ASSESSMENT REPORT — NUMBER 2

ASSESSMENT REPORT FOR THE FINAL ENVIRONMENTAL IMPACT STATEMENT FOR CEMENT AND LIME PLANT — QUARANTINE ISLAND

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ENVIRONMENT UNIT
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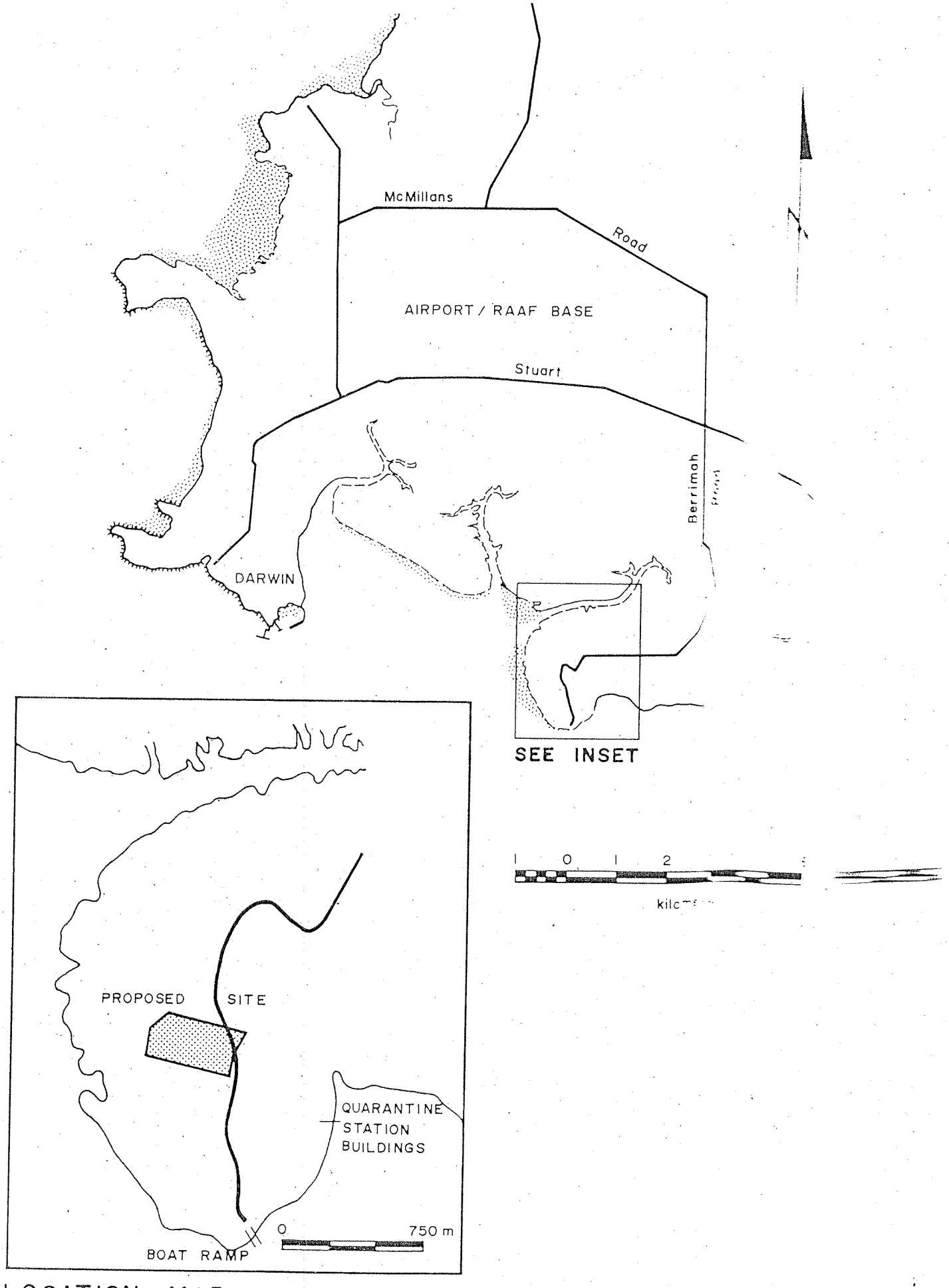

LOCATION MAP:

PROPOSED CEMENT & LIME PLANT QUARAN

ASSESSMENT REPORT FOR THE FINAL ENVIRONMENTAL IMPACT STATEMENT FOR CEMENT AND LIME PLANT, QUARANTINE ISLAND

1. INTRODUCTION

1.1 This Report

This report reviews the final Environmental Impact Statement (EIS) on the proposal by Northern Cement Pty Ltd to build and operate a cement and lime manufacturing plant on Quarantine Island, on the East Arm of Darwin harbour.

