PROPOSED LIQUEFIED PETROLEUM GAS (LPG) EXTRACTION PLANT

WESFARMERS KLEENHEAT GAS PTY LTD

Report and Recommendations
by the
Environmental Protection Authority

Department of Conservation and Environment
Perth, Western Australia

Bulletin 257 April 1986

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PREAMBLE

This Assessment Report comprises two parts. The first assesses the environmental impact of the proposed LPG extraction plant itself.

The second part considers the general issue of the management of environmental impact in the Kwinna Industrial Area. This part is intended to provide guidelines and objectives for the reduction of the environmental impact of existing industry, and to indicate how environmental regulation should adjust with the extra industries proposed for the area.

CONTENTS

CONTENTS

SUMMARY AND RECOMMENDATIONS

This Assessment Report comprises two parts. The first assesses the proposed LPG extraction plant itself. The second part proposes an overall strategy to ensure that industrial development (as a whole) in the Kwinana Industrial Area is environmentally acceptable. It provides a means whereby the cumulative environmental impact of industrial development can receive appropriate consideration.

PART A

The Environmental Protection Authority has concluded an assessment of the Liquefied Petroleum Gas (LPG) Plant Public Environmental Report.

The Authority believes that the review documents for this project (ie the Public Environmental Report, the Det Norske Veritas Preliminary Risk Analysis and the proponent's response to the issues raised by the submissions) to be comprehensive, and commends the proponent.

The Public Environmental Report identified four regions within which the proposal could be located within Western Australia along the gas pipeline route from Burrup Peninsula to Wagerup. Kwinana area was the proponent's preferred region. Within Kwinana, five alternative sites were investigated. The document concluded that the Broken Hill Proprietary/ Australian Iron and Steel land, located south-east of the decommissioned blast furnace as the preferred site for the project.

The Authority has reviewed the proponent's site selection process and has found this process to be adequate and acceptable on the regional and local levels.

The major issue arising from this proposal, ie extraction, storage and exportation of LPG, concerns risks and hazards. The major hazard identified for the plant relates primarily to fire or explosion. The proponent has made a comprehensive set of commitments of safeguards which would minimise risk and hazards. However, even with those safeguards, residual risks from the plant remain. This is due to the fact that there are limitations in technology and accidental failures of material and components will occur, however infrequently. In addition, human error is possible. However these risks have been recognized and included in project planning. As well contingencies for such circumstances have been made.

There has been an extensive assessment of risks of the proposed development (taking into consideration the proposed safeguards) by Det Norske Veritas. The Det Norske Veritas report (Volume 2, Public Environmental Report) has estimated the residual individual risk levels which would be experienced at distances from the proposed LPG extraction plant. These levels show that the proposed LPG plant would generate an individual risk level of less than 1 in a million per year for residential areas. The Environmental Authority believes that the extra risk is so small as to be acceptable.

The proposed plant would generate a number of waste products which would require treatment and/or disposal.

The Authority believes that the management commitments, given by the proponent, on the disposal of wastes, are appropriate and if carried out in the proper manner, would not have a significant impact on the proposed plant site, or the environment of the surrounding area.

Finally, the proposal raises occupational health, amenity and social impact issues. The Authority has reviewed these matters appropriate to its responsibilities and believes that these issues can be managed. It has directed the proponent to undertake appropriate measures.

In conclusion, the Authority believes that the proposed LPG plant proposal is acceptable on environmental grounds, subject to the Authority's recommendation in this Assessment Report and the proponent's commitments made in the Public Environmental Report and those additionally given to the Environmental Protection Authority. A summary of the proponent's commitments upon which the Authority has based its assessment of the proposal and upon which the environmental acceptability of the proposal is dependent is reproduced as Appendix 5 of this Assessment Report.

RECOMMENDATION 1

The Environmental Protection Authority recommends that a condition of approval should be the preparation in stages of a comprehensive and integrated hazard and risk management strategy, to the Authority's satisfaction.

This should consist of the following: the results of which should be forwarded to the Department of Conservation and Environment:

- a HAZOP study to be completed and submitted before construction commences;

- a HAZARD ANALYSIS UPDATE (including FIRE SAFETY STUDY and STUDY OF EMERGENCY PROCEDURES) to be submitted before plant commissioning; and

- an ANNUAL AUDITING of risk and hazards to be submitted on an annual basis.

PART B

The second part of the Assessment Report sets an environmental objective for the Kwinana Industrial Area as follows:

> to ensure that the environmental impact of industry is not so great that the industrial area becomes unsuitable for industrial use, and that industry is so controlled that it does not have excessive impacts on the environment within the industrial area itself (in terms of its beneficial use), nor regular or excessive impacts on people outside the industrial area.

A strategy is stated which is designed to guide management of environmental impact of industry in the Kwinana Industrial Area, such that the beneficial uses of the area and the surrounding region are maintained.

The following recommendation is made:

> RECOMMENDATION 2
>
> The Environmental Protection Authority recommends that, in order to achieve the environmental objective given in this Assessment Report, a regional plan should be developed. This plan should encompass and define the Kwinana Industrial Area, an appropriate buffer zone, and adjacent residential zones. Following the endorsement of the regional plan by Government, the local planning schemes of the relevant local authorities should be revised and zonings implemented in a manner consistent with the regional plan.
>
> The Authority considers that such a plan will be an essential mechanism by which the environmental objective can be attained.

1. INTRODUCTION

Wesfarmers Kleenheat Gas Pty Ltd (the proponent) proposes to establish a plant within the Kwinana Industrial area (see figure 1) to extract Liquefied Petroleum Gas (LPG) and condensates (heavy gases) from natural gas supplied to the State Energy Commission of WA from the North-West Shelf development.

LPG is extensively used in WA, making the State the highest non-industrial per capita consumer of this energy source in Australia. Present consumption is approximately 45 000 tonnes per annum, the bulk of which is currently produced at the BP refinery at Kwinana. Due to a number of factors, identified in the Public Environmental Report, the extraction of LPG from natural gas is now economically feasible in Western Australia.

The total cost of the project is $70-$80 million.

A Notice of Intent was received, by the Environmental Protection Authority, from the proponent in October 1985. The Authority recommended that a Public Environmental Report including a separate Preliminary Risk Analysis, should be prepared and issued guidelines to the proponent (see PER Appendix A). The Authority required an eight week review period for the Public Environmental Report, which began on 21 December 1985.

The Authority has received 28 submissions on this project, 22 from Government Agencies and 6 from private individuals. Matters relevant to the proponent, raised in these submissions, were forwarded to Wesfarmers for their comments. Other matters, which lay in the domain of State Government were sent to the Department of Resources Development. The proponent's response to the submissions is included as Appendix 1 of this Assessment Report. The Government response from the Department of Resources Development is included as Appendix 2 of this Assessment Report.

The Authority believes that the review documents for this project (ie the Public Environmental Report, the Det Norske Veritas preliminary Risk Analysis and the proponent's response to the issues raised by the submissions) to be comprehensive, and commends the proponent.

The Environmental Protection Authority has assessed the environmental aspects of the project from information provided in the Public Environmental Report, public and Government Agencies' submissions to the Authority, the proponents' and Government's response to comments made in the submissions and the Authority's own investigations.

Matters raised in submissions to the Authority are shown in Table 1 and fully analysed in Appendix 3 and may be summarised as follows:

- site selection and land use planning;
- risks and hazards (both from this project and cumulative);
- air pollution and odours;
- solid and liquid waste disposal;
- occupational health; and
- amenity and social impacts.

These issues are reviewed and discussed in Chapters 3 and 4 of this Assessment Report.

