MINERAL SANDS DRY PROCESSING PLANT MUCHEA

TiO_2 CORPORATION NL

Report And Recommendations of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin No 344 August 1988

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i. SUMMARY AND RECOMMENDATIONS

TiO_2 Corporation NL (referred to here as 'the proponent') has previously submitted a proposal which included the establishment of a mineral sands dry processing plant at a site close to the Muchea townsite about 60 km north of Perth. The details of the proposal were outlined in an Environmental Review and Management Programme (ERMP). The Environmental Protection Authority assessed that proposal and found it environmentally acceptable subject to the implementation of several recommendations.

Subsequently the proponent submitted a proposal for a synthetic rutile plant on the same site and was advised that the site was too close to Muchea for the synthetic rutile plant to be environmentally acceptable.

The proponent has now located a possible alternative site for its operations and is seeking approval for the establishment of a dry process plant on that site. The dry process plant is assessed on its merits in this report as the first part of a two-stage assessment. The second part, a synthetic rutile plant, is under public review. Nothing in this report will pre-empt any part of the assessment of the synthetic rutile plant.

On receipt of the proposal to change the location of the dry process plant, the EPA determined that the level of formal assessment, under Part IV of the Environmental Protection Act would be a Notice of Intent (NOI). The proponent subsequently submitted that Notice of Intent.

The proposed site is about 4 kilometres north of Muchea on the eastern side of the Brand Highway. The property is cleared apart from the margins of the Chandala Brook and a patch of banksia scrub on the northern end of the block which is slightly elevated and on which it is proposed to site the plants. The site is not on a floodplain though care will be required with drainage due to the high water table.

In its previous assessment of the dry process plant the EPA found the proposal acceptable subject to recommendations on:

- monitoring groundwater levels;
- adopting specific dust control measures;
- adhering to regulations relating to radiation;
- modifying or expanding the dry separation process;
- preparing and implementing an environmental management programme; and
- reporting to the EPA.

Appeals against the EPA's report indicated concerns about the proximity of the plant to Muchea and the impacts it might have on the environment and lifestyle. The Minister for Environment dismissed the appeals. The EPA considers any environmental impacts of the proposal were adequately addressed in its recommendations and the proponent's commitments. Lifestyle impacts are mostly addressed through the planning process, not the environmental assessment process.

At the new location, much further from Muchea, the environmental impact of the plant on Muchea residents will be reduced.

On the new site the plant will be further from the Brand Highway and more effectively screened, though it will be necessary for plant traffic to cross the Chandala Brook.

The site is over 2 km south of the Lake Chandala Reserve so no environmental impacts on that reserve are anticipated.

RECOMMENDATION 1

The Environmental Protection Authority concludes that the proposal for a dry processing plant described in the Notice of Intent and in the Environmental Review and Management Programme for the Cooljarloo Mineral Sands Project is environmentally acceptable at the location described in the Notice of Intent and recommends that it could proceed subject to the Environmental Protection Authority's Recommendations in this Assessment Report and the commitments made by the proponent in the Notice of Intent and the Environmental Review and Management Programme including:

- reporting site layout to the Environmental Protection Authority at the detailed design stage;
- preserving vegetation along the Chandala Brook;
- implementing a landscape plan;
- monitoring waterfowl usage of ponds;
- protection of aboriginal sites;
- strict adherence to all Western Australian regulations and the Commonwealth Code of Practice relating to radiation;
- monitoring groundwater levels near the plant; and
- adopting dust control measures at the plant site.

RECOMMENDATION 2

The Environmental Protection Authority recommends that prior to construction of each crossing of the Chandala Brook on the site, plans for the crossing be prepared by the proponent on the advice of the Swan River Management Authority and to the satisfaction of the Environmental Protection Authority so as to preserve the integrity of the Brook and minimise disturbance to the riparian vegetation.

RECOMMENDATION 3

The Environmental Protection Authority recommends that the proponent submit prior to construction, and subsequently implement, a detailed landscaping and planting programme, with a view to screening, decreasing water usage, amelioration of salinity and supplementing the riparian vegetation, to the satisfaction of the Environmental Protection Authority.

RECOMMENDATION 4

The Environmental Protection Authority recommends that the proponent submit prior to construction, and subsequently implement, an environmentally acceptable detailed drainage plan for the plant site and the whole property,

on the advice of the Swan River Management Authority and to the satisfaction of the Environmental Protection Authority.

RECOMMENDATION 5

The Environmental Protection Authority recommends that prior to construction of the evaporation ponds the proponent submit, and subsequently implement, plans for the construction of the ponds including:

. location and dimensions;

. nature of liner and method of joining;

. method of liner protection in ponds where recovery of solids is planned;

. location of monitoring bores and provision for their use as recovery bores;

. capacity and demonstration of adequacy to ensure no overflow; and

. expected life and indicative plans for decommissioning ponds;

on the advice of the Department of Mines and the Water Authority of Western Australia, and to the satisfaction of the Environmental Protection Authority.

