ASSESSMENT REPORT — NUMBER 4

ASSESSMENT OF THE PROPOSED DARWIN RENDERING PLANT

MARCH 1983

CONSERVATION COMMISSION OF THE NORTHERN TERRITORY
DARWIN N.T.

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SUMMARY

(i) The proponent, Northern Rendering Pty Ltd, proposes to accumulate abattoir, prawn and chicken waste and render it to produce a 50% protein meal and tallow. The proposal will incorporate various ancillary industries, including hide processing and 44-gallon drum cleaning. The proponent is also attempting to attract fertiliser and stockfeed manufacturers, to locate on the site.

(ii) The plant will operate at a peak render of 50-55 tonnes per day input during the dry season, falling off to around 15 tonnes per day in the wet season. This equates with the rise and fall of local abattoir activity.

(iii) The major environmental concern arises from the emission of highly odorous gases from the rendering process, the handling of raw materials, blood drying and the effluent treatment ponds.

(iv) The proponent has applied to the Department of Lands for a 4.98 hectare site in the Hudson Creek noxious industry zone. Establishment of the rendering plant at this site raises the possibility of odour adversely affecting nearby Palmerston, the proposed University and railway terminus, Berrimah Gaol and a number of other land users in the immediate area.

(v) An alternative site is available at Anzac Parade in the Humpty Doo area. This site is considered as being less sensitive with regard to potential odour nuisance, because of its relative remoteness from urban or near urban centres. The proponent has indicated that this site would be unsuitable on economic grounds.

:OMMENDATIONS

lowing examination of the proposal by Northern Rendering Pty Ltd to ablish and operate a rendering plant at Hudson Creek in the Darwin a, the Conservation Commission recommends that -

the proposal as presented should not proceed at the Hudson Creek site because of the unacceptable risk associated with offensive odours reaching Palmerston and other major land users in the adjacent area;

the preferred option is for the proposal to proceed at the alternative Anzac Parade site subject to the following additional conditions:

(i) covered transport of raw materials;

(ii) collection and disposal of all contaminated water (e.g. truck wash-down areas) to the effluent ponds;

(iii) design of effluent ponds to be approved by the Water Division;

(iv) no water from the ponds or other waste water to be discharged from the site without prior approval of the Water Division;

(v) venting through the odour control equipment of gaseous discharges from the blood drying process;

any further consideration of the Hudson Creek site should only be on the basis that the proponent agrees to install a condenser/ afterburner odour control system capable of incinerating non-condensible gases at 750° C over 0.3-0.5 seconds. The additional conditions under (b) would also apply.

1. INTRODUCTION

This report is an assessment of the potential environmental impact of the proposal by Northern Rendering Pty Ltd to establish and operate a rendering plant at Hudson Creek in the Berrimah area, 16 km from central Darwin.

A number of sources were consulted prior to the preparation of the report. These included the Departments of Lands, Health, Transport and Works, the Palmerston Development Authority, the N.T. Development Corporation, Government and industry representatives in N.S.W. and S.A. with experience in rendering operations, and various other sources.

Assessment has been based on written information supplied by the proponent and supplemented by verbal communication with the same source. It was unfortunate that the type of information provided by the proponent was not in the form of one cohesive report describing the proposed operations. This is not necessarily a criticism of the Company, given the history of the proposal, but the various successive communications gave rise to discrepancies and lack of detail in relation to a number of important aspects of the proposed operation. Some of these aspects were able to be clarified by verbal contact with the Company.

The following sections examine the proposal, the environmental aspects of concern, the alternative sites and a number of other considerations which have a bearing on the proposal.

2. THE PROPOSAL

Northern Rendering Pty Ltd has applied for a 4.98 hectare (12.31 acres) site within the Hudson Creek noxious industry zone at Berrimah. The site is intended to accommodate facilities

associated with the proposed rendering plant, final product storage, waste effluent ponds, office and staff amenities, internal roadways and car parking areas. Also to be included on the site are a number of ancilliary industries such as hide processing, drum reconditioning, stock feed manufacture and bulk salt store. The main facility which will enclose the rendering equipment and meal store is to be a metal-clad, steel-frame building 30 x 15 m and 12 m in height.

The following sections describe in detail the operational and ancilliary features of the proposal.

2.1 Sources of Raw Materials

The material for rendering will include offal from regional abattoirs, prawn and chicken processing plants and local butcher and pet food operations. Abattoirs at Mudginberri, Point Stuart, Menaling and Berrimah will supply the bulk of materials. The average daily input is given as:

30.6 tonnes fat and bones;
12.18 tonnes gut material;
3.26 tonnes coagulated blood;
2.0 tonnes prawn waste

plus 3.0 tonnes per day of feathers and chicken wastes for 3 days per week, adding to a daily average of 50 tonnes.

These figures represent peak input and are relevant for dry season operations. Wet season operations are expected to be considerably reduced (to 15 tonnes per day for November-April).

It should be noted that chicken wastes are to be processed separately.

2.2 Handling of Raw Materials

Raw materials are to be road-transported to the site with 7 inward trips per day (using dog trailers as required) at peak periods. The trucks will have epoxy-coated metal bodies.

Unloading will be into a steel bunker located within the plant building from which offal is conveyed to a prebreaker by a screw conveyor. The prebreaker serves to mash the offal to a reduced, regular size (25 mm square). From the prebreaker, the 'sized' material will accumulate in an 'over-cooker bin' until a 'charge' weight is reached (3,000 kg). Four cookers are to be installed, one of which will be utilised as a dryer, i.e. for blood and feather processing.

Degradation of the offal has two main manifestations. From the proponent's viewpoint, the most important is the increased production of free fatty acids which reduces the value of the resultant tallow. The second manifestation is the increased odour production (mainly mercaptans).