A draft EIS was prepared by the environmental consultants Peter Hollingsworth and Associated Consultants, and submitted by Northern Cement in August, 1982. This report refers to the amended, October 1982, EIS.

Chapters on existing environmental conditions, the proposed project, impact assessment and safeguards and monitoring are included in the EIS, and are reviewed in succession by this report.

1.2 The Proposal

Northern Cement Pty Ltd proposes to build a cement and lime manufacturing plant at Quarantine Island, East Arm. Stage 1 of the project, a clinker grinding plant utilizing imported clinker, is planned for completion by December 1983. Stage 2, the full process of cement manufacture, will not be developed until the Darwin market has expanded sufficiently to justify the capital expenditure. This is expected to take 10-15 years given normal market growth. While the decision on a lime plant to be incorporated in Stage I has been temporarily deferred pending finalisation of experimental work by Ranger Uranium Mines, its impact has been discussed in the EIS and this report.

Quarantine Island lies at the entrance of East Arm in Port Darwin. It has seen previous use as a flying boat base during World War II and currently has a little-used Quarantine Station. The old flying boat launching ramp now provides perhaps the best recreational boating ramp in the Darwin area and is extensively used by amateur and professional fisherman.

The mangrove surrounded island is planned for industrial uses, and is connected to the mainland by an existing causeway.

Eight hectares of land on Quarantine Island has been made available to Northern Cement Pty Ltd for the facility.

Stage I, involving a site construction workforce of up to 60 has a projected cement production rate of 66,000 tonnes per year in 1984, increasing to 110,000 tonnes per year in 1990.

Clinker will initially be imported by ship and unloaded at the Fort Hill Wharf, approximately 20 km by road from Quarantine Island. Trucks will transport the clinker to the plant site. In the future, Northern Cement anticipates that raw materials may be unloaded by self discharging ships onto an enclosed conveyor system at a new Port Authority bulk materials wharf proposed for the planned port orientated industrial development in the Quarantine Island area.

The clinker will be blended with gypsum and milled to form cement which will be stored in silos prior to despatch either in bulk or in bags.

Lime manufacture will involve the importation of raw material, and unloading and transporting methods similar to those for cement. Alternatively, if suitable deposits are found, local raw material will be used.

Limestone will be fired in a kiln to produce quicklime. Maximum production in the long term - requiring the importation of 40,000

tonnes per year by 1990 - will be 250 tonnes per day. This will be despatched in bulk or hydrated. Hydrated lime will be sold in bulk or bagged form at a rate of 3,000 tonnes per year.

Stage II, when fully operational, will employ as many as 200 workers.

Limestone will be imported, or locally won, blended with other additives, then milled and fired to produce clinker. This clinker will be used to manufacture cement as in Stage I.

2. THE ENVIRONMENTAL ASSESSMENT REQUIREMENT

The Quarantine Island site was considered by Northern Cement to be the most suitable - of several options - as of March 1981. This preference was altered in favour of a site on, or close to, Channel Island in September, 1981; however economic considerations, plus apparent incompatability between the cement works and a proposed new power station on Channel Island, led to the re-emergence of Quarantine Island as the favoured site in May, 1982.

Guidelines for an EIS on the Quarantine Island site were prepared by the Conservation Commission of the Northern Territory (CCNT) and given to Northern Cement on 21 June, 1982; draft sections of the statement were received on 17 August. The initial complete draft EIS was received on 31 August.

At this stage it should be mentioned that the guidelines proposed for the EIS followed the essence of the Environmental Assessment Act which will be administered by the CCNT.