RECOMMENDATION 6

The Environmental Protection Authority recommends that the proponent submit prior to construction, and subsequently implement, a ground and surface water monitoring programme, including regular reporting of monitoring results to the Water Authority of Western Australia, to the satisfaction of the Environmental Protection Authority.

RECOMMENDATION 7

The Environmental Protection Authority recommends that the proponent submit prior to commissioning, and subsequently implement, an environmental management programme to the satisfaction of the Environmental Protection Authority relating to all aspects of environmental monitoring and management requirements of the proposal described in the Notice of Intent and Environmental Review and Management Programme, including submission of brief annual and comprehensive triennial reports to the Environmental Protection Authority on the environmental management and monitoring of the project.

RECOMMENDATION 8

The Environmental Protection Authority recommends that the proponent be responsible for decommissioning the plant and surrounds, and that 6 months prior to decommissioning the proponent submit decommissioning plans to the satisfaction of the Environmental Protection Authority.

1. BACKGROUND

In November 1987 the TiO_2 Corporation submitted to the Environmental Protection Authority an ERMP describing a proposal which included the establishment of a mineral sands dry separation plant at a site just north of Muchea on the Brand Highway.

The EPA assessed that proposal and found it environmentally acceptable subject to the implementation of several commitments and recommendations. (EPA Bulletin 330, March 1988).

Subsequently the proponent submitted a proposal for the establishment of a synthetic rutile plant on the same site and was advised that the site was too close to Muchea for the synthetic rutile plant to be environmentally acceptable. This was due to potential impact from air emissions such as hydrogen sulphide.

The proponent required both plants to be on the same location to enable ilmenite produced by the dry process plant to feed directly into the synthetic rutile plant, and wastes from the synthetic rutile plant to be backloaded to the minesite in trucks delivering concentrate to the dry process plant. Also a joint location offered economies in shared administration facilities and services.

Consequently the proponent located a potential alternative site (see Figure 1) and submitted separate proposals for a dry process plant and a synthetic rutile plant on that site.

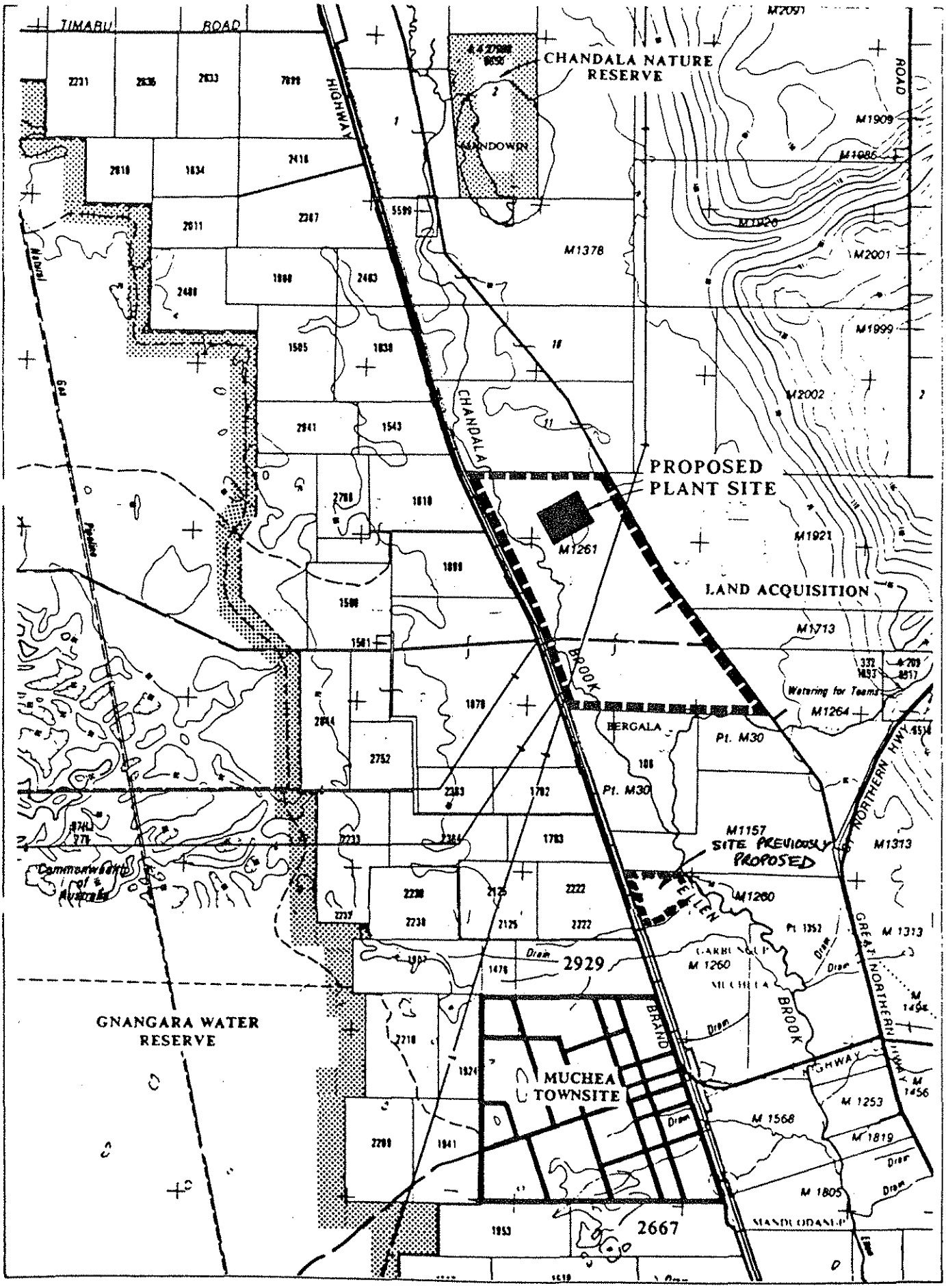
On receipt of the proposal for the dry process plant at the changed site, the EPA determined that the proposal required formal assessment under Part IV of the Environmental Protection Act 1986 at the level of a Notice of Intent.