Degradation can be retarded by either refrigeration or spraying with mineral acid. Refrigeration controls both odour and fatty acid production while mineral acid treatment primarily inhibits build-up of fatty acids. The proponent proposes to treat the offal as required with commercial grade (35%) hydrochloric acid at a rate of '1.5 to 3 lbs/tonne'.

Clean-up operations from this phase of the operation concern the trucks and unloading area, no provision being made for en-route spillage or accidents. Truck cleaning will consist of sweeping (sweepings into the holding bunker) followed by spraying with water. Almost no information has been provided by the proponent on general sanitation and cleaning procedures to be employed within the plant area.

Blood is to be pumped to bulk storage tanks, with sodium metabisulphite added to retard deterioration. It is then to be fed through a continuous coagulator to reduce the bulk, and the solid component fed to the cookers for drying.

2.3 Cooking Process

Each cooker is a horizontal jacketed steel cylinder, equipped with a reversible agitator mechanism. Steam is supplied to the outer jacket, reaching a maximum of 121° C during the second, or high pressure, phase of the operation.

The cooking cycle, a total of two hours, starts with a 'charge' (3,000 kg) of sized material being released into the cooker from the over-cooker bin. At this stage, the exhaust vents are open and heating commenced. Water vapour and a small amount of gaseous product are the main effluent. Once the majority of the water vapour has been drawn off (average 40% by weight of the charge), the exhaust vent is closed and pressure built up and maintained for 20 minutes or so to complete the cooking process and sterilise the material. The steam is to be generated in a 'normal fire tube boiler'.

Within the cooking vessel, the materials are agitated (by a reversible agitator driven by a 35 kw electric motor) through the cycle until the pressure is released. Upon completion of the cooking cycle, gases are vented to the exhaust system, the discharge door opened and melted fats allowed to flow out into a perforated percolator pan in front of the vessel. Strained fats are pumped to the tallow refining section.

After draining is completed, the agitator would be restarted in the reverse direction to empty the solids onto the percolator pan. These will be allowed a short period of drainage before being transferred to a continuous hydraulic press where grease content is further reduced. This resultant grease will

proceed to the tallow refining section, while solids would be conveyed to the hammer mill for further size reduction, and from there to the bagging plant.

Water requirements are given as 7,500 litres/day excluding steam generation and staff amenity requirements.

2.4 Exhaust Gases, Vapours and Liquid Effluent

Exhaust gases and vapours will pass from the exhaust manifold through a water trap (shell and tube condensor) to remove some soluble vapours and entrained droplets. The gas stream will then be scrubbed by bubbling through calcium hydroxide in a packed tower before venting to the atmosphere diluted with hot vapour from steam generation (this latter step is to involve the passage of residual fumes through the combustion chamber of the steam plant).

Water condensed from vapour in the water trap and containing some entrained fats will pass through a grease trap to remove these fats and some suspended solids. From there the water, at between 1,200-1,500 ppm BOD_5, will pass firstly to an anaerobic pond (retention time 21 days) then to an aerobic pond (retention time 90 days). The resultant liquor is predicted to have a BOD_5 of 20 ppm and suspended solids of 30 ppm, the W.H.O. standard.

Contaminated water will evolve from various sources within the plant apart from the actual cooking operation. These sources include blood coagulation, vehicle washing, site cleaning, tallow refining and staff amenities. With the exception of blood coagulation, effluent volumes from these sources have not been provided by the proponent.

The water budget for the proposed plant is somewhat of an unknown factor. The proponent has not satisfactorily

described this aspect and the various figures that are given lead to some confusion as to the quantities and destination of waste water.

Water usage is given as some 7,500 litres/day with efficient management but does not include water required for steam generation and staff amenities.

The moisture content of offal is some 45-50% (25 tonnes). This evolves as steam during the rendering process and is condensed to form waste water. Blood coagulation adds a further 2 tonnes (2,000 litres) of waste water giving a total of 27 tonnes of water/day for dry season operation. The information provided by the proponent indicates that some 4-5,000 litres/day are expected to enter the effluent ponds, even though some 13,000 litres/day is quoted as passing through the save-all to remove entrained solids and fatty material. On these figures a considerable quantity (some 22 tonnes) of waste water is unaccounted for. It can only be assumed that this will be re-used within the plant or vented to the atmosphere as steam.

No design criteria are provided for the effluent ponds although verbal communication from the Company indicates that initially two ponds will be installed. The anaerobic pond will have a depth of 5 metres and the aerobic pond 1-2 metres, in line with the accepted practice for this type of effluent treatment system. A further aerobic pond may be added later if warranted by experience with the two-pond system. The effluent will enter the anaerobic pond via a 75 mm pipe draining under gravity from the save-all overflow. Excess water from the final (aerobic) pond will be used for site irrigation.

2.5 The Product Ex-cooker

Following the exit of dissolved fats (covered previously), the greasy solids are dumped onto a perforated tray to allow further drainage and some cooling (having exited the cooker at approximately 110-120° C), before being screw-conveyed to the hydraulic press for further grease removal. Dissolved fats and grease from the press and the drainage area are refined into tallow through a series of centrifuges. Some water may be used here to aid 'polishing'; however, this is kept to a minimum as it reduces the quality of the final product.

From the press, the material is conveyed to the hammer mill for size reduction, and the material is cooled and bagged. It should have an approximate final analysis as follows:

moisture 7.5%;
grease 10.0%;
protein 50.0%.

All of these operations occur within the main plant building.

The bagged material, since it has been sterilised, can be stored for extended periods (if kept dry) without deterioration, and is used as a protein concentrate to feed pigs, chickens and ducks or for fertiliser production. Tallow is used for soap and lubricant manufacture, and as a chemical feedstock for the manufacture of fatty derivatives for shampoos, detergents, etc.