However, since this Act has not yet commenced, environmental assessment of the project was carried out in accordance with the provisions of the Planning Act 1979-82. Environmental Assessment

under Planning Legislation is less specific than under the Environmental Assessment Act, however, co-operation between the Department of Lands and the CCNT ensured that the requirements of the Planning Act were fulfilled, while the more advanced procedures of the Environmental Assessment Act was able to be utilised.

Review of the draft EIS resulted in a submission to Cabinet by the Department of Lands recommending that the allocation of land for the proposed works be allowed to procede, and that the company be requested to rewrite the EIS to take into account matters raised by relevant Government Departments/Authorities. The amended EIS was received from the Department of Lands on 5 November, 1982, and is the subject of this assessment; preliminary comments were forwarded on 13 December, 1982.

3. EVALUATION OF THE EIS

The following evaluation examines the EIS, section by section, to determine its success in meeting the Northern Territory Government's environmental assessment requirements.

It is noted here that deviation by Hollingsworth and Associates from the CCNT's guidelines, particularly in suggested sections 4 and 5 and subsections 8.1, 8.2 and 8.3 tended to reduce the overall clarity and effectiveness of the EIS. While adherence to the guidelines is not mandatory, they are drawn up to assist the consultants in the preparation of a fully detailed and satisfactory report.

3.1 Introductory Sections

The proposed development is introduced and the requirements for environmental assessment outlined. Background material on Northern Cement Pty Ltd is presented together with the philosophy behind the Company's determination that Stage I of the two stage operation would now be viable, with full development to Stage II

completion dependent on marketing trends in the future. The economics of lime manufacture may be in doubt in view of Ranger Uranium Mines Pty Ltd experimental work on the substitution of manufactured lime - used in the neutralisation of tailings - with ground limestone.

Alternative sites are discussed and the company reasoning behind its choice outlined. The crucial argument, ease of access to deepwater unloading facilities, overruled Channel Island and Hudson Creek in favour of Quarantine Island.

3.2 Existing Environmental Conditions

3.2.1 Regional Meteorology

This subsection is concerned with winds, rainfall, temperature and visibility.

Wind data were obtained from the Bureau of Meteorology and consist of 0900 and 1500 hr observation only. The sources of rainfall, temperature and visibility data are not recorded.

The quality of the sub-section serves to give a general climatic picture only. No data are offered with respect to ambient particulate levels (an omission noted in the preliminary comments to the Department of Lands from the Conservation Commission) although the visibility data appears to be an attempt to cover this aspect.

3.2.2 Geology and Soils

Regional and local geology data are presented with East Arm being discussed in detail. Local soils are described and some attempt made to illustrate soil - geomorphology associations.

3.2.3 Surface Water

Included here are details of surface runoff on the site and local marine hydrology. Due to the island's small surface area and the permeable nature of its soils, surface ponding does not occur.

Local hydrology data from a detailed survey in 1970 and a float study in 1974 are presented. Although informative, their relevance is peripheral to this EIS and their value negated by the lack of water quality data. This omission was noted in the preliminary comments from the Conservation Commission.

3.2.4 Noise

The existing noise level climate was determined for the Quarantine Island site and a point on the approach route in Berrimah Road. The presence of Kormilda College in the vicinity of the access route is noted, and L_{10} and L_{90} -noise levels exceeded 10% and 90% of the time - are calculated for each site to effectively quantify the current ambient situation.

A traffic count is presented for two sites, neither of which is on the actual access route; the portion of the route most likely to be greatest affected by an increase in traffic i.e. Berrimah Road, is not considered.

3.2.5 Air Quality

This section is noticeably brief and is subjective in its approach. Little attention has been given to the need for the establishment of the ambient condition.

3.2.6 Biological System

3.2.6.1 Vegetation

The local vegetation is covered in some detail; alleged degradation of eucalypt - palm forest to eucalypt-open woodland on the site vicinity could have been amply illustrated using available aerial survey photographs.

Two open woodland vegetational units are described in detail and their distribution adequately mapped as an Appendix. The mangrove succession is well documented and illustrated, and it is unfortunate that the details of the actual survey do not appear.