Table 1 - Summary of Submissions

	PUBLIC SUBMISSIONS						GOVERNMENT SUBMISSIONS																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	TOTAL
1 RISKS AND HAZARDS																													
. Emergency Disaster Plan						*										*								*		*			4
. Cumulative Risk Assessment		*					*							*			*							*					5
. Transportion and Loading	*	*	*		*		*	*					*	*	*									*		*			10
. Public Access to Beach																		*											1
. Auditing and Monitoring					*													*						*					3
. Storage Tanks	*	*	*		*									*	*									*			*		8
. Pipeline Safety					*						*											*							3
. Rockingham Road and MTT Bus Station			*													*	*												3
. Utilization and Alternative to Mason Road	*																*							*					3
2 SITE SELECTION AND LAND USE PLANNING																													
. Decentralisation		*		*	*																								3
. Zoning						*											*												2
. Site Selection		*	*		*			*																					4
3 AIR POLLUTION AND ODOURS																													
. Noxious Odours (ie mercaptans)								*			*												*						3
. Air Quality/Pollution				*	*																								2
. Sulphur Dioxide Pollution		*																											1
4 LIQUID AND SOLID WASTES																													
. Disposal of Solid Waste					*					*							*	*						*				*	6
. Fate of Liquid Waste					*																								1
. Recycling of Mercaptans											*			*										*					3
5 OCCUPATIONAL HEALTH																													
. Education and Training																								*					1
. Worker Safety					*																								1
. Noise Level Restrictions(input) in plant									*																				1
6 AMENITY AND SOCIAL IMPACT																													
. Acoustic Emission									*									*						*					3
. Traffic																*													1
. Buffer Zone					*												*												2
. Employment																				*					*			*	3
. Residents in Area																												*	1
7 OTHERS																													
. Natural Resources and the Environment					*																				*			*	3
. Adequacy of PER	*										*			*				*						*				*	6
. No comment							*			*					*				*		*		*						5

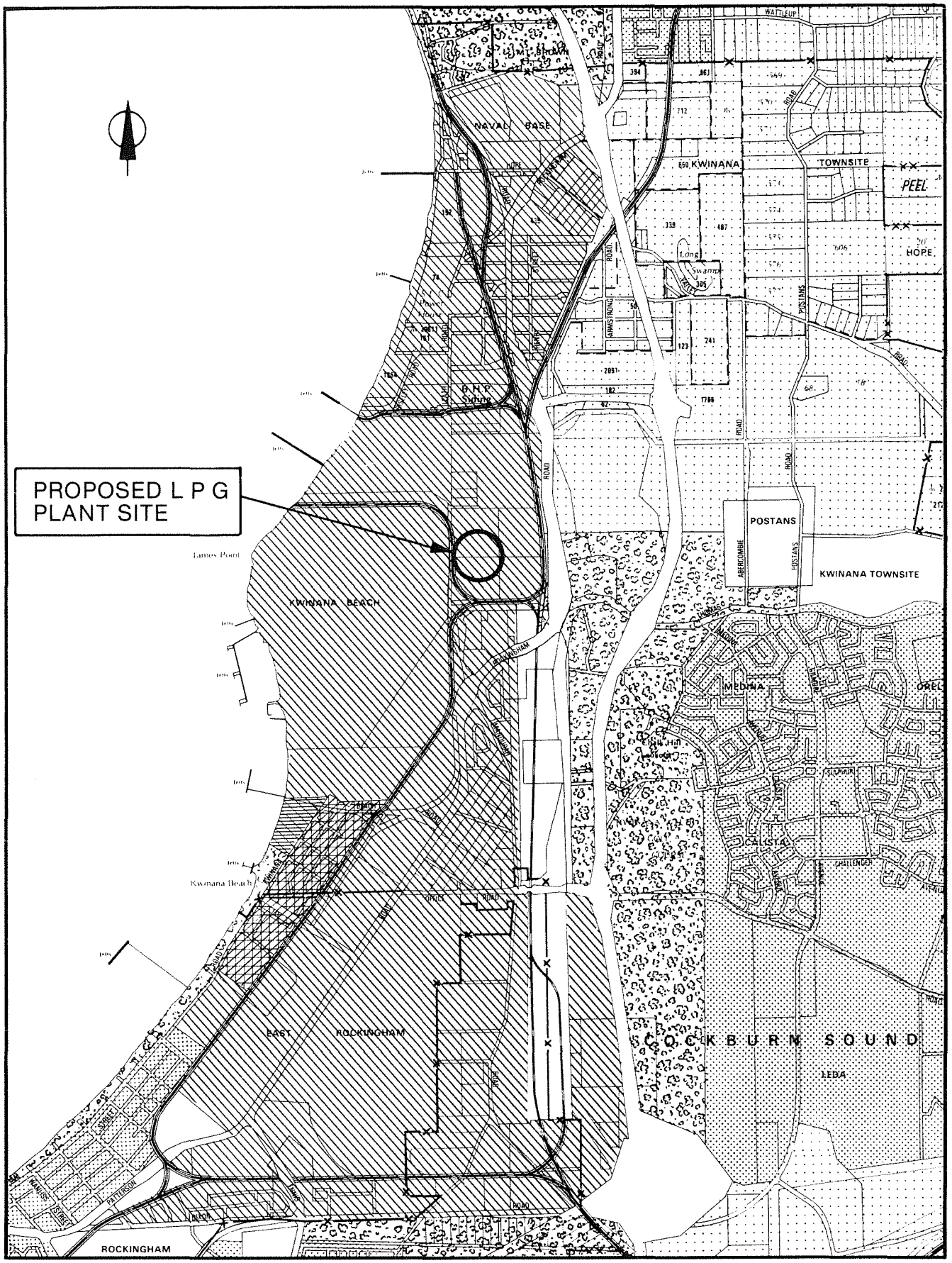


FIGURE 1 - SITE LOCATION AND GENERALISED ZONING

2. DESCRIPTION OF THE PROPOSAL, ALTERNATIVE SITES AND THE EXISTING ENVIRONMENT

2.1 THE PROPOSAL

The proposal calls for the treatment and processing of an average of 320 terajoules (10^{12} joules) per day of natural gas to produce approximately 150 000 tonnes of LPG and about 25 000 tonnes of condensate (or heavy gas/oil) per year. The Public Environmental Report states that after 1990, "the production of condensates would probably cease, as they will most likely be extracted from the feedstock natural gas by the North-West Shelf project partners" (PER p 18). After the extraction of the LPG and condensates, the feedstock natural gas would be returned to the State Energy Commission of WA pipelines and used for normal purposes.

LPG is currently manufactured in WA by the processing of crude oil into different hydrocarbon fractions at the BP Refinery at Kwinana. The Refinery currently produces approximately 40 000 tonnes per annum of LPG. It is the Authority's understanding that due to process modifications, the Refinery would now be producing a lower volume of LPG and a higher volume of petrol. The proposed LPG facility would be compensating for this shortfall in LPG production as well as supplying the growing future demand of WA. The Public Environmental Report states that the excess LPG, approximately 100,000 tonnes per year, would be stored on site in two refrigerated vessels (total storage capacity 35 000 tonnes) and exported to Japan, in ships, three or four times per year.

The proponent, in finalizing the environmental and feasibility studies, has made the following modifications to the proposal described in the Public Environmental Report:

- process modification which allows all the water, mercaptans and sulphur-bearing compounds stripped from the inlet natural gas to be returned to the gas leaving the plant; and
- full-height, reinforced, concrete walls or bunds for the refrigerated storage tanks.

2.1.1 LPG Extraction Process

The Public Environmental Report investigated four alternative LPG extraction processes and concluded that the turbo-expander process was preferred (see PER p 17).

The turbo-expander extraction process consists of five stages as shown in simplified form in figure 2. These stages are:

- dehydration (ie water removal);
- chilling or cooling of gas;
- expansion which removes heat from gas thus liquefing LPG and condensates;
- separation of lower and higher fractions; and
- compression of feed gas.