2.6 Projected Economic Effects and Ancillary Industries

Latest indications are that the plant expects to produce 2,500 tonnes of tallow and 4,000 tonnes of 50% meat meal per year with a sale value of $1.5 million, although this amount varies from 4,700 tonnes total to 9-10,000 tonnes within the correspondence from the proponent.

Some discrepancy appears with regard to expected job creation numbers which range from 14 to 30. There is expected to be a downturn in employment in the off-season (November-April).

The transport of export materials is expected to require $550,000 expenditure on cartage to wharf, wharf costs and other freight charges. Local transport cost is estimated at $235,000.

It is proposed that excess steam production be used in a 44-gallon drum cleaning operation. Some drums would be used within the plant for tallow storage and the drum reconditioning service will be offered to local oil companies.

A major ancillary industry proposed is a hide treatment works. Although this is not a true tannery, the operation will consist of collection, weighing, grading and processing of skins to present them in a more acceptable form for sale to a tannery. Hides are currently prepared and sold by individual abattoirs resulting in wide variation in quality and presentation, so that N.T. hides are generally regarded as of poor or variable quality. It is hoped that the proposed operation (which mainly involves efficient fleshing to produce further renderable material and aid the penetration of preservatives) will lead to stabilisation of quality with development of direct outlets in Asia.

No further information on this proposal has been received from the proponents.

Negotiations are being carried out to attract a stock feed manufacturer to locate adjacent to the proposed plant. This would allow the sharing of common facilities (steam raising plant, weighbridge, clerical services) and eliminate duplication of tallow and meal storage facilities.

Degreasing equipment (continuous hydraulic presses) used on meat meal production would be capable of processing any locally grown oil seeds to produce stock feed meals and a marketable oil fraction.

0 ENVIRONMENTAL ASPECTS OF CONCERN

The aspect of most concern associated with the establishment and operation of the proposed rendering plant at Hudson Creek is the potential for offensive odour nuisance affecting nearby Palmerston and surrounding areas. Odour can be generated from a number of sources in the rendering operations but the most significant of these concern the cooker vapours and, to a lesser extent, cooker discharge vapours, blood drying and the effluent treatment ponds. The gases concerned are organic sulphur compounds related to hydrogen sulphide, known as mercaptans. These are among the most malodorous compounds known, and can be detected at very small concentrations.

	Odour Threshold (parts per million)	(concentration in air at which odour is detectable)
Allyl mercaptan	0.017	
Benzyl mercaptan	0.037	
Crotyl mercaptan	0.008	
Ethyl mercaptan	0.0063	
Methyl mercaptan	5.5	[Source: Dague, R.R. J. Water Poll. Control Fed., 1972, 44(4),583-594]
Hydrogen Sulphide	0.73	
Sulphur Dioxide	3.5	

Because these concentrations are so slight for the odour to be noticeable, even a small emission of one of the compounds requires considerable dilution in air to take it below the threshold of detection. This is the cause for concern in relation to the Palmerston subdivision: the 3 km buffer about the proposed Hudson Creek site and the cleaning process proposed for the development

together may not be enough to ensure that emissions will always be diluted below the threshold by the time they reach the residential area.

It is difficult to predict accurately whether there will be an odour at a particular place and time, and the frequency with which the odour is likely to occur. This will depend on operating procedures at the plant and also be influenced by the nature of raw materials (particularly as fish waste processing, with another range of malodourous compounds, is also to be included), the condition in which the raw materials arrive at the plant and the particular meteorological conditions existing in the area at the time.

This point must be borne in mind when considering the present proposal by Northern Rendering Pty Ltd and to what extent Palmerston may be affected by offensive odour problems. The essential question is whether the odour control measures proposed are adequate to prevent nuisance to adjacent areas, and Palmerston in particular, or whether more stringent measures are necessary or, alternatively, whether the proposal should be located at another more suitable site.

The following sections attempt to identify the principal problem areas within the proposed operation (including aspects other than odour) which need to be taken into account in any decision on the proposal, and discuss how these problem areas should be controlled.

3.1 Handling of Raw Materials

Problems encountered here concern the distances involved in transportation of the offal and the type of vehicle to be used. Although Mudginberri, Pt Stuart and Angliss abattoirs have offal chillers (the fourth major supplier, Menaling, is not currently operating), the distances involved indicate that offal from Mudginberri (some 252 km from Berrimah) will be a

minimum of 3-4 hours old and probably more when it reaches the proposed site at Hudson Creek, given perfect management procedures at point of origin. If a cooker is not immediately available to receive this material, an odour problem will occur at the storage bin/overcooker bin area, but this will largely be contained within the plant building. The proponent intends to spray this material with hydrochloric acid. This primarily acts to suppress free fatty acid generation (which decreases final product quality) although some odour control may be achieved.

Odour emanating during transport should ideally be controlled by the use of refrigerated vehicles; however, a suitable alternative to this expensive process is the use of covered rather than open trucks. A vehicle breakdown or accident in central Darwin (the proponent will take offal from local Darwin butcher shops) will result in a considerable noxious odour problem if open vehicles are used. The proponent has verbally indicated that covered trucks will be used.

The emptied vehicles are to be swept (solid material to enter the holding bunker) and then washed. It is important that the wash-down water be directed to the effluent ponds. If the trucks are not properly cleaned they will retain an odour problem and flies will be attracted to any solid material that remains in the wash-down area.

3.2 Cooking Process

This represents the major area of concern. Noxious gases (non-condensible gases) arise from two main sources - the exhaust from the rendering vessels and from the rendered material when it is expelled from the cookers onto the percolator pans.

Rendering vessel exhaust contains vapour entrained fats and non-condensible gases. The fats would be largely extracted when the exhaust passes through the condenser, and are subject to the controls on the water effluent system discussed below. Non-condensible gases, which include the most noxious pollutants of the process, detectable in concentrations as low as .006 parts per million, are proposed to be treated by passage through a calcium hydroxide bath and from there to the boiler combustion chamber to be vented through to the atmosphere.