3.2.6.2 Fauna

A cursory section with no detail on methodology. No animal or bird sightings are listed, and the brevity suggests a brief stroll over the area to have been the sole attempt at fauna quantification.

3.2.7 Land Use

Current land use is presented with brief historical data. Any previous wartime or Aboriginal usage or significance is not mentioned.

3.2.8 Infrastructure

Road access, water and electrical service of limited capacity are available. The road from Berrimah is noted as probably requiring some upgrading.

3.2.9 Planning Control

The explanation of the current and future zoning situation is relevant and satisfactory. The passage of time has validated the assumption that the required rezoning will become fact.

3.3 The Proposed Development

This section, after a brief introduction note, discusses the proposed development in terms of construction phase, Stage I and Stage II development, waste products, energy requirements, infrastructure and landscaping.

3.3.1 Construction Phase

It is unfortuante that site clearance - as well as fencing and the installation of power and water services - is programmed for the 1982/83 wet season, as this will subject the site to maximum erosion potential through stormwater run-off when it is least protected; however, it is realised that the alternative - site preparation in the 1983 dry season followed by construction during the 1983/84 wet season - is economically unattractive.

The EIS is imprecise on details of the clearance programme, and the CCNT recommends that total clearance - necessary for the construction of Stage II - be delayed until market trends dictate Stage II commencement; this strategy would maintain an effective visual and aural buffer zone to the north of Stage I operations.

Details of fill borrowing for Stage I - estimated as up to 12,000 m^3 - do not include post-borrow strategy for the pit or discuss alternative sites other than immediately adjacent to the Quarantine Station. Stage II borrow strategies are not discussed although the amount of fill required would be potentially greater than for Stage I.

3.3.2 Stage I

Projected production figures are reported, as are clinker grinding and lime manufacture methods. An alternative route for the nighttime conveyance of raw material from the Fort Hill Wharf to the site - designed to minimise suburban noise - is suggested, and should be encouraged. The bulk of the subsection details the passage of raw materials through to final cement and lime production and falls short of being completely adequate on two points:

(i) The transport of coal is not detailed.
(ii) Figure 8 is clearly included in an incomplete state with no reference to lime production machinery or stockpile placement.

3.3.3 Stage II

Although Stage II will not commence until the local market expands considerably - which is not anticipated for some years - production processes for complete cement manufacture are thoroughly explained.

3.3.4 Waste Products

The two main wastes are identified as water and dust. Domestic sewage will be treated to the appropriate standards.

Water pollution by runoff containing suspended stockpile material and dust is recognised as a potential hazard and it is proposed to pass this water through a settling pond. Details of the

pond appear in a later section, however, the pond does not appear on either Figure 8 (Stage I) or Figure 9 (Stage II).

Dust production - the traditional hazard of cement manufacture - is reportedly to be controlled by installation of dust collection devices at potential sources. Stack emissions will be kept within 'acceptable standards'.

3.3.5 Energy Requirements

For Stage I, power requirements will be mainly electrical except for the lime kiln which will be oil fired to 1987/88, after which it will be coal fired. A table of projected energy requirements is included.

3.3.6 Infrastructure

The proposal requires the installation of an 11KV power line from the Berrimah sub-station, details of which are given. Current water supply is considered adequate with the addition of a 90,000 litre tank. The siting of this tank is not considered.

The Berrimah to Quarantine Island road is considered in the EIS to be adequate in its present state, with the understanding that visibility may have to be improved on blind corners. Examination of the road and advise from other Government Authorities, however, indicate that substantial improvements to the road will be required. Thought may have to be given to dust control on this road during periods of heavy usage. All on-site roads are to be sealed, kerbed and guttered.

Clinker unloading facilities at Fort Hill Wharf are not adequately dealt with. Considering recent continuing public alarm and concern with regard to sulphur spillage at the same wharf, the problem of dust production and prevention should be the subject of constructive comment and not avoided and glossed over.

The question of a hopper facility has been discussed by all concerned. Since Cabinet has given no specific directon on this regard, and Northern Cement maintains that this is a Port Authority responsibility, the dust situation at the unloading facility must be kept under constant surveillance.

