plant being used for other purposes, in which case another environmental impact study would be required; or could involve dismantling and removal of the facilities from the site.