CHAPTER 13

ENVIRONMENTAL IMPACT ASSESSMENT AS AN ON-GOING PROCESS: A WESTERN AUSTRALIAN CASE STUDY*

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This paper by John and Angus describes how the process of environmental assessment works in W.A. using a case study of the SCM industrial plant in Australind. This plant had a long history of environmental problems, and the resolution of these, with benefit to the public, the company and the environment is an excellent example of the assessment process.

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Location of sites and features mentioned in the text.
Environmental Impact Assessment: A Western Australian Case Study

Introduction

Environmental Impact Assessment (EIA) is the Administrative process by which the environmental impacts of a proposal are determined (Fuggle, 1979). A formal requirement for EIA was first initiated in the United States under the 1969 National Environmental Policy Act (NEPA). In general terms EIA seeks to aid the efficient use of human and natural resources and has proved useful to both those promoting and authorizing developments (Clark, 1984).

Ideally, EIA should be an on-going process rather than one that starts with the formulation of a proposal and ends with the decision to go ahead. It should not be limited to the production of a single document at one point in time but should be a process best undertaken in a continuous manner; a process in which the environmental impacts of a proposed development are predicted, then managed and monitored, and finally re-assessed.

Continuous EIA has been used in Western Australia over the last 17 years with varied success. An example of particular note is the assessment of the manufacture of titanium dioxide from mineral sands by SCM Chemicals Limited (formerly Laporte Australia Ltd) in the south west of Western Australia. This industry has been subject to a series of environmental reviews since its early days in the 1960’s.

A case history of the environmental assessment of the SCM plant follows; further details can be found in Bailey and Saunders (1987). The case study was chosen to illustrate the use of EIA as an on-going process and also to demonstrate how the drive to solve an existing environmental problem can also be of economic benefit. That is, environmental and economic goals do not necessarily conflict.

In recent years EIA has become more widely accepted as part of the decision-making associated with the approval of proposed developments. Nevertheless, some sections of the community still regard EIA as an unnecessary impediment to good and timely development and as no more than a hurdle to be cleared as expeditiously as possible. Questions such as: Does EIA harm or help development? and Is EIA a once-off or an on-going process? are still raised by some. This chapter examines such questions from the point of view of the assessment of the SCM plant at Bunbury, Western Australia.
Environmental History of the Titanium Dioxide Plant at Australind, Western Australia

Titanium dioxide manufacture commenced at Australind in the south west of Western Australia in 1964.

Initially, Laporte Australia Ltd was granted rights to produce 10,000 tonnes per annum (tpa) of titanium dioxide from mineral sands using a sulphuric acid process, while the State accepted full responsibility for effluent disposal. The plant was subsequently increased in capacity to 12,000 tonnes in 1966, 18,000 tonnes in 1969 and 36,000 tonnes in 1975. Effluent was originally pumped across the Leschenault Inlet and discharged into the surf zone of the ocean. This led to ocean and beach staining and from 1969 the current disposal method using lagoons on the Leschenault Peninsula was adopted.

Approximately 6,700 m³/day of liquid effluent is produced comprising mainly sulphuric acid and iron sulphate (Laporte Steering Group, 1985). Air emissions of steam and sulphur dioxide are additional products of the refining process. It is possible to segregate the liquid effluent into two streams; a low volume high concentration stream (strong effluent) and a high volume, low concentration stream (weak effluent).

Since the plant’s commissioning, there has been an on-going concern about its environmental impacts and much effort has been directed towards finding a solution.

The environmental assessment of SCM’s operations entered a new phase in 1984/85. In January 1984 a joint submission on effluent disposal was presented to the W.A. Government by the Minister for the Environment, the Minister for Minerals and Energy and the Minister for Water Resources (Environmental Protection Authority 1987a, page 4), and in September SCM Chemicals Ltd commenced a 12 month feasibility study on conversion to the chloride process.

While this was occurring SCM submitted a Stage I Environmental Review and Management Programme (ERMP) to the Environmental Protection Authority (EPA) in January 1985. The ERMP was subsequently released for public review and comment.

The purpose of the ERMP Stage I was to assess the environmental
implications of the various long-term effluent disposal strategies based on current knowledge and with consideration given to various social, economic and environmental issues. The report was commissioned by the Laporte Steering Group (LSG) (Laporte Steering Group, 1985, page 2).

In the Stage I ERMP it was stated that new titanium dioxide plants constructed during recent years had used the chloride rather than the sulphate process. Company personnel advised that it would be technically possible to change the 'front end' of Laporte's factory to the chloride process whilst maintaining the existing product treatment facilities. If so the volume of effluent would be greatly reduced to 1,000-1,800 tpa ferric chloride and air emissions of sulphur dioxide/trioxide would be largely eliminated. However, the capital expenditure on a change to chloride technology could not be justified on environmental grounds alone. It was therefore proposed that a substantially larger plant of approximately 50,000 tpa of titanium dioxide was required (Laporte Steering Group, 1985, page 42).