There is no formal public review associated with this level of assessment, but the EPA decided that the NOI should be made available for the information of local residents through the Shire of Chittering.

Comments on the proposal were sought from the Shire and there was also some opportunity for public input on any issues which had not been already covered in the previous assessment.

2. PROJECT DESCRIPTION

The dry plant operation is essentially unchanged from that previously proposed. At Muchea, heavy minerals concentrate from the Cooljarloo minesite will be dried and then passed through a complex series of electrostatic, magnetic and gravity separation equipment. The various heavy mineral components of the concentrate have a unique combination of electrical and magnetic properties and specific gravities on which this process relies. Ilmenite and rutile are electrical conductors while zircon and monazite are non-conductors. Therefore, as the concentrate passes through an electrical field, the conductors and non-conductors separate and can be collected. As ilmenite is magnetic, it can be separated from the rutile by passing this stream through a magnetic field and a similar process can be used to separate magnetic monazite from non-magnetic zircon. Gravity separation is used to further refine some of the final product streams.



LOCATION OF SYNTHETIC RUTILE AND DRY PROCESS PLANTS NEAR MUCHEA **FIGURE 1**

The waste materials will be stockpiled to be returned to the Cooljarloo minesite for burial in the mined out areas. Products will be transported by rail to Kwinana for export except for the monazite which will be railed to Fremantle in containers.

3. ENVIRONMENTAL ASSESSMENT AND MANAGEMENT

Following a review of the environmental aspects of the proposal, the Environmental Protection Authority concludes that the proposal would be environmentally acceptable subject to a number of conditions as discussed in the following sections of this report.

RECOMMENDATION 1

The Environmental Protection Authority concludes that the proposal for a dry processing plant described in the Notice of Intent and in the Environmental Review and Management Programme for the Cooljarloo Mineral Sands Project is environmentally acceptable at the location described in the Notice of Intent and recommends that it could proceed subject to the Environmental Protection Authority's Recommendations in this Assessment Report and the commitments made by the proponent in the Notice of Intent and the Environmental Review and Management Programme including:

- **reporting site layout to the Environmental Protection Authority at the detailed design stage;**
- **preserving vegetation along the Chandala Brook;**
- **implementing a landscape plan;**
- **monitoring waterfowl usage of ponds;**
- **protection of aboriginal sites;**
- **strict adherence to all Western Australian regulations and the Commonwealth Code of Practice relating to radiation;**
- **monitoring groundwater levels near the plant; and**
- **adopting dust control measures at the plant site.**

3.1 VEGETATION

The proposed site is located about 4 km north of Muchea as Figure 1 shows. Much of the site has been cleared and pastured, and the whole site has been subject to grazing for many years.

There is significant native vegetation retained along the margins of the Chandala Brook, although the banks have been degraded by stock. Disturbance to the vegetation along the Brook should be minimised.

To the south of the site, Chandala Brook becomes Ellen Brook which in turn flows into the Swan River. The effects of the proposal on the Brook and associated vegetation are therefore of interest to the Swan River Management Authority.

RECOMMENDATION 2

The Environmental Protection Authority recommends that prior to construction of each crossing of the Chandala Brook on the site, plans for the crossing be prepared by the proponent on the advice of the Swan River Management Authority and to the satisfaction of the Environmental Protection Authority so as to preserve the integrity of the Brook and minimise disturbance to the riparian vegetation.