3.3.7 Landscaping

It is proposed to landscape the perimeter of the site during the initial construction phase. Much emphasis is placed on Northern Cement's parent company, Adelaide-Brighton, landscaping efforts at their cement plant in South Australia. Inspection of the Adelaide-Brighton plant confirmed the enhancement of the site by landscaping however, it is relevant to note that:

(i) total site clearance is completely unnecessary in view of the long lead time prior to Stage II commencement; and

(ii) expert advice should be sought with respect to suitable species selection for any site landscaping undertaken.

3.4 Impact Assessment

3.4.1 Water Quality Effects

Effects are detailed from Stage I and Stage II. The issue of potential harbour pollution at Fort Hill wharf is by-passed with the assumption that the Port Authority will provide an unloading hopper; no secondary plan is discussed in the event of the hopper not materializing.

Plant site effects extend mainly from run-off. It is unfortunate that this subsection in particular contains many unsubstantiated statements and is written in an unscientific manner.

It is relevant here to note that, while an EIS cannot generally be considered a scientific document, assessment of particular impacts - around which an EIS is constructed - should receive objective, quantified treatment before they can be termed 'insignificant' or 'of no concern'.

It is proposed that site run-off will be passed through a settling pond to allow deposition of sediment load. Although this pond has apparently not yet been designed, and is not included in the Stage I site plan (Figure 8), criteria for its design are presented. These appear adequate, but no attention is given to the settling pond outfall. In view of this lack of detail, no effective assessment can be given, however, the problem of stockpile leachate run-off contamination - a potential major water effect - may be avoided or contained by the erection of some form of bunding.

The EIS contains no suggestion of a water quality assessment programme. If it considered that a water quality monitoring system to include regular settling

pond and outfall total dissolved solids, dissolved oxygen and pH measurements, should be implemented before the commencement of Stage I, and maintained for the duration of Northern Cement's Quarantine Island operations.

3.4.2 Transport

Details of truck tonnages, movements and timetables are given and - for Stage I - are considered to have minimal potential impact provided that:

(i) Berrimah Road is suitably upgraded such that public access to the Quarantine Island boat ramp is not hindered; and

(ii) the trucks undertake adequate dust control precautions, such as load covering.

Stage II transport impacts are subject to a number of unknowns, including possible wharf constructions, possible rail transport etc., and cannot be adequately assessed at this early stage.

3.4.3 Noise Effects

Northern Cement is clearly aware of the noise producing potential of their proposed operation, and this awareness is demonstrated by the attention to detail in this sub-section. The plant itself - with clinker grinding the source of most effect - will be satisfactorily noise-proofed by the implementation of Northern Cement undertakings; restriction of total site clearance, suggested earlier (3.3.1), would further enhance noise retention strategies.

Transport movement will be locally restricted so as not to create suburban noise nuisance. Kormilda College in

Berrimah Road is recognised as a possible noise nuisance location and the scheduling of truck movements to maximise daylight activity will reduce effects.

3.4.4. Air Quality

Fourteen sites of possible dust emission are identified and relevant controls noted.

These are recorded in tabular form below:

POTENTIAL EMISSION SOURCE	TYPE OF EMISSION	CONTROL TO BE IMPLEMENTED
Lime kiln	Exhaust gas	Bag filters
Cement mill	Stack gas	Electrofilters and bag filters.
Clinker storage shed	Loose material	Full enclosure
Silos	Loose material	Vent fans and bag filters.
Bagging	Spillage, loose material.	Bag filter, venting hoods.
Tanker loading	Spillage	Vented elephant's trunk.
Conveyors and transfer points.	Spillage and loose material.	Full enclosure, fabric filters.
Collected dust	Clogged filter material.	Re-use or distribution as fertilizer.
Fugitive dust	Wind blown general dust.	Regular site sweeping/ cleaning.
Unloading	Raw material i.e. clinker, lime-stone, coal dust, road dust.	Covering of trucks. Watering of roads.
Additional Stage II Sources		
Kiln/raw mills	Exhaust gases	Electrostatic precipitators.
Clinker coolers	Waste gasses	Multiclone dust collector.
Coal mill	Pulverised coal ash.	Venting to kiln, re-use as clinker.
Stockpiles	Limestone dust	Enclosed storage, water sprays.