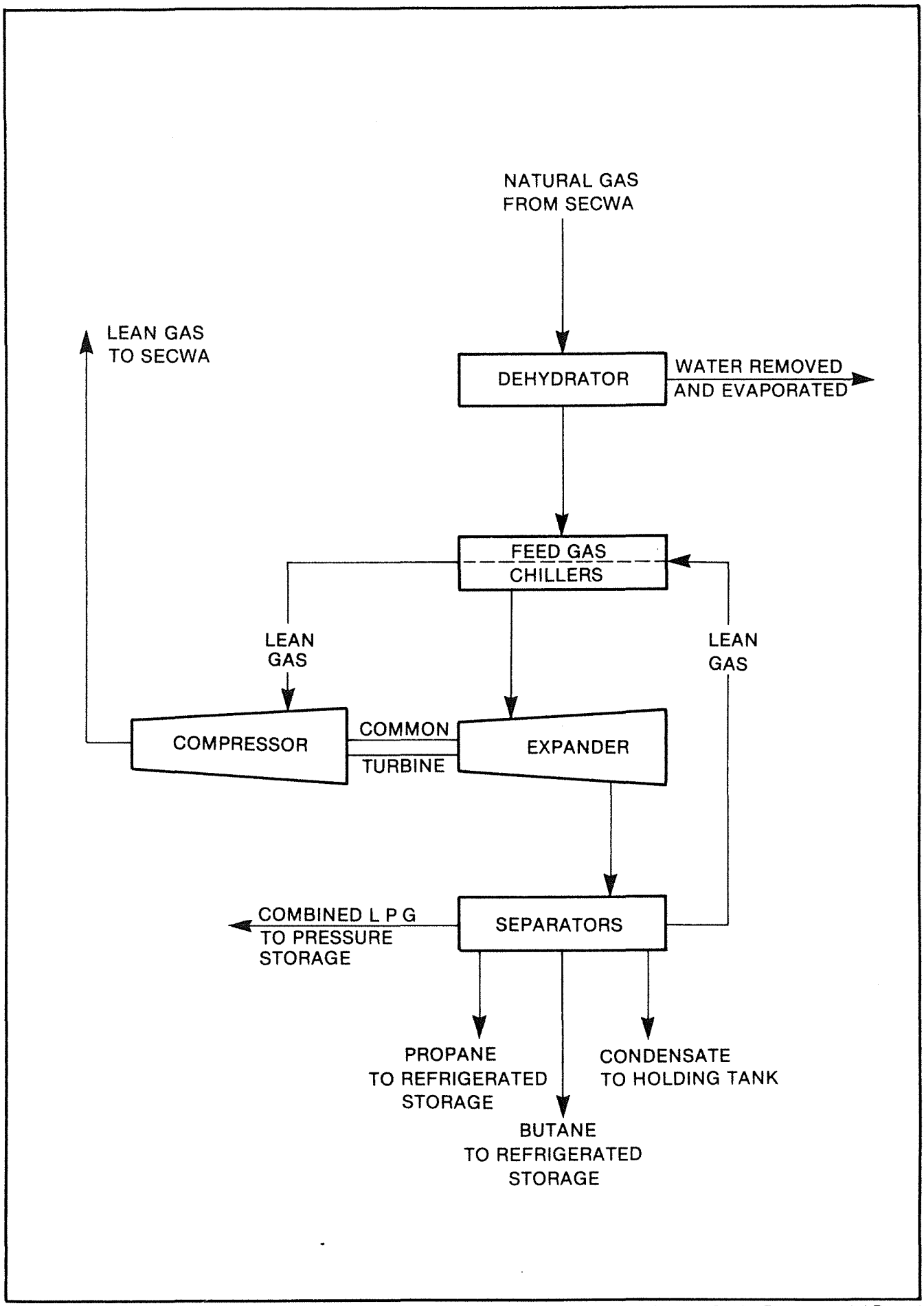


FIGURE 2 - PROCESS FLOW CHART

Source: Public Environmental Report

2.1.2 The Plant

The Plant layout would be as shown in figure 3. The Plant components are fully discussed in the Public Environmental Report (p 22-29). In summary, they would be as follows:

- LPG extraction plant consisting of the five stages as described above;
- two refrigerated storage tanks (export);
- two pressurized storage vessels (domestic);
- four load-out pumps and associated pipelines;
- a loading arm;
- a flare tower - located in a 100 metre radius zone as shown in figure 3;
- fire fighting system - a fire fighting system driven by three diesel-driven pumps is proposed;
- infrastructure - would include an administration office, a workshop, a stores area, a car park and amenities buildings;
- power supply - plant would be provided with two separate connections to the State power grid. In the event of power failure, backup power would be provided to key safety areas ie refrigerated storage units by diesel operated generators located on-site.
- process cooling which is currently under investigation. Two options are being reviewed. These consist of air cooling (which could generate noise) and recirculated water cooling.

The Public Environmental Report states that the plant would take over 20 months to construct and would require a construction workforce of approximately 200. When in operation, the plant would be operated continuously over three shifts. The plant would have a workforce of approximately 40 permanent employees.

2.2 ALTERNATIVE SITES

This section summarises the proponent's statements on site selection. The Environmental Protection Authority's assessment of the site selection process is discussed in Chapters 3 and 5.

The site review process discussed in the Public Environmental Report consists of the following methodology:

- compilation of relevant site selection criteria;
- identification of a number of possible alternative site regions and localities; and
- through an iterative process of elimination, the selection of the appropriate site.