In the ERMP it was concluded that dune disposal of effluent on the Leschenault Peninsula had a limited life in the currently available areas. An attractive solution would be to change to the chloride process but this would require an increase in plant capacity. If it was not feasible to make this change, then ocean disposal was considered the only practical alternative for the weak effluent. Co-disposal with alumina refinery red mud was considered the most favourable long term treatment for strong effluent with deep well injection a potential alternative (Laporte Steering Group, 1985, page ix).

It was also stated that the vegetation of the Peninsula, particularly the woodlands to the north, are of high conservation value and continued northern expansion of effluent disposal would degrade these areas and conflict with conservation, tourism and recreation values. It was felt that the increasing population of the Greater Bunbury Region will mean that the Inlet and Peninsula will increase in significance as a scenic and recreational resource to the local and visiting population (Laporte Steering Group, 1985, page xi).

The EPA responded to the Minister for Minerals and Energy on the ERMP Stage I in late 1985 (Environmental Protection Authority, 1987a page 4). The EPA did not issue an assessment report but provided some guidelines and comments. In this guidance the EPA stated that it strongly supported the Cabinet commitment to eliminate the present
dune disposal of effluent.

In May 1986 SCM Chemicals Ltd submitted a Notice of Intent to the EPA in which it was proposed to construct a new chloride based titanium dioxide plant. The EPA requested that an ERMP be prepared (the ERMP Stage II). This report was released for public review in November 1986 (Kinhill Stearns, 1986).

The Stage II ERMP proposal involved the following:
- Construction of a 70,000 tpa titanium dioxide manufacturing plant based upon the chloride process;
- Construction of a chlor-alkali plant of 12,000 tpa capacity to provide the chlorine required;
- Continued use of the existing finishing plant at Australind;
- Disposal of 4,500 kL/day of a clear, neutral, non-radioactive brine by infiltration at the plant site;
- Dust and noise during construction would be controlled;
- Noise would be maintained at levels that would not create a nuisance to surrounding areas;
- The plant would be aesthetically designed and landscaped;
- All waste products would be safely disposed of and all practicable safety features would be incorporated into the design; and
- A hazards and operability study (HAZOP) would be undertaken for the plant and all personnel would be trained in safe work practices and emergency procedures.

The beneficial impacts foreseen included:
- Cessation of waste water disposal on the Peninsula;
- Cessation (in time) of beach staining;
- No further pollution of the Inlet from pipeline failure;
- Ability to rehabilitate and stabilise the coastal environment; and
- Improved air quality due to a reduction in the sulphur containing emissions.

The trade-off for these environmental gains would be the risk associated with the use of chlorine. Chloride process plants employ sufficient quantities of toxic chlorine and titanium tetrachloride to impose some risk outside the plant boundary in the event of a major loss of containment. The preliminary assessment of this risk concluded that an individual fatality risk of 1 in a million per year (for chlorine storage of 50 tonnes on the Australind site) extends slightly into the Australind residential district, and 3 houses exist in the zone of risk.
between 1 and 10 in a million (Kinhill Stearns, 1986, pages 73-75).

In May 1987 the EPA released its report and recommendations on the Stage II ERMP in a bulletin entitled “Proposed Chloride Process Titanium Dioxide Plant at Australind” (Environmental Protection Authority, 1987b). In regard to the history of the sulphate process plant’s operation, the EPA concluded that “from an environmental viewpoint it would have been inappropriate to initially locate the plant at Australind. However, given the location, the residential development in proximity to the plant is unfortunate from an environmental planning perspective” (Environmental Protection Authority, 1987a, page i). The EPA also stated that the on-going environmental management of the existing plant had been inadequate and did not provide a basis for confidence in the future. After assessing the Stage II ERMP, the EPA came to the following additional conclusions:

• The Australind site could be made environmentally acceptable;
• That additional safeguards were required;
• That if the proponent’s safeguards and the EPA’s recommendations were implemented then the risks generated would be low enough to be acceptable to the EPA;
• That with appropriate conditions, wastewater discharge could be managed in an environmentally acceptable manner; and
• That provided the EPA monitors all stages of construction and management, the proposed plant could be satisfactory environmentally and risk-wise (Environmental Protection Authority, 1987a pages i-iii).

In June 1987 it was announced that a change in the site from Australind to Kemerton was proposed. The EPA determined that the degree of assessment required for this proposal should be at the Notice of Intent (NOI) level since the Australind proposal had been previously examined in detail and was very similar to the new proposal. Furthermore, the EPA had previously assessed a proposal for an aluminium smelter at the Kemerton site and had presented a detailed assessment report (Environmental Protection Authority, 1987b, page 1).

The Kemerton proposal was as follows:

• Construction of a 70,000 tpa titanium dioxide manufacturing plant at Kemerton based upon the chloride process;
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• Construction of a 12,000 tpa chlor-alkali plant at Kemerton with 100 tonne refrigerated chlorine storage in three 50 tonne tanks (one tank would be on standby);
• De-commissioning of the existing sulphate process plant at Australind which would be investigated for alternative process use in the future;
• Disposal of 4,800 kL/day of treated wastewater (including contaminated groundwater) at 30-32°C into the Collie River;
• Disposal of 2,700 kL/day of treated saline wastewater into the Wellesley River via a 1.5 km drain (Environmental Protection Authority, 1987b, page 1).

The EPA was advised by the Minister for the Environment that its assessment of the NOI proposal was required by 16th July, 1987. The EPA then:

• Consulted the Harvey Shire Council on the best means of obtaining public input;
• Provided input to the summary of the company’s NOI which the Council made available to all surrounding residents;
• Made copies of the NOI available at local public libraries and the Council chambers;
• Organised a public meeting. The proceedings were taped and transcripts used as submissions; and
• Forwarded copies of the NOI to all relevant Government agencies for comment (Environmental Protection Authority, 1987b, pages 1-3).

The EPA concluded that the development of a chloride-process titanium dioxide plant at the Kemerton site would generate environmental impacts including: construction phase impacts, impacts of risk and hazard, other environmental impacts due to water resources extraction and occupational health and traffic impacts (Environmental Protection Authority, 1987b, pages 35-45).

The EPA concurred that due to the adequate buffer zone of approximately 2 km radius at the Kemerton site it may not be necessary to have all of the safeguards initially proposed for the Australind site but that no more than 50 tonnes of chlorine should be stored at Kemerton in containers not exceeding 25 tonne capacity (Environmental Protection Authority, 1987b, pages 46-48).

The EPA concluded that the proposal to discharge wastewater into the Wellesley River was unacceptable and recommended that the
proponent investigate alternatives such as ocean discharge or deep well-injection. It was also recommended that a chlorine scrubbing system be installed on the chlor-alkali plant with sufficient back up to be able to absorb all of the chlorine produced during one hours' production (Environmental Protection Authority, 1987b, pages 53-63).

The EPA was informed by the Water Authority of Western Australia that there would be adequate fresh water available for the proposed plant at Kemerton; however, insufficient detail had be provided for the EPA to advise on water supply. Consequently, the EPA recommended that a detailed water supply proposal be referred to the EPA for assessment (Environmental Protection Authority, 1987b, pages 65-70).

Finally, the EPA again recommended that the proponent be required to meet the reasonable costs associated with monitoring the environmental performance of the construction and operational phases of the Australind and Kemerton plants (Environmental Protection Authority, 1987b, pages 75-78).

The new plant at Kemerton was officially opened on the 11th November, 1988.

Conclusion

The history of the SCM titanium dioxide plant at Australind is a good example of EIA as an on-going process rather than one that starts with a proposal and ends with the decision to go ahead. In the SCM case there has been a series of environmental impact assessments, some of which involved the public. The successful outcome of the 1987 environmental reviews can, in part, be attributed to the new Environmental Protection Act 1986 which has provided the EPA and the Minister for the Environment with the ability to function effectively.

The EIA process has not only been the driving force behind the solution to the environmental problems associated with the sulphate process plant but has assisted in other ways. The Company will benefit by its move to Kemerton by ending its dependence upon outmoded and non-competitive technology and by doubling its production output. Furthermore, the new plant will have probably the most competitive technology and be one of the biggest in the world. The Company will have fewer planning constraints at the Kemerton site due to the
presence of a suitable buffer zone.

The local community will also benefit in a number of ways. The dunes on the Peninsula can be rehabilitated when disposal ceases and public access to this area can then be made available. The visually obtrusive pipeline across the Leschenault Inlet may also be removed. Termination of the sulphurous emissions will benefit the local residents and part of the Australind site can be rehabilitated and given a more appropriate land use. These gains have been facilitated by the involvement of the local community, ranging from individuals to the Harvey Shire Council.

Western Australia will also derive certain benefits from the Kemerton proposal. There will no longer be the problem and expense associated with effluent disposal from the sulphate process plant. The doubling of titanium dioxide output will increase the value added which comes to Western Australia and the State will benefit by hosting one of the biggest and most competitive plants in the world. Furthermore, the State will benefit socially and economically by improved land use in the Australind district.

This study clearly demonstrates that EIA is not a hindrance to development. The EIA process has served as a driving force behind social and economic, as well as environmental benefits. Compared with the existing plant and the proposed plant at Australind, the Kemerton proposal will achieve significant environmental and economic advantages by facilitating the environmentally preferred alternative with a larger plant. The social environment will also benefit significantly. The new plant, whilst doubling the existing output of titanium dioxide, is a highly competitive project creating virtually no air emissions, using water more efficiently, producing less liquid effluent and imposing fewer planning constraints. The Kemerton project will be of benefit to the environment, the local community, Western Australia, and the Company.

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References.