Sulphur dioxide will be produced from coal combustion and contained in stack emissions; to predict fallout rates for this and entrained dust/exhaust particles, the modified Pasquill - Gifford model is used.

Given the lack of suitable local data i.e. horizontal wind speed and direction, horizontal and vertical turbulent diffusion, atmospheric stability and mixing height, certain assumptions were made in order to use the model.

The use of this model and associated assumptions is accepted practice and, given that specific air pollution controls are extant for the Northern Territory, is effective in demonstrating the company's claim that acceptable air pollution levels will be met and exceeded using existing interstate and international standards as guidelines. The use of 'worst case' situation data to predict fallout rates shows that fumigation activities under conditions of nocturnal inversion breakup combined with the development of a thermal internal boundary layer, could lead to high fallout rates; however, given that stack emissions are claimed to have sufficient buoyancy to penetrate such trapping conditions, and assuming that management is made aware of the potential problems, no excess fallout is anticipated.

Given normal operating conditions and assuming bag filters, electrostatic precipitators, venting fans and water dampers are all operated properly, this subsection demonstrates the company's claim that air quality impacts will be confined to a small area surrounding the plant.

3.4.5 Biological Effects

The 'assessment' here is cursory and subjective. It is possible that suitable settling pond design may in fact

result in minimal discharge effects but due to the lack of pond design data, outfall position site and estimated rates of discharge, proper assessment of the effect on marine biota is not possible and remains a serious omission.

The effect on mangrove communities is expected to stay within localised minimal limits.

Land fauna are not discussed.

3.4.6 Land Use Effects

The statement on the proposed site 'nor does it have any conservation value' (p49, subsection 5.6, par 1) is beyond the mandate and the apparent expertise of the EIS authors. Absence of detail on local fauna and/or possible Aboriginal and local historic significance (both of which may be found - as items to be discussed - in the study guidelines issued 21-6-82) relegates statements on land use effects to the level of opinion rather than properly prepared commentary.

Road access to the Quarantine Island boat ramp will be maintained throughout.

3.4.7 Socio-economic Effects

The anticipated work force to be employed over the nine month Stage I construction period is 40 people. Stage II development will employ an average of 150 people over a two year construction phase. Most of these positions will be available to local workers.

Operation employment will involve 20-30 people for Stage I with a further 17-20 people employed in administration,

finance and marketing. This workforce will grow to approximately 200 following the completion of Stage II and it is anticipated that local workers will be employed in all but a few specialised positions.

Some multiplier effect is correctly anticipated and the advantages of local manufacture as opposed to the importation of the finished product are presented.

The general Quarantine Island area itself will suffer some detriment to its recreational value. While this may be considered an unavoidable side effect of a general developmental policy, such detriment should be mentioned and acknowledged by Northern Cement.

3.4.8 Visual Effects

Stage I will have minimal visual impact as none of the proposed structures exceeds 25 m in height. This impact will be further reduced with selection of camouflaging cladding materials. Stage II, with two 65 m preheater towers and one 75 m exhaust stack, presents greater difficulties and Northern Cement proposes to retain architectural consultants in an additional attempt to reduce visual prominence.

Peripheral screening by vegetation and landscaping will form an integral part of site development. Botanical consultants will be retained to advise on the selection of appropriate species.

3.5 Safeguards and Monitoring

Section 6.2, incorrectly incorporated in this subsection, expounds the economic benefits of the Northern Cement proposal. These include local employment opportunities and control over

cement pricing, which are of genuine advantage to the Darwin community; however it is noticeable that these benefits are presented more in the form of a public relations exercise on behalf of Northern Cement rather than as the carefully weighed comments of an environmentally concerned manufacturer.

The true subject matter of this section (subsection 6.4) is basically a summary of potential problem areas and the safeguarding and monitoring procedures to be undertaken by the company. These undertakings are detailed in the following section (4).

4. UNDERTAKINGS FOR IMPACT REDUCTION

Northern Cement Pty Ltd has agreed in their EIS to undertake the following measures. It needs to be recognised that these are based on current knowledge of prevailing conditions and that some adjustment of these undertakings may be necessary as more information becomes available and in particular, if and when Stage II development begins.

4.1 Protection of Air Quality

- Access road to the site will be watered regularly during dry weather.
- All on-site roads will be sealed, kerbed and channelled.
- Dust collection equipment will be installed at every potentially significant dust source.
- Clinker, coal and clay will be stored in an enclosed shed and handled by enclosed conveyors.
- Water sprays will be used to control dust from exposed stockpiles of fine limestone.

For Stage I

- Bag filters will be used to remove particulates from the exhaust gases in the lime kiln. Dust burden in emissions will be less than 100 mg/Nm^3.

- Cement mills will be vented by 20m stacks via bag or electrofilters. Exhaust gas will contain less than 100 mg/Nm^3 of particulates.

- Clinker storage will be completely sealed.

- Cement and quicklime storage silos will be kept under suction by means of vent fans and bag filters used to remove particulates.

- Bagging of cement and lime will take place in an enclosed shed.

- Bagging machines will be vented by bag filter. Spillage from bagging operation will be collected and returned to the machine. The outside of the bags will be cleaned under a hood vented to the dust collector.

- Road tankers will be loaded with bulk cement in an enclosed filling station and vented through an air return duct to bag filters on the cement silo.

- Conveyors and transfer points for raw materials and finished products will be enclosed. Transfer points will be vented through bag filters.

- Collected dust from electrofilters and bag filters will be returned to the relevant process and storage phases.

- Ground surfaces around the plant including service roadways will be regularly cleaned and swept to minimise fugitive dust.

- Transport of clinker by road to the plant will be by covered load.

Additional Measures for Stage II:

- Exhaust gases from the raw mills and kiln system will be passed through electrofilters to remove in excess of 99.9% of particulates before being vented to the atmosphere via 75m stacks. The dust burden on leaving the stacks will be less than 100 mg/Nm^3.

- No exhaust gases will be released from the clinker cooler system.
- Stack emissions will be kept within acceptable standards.

4.2 Protection of Water Quality

- There will be no release of process water from the site.
- Cooling tower blowdown will be re-used as process water or stockpile dust control.
- Drainage from open stockpile areas will pass through a settlement pond before release from the site.
- Sweeping facilities will be provided to clean up accidental spills of raw materials and finished product.

4.3 Control of Noise

- All major noise sources in the plant will be enclosed, sealed or lined with appropriate sound absorbing materials.
- Truck movements to and from the site will be scheduled for maximum daytime operations.

4.4 Aesthetic Considerations

- A vegetation screen will be established around the perimeter of the project area utilising appropriate species up to 8m in height. This is to commence as far as possible during Stage I. Specialist advise will be obtained on selection of plant species.
- Selected areas will be landscaped to enhance the visual effect of the plant.
- Aesthetic design of structures and use of suitable cladding materials will be employed to reduce the visual impact of the plant as far as possible.

4.5 Environmental Monitoring

- A system of continuous monitoring of particulates and SO_2 in stack emissions will be installed to enable the early detection of excessive emission rates.
- In the event of a failure of a dust collection system and a rise in emission loads, the relevant section of the plant will be quickly shutdown and repairs implemented.
- The Company will undertake an air quality monitoring programme prior to commencement and during operations to confirm the effectiveness of emission control measures.
- Prior to the plant commencing operations and during operations, the Company will undertake monitoring of water quality in the vicinity of the plant to ensure no adverse effects arising from site drainage.
- Noise from the plant will be closely monitored once it becomes operational and should noise appear to be a problem, additional noise absorption equipment will be installed on significant noise sources to minimise any disturbance to adjacent land uses.

5. Conclusion

Although divergence of the consultants from CCNT guidelines was counter-productive, the EIS for the Quarantine Island cement and lime works provides sufficient information for a decision to be made on the extent of the project's enviornmental disturbance.

Based on an evaluation of the EIS, it is the Commission's belief that environmental impacts will fall within acceptable and controllable limits.

Although deficient in the treatment of some areas of impact, and subjective in others, implementation of the proposed environmental safeguards and their regular maintainance, will negate these inadequacies.