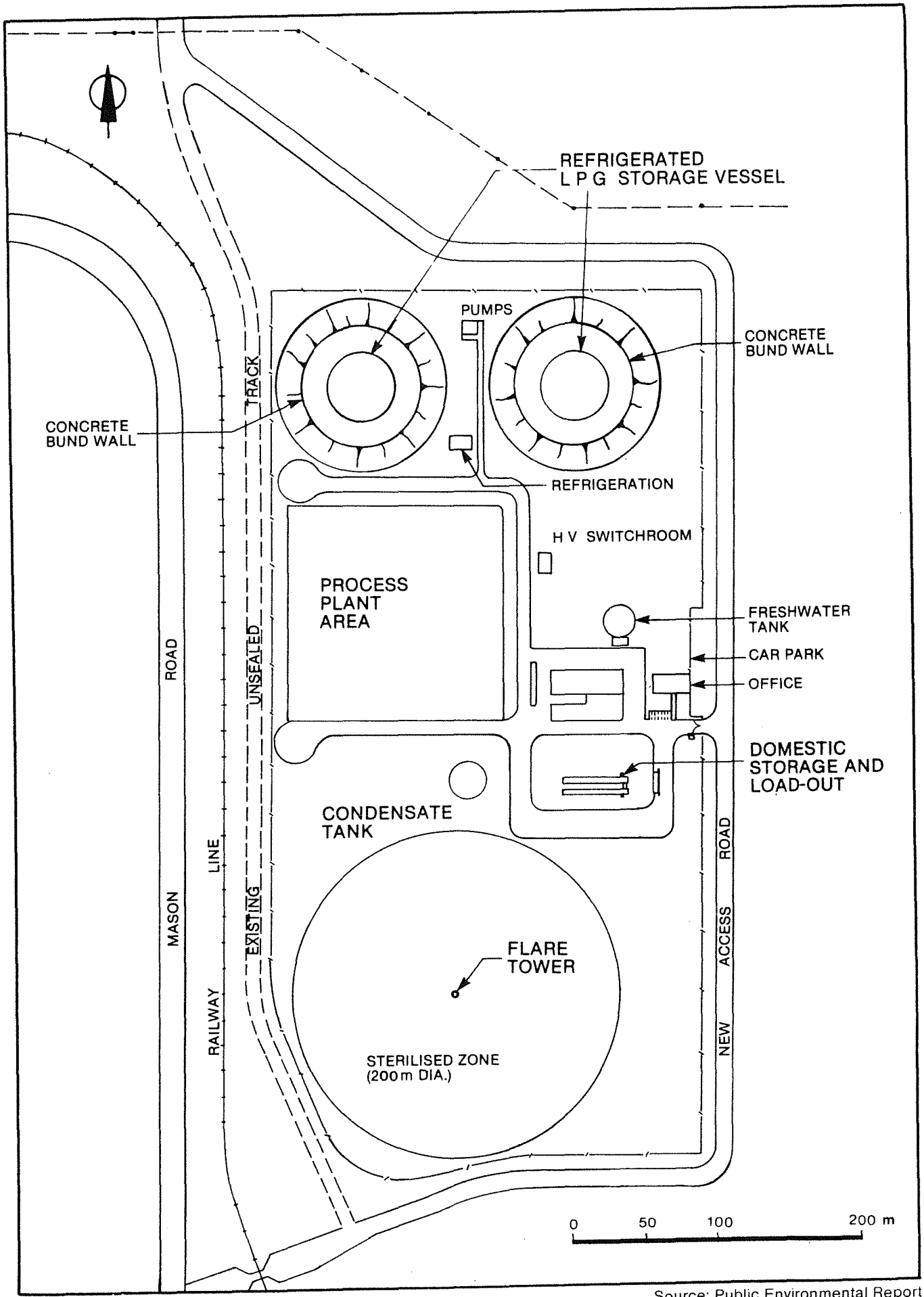


FIGURE 3 - PLANT LAYOUT

Source: Public Environmental Report

The regional selection criteria identified in the Public Environmental Report, were:

> proximity to supply of gas, to market, to shipping facilities, to workforce and industrial infrastructure; maximum use of available natural gas; minimisation of hazards associated with production and transport; and availability of land of appropriate sizes and zoning.

The Public Environmental Report then identified four regions within Western Australia and along the gas pipeline route from Burrup Peninusula to Wagerup (see figure 4). These regions were: Burrup Peninsula, Geraldton, Kwinana, and between Kwinana and Wagerup.

The document rejects Geraldton because of the fact that it is located 50 km from the natural gas pipeline and is also remote from the major domestic consumers.

After rejecting the other two regions for commecial reasons, the Public Environmental Report concludes that the Kwinana Industrial area is the preferred region for locating the proposed LPG extraction plant.

The Public Environmental Report then identifies the following site selection criteria for the selection of a site within the Kwinana region:

> a safety and buffer zone; proximity to a suitable export jetty; proximity to BP Refinery; appropriate land use zoning; and availability of services.

The document then investigated five sites (see figure 5). These were:

> Kwinana Beach - Fremantle Port Authority land;
> Western Mining Corporation land;
> BP Refinery land;
> Broken Hill Proprietary/Australian Iron and Steel land; and
> East Rockingham industrial area.

The Public Environmental Report discussed advantages and disadvantages of each site. The document then concluded that the Broken Hill Proprietary/ Australian Iron and Steel land, located south-east of the decommissioned blast furnace was the preferred site for the project.

2.3 THE EXISTING ENVIRONMENT

2.3.1 The Bio-Physical Environment

The proposed LPG plant site and the zoning of the surrounding areas is as shown in figure 1. The site is an 18 hectare rectangular block, located towards the northern end of the Becher-Rockingham beach ridge plain.

The meteorological aspects of the site consist of sea breeze/land breeze phenomena reinforced by a katabatic wind from the Darling scarp. The area experiences strong westerly winter winds while strong easterly winds predominate in summer. The DET NORSKE VERITAS Risk Analysis document (Public Environmental Report, volume 2) has taken low night-time winds, average conditions, afternoon strong breezes and occasional high winds as representative wind conditions in their consideration of the modelling of the gas dispersion characteristics.

The proposed LPG plant site has generally been cleared of native vegetation although pockets of Acacia rostellifera do exist among a cover of alien grasses.

2.3.2 Land Use, Zoning and Traffic

2.3.2.1 Land Use

The site is located in the Kwinana Industrial area which has been used for industrial development since 1955. The existing land uses within the area and their proximity to the proposed LPG plant site are shown in figure 5.

The Public Environmental Report discusses the population distribution of the surrounding communities to the Kwinana Industrial area and concludes that "Kwinana 'New Town' is expected to continue to .... grow away from the proposed LPG plant" (PER p 38).

2.3.2.2 Zoning

The proposed site is currently zoned 'industrial' under the Town of Kwinana Town Planning Scheme No.1. Town Planning Scheme No.2 is currently in preparation.

2.3.2.3 Traffic

The site is located in proximity to Mason Road and the Metropolitan Transport Trust transfer station which is located adjacent to Rockingham Road east of the plant site. The possible risk aspects associated with the plant and their potential impacts on these two areas are discussed in Section 4.2.