There is a low sandy rise in the northern half of the property which bears a mixed Banksia woodland, though the limited area and the history of grazing have reduced the woodland's significance in terms of flora and fauna. About a third of this woodland is to be retained according to the notional Site Plan (Figure 2), with the dry process plant and synthetic rutile plants occupying the remainder of the rise. The administration block, dry process plant, and associated materials handling and evaporation pond areas together occupy about a half of the rise.

The site is not a floodplain though care will be required with drainage due to the high water table. There is evidence of high salinity in the seepage from the western margin of the Banksia rise, and the clearing of part of the rise to construct the plant could increase this seepage. This effect can be minimised by the planting of trees in unused cleared areas on the rise, and the planting of salt tolerant species on the seepage area.

The notional Site Plan (Figure 2) identifies areas where tree planting is proposed, and the proponent is committed to implementing a landscaping and planting programme.

RECOMMENDATION 3

The Environmental Protection Authority recommends that the proponent submit prior to construction, and subsequently implement, a detailed landscaping and planting programme, with a view to screening, decreasing water usage, amelioration of salinity and supplementing the riparian vegetation, to the satisfaction of the Environmental Protection Authority.

3.2 HYDROLOGICAL IMPACTS OF PROCESSING FACILITIES AT MUCHEA, PROCESSING PLANT WATER BALANCE, SITE DRAINAGE AND POTENTIAL FOR CONTAMINATION OF SURFACE AND GROUND WATERS

Issues relating to management of water and pollution control at the proposed dry processing plant at Muchea were considered by the Authority in its assessment of the proposal.

These issues were generally related to the following aspects:

- drawdown of the water table through abstraction of water from bores for the processing plant;
- design and operation of plant site drainage and evaporation ponds to ensure that contaminated water does not flow indirectly into adjacent watercourses such as Ellen Brook; and
- monitoring of surface and groundwaters for contamination.

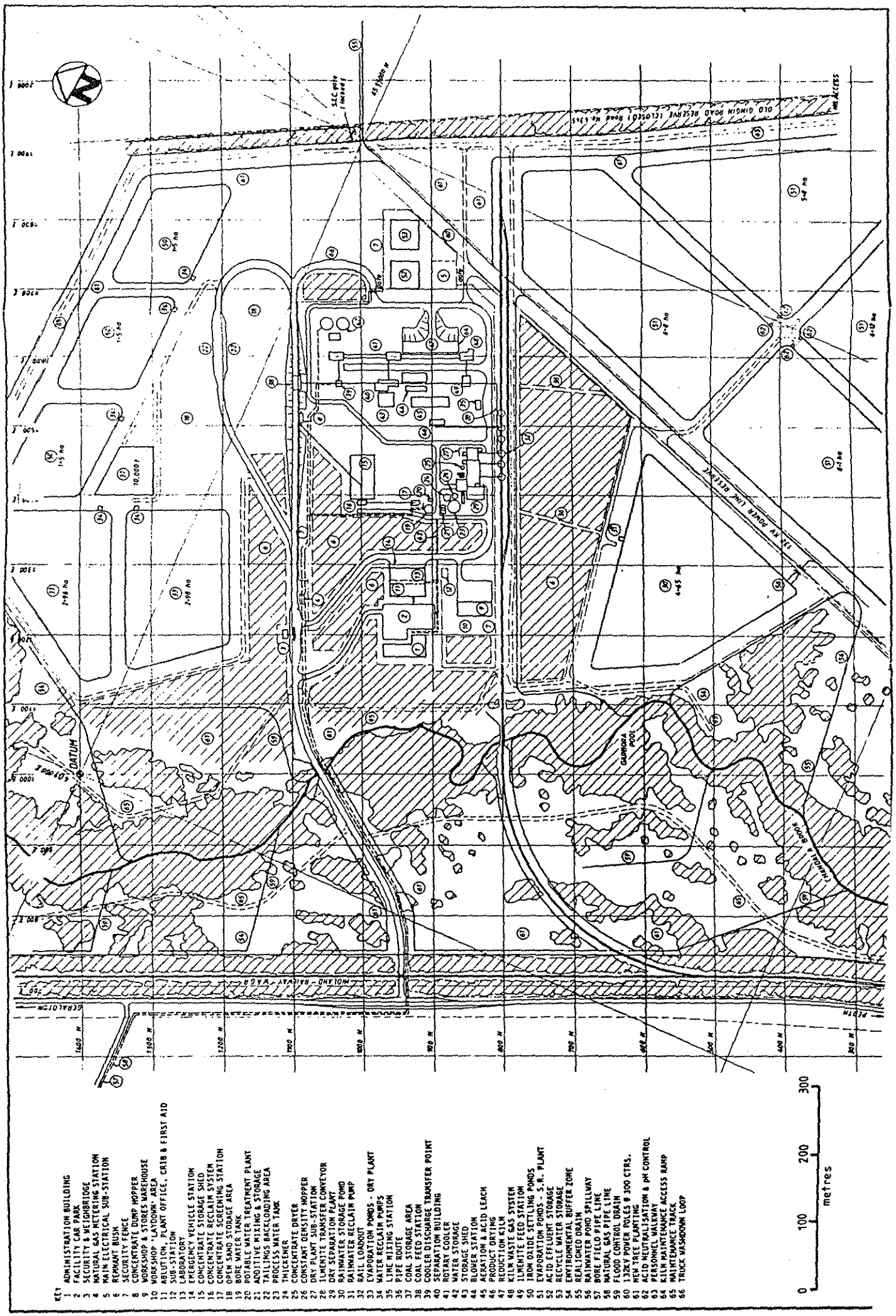


Figure 2. Site Plan and Plant Layout.