Advice from the NSW State Pollution Control Commission, Metro Meats of SA, the Los Angeles County Air Pollution Manual, SA Department of Environment and Planning, and various other sources, indicates that this system is considered to be unsatisfactory except in a rural environment, is selective and inefficient in controlling odour, and is open to poor management and accidental problems. This inadequacy is due largely to the lack of control of retention time and temperature in the boiler combustion chamber, the selectivity of the scrubber, and the need for continual monitoring of active constituent concentrations to maintain its efficiency. Further problems arise when the disposal of reacted scrubber concentrates is considered.

A recent independent assessment of the present proposal obtained by the Department of Lands from a consultant engineer states that the process described by the proponent "appears to be somewhat primitive". The consultant quotes the following comments from a study of odour problems in Great Britain [Department of the Environment, 1974. "Odours: Report of the Working Party on the Suppression of Odours from Offensive and Selected Other Trades." Part 1.]:

"147. A packed absorption column would often be the most suitable equipment for absorbing odours; in some cases a tray column or sequence of spray towers might be appropriate..."

"145...The oxidation [in a scrubber] is both slow and incomplete, i.e. it does not proceed all the way to carbon dioxide,

water, etc., but the products of partial liquid-phase oxidation are usually much less unpleasant than the original malodorants, e.g. mercaptans are oxidised to disulphides. However, this may not obtain in all cases and this is a point to be watched..." (consultant's emphasis).

The consultant continues - "This is not to say that the process proposed will not work. It does indicate, however, a reasonable doubt that the scrubbing would be insufficient to ensure freedom from emissions which might result in odours at Palmerston".

All of the evidence examined, suggests that the most suitable and necessary odour control measure in an urban, or near-urban, situation is to employ thermal oxidation, by use of an "afterburner". The action of the afterburner, following condensation of the vapour stream, is to oxidise the non-condensible (noxious) gases to basic compounds (e.g. sulphur dioxide, carbon dioxide, oxides of nitrogen, water), all of which are unlikely to cause a nuisance to Palmerston.

It is, however, worth noting that afterburners may also fail from time to time. This could occur during workforce strikes, and breakdowns resulting in incomplete oxidation of the malodorous compounds.

The type of afterburner installed is also important as some cheaper models are available which may not be entirely efficient. The requirement for an afterburner would add a significant capital cost to the plant (they range from $12,000-$60,000) and involve the use of 60 gallons/day of distillate (Company figure). The afterburner must be capable of maintaining the gases at 750° C for 0.3-0.5 seconds to ensure maximum odour control.

A number of advantages to the proponent may accrue from the use of afterburners, and may offset to a large extent the

capital costs of installation and the continuing fuel and maintenance costs. Much of the steam from the rendering vessels is non-odorous water which can be condensed before the vapour stream reaches the afterburner more cheaply than actually heating it again in the afterburner. The condenser, in turn, can provide hot water for the plant. The proponent has indicated that there is no large hot water requirement; however, there must surely be a possibly major cost advantage in having a supply of hot water for steam generation.

It is understood that the proponent has investigated the potential for supplying plant hot water to Angliss Meatworks and Berrimah Gaol.

3.3 Other Process Odour Sources

Within the process building there are several odour sources apart from cooker exhaust gases. These include the percolator pan area where the rendered material is discharged from the cooker to drain, storage bunker and overcooker bins, blood storage tanks and coagulator, conveyors and presses. These odours will be "fugitive" in the sense that they will be released into the process building rather than into the exhaust manifolds which take the gases during the actual cooking. No provision appears to have been made for these in the information available from the proponent. Any stale materials within the plant will increase this odour problem. Much of this odour can be eliminated by good housekeeping practices but the more serious sources associated with batch discharge and blood treatment should be vented through the odour control equipment. The building should be air-conditioned, or at least have an appropriate air circulation system, to enable catching of fugitive emissions by filtration or scrubbing at air outlets. Problems can occur with the stored product (meat meal) only when it becomes damp. As the proposed meal store is to be an enclosed area within the process building this is unlikely to be of concern.

3.4 Effluent Treatment Ponds

It is proposed to use two ponds in series for the treatment of effluent water. This is an alternative option when sewer line disposal - the best method - is unavailable. The first receiver, an anaerobic pond, is planned to have a retention time of 21 days after which water will pass to the secondary aerobic pond. Before entering the anaerobic pond, waste effluent is to pass through a save-all trap to remove solids and fats.

An anaerobic pond stabilises organic wastes by the action of anaerobic, methane-forming bacteria. The ponds are generally most efficient with a low surface-to-volume ratio as heat can be maintained and oxygen uptake minimised. An important factor in restricting odour is the formation of a scum crust on the pond surface. Good management is essential to ensure that the activity of the bacteria is maintained. The gases produced during the process, particularly hydrogen sulphide, can create considerable odour nuisance to surrounding areas.

Final treatment is to occur in an aerobic pond and excess water from this pond is to be used for site watering.

It is difficult to satisfactorily assess the proposed effluent treatment system as very little detail has been provided on this aspect by the proponent. It is essential that the pond system be designed to cope with the largest expected effluent load at any one time. Stormwater should be diverted around the ponds and approximately 0.5 m of freeboard above top-water level be provided to avoid overflowing. No waste water should be allowed to discharge into any adjacent waterway unless this has been approved by the Water Division. Design of the ponds also requires approval by Water Division and regular monitoring of the pond system is essential to ensure satisfactory operation.

The design and management of the ponds must also avoid potential mosquito breeding problems. Advice from the Department of Health indicates that the ponds should have steep sides, be large enough for a wind-created ripple to generate and be weed-free to minimise mosquito breeding conditions.

ALTERNATIVE SITES

The proponent first approached the N.T. Development Corporation in June 1980 for suitable land near Darwin for a rendering operation. NTDC advised that the only suitable land available was at the site occupied by Angliss Meatworks at Berrimah. A subsequent approach to Angliss by the proponent was not successful.