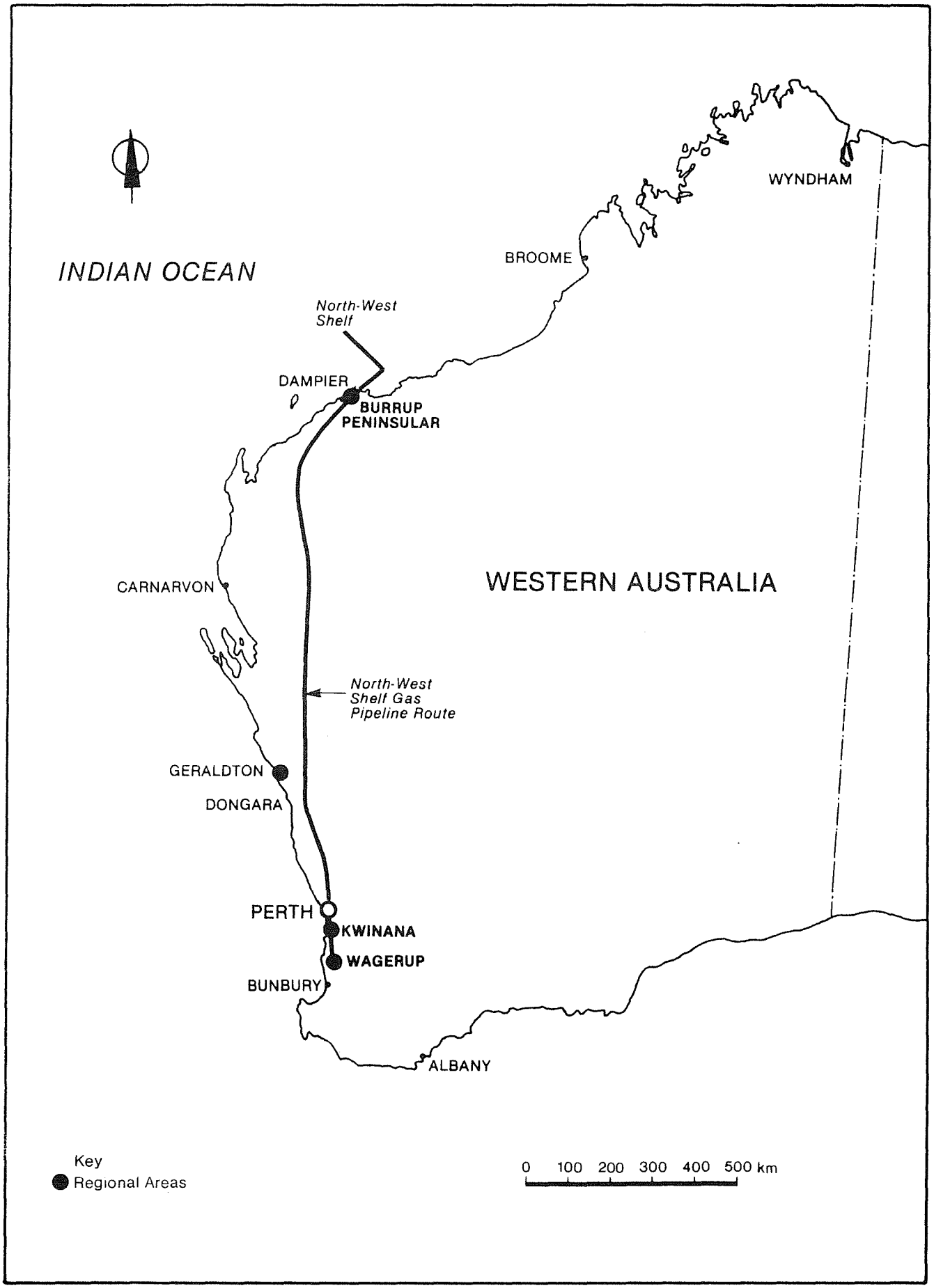


FIGURE 4 - REGIONAL AREAS INVESTIGATED

Source: Public Environmental Report

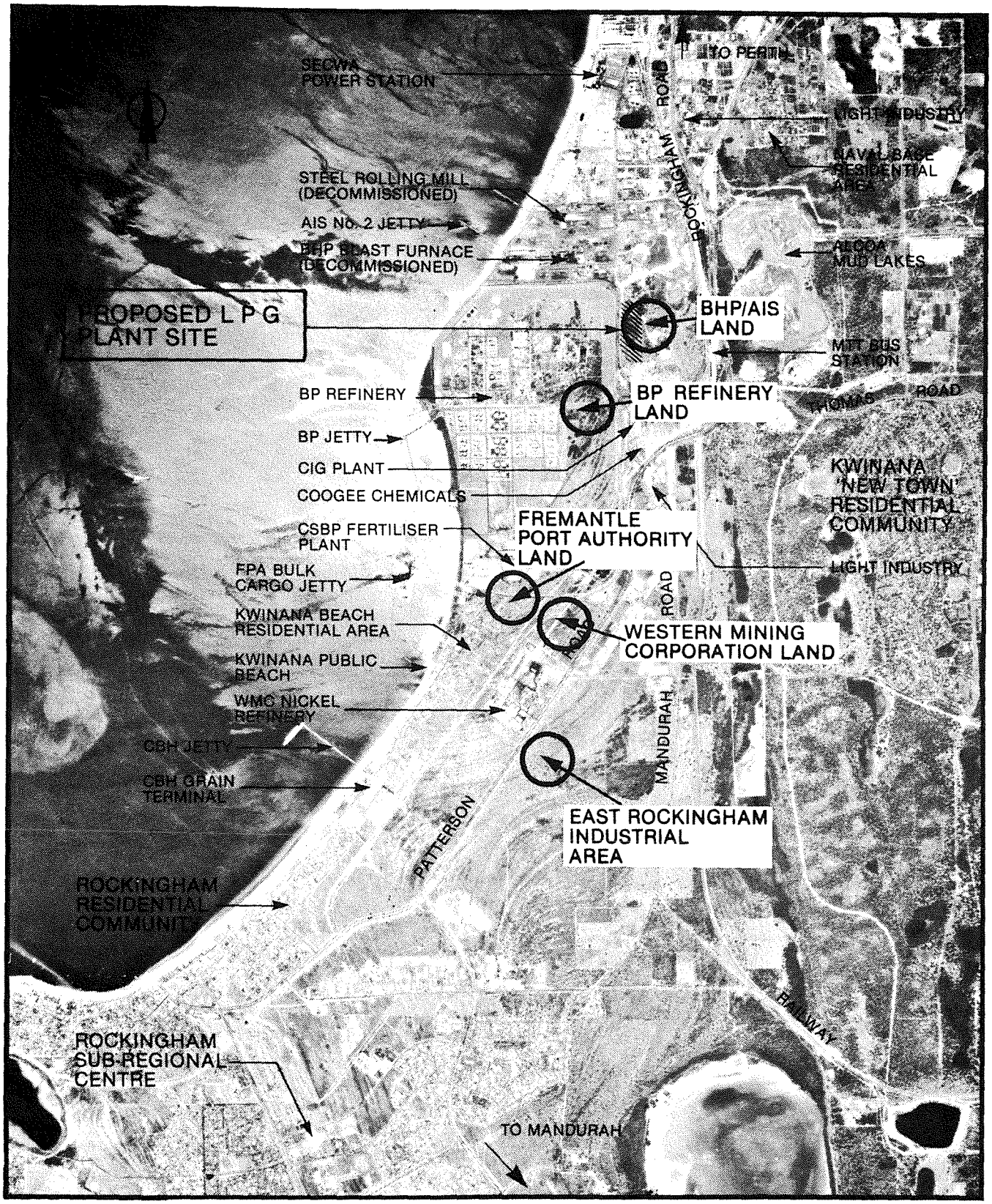


FIGURE 5 - ALTERNATIVE PLANT SITES IN KWINANA

Source: Public Environmental Report

3. ASSESSMENT OF THE SITE SELECTION PROCESS

The Authority has reviewed the site selection process, presented by the proponent and summarised in Chapter 2 of this Assessment Report and has found this process to be adequate and acceptable both on the regional and local levels.

At the local level, the major issue associated with the project concerns risks and hazards. This is discussed in Chapter 4.2. In summary, the processing, storage and export/transportation of the LPG generates risks and hazards of fire and explosion. These risks have been independently quantified by Det Norske Veritas, (see Appendix 4) and the preliminary risk analysis presented in a public document (Public Environmental Report, volume 2).

The Det Norske Veritas conclusions on the appropriateness of the preferred site within the general Kwinana Industrial Area were that the site had advantages and disadvantages. The advantages identified in Det Norske Veritas document (p 7) are:

- " it is large enough to allow for necessary layout and spacing;
- it is distant from residential areas to avoid risks to residents;
- the natural slope and terrain would act to impede and disperse any release of gas to safe concentrations before reaching residential areas;
- it is close to the jetty to minimise pipeline length and resulting volume of LPG that would be released in the event of pipeline leak or rupture;
- it is away from external risks such as aircraft routes, and sources of projectile. The BP refinery is more than 1 km and the decommissioned Australian Iron and Steel blast furnace facilities are more than 300m from the nearest plant, and the refrigerated storage tanks, which exceeds the distance projectiles normally travel in the event of explosion;
- the area is classed as a low risk of earthquake (Zone 0) and in accordance with recommended practice the plant is designed to a higher standard than that for normal structures;
- appropriate land zoning for hazardous or critical plants (Zone 1);
- the site has access to unlimited sea water for fire protection purposes."

The principal disadvantages identified in the Det Norske Veritas document (P8) are:

. " the jetty proposed is a general bulk goods jetty which would require modification and controls to provide an appropriate degree of protection for flammable gas liquids use;

. the site is adjacent to Mason Road which is presently the only usual access to and egress from the BP refinery. To provide for the safety of road users and to minimise sources of ignition in the unlikely event of a major gas release at the facility, contingency procedures will be developed for the site in co-operation with neighbouring facilities. These will include provision for temporary road closure, safety evacuation areas and opening of alternative traffic routes;

. the site is in proximity to, but not unacceptably close to a bus station on Rockingham Road where up to 500 bus passengers can be gathered for several minutes during commuting periods."

These issues and the related issue of cumulative risks, are discussed in Chapter 4.2.

4. ENVIRONMENTAL IMPACTS AND MANAGEMENT

The development of an LPG plant may generate a number of potential impacts which include:

- construction phase impacts;
- impacts of risks and hazards;
- other environmental impacts due to the emissions of wastes; and
- occupation health, amenity and social impacts.

The proponent cognizant of the Environmental Protection Authority's (and the community's) desire to have the highest levels of management controls and safeguards and to generate a minimum impact on the Kwinana area, has made extensive commitments to ensure that these objectives would be met (see Appendix 5).