Water requirements for the dry processing plant at Muchea were reported in the ERMP as being approximately 240 kilolitres of process water and 60 kilolitres of potable water each day. As there is no reticulated water supply in the Muchea area the majority of the area's supplies are drawn from groundwater bores or rainwater storage. Some concern was expressed that abstraction of water from bores for processing operations would result in a lowering of the groundwater table and jeopardise domestic groundwater supplies.

The Company has indicated that it intends to draw its water supply from the Leederville formation aquifers. More detailed testing of this water supply is being carried out, and the likely effects on the superficial aquifer are currently being assessed.

The Authority notes that any abstraction of groundwater would require licensing by the Water Authority of Western Australia under the Rights in Water and Irrigation Act.

The Authority also considered issues relating to the control of drainage and evaporation ponds at the plant site to ensure that surface waters are not contaminated. Current proposals for separation of the individual heavy mineral components from the mineral sand mixture do not require the addition of chemicals. The concentrates themselves have little potential for contamination as they would be thoroughly washed prior to being transported to site. It is also important to note that the separation process is by physical means and does not alter the chemically stable compounds as they exist in nature.

Evidence of surface water in winter across much of the pasture probably indicates the development of a hard pan, as the pasture has not been broken up for many years. Also the site receives water from other properties higher in the catchment. Improved pasture management, tree planting and upgrading of site drainage will reduce surface water with only a minor increase in the flow into Chandala Brook.

The notional site plan indicates upgraded and realigned drainage of the property and the provision of a rainwater pond to ensure that washings from the roadways and product handling areas are clarified by settling and, where possible, evaporated.

RECOMMENDATION 4

The Environmental Protection Authority recommends that the proponent submit prior to construction, and subsequently implement, an environmentally acceptable detailed drainage plan for the plant site and the whole property, on the advice of the Swan River Management Authority and to the satisfaction of the Environmental Protection Authority.

The proposal is for plant process waters to be either recycled or evaporated in lined ponds so that there is no liquid effluent from the plant. It will be important to ensure the integrity of the evaporation ponds both by their design and by appropriate monitoring.

RECOMMENDATION 5

The Environmental Protection Authority recommends that prior to construction of the evaporation ponds the proponent submit, and subsequently implement, plans for the construction of the ponds including:

- **location and dimensions;**
- **nature of liner and method of joining;**
- **method of liner protection in ponds where recovery of solids is planned;**
- **location of monitoring bores and provision for their use as recovery bores;**
- **capacity and demonstration of adequacy to ensure no overflow; and**
- **expected life and indicative plans for decommissioning ponds;**

on the advice of the Department of Mines and the Water Authority of Western Australia, and to the satisfaction of the Environmental Protection Authority.

RECOMMENDATION 6

The Environmental Protection Authority recommends that the proponent submit prior to construction, and subsequently implement, a ground and surface water monitoring programme, including regular reporting of monitoring results to the Water Authority of Western Australia, to the satisfaction of the Environmental Protection Authority.

Potential for contamination of domestic rainwater supplies through dust and gaseous emissions was also considered by the Authority. This issue is further discussed below.

3.3 DUST, NOISE AND GASEOUS EMISSIONS FROM THE PROPOSED DRY PROCESS PLANT AT MUCHEA

Dust control at the proposed dry processing plant site was identified as an important issue with respect to both occupational health aspects and impacts on the local community at Muchea.

The Company recognised this in their response to issues raised in submissions on the ERMP and have made a commitment to install and operate dust control systems including:

- dust collection system in the exhaust gas stream from the dryer;
- enclosure of the area containing the circuit from the drier transfer point through to and including the upper floor primary high tension circuit and installing an adequate dust extraction system for this area;
- vacuum system for dust collection throughout the plant;
- allowance made for other plant circuits to be enclosed and ventilated as required; and
- baghouse dust collection system.

Other factors in controlling dust emissions would be:

. washing of concentrates free of dust material prior to transport;

. storing incoming concentrates in an enclosed shed; and

. collection of dust from baghouses and other sources to be slurried and transported back to the mine with other reject material.

Noise and dust levels from operations in Muchea must be within standards set by pollution control regulations under the Environmental Protection Act, 1986.