The next approach for land by the proponent occurred in April 1982 in correspondence to NTDC and the Department of Lands. From subsequent consultations the proponent was given to understand that a site would be made available in the Hudson Creek noxious industry zone.

In January 1983 the proponent was advised that the Hudson Creek site was considered to be unsuitable because of its proximity to Palmerston. Five alternative sites were suggested. These sites were inspected on 16 January 1983 and considered unsuitable by the proponent.

While acknowledging that four of the alternative sites would not be suitable to meet the interests of the proponent, the Anzac Parade site in the Humpty Doo area warrants further consideration. The proponent's main objection to this site appears to relate to the additional distance involved for travel to the plant by employees, necessitating a travel subsidy payment or provision of staff accommodation in order to secure and retain a stable workforce.

A comparison of the Hudson Creek and Anzac Parade sites follows.

4.1 Hudson Creek (Map A)

Located in a noxious industry zone, this 4.98 hectare site is immediately north of the area currently occupied by Northbrick Pty Ltd, and has power and water available, but is not sewered.

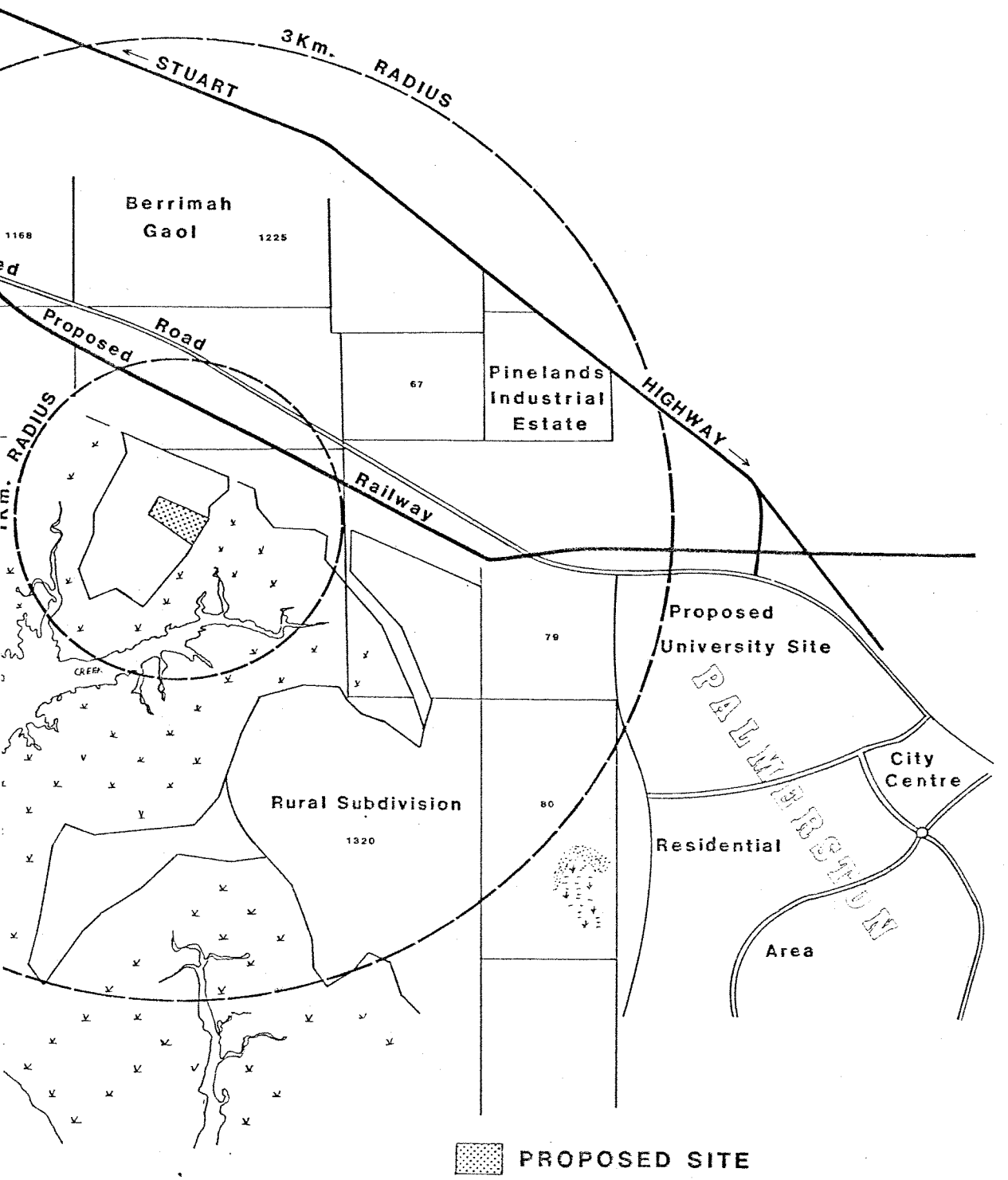
The site is approximately 16 km from central Darwin with road access via the Stuart Highway, turning off immediately east of Angliss Meatworks. Prevailing winds for the area are north-westerly during the wet season (November-April) and south-easterly in the dry (May-September).

The following table relates the location of the site to some current and proposed development in the surrounding area. (Source: Planning Map DWN 1979).