4.1 CONSTRUCTION STAGE IMPACTS

The construction of the project, over an approximately two year period, would have the following impacts: the generation of dust; discharge of contaminated stormwater (especially grease and oils from construction equipment); noise; and site clearance of native bushland.

The proponent's commitments on these matters are as below:

- site clearing will be limited as far as is practicable;

- dust generation will be reduced by carrying out construction in winter months and suppressed by sprinkler watering practices;

- construction materials and practices will be in accordance with the requirements of relevant Australian or, in their absence, international codes; and

- noise generated during construction will not exceed those levels deemed acceptable by relevant legislation.

The Authority believes that the proponent needs to liaise closely with the relevant control agencies, especially the Kwinana Town Council, during the construction phase to ensure that no issues arise during that period which could adversely effect the environment or inconvenience the local population. In particular the proponent needs to ensure that:

- stormwater runoff is properly filtered for grease and oil before discharge to the Cockburn Sound;

- traffic generation is kept to a minimum; and

- hours of work are controlled if necessary.

4.2 RISK AND HAZARD IMPACTS

As discussed earlier, the extraction, storage and exportation of LPG generates risk and hazards. The major hazard identified for the plant relates primarily to fire or explosions. The Authority believes that the assessment of risk to the community is an important and integral component of an evaluation of the environmental impact of risk or hazard associated projects. Historical record shows that industrial accidents do occur and that technical safeguards have their limitations. However, with appropriate planning, review and effort during the industrial plant design, commissioning and operational stage, these risks and hazards can be controlled and managed.

Risk is defined as the "probability that a hazard, in terms of a specified level of loss or injury to people or property, will occur in a specific period of time" (Pomeroy, 1982). 'Hazard' can be described as a set of conditions which could lead to an accident with harmful consequences.

Risk assessment methodology consists of the following elements:

(i) HAZARD IDENTIFICATION OR DEFINITION: ie identification of potential hazards or hazard events.

(ii) RISK ESTIMATION: ie determination of the likely severity of consequences of the event and its products with the likely frequency of the event.

(iii) SOCIAL EVALUATION: ie standards of assessment and an evaluation of the social risk.

There has been an extensive assessment of risks of the proposed LPG plant process, operation, storage of LPG, pumping and piping for export, ship loading and shipping to and from the jetty and the Sound by Det Norske Veritas (Public Environmental Report, volume 2). The Authority has reviewed the Det Norske Veritas document, and on the basis of that company's credentials accepts the preliminary analysis as a comprehensive and appropriate assessment of the risks and hazards associated with the proposal on the proponent's preferred site.

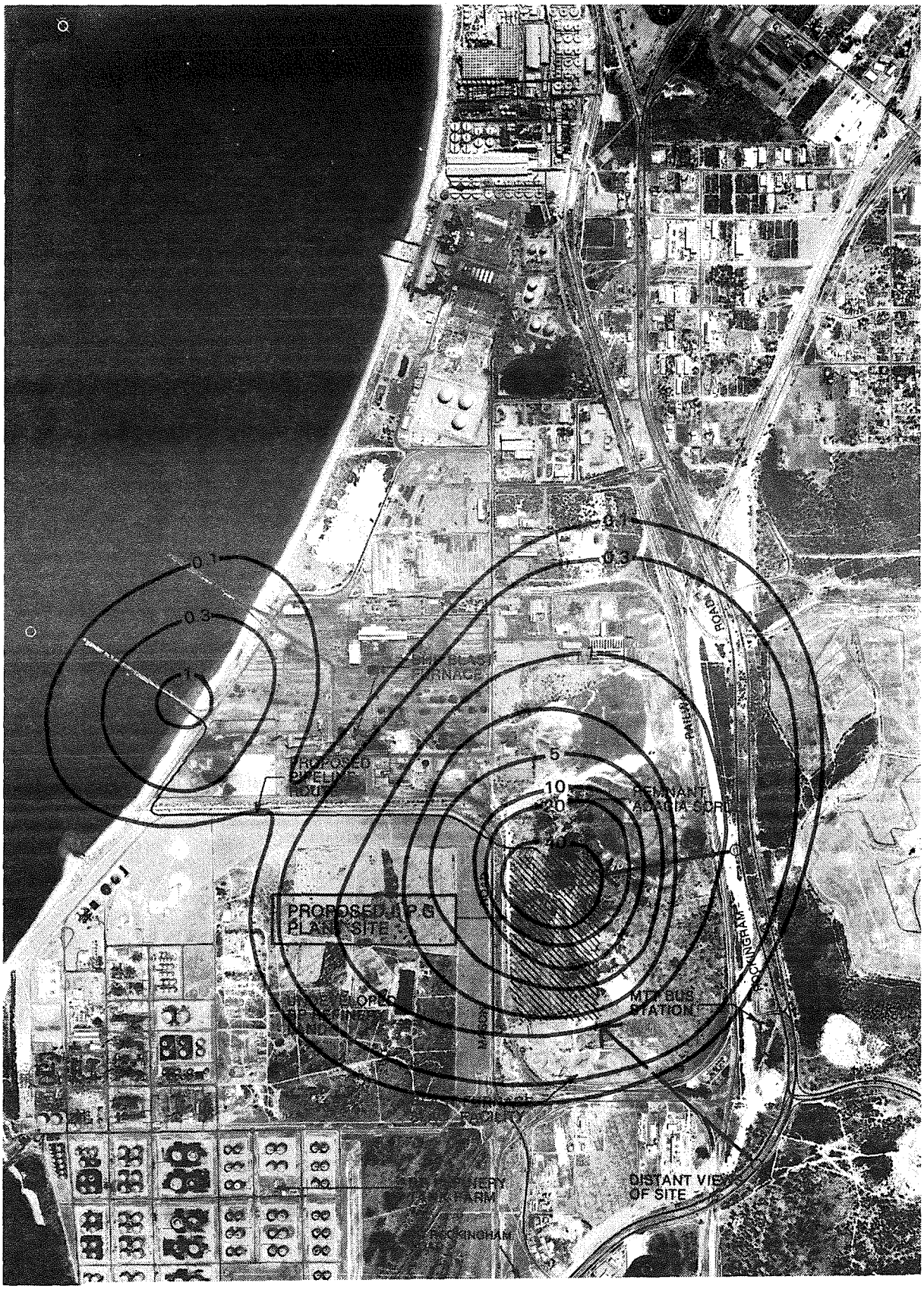
4.2.1 Hazard Identification

The major risk, associated with LPG extraction plants are those that arise from the loss of containment of LPG.

The Det Norske Veritas document identifies the following areas or activities which would generate risks and hazards. These are:

> plant process; plant operation; storage of LPG, both refrigerated and pressurised; LPG load out pumps; LPG export pipeline and the return vapour pipeline; ship loading including loading area; and shipping risks.

The hazards associated with the above activities are discussed, in detail, in the Det Norske Veritas document. The safeguards to be taken by the proponent have been forwarded, by the proponent, to the Environmental Protection Authority and are reproduced as Appendix 5 of this Assessment Report.



4 Key

Risk contour for LPG Plant
(Per million per person per year)

0 250 500 1000 m

Source: Det Norske Veritas

FIGURE 6 - RISK CONTOURS FOR THE LPG PLANT

4.2.2 Risk Estimation and Social Evaluation

In the Det Norske Veritas document, a detailed listing of potential events, which could give rise to identified hazards, was made. Listed in Appendix 5 of this Assessment Report are the safeguards which would be undertaken by the proponent. However, even with those safeguards, residual risks from the plant remain. This is due to the fact that there are limitations in technology and accidental failures of material and components will occur, however infrequently. In addition, human error is possible.

Taking historical failure frequencies and diffusion consequences of a number of possible scenarios, the proponent has estimated the risk levels which would be generated by the proposed LPG plant at Kwinana. These levels are illustrated in figure 6.