Gaseous emissions from the plant will consist of carbon dioxide from the burning of natural gas, water vapour and heated air from the drier. It is not expected that these would have any adverse impacts on nearby residents or primary land-based enterprises in the Muchea district.

3.4 RADIATION HAZARDS

Radiation hazards associated with the proposal were considered with regard to both occupational and public health aspects.

Areas where there is transport or storage of radioactive substances (or irradiating apparatus) come under the Radiation Safety Act. Accordingly the provisions of this Act must be complied with respect to the following aspects of the proposal:

. monazite storage at Muchea;

. on-site gauges which use radioactive sources; and

. on-site X-ray analysis equipment.

The proponent would also be required to comply with relevant Codes of Practice.

Other responsibilities would include:

. education of the workforce about radiation safety (including dust); and

. ensuring that, at the eventual cessation of processing, all radiation levels are reduced to levels which existed prior to the establishment of the processing plant.

As it is recognised that inhalation of radioactive dust presents the most significant health hazard, exposure to radiation can be adequately controlled through the dust control measures described in the previous section of this report. These matters should also conform with the requirements of the Radiation Health Branch of the Health Department.

The Authority has noted that the proponent has made a commitment to strictly adhere to all Western Australian regulations and Commonwealth Codes of Practice relating to radiation protection including:

. a comprehensive radiation level monitoring programme at both the minesite and dry process plant and their environs and of monazite transport units;

- isolation of the monazite process circuit into a separate building;

- comprehensive dust suppression measures; and

- specific precautions in the handling, storage and transport of the monazite product.

3.5 MONITORING PROGRAMMES AND REPORTING

To ensure that environmental management programmes for this proposal are being carried out in an appropriate manner the Authority considers that a comprehensive system of monitoring and reporting of results to the Government needs to be established.

RECOMMENDATION 7

The Environmental Protection Authority recommends that the proponent submit prior to commissioning, and subsequently implement, an environmental management programme to the satisfaction of the Environmental Protection Authority relating to all aspects of environmental monitoring and management requirements of the proposal described in the Notice of Intent and Environmental Review and Management Programme, including submission of brief annual and comprehensive triennial reports to the Environmental Protection Authority on the environmental management and monitoring of the project.

3.6 TRANSPORTATION OF MATERIALS

Environmental issues related to transport of materials between the Cooljarloo minesite and the proposed dry processing plant at Muchea were considered in the assessment of the proposal at the previous site, and are substantially unaffected by the change in location.

As at the previous location, it is important that particular attention be given to road and rail access points to assure an adequate standard of safety. The Authority notes that design and construction of these points would need to be to a standard approved by the Main Roads Department and Westrail.

The entrance to the proposed dry processing plant site is now some 4 kilometres further north than was previously proposed, reducing any impact the site entrance may have had on the town of Muchea. In the event that noise or dust from the operations becomes a problem, the provisions of Part V of the Environmental Protection Act, 1986 for the control of pollution would apply.

Monazite is one of the products that would be produced at the proposed dry processing plant. As this product has a low specific radiation level special transport requirements would apply. Likewise, transport of petroleum fuel would need to be in accordance with the Dangerous Goods (Road Transport) Regulations which are administered by the Department of Mines.

3.7 EXPANSION OF PROPOSED FACILITIES

Should any expansion of the proposed facilities be considered in future, the proponent must refer the matter to the Environmental Protection Authority for assessment.

3.8 DECOMMISSIONING

RECOMMENDATION 8

The Environmental Protection Authority recommends that the proponent be responsible for decommissioning the plant and surrounds, and that 6 months prior to decommissioning the proponent submit decommissioning plans to the satisfaction of the Environmental Protection Authority.

4. CONCLUSION

Upon assessment of the TiO_2 Corporation NL proposal, the Environmental Protection Authority has concluded that the proposed dry process plant would be environmentally acceptable subject to the operations being carried out in accordance with the commitments in the Notice of Intent and the Environmental Review and Management Programme and the Environmental Protection Authority's Recommendations.

It should be noted that this proposal for a dry process plant has been assessed on its merits in this report as part of a two-stage assessment. The second part, a synthetic rutile plant, is under public review. Nothing in this report pre-empts any part of the assessment of the synthetic rutile plant.

EXTRACTS FROM RESPONSES BY TiO_2 CORPORATION NL TO POINTS RAISED IN SUBMISSIONS ON ERMP

4. RADIATION HAZARDS

A. HEALTH

(i) Radiation Safety Act

TiO_2 recognises the operations areas which are subject to regulation under this Act, and will abide by the requirements of the Act or any amendments made to that Act.

In regard to transport of monazite to Fremantle, application of the Commonwealth Code of Practice for the Safe Transport of Radioactive Substances is referred to in the Draft ERMP (Section 7.4.9). It is now the intention for containers to be transported by rail, thus avoiding the use of public roads.

(ii) Importance of Radiation Protection

TiO_2 has paid particular attention to radiation protection, and to the control of dust emissions and this is reflected in the discussion contained in the Draft.

TiO_2 has undertaken to abide by the Commonwealth Code of Practice. Referring to the Radiation Safety Officer, that Code requires that person to have "qualifications and experience acceptable to the appropriate authority." (Clause 9 [19]).

(iii) Company Responsibilities

(a) The standards, guidelines and regulatory responsibilities foreshadowed by TiO_2 as applicable to this project are described in the Draft (7.4.2, 7.4.3 and 7.4.9). In addition as stated above, TiO_2 recognises the need to observe the Radiation Safety Act.

(b) TiO_2 has stated its intentions in regard to workforce education on radiation safety in the Draft (7.4.7).

(c) TiO_2 states in the Draft (7.4.8), that checks will be carried out to ensure that rehabilitation both at the mine and plant (upon closure) is effective in eliminating residual incremental radiation.

(d) Wastes containing radioactive residues will be disposed of to standards approved by the appropriate authority. Wastes from the process will be returned to the mine and buried. This includes residuals collected in lined, evaporative storage ponds at the plant, stockpile residuals, baghouse dust (after slurrying), and process circuit non-commercial rejects.

EXTRACTS FROM RESPONSES BY TiO_2 CORPORATION NL TO POINTS RAISED IN SUBMISSIONS ON ERMP (cont'd)

B. Dust at Muchea and Public Exposure to Radioactivity (including comment in Section 8).

The Commonwealth Code of Practice requires TiO_2 to manage its operations so that outside its site boundaries, incremental radiation arising from its operations meets the standards required for protection to a member of the public. If that does not occur or if from monitoring results, a trend towards non-compliance is exhibited, the appropriate authority can take action ranging from requiring process modifications in particular areas within a specified timetable, to shutdown of either some sections or all of the plant. Thus TiO_2 must both plan its operations so that compliance is assured and monitor incremental radioactivity at or outside plant boundaries to demonstrate compliance.

Recognising that the inhalation of radioactivity as airborne dust presents the most severe operating restriction in terms of occupational and public health considerations, TiO_2 has taken the following steps to maintain compliance with statutory requirements:

(i) Concentrates will be washed free of dust material prior to transport to Muchea. This will greatly reduce dust loads reaching the plant compared to past industry practices.

(ii) An enclosed shed will be provided to store incoming concentrates.

(iii) A dust collection system will be installed in the exhaust gas stream issuing from the drier immediately before entering the exhaust system.

(iv) The area containing the circuit from the drier transfer point through to and including the upper floor primary high tension circuit will be enclosed and dust extraction equipment installed.

(v) A vacuum system for dust collection throughout the plant will be provided.

(vi) In the design, allowance will be made for other circuits to be enclosed, if unexpected operational circumstances arise.

(vii) Dust collected from baghouses and other sources will be slurried and transported back to the mine with other reject material.

During start-up and progressive commissioning of the circuits, commencing with the ilmenite circuit, some product stockpiling will be required on site. Dust suppression from these stockpiles will be provided either by water spraying, or sealants. These procedures will also apply to any residual stockpiling of material which may result from operational procedures from time-to-time.

EXTRACTS FROM RESPONSES BY TiO_2 CORPORATION NL TO POINTS RAISED IN SUBMISSIONS ON ERMP (cont'd)

Dust emissions from offloading of moist concentrate from the minesite will be minor and no special dust suppression provisions are considered necessary. If dust suppression is subsequently found to be required, TiO_2 will install water sprinklers. Tailings from the process will be stockpiled for subsequent transfer back to the minesite. On these stockpiles, some surface drying may occur and any potential dust arising will be controlled by water sprays or sealants.

Routine hygiene measures will be conducted outside the plant buildings to suppress dust.

In addition to the above, monitoring of pre and post operational levels of radioactivity in the air, will be carried out in consultation with the appropriate authority. It is expected that the results of these programmes will be made available on a regular basis through the Shire, to local residents.

Summarising, TiO_2 has taken specific and positive measures in reducing the dust load coming to the plant, and controlling emissions within the plant; so that outside the plant boundaries and further out to residential areas, compliance with the Code of Practice will be achieved. Compliance will be the subject of routine monitoring.

6. **Processing Plant Water Balance, Site Drainage and Potential for Contamination of Surface and Groundwaters**

TiO_2 believes it can adequately demonstrate to the satisfaction of the Water Authority and the EPA that Ellen Brook will not become polluted due to the company's operations. Current plans are not to use chemicals in the dry mill operation. Overflow from the evaporation pond, which will only occur as a consequence of episodic rains, will be clean water.

Further information can be supplied after the quality of the water from the bores presently being drilled are available. The Company will make the data available to the Water Authority and the EPA.

8. **Dust and Noise at Muchea**

TiO_2 has already stated its commitment to control dust at Muchea (see 4 B above).

The proposed plant is located more than 1 km from the nearest occupied dwelling within the townsite. TiO_2 does not expect any difficulty meeting the noise control levels required by the EPA for this form of industrial facility.

10.3 **Aesthetic Impact of Processing Plant at Muchea**

TiO_2 intends to save all remnant vegetation on this site. As soon as the site development plans have been finalised, a plant screening landscape plan will be developed and implemented.

EXTRACTS FROM RESPONSES BY TiO_2 CORPORATION NL TO POINTS RAISED IN SUBMISSIONS ON ERMP (cont'd)

10.5 Gaseous Emissions from Plant Site

The emissions will be carbon dioxide from burning natural gas, water vapour and heated air from the drier. These should produce no adverse impacts on the primary land-based enterprises in the Muchea district.

10.6 Transportation

The proposed entries and exits to both the minesite and the processing plants have been designed by the Main Roads Department and are acceptable to TiO_2. The entry to the Muchea site has now been moved to the northern boundary of the site, ie further away from the town. For dust and noise see also 4B and 8 above. It is now proposed to transport the monazite by rail. TiO_2 will obey the law on all matters, including transportation of flammable liquids.

10.8 Expansion Proposals Muchea

If these are proposed then TiO_2 will notify the EPA.

10.10 Impacts on Flora and Fauna at Muchea

See Sections 4B, 8 and 10.5. TiO_2 intends to enhance the flora and fauna on the Muchea site (see Section 10.3) and does not expect any effects on flora and fauna outside its boundaries.

COMMITMENTS BY TiO_2 CORPORATION NL WITH REGARD TO THE DRY PROCESS PLANT

A. Commitments given in Appendix 3 of the EPA assessment of the Cooljarloo Mineral Sands Project relating to the Dry Process Plant.

6. As monazite is radioactive, strict adherence to all Western Australian regulations and the Commonwealth Code of Practice relating to radiation protection will be adopted as described in Section 7.4. This will include specifically:

- a comprehensive radiation level monitoring programme at both the minesite and dry process plant and their environs and of monazite transport units;
- isolation of the monazite process circuit into a separate building;
- comprehensive dust suppression measures; and
- specific precautions in the handling, storage and transport of monazite product.

17. TiO_2 recognises the operations areas which are subject to regulation under the Radiation Safety Act, and will abide by the requirements of the Act or any amendments made to that Act.

18. TiO_2 has undertaken to abide by the Commonwealth Code of Practice. Referring to the Radiation Safety Officer, that Code requires that person to have "qualifications and experience acceptable to the appropriate authority." (Clause 9(19))

19. Wastes containing radioactive residues will be disposed of to standards approved by the appropriate authority. Wastes from the process will be returned to the mine and buried. This includes residuals collected in lined, evaporative storage ponds at the plant, stockpile residuals, baghouse dust (after slurrying), and process circuit non-commercial rejects.

20. Recognising that the inhalation of radioactivity as airborne dust presents the most severe operating restriction in terms of occupational and public health considerations, TiO_2 has taken the following steps to maintain compliance with statutory requirements:

(i) concentrates will be washed free of dust material prior to transport to Muchea. This will greatly reduce dust loads reaching the plant compared to past industry practices;

(ii) an enclosed shed will be provided to store incoming concentrates;

(iii) a dust collection system will be installed in the exhaust gas stream issuing from the drier immediately before entering the exhaust system;

COMMITMENTS BY TiO_2 CORPORATION NL WITH REGARD TO THE DRY PROCESS PLANT (cont'd)

(iv) the area containing the circuit from the drier transfer point through to and including the upper floor primary high tension circuit will be enclosed and dust extraction equipment installed;

(v) a vacuum system for dust collection throughout the plant will be provided;

(vi) in the design, allowance will be made for other circuits to be enclosed, if unexpected operational circumstances arise; and

(vii) dust collected from baghouses and other sources will be slurried and transported back to the mine with other reject material.

B. **Commitments made in the Notice of Intent Appendix 2.**

TiO_2 Corporation NL is committed to achieving EPA standards in construction and running of the proposed synthetic rutile plant. More specifically, the company's commitments are as follows:

- report to the EPA during the detail design stage with a site layout and its environmental implications;
- preserve as much as practically possible of the Chandala Brook vegetation during the construction of the road and rail access over the brook with a significant buffer strip;
- implement a landscaping and planting programme to ensure the site blends in well with the surrounding area;
- incorporated into the general site monitoring reports for the EPA, will be records of waterfowl usage of the ponds;
- inform personnel of the locations of the two sites on the property, and the fact it is an offence to interfere with aboriginal sites; and
- comprehensive monitoring of radiation as outlined in the Cooljarloo Mineral Sands ERMP (Maunsell & Partners, 1987).