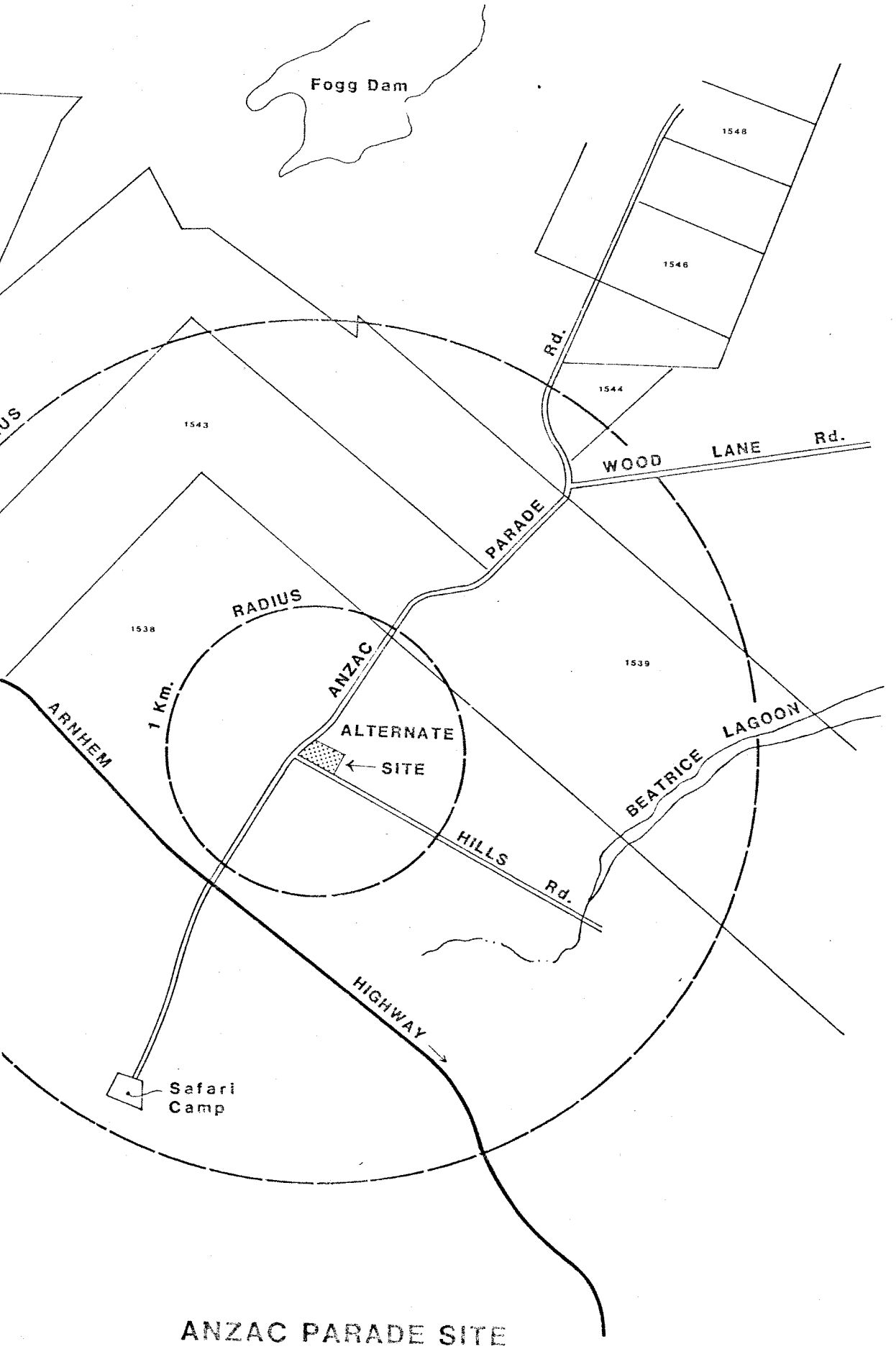
Development	Current Status	Distance (km) and Direction
Palmerston - city centre	Current	4.7 ESE
- closest point (rural subdivision)	Proposed	1.2 ESE
University of the N.T. (closest point)	Proposed	2.7 E
Berrimah Railway Terminus	Proposed	0.8 NE
RAAF Communications Base (closest point)	Current	1.5 NE
Berrimah Research Farm (main buildings)	Current	2.6 NNW

4.2 Anzac Parade (Map B)

This site is located on the corner of Anzac Parade and Hills Road, 4 km north-west of Beatrice Hill in the district of



HUDSON'S CREEK SITE



ANZAC PARADE SITE

Humpty Doo. Located approximately 70 km from central Darwin, this site has power supply but is neither sewered nor watered. Good quality bore water has been obtained locally at a depth of 20 metres or less.

The Department of Primary Production has agreed to release a suitable area which was formerly used for part of the pasture improvement programme at the Beatrice Hill Research Station. A total area of 10 hectares is available. This would allow for the 4.98 hectares required for the rendering plant with the remainder available for other related industries which may wish to locate close to the rendering facility in the future.

The existing population in the immediate area is relatively sparse compared to the Hudson Creek site. The prevailing winds are similar for both sites.

The following table indicates the relationship of the Anzac Parade site to surrounding developments.

Facility/Development	Distance and Direction from Site (km)
Arnhem Highway	1.0 SSW
Department of Defence Aerial Farm (closest point)	0.2 W
Fogg Dam	5.6 N
Beatrice Lagoon (nearest point)	2.0 E
Beatrice Hill Research facility	4.0 SE
Peter Thompson's Safari Camp	2.7 SSW

4.3 Comparison of the Alternative Sites

An important consideration for the proponent, in terms of site location, is the distances involved in the transport of raw materials and finished product (most is to be sold by export). Comparison of these distances reveals that there is no significant difference between the sites.

Raw Material Site	Distance from Hudson Creek site (km)	Distance from Anzac Parade site (km)	Difference (km)
Mudginberri	252	189	- 63
Point Stuart	162	99	- 63
Menaling (Batchelor)	87	22	- 5
Angliss (Berrimah)	3	57	+ 54
Darwin Butcher Shops	16	70	+ 54
			- 23 kms

A twice daily collection trip from each source of raw material to the Anzac Parade site would result in a saving of 46 km travelled/day. This would offset the increased distance freight carriers would have to travel three times/week to Port Darwin with export product.