The question of the 'acceptable' level of risk, has been discussed previously, by the Authority, in its Assessment Report of the chlor-alkali plant at Kwinana (see Department of Conservation and Environment Bulletin 216). In that report, the Authority took note of how decisions on risks are taken in other parts of the world. Where a new industrial development has a risk level of 1 in a million in a residential zone, or 50 in a million in an industrial zone, the Authority indicated that the extra risk is so small as to be acceptable.

4.2.3 Risk Assessment

The Det Norske Veritas report (Volume 2, Public Environmental Report) has estimated the individual risk levels which would be experienced at distances from the proposed LPG extraction plant. These levels are illustrated in figure 6.

Figure 6 indicates that the proposed LPG plant would generate an individual risk level of less than 1 in a million per year for residential areas. The Environmental Protection Authority believes that the extra risk is so small as to be acceptable.

The proposal raises a number of related issues identified either by the Authority or by submissions to the Authority. These issues are listed below. The proponent's comments on the issues are included as Appendix 1 of this Assessment Report. The numbers in brackets correspond to sections discussing these issues in Appendix 1:

- appropriateness of the Australian Iron and Steel No.2 jetty to accommodate the LPG export mechanism; (3.9)
- utilization and an alternative to Mason Road during emergencies; (3.2)
- question of the ability to evacuate the foreshore during an emergency; (3.2)
- the possible need to find alternative entrance/exit for BP Refinery personnel during an emergency; (3.2)

- the need for a plant emergency plan including fire fighting and emergency planning; (3.5)

- safety of the Metropolitan Transport Trust bus station users in case of an emergency; (3.2)

- safety of the Rockingham Road users during an emergency: (3.2)

- the need for annual future hazard auditing; (3.4)

- the need for a HAZOP analysis during the design stage; (3.5)

- the need for a Kwinana Emergency Plan, to integrate individual industrial emergency plans;

- cumulative risk analysis needs to be undertaken as previously recommended by the Environmental Protection Authority; and

- the cumulative risk of the potential recommissioning of the Australian Iron and Steel plant/BP Refinery on the LPG plant and vice versa needs to be investigated (see Appendix 4).

The Authority has reviewed the proponent's comments on a number of issues including the above matters and believes that these matters can be managed by the proponent.

The proponent's comments on the above issues raised can be summarised as below:

- the proponent recognizes that the multiple use jetty is not ideal for the loading of LPG. However, in this instance, the proponent believes that the proposal should be considered acceptable for the following reasons:

  - the small number of loading operations per year;

  - proposed modifications to the jetty including upgrading of the fire system and provision for isolation of all electrical equipment;

  - the use of all intrinsically safe equipment for the LPG loading operations;

  - establishment of an appropriate commissioning and decommissioning procedure for each shipment.

- in the event of an emergency affecting Mason Road, an alternative means of access for employees at the BP Refinery would be via gates on the refinery southern boundary or along the beach. The proponent will offer all possible co-operation with the relevant Government authorities and the BP Refinery to develop contingency plans for this area;

- it is possible for the public to have access to the beach near the loadout jetty and pipeline. This does not affect the results of preliminary risk analysis presented in the Public Environmental Report as the calculated risk levels along the beach are well within the Environmental Protection Authority recommendations for recreational areas. In the event of an emergency in this area or at the plant, personal safety of people on the beach will not be an issue as there will always be a means of egress, either along the beach or by one of the access roads to the adjacent industries;

- an important consequence of the HAZOP study is the formulation of a detailed Plant Emergency Plan covering all aspects of plant safety and emergency contingency planning. This Plant Emergency Plan will be made available to the relevant Government Authorities, the Kwinana Town Council and State emergency groups;

- the risk levels for Metropolitan Transport Trust bus station/ Rockingham Road are within the Environmental Protection Authority recommended risk levels;

- Section 7.5 of the Public Environmental Report commits the proponent to undertake regular independent safety audits to ensure compliance to commitments to safeguard people and property;

- the proponent will be undertaking a full HAZOP study prior to the commissioning of the Plant;

- cumulative risk re the Australian Iron and Steel Plant/BP Refinery is discussed in a separate letter from Det Norske Veritas forwarded to the Environmental Protection Authority (see Appendix 4).

In its assessment of the above issues, the Environmental Protection Authority makes the following comments:

- the Authority does not believe that the general public should have access to the beach near the Australian Iron and Steel load-out jetty and the LPG pipeline, especially during the hazardous LPG loading operations. The matter of public access to beaches, especially near areas of hazards in the Kwinana Industrial area needs to be investigated in any subsequent Regional plan, taking into account the results of the Government Cumulative Risk Analysis Study.

- the Authority had sought further information from the proponent on the potential of the proposed LPG plant to cause cumulative risk impact in the plant site surroundings, ie the potential of the 'domino' effect on or from the Australian Iron and Steel plant/BP Refinery. The Det Norske Veritas reply is included as Appendix 6. In summary, that company state that their preliminary cumulative risk analysis show that the cumulative impact or the 'domino' effect from a recommissioned Australian Iron and Steel blast furnace would not adversely effect the LPG plant and vice versa. Similarly, adequate buffer zone currently exists between BP Refinery and the proposed LPG plant site. The Det Norske Veritas reply concludes that the risk from the plant, including cumulative risk, can be managed.

The Authority concurs with this statement. The proponent has already made commitments to undertake most of the risk management steps necessary including:

- a preliminary Risk Analysis (already completed by the proponent);
- HAZOP analysis during the design stage to be undertaken before construction (the proponent has made a commitment to do this).

The Authority believes that the following are also necessary:

- a HAZARD ANALYSIS UPDATE including a FIRE SAFETY STUDY and STUDY OF EMERGENCY PROCEDURES to be completed before plant commissioning (the proponent has made commitments to undertake some of these studies); and
- an ANNUAL AUDITING of risks and hazards.

Accordingly, the Environmental Protection Authority recommends as follows:

RECOMMENDATION 1

The Environmental Protection Authority recommends that a condition of approval should be the preparation in stages of a comprehensive and integrated hazard and risk management strategy, to the Authority's satisfaction.

This should consist of the following: the results of which should be forwarded to the Department of Conservation and Environment:

- **a HAZOP study to be completed and submitted before construction commences;**
- **a HAZARD ANALYSIS UPDATE (including FIRE SAFETY STUDY and STUDY OF EMERGENCY PROCEDURES) to be submitted before plant commissioning; and**
- **an ANNUAL AUDITING of risk and hazards to be submitted on an annual basis.**

While the above recommendation lists a risk management strategy, it should be noted that additional requirements to those listed in the recommendation may be imposed on the LPG project, arising from the findings and recommendations of the Kwinana Cumulative Risk Analysis Study. Nevertheless, any proposed changes to implementation of the above recommendation should be at the Authority's prerogative.

The Authority had forwarded the matters of the Kwinana Cumulative Risk Analysis Study and the associated Kwinana Emergency plan and procedures to the Department of Resources Development for comments.

The Department of Resources Development response on the risk issues concerning cumulative risk study and emergency plan is included as Appendix 2. In summary, this response is that

"To obtain an authoritative understanding of the cumulative effects of risks and hazards, the Department of Resources Development has initiated a study to investigate risks and hazards in the whole of the Kwinana area. It is envisaged that the results of this study, will provide useful input in the planning for optimising future plant locations to minimise risk and hazard.

The results of the hazard study should also highlight any necessity for upgrading emergency procedures in the area." (See Appendix 2)

4.3 ENVIRONMENTAL IMPACTS FROM THE EMISSIONS OF WASTES

The Public Environmental Report identified a number of waste products being generated from the plant which would require treatment and/or disposal:

These included:

> sulphur and mercaptan-contaminated water from dehydration; mercaptans and sulphur compounds; 40 tonnes every two years of solid waste, ie inert desiccant (clay type material); light combustible gases, eg methane/ethane which would be flared; contaminated wastewater and stormwater; noise; and domestic sewage (disposal in septic tanks).