The main advantage of the Anzac Parade site is that being in a relatively remote area, with no large concentrations of residents in the immediate area, the potential for odour nuisance from the rendering plant is reduced and less stringent odour control measures would be required than at Hudson Creek. The safeguards required in relation to handling of raw materials, plant housekeeping, waste water collection, treatment and disposal would be the same for both sites. However, the requirement for an afterburner facility to treat cooker exhaust gases is not as critical for the Anzac Parade site and the treatment system proposed by the Company should be adequate to contain odour problems. By comparison, the Hudson Creek site is close to Palmerston, and in particular, the proposed rural subdivision with provision for 600-1,200 residents (1.2 km distant), the proposed University and railway terminus, Berrimah Gaol, as well as the Pinelands light industry estate which includes a number of residences. Under these circumstances, the risk of potential odour problems from the rendering plant is such that installation of an afterburner is considered to be an essential requirement.

The capital and operating costs associated with an afterburner may be sufficient incentive for the proponent to reconsider the Anzac Parade site.

ADDITIONAL CONSIDERATIONS

During the course of this assessment, a number of issues which may affect the proposal's impact in the mid- to long-term were highlighted. These issues were inadequately addressed by the proponent who is, understandably, keen to commence operations after two and a half years of negotiation. Nonetheless, they have a strong bearing on the overall potential impact of the proposal and as such must be duly considered.

5.1 Associated Industries

In the interests of efficiency and economics, the proponent has arranged, or is trying to arrange, for various ancillary processes to locate adjacent to, or on, the rendering plant site. These processes include hide processing, drum cleaning, stockfeed manufacture and a bulk salt store. Some of these aspects have been mentioned previously. There is also the possibility that a tannery operation is being considered as a future option by the proponent. A tannery generates a number of toxic wastes which require separate treatment facilities.

The fact that hide processing and drum cleaning will add to the liquid effluent budget of the proposal has largely escaped the attention of the proponent but, more importantly, the potential odour release, especially from green hide processing, could exaggerate the environmental problems arising from the rendering plant. The proponents must be able to guarantee that this will not occur, or hide processing will have to be the subject of separate assessment. Skin drying

can cause odours. It is not known if the skin drying areas are to be enclosed. The sheds should be designed for easy cleaning to avoid the build up of conditions for fly breeding.

It is relevant to note that hide accumulation has already commenced. This operation will ultimately be moved onto the same site as the rendering plant.

5.2 Offal Availability

The progress of the BTB eradication campaign could alter the availability of offal to the proponent. It is expected that the required control of buffalo movement will lead to large scale culling of unfenced, mobile herds, eventually leading to a far smaller, but properly managed buffalo population. This may reduce the amount of meat offal generated. However, the existence of the plant, especially if it is located at Hudson Creek, is likely to encourage increased utilisation by the fishing industry from the point of view of trash fish and prawn waste processing.

This trend, away from meat towards marine produce processing, must be considered very seriously. The advice from interstate Government agencies familiar with odour producing processes is that the only process more prone to odour production than a meat rendering plant is a fish rendering plant. The necessity for a high standard of odour control procedures at the plant if it is located at Hudson Creek is therefore reinforced.

5.3 Management

Many potential problems arising from the proposal can be minimised by good management practices. Responsible and effective management is therefore an important factor in determining the degree of impact from the proposed rendering operation.

The effectiveness of a calcium hydroxide scrubber decreases with time, as the reactive concentrate becomes saturated. This concentrate must, therefore, be continually monitored, and recharged when required, a procedure which could easily be overlooked.

General plant cleanliness is critical in effective odour abatement. Regular, effective wash-downs including all plant equipment, storage bins and floor areas, with the effluent to pass through the grease trap to the treatment ponds is essential. Neglect in this area would result in the overall control procedures being less than fully effective. Effluent water from drum cleaning operations must also proceed to the treatment ponds, and any oil sludge material disposed of properly.

After a period of time, the anaerobic treatment pond will accumulate a decomposed sludge to the extent that it will require draining and cleaning to remain effective. The disposal of this highly odorous sludge is not considered in the current proposal. The sludge may be dried for use as fertiliser or buried under controlled land-fill conditions. Water draining from the drying sludge must not be allowed to contaminate groundwater or waterways and should be directed to the anaerobic pond.

The formation of odorous, non-condensible gases is exacerbated by overcooking and this would heighten the possibility of (the proposed) scrubber overload. The installation of an effective afterburner should ensure that any such problems with the actual cooking process does not result in increased odour manifestation off-site.

COMMENTS FROM OTHER N.T. AGENCIES

The comments of Departments of Health (Environmental Health Division) and Transport and Works (Water Division) are relevant to the assessment of the proposal. Copies of the comments previously provided to the Department of Lands by these agencies are included as attachments to this report.

PALMERSTON DEVELOPMENT AUTHORITY (PDA)

The PDA has expressed considerable concern about the possible location of the rendering plant at the Hudson Creek site because of the potential odour nuisance this may cause to the residents of Palmerston. In addition to this general concern, advice from the PDA indicates that the future of the proposed rural subdivision at Palmerston (currently in the planning stage) will be severely jeopardised if the rendering plant is located at Hudson Creek. The proposed rural subdivision, which is planned to cater for 600-1,200 people, is at its nearest point 1.2 km from the site being considered for the rendering operation. With odours from rendering plants known to have been detected from distances in the order of 10 or more kilometres downwind, the concern of the PDA appears justified, regardless of the odour control measures employed in the proposed plant if located at Hudson Creek.

CONCLUSIONS

Three main conclusions essentially arise from the information and discussion presented in the preceeding sections.

(a) On the available evidence and opinions from all sources consulted, and from the Conservation Commission's examination of all aspects associated with the proposed rendering plant, it is obvious that the present proposal would represent an unacceptable risk of offensive odour nuisance to nearby Palmerston and to other major land users in the area, if allowed to locate at Hudson Creek.

(b) The present proposal should be encouraged to proceed at the alternative site at Anzac Parade, as this site is considered less sensitive to the creation of potential odour nuisance because it is relatively remote in terms of surrounding population and existing land use.

(c) The proponent is unlikely to favour the alternative site option on economic grounds and will understandably press for the original site. There is also the suggestion that the proponent may consider abandoning the proposal if the Hudson Creek site is not made available. In this event, the only circumstances under which the proposal could be considered at Hudson Creek is the mandatory installation of a condenser/afterburner odour control system and strict adherence to conditions relating to overall plant sanitation, and design and management of the effluent treatment ponds.

It must be recognised that an afterburner is not a total solution. Breakdowns can occur and there would also be a need to shut down the afterburner from time to time for maintenance and repair purposes. Process operations would have to be specifically designed to cope with shutdowns of this nature without immediately giving rise to an odour problem.

Although, on balance, the installation of an afterburner is considered to be the measure most likely to succeed in preventing process odour from reaching Palmerston and other surrounding developments, some element of doubt remains when the proposal is considered in its entirety. Significant odour production will also

occur from other point sources associated with the operation (e.g. effluent ponds, blood processing, handling of raw materials) and the extent to which this is likely to generate off-site problems will depend on the management practices adopted. However, it is considered that these subsidiary odour problems can be contained, given suitable management, and stringent attention to appropriate and established pollution engineering procedures for design and operation of these various elements of the proposal. If this cannot be guaranteed, the proposal should not be allowed to proceed at Hudson Creek under any circumstances in order to avoid risk of odour to the residents of Palmerston.

Additional odour problems arising from the proposed ancillary hide processing operation and particularly from marine waste processing could be significant in relation to Palmerston, as would a possible future tannery operation. Predicting the potential impact from such sources is difficult, due to the absence of substantive information from the proponent on these aspects.

ATTACHMENT

NORTHERN TERRITORY OF AUSTRALIA

DEPARTMENT OF TRANSPORT & WORKS

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Attention: Sri Ramanathan

PROPOSED RENDERING PLANT

I refer to your letter of 24 January, 1983.

The information supplied by Austec Australia Pty Ltd has been studied in the light of the concerns previously expressed and we find that many of the aspects have now been satisfactorily dealt with.

However, the Developer has not fully responded to the matters relating to effluent disposal. A number of figures are supplied and statements made concerning the technical track record of the Company, but no details are provided as to the proposed design and management of the disposal system itself.

It is pointed out that in the Darwin climate it would be almost impossible to have a fully self-contained pond system; some disposal of excess will be required. This appears to be recognised in the Company's submission, which implies that excess water will be disposed of during the wet season, but gives no information on the manner of disposal.

It is stressed that any proposal to dispose of excess water from the ponds off the block (at either site) would have to be subjected to close scrutiny by this Division; on the basis of currently available information it is certainly not possible to approve such a practice.

Brief examination of the data provided does suggest, however, that by proper management it would be feasible to dispose of all excess pond water by dry season irrigation within the Hudson Creek block. In order to do this, it would be necessary to provide significant pond freeboard to store wet season rainfall.

Another matter of concern in respect mainly of the Hudson Creek site, is that of groundwater pollution. Unfortunately this matter does not appear to have been taken up in the letter from your Department to the Developer.

Available information suggests that the Hudson Creek site may be underlain by Coomalie Dolomite, which, if located immediately below the treatment ponds, could provide an avenue for groundwater pollution. Such pollution could effect other local consumers, or give rise to contaminated spring flows 'downstream'. While this is unlikely to be a problem, it is essential that the strata immediately below the pond flows be investigated. If there is found to be a problem, some form of sealing of the ponds may be required.

In conclusion, from the available information we cannot identify any factors which indicate that either of the proposed sites is unsuitable. However, it is recommended that:

a) Further information should be provided by the Developer with respect to his proposed method of effluent disposal either on or off the site, and that no water from the ponds or other wastewater is to be discharged from the site without prior approval of the Water Division.

b) In the case of the Hudson Creek site, the design of the treatment ponds is to be subject to the approval of the Water Division. Information to be submitted with the pond design shall include an appraisal by a qualified person of the nature and permeability of the strata within five metres of the pond's floors.

N A WATSON

Assistant Director
Resource Investigations Branch
WATER DIVISION

27 January 1983

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IN REPLY QUOTE

82//1459

10 February 1983

Secretary
Department of Lands
GPO Box 1680
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ATTENTION: MR SRI RAMANATHAN

PROPOSED RENDERING PLANT. YOUR 82/585 OF 24 JANUARY REFERS.

The supplementary information supplied by Austec Australia Pty Ltd does not remove concern for potential odour problems. Further enquiries have revealed that some States have legislation which requires processors to ensure that no odour is detectable outside the site boundary. It is recommended that these conditions be included in any agreement with the Company. To satisfy this condition all vapours will have to pass through condensors and then through afterburners operating at 700° C with a retention time of at least half a second. It is unlikely that the proposed CaOH scrubbing tower could meet such a stringent requirement, especially as the CaOH became saturated.

Even if the Company agrees to the above conditions there remains the possibility of faults (mechanical or human) which could lead to the escape of extremely obnoxious odours. If the development proceeds in the Hudson Creek area there would be a considerable impact from such potential mishaps affecting the Palmerston Development. From this aspect the Anzac Parade site is obviously more suitable.

The public is becoming increasingly sensitive to environmental disturbances from odours and it is believed that maximum effort should be made to minimise the chance of any further problem.

The other matters raised in Mr Prince's letter of 15 January would still be applicable at the Anzac Parade site.

John V. Quinn
Assistant Secretary-Environmental Health
for SECRETARY FOR HEALTH