The proponent's comments on matters raised by submissions to the Environmental Protection Authority is included as Appendix 1 of this Assessment Report.

As mentioned in Chapter 2.1 of this Assessment Report, the proponent has made plant modifications such that mercaptans-contaminated wastewater and mercaptans odourizers will now be recirculated and re-used in the gas leaving the plant rather than being removed, stored and incinerated on site. Given this situation, the Authority believes that this removes the issue of mercaptans and odourizers, having impact on the local area, from being considered in the environmental assessment of this proposal. Similarly, sulphur and mercaptan contaminated wastewater would now be recirculated back into the gas leaving the plant and does not require further consideration.

In summary, the proponent has provided the following information on the disposal of wastes:

- the 40 tonnes of solid waste requiring disposal every two years is an inert clay type non-toxic desiccant which would be stripped of all hydrocarbons, mercaptans and sulphur compounds prior to disposal and would therefore not present an odour problem nor impact the environment when disposed by sanitary landfill as is the practice with other plants. The proponent would investigate landfill sites during the plant design period;

- a small quantity of hydrocarbons would be periodically released from the condensate storage tank into the atmosphere. The proponent states that "although the quantities cannot be quantified at this stage, they will undoubtedly be sufficiently small and intermittent to not be detectable outside the plant boundary". (Appendix 1, Section 3.3).

- The proponent also states that the "incremental effect on air pollution, (from the plant) will be restricted to the following:

  - accidental releases of hydrocarbons;

  - products of combustion resulting from intermittent flaring of hydrocarbons;

  - products of combustion resulting from the use of natural gas fired turbines as power sources in various areas of the plant".

- oil-contaminated liquid wastes from cleaning facilities. There would also be some oil-contaminated stormwater. The proponent proposes to extract the oil and grease, store the treated water in a pond and use this water for reticulation and emergency fire fighting. The centrifuge extracted oil/grease would be sold off-site; and

- noise from the plant would not impact at the residential areas.

The Authority has reviewed the information provided by the proponent, on the emissions and disposal of wastes. The Authority's assessment, on these matters, is as below:

- given that mercaptans would now be recirculated (without handling), the potential problem of odour from the plant has been removed. The Public Environmental Report does not mention or identify odours from any other source within the plant;

- the Authority believes that the emission of hydrocarbons, from plant process or condensate storage, can be controlled and managed. The Authority notes the proponent's commitment to minimise these emissions and proposes that the reduction of hydrocarbon emission, either from normal plant operation or from contingencies, needs to be considered in the HAZOP studies and reviewed annually in the hazard auditing of the plant (see Recommendation 1 - Chapter 4.2).

  Given these safeguards and the proponent's management commitments, the Authority believes that the hydrocarbon emission, from the LPG Plant, will not significantly increase the current hydrocarbon emission of the Kwinana Industrial Area or have a detrimental impact; and

- as mentioned in Chapter 2, the proponent is currently investigating process cooling options. The two options being reviewed consist of air cooling and recirculated water cooling. Air cooling has the potential to generate noise. The proponent has made a commitment to manage the emission of noise and to ensure that noise within the plant would not exceed 85 dB(A). In addition, the proponent predicts that sound attenuation, over the terrain, would be such that noise levels experienced by the nearest residential area would be below the audible level. Given the distance involved, ie 2 km, the Authority concurs with this prediction. The Authority believes however that this prediction needs to be verified if and when air cooling is chosen as the preferred option. The resulting noise levels then need to be measured and the results provided to the Department of Conservation and Environment and action taken to comply with appropriate standards set by the State.

In summary, the Authority believes that the management commitments, given by the proponent, on the disposal of wastes, are appropriate and if carried out in the proper manner, would not have a significant impact on the proposed plant site, or the environment of the surrounding area.

In terms of proper management of wastes, the Authority believes that the proponent needs to undertake the following:

- liaise closely with the Health Department and the Kwinana Town Council on the matter of solid waste disposal;

- review the matter of minimisation of accidental releases of hydrocarbon in the HAZOP study and in the Annual Hazard Auditing (see Recommendation 1 - Chapter 4.2); and

- ensure that the flare is properly designed for the minimum generation of the products of combustion such that any emission does not exceed standards set by the State.

4.4 OCCUPATION HEALTH, AMENITY AND SOCIAL IMPACTS

The following issues are identified for discussion in this section:

- matters which could affect the health or safety of personnel in the LPG plant or in the industrial installations in the surroundings (the Environmental Protection Authority acknowledges that the responsibility for reviewing acceptable standards for occupational health rest with the Commissioner for Occupational Health, Safety and Welfare);

- the potential of an increase in heavy-vehicle traffic from the domestic transportation of LPG; and

- the potential of visual impact, due to the plant.

The Authority has reviewed the information provided, by the proponent, on the above matters. The Authority's assessment, on these matters, is as below:

. the risk levels, within the proposed LPG plant, are shown to be 40 chances of fatalities per million per year per person (see figure 6). While this level complies with the recommended standard for industrial zoned areas (see Chapter 4.2.2), the Authority believes that the proponent needs to consider the matter of plant personnel safety in the HAZOP analysis and the subsequent risk associated studies (see Recommendation 1 - Chapter 4.2).

  In this regard the Authority believes that the proponent needs to liaise with the Commissioner of Occupational Health, Safety and Welfare who has this responsibility.

  the Authority notes the proponent's long record of high safety. Given this record, and the proponent's commitment to accept and further train highly qualified and experienced personnel, the Authority believes that the matter of plant personnel training and safety could be adequately managed by the proponent;

. the proposal calls for a 40% increase in LPG tanker traffic, from the current 15 BP Refinery LPG carrying trucks per day to 21 trucks per day from the proposed plant.

  Given the:

  - carrying capacity of the Rockingham Road; and

  - current low level of saturation of the road

  the Authority believes that the proposed increase in traffic would be acceptable. However, the proponent needs to liaise with the State Emergency Service (including police and fire brigade) to ensure that contingency planning for LPG transportation incidents is co-ordinated, integrated, and periodically up-dated; and

. the proponent has given a commitment to "attractively landscape the plant while the buildings would be aesthetically designed and comparable with the surrounding industrial setting" (PER p 57).

On the last matter the Authority is aware that a LPG extraction plant, due to its function, will not be a building with a bulk and height which could blend-in with the surrounding terrain. The proposed plant would be a modern and compact version of the type of installation currently in existence at the BP Refinery.

The Authority believes that the landscaping of the proposed LPG plant needs to be integrated within a landscaping scheme for the whole of the Kwinana Industrial Area. The Authority has referred this matter to the Department of Resources Development. That Department's comment on this issue is attached as Appendix 2. In summary, this comment is that:

"Recently, Cabinet endorsed a recommendation of the Kwinana Industries Co-ordinating Committee concerning this issue and the WA Government will seek the practical and financial participation of Kwinana industries in a regional landscape improvement scheme to rehabilitate degraded industrial areas and vacant land planting and landscaping to a standard demonstrably achievable in other well planned and managed industrial areas.

Thus it is expected that there will be joint planning between industry, local Government and relevant Government Departments with an initial landscape proposal and plan funded by the State." (see Appendix 1)

5. CONCLUSIONS

This Assessment Report is submitted to State and Local Government to provide an environmental input to decision-making on the proposed 150 000 tpa LPG Extraction Plant at Kwinana. In preparing this report, the Authority has considered a range of documentation including both volumes of the Public Environmental Report, contributions in the form of submissions from public and Government Agencies, the proponents and Department of Resources Development's comments on the submissions and the Authority's own review and investigations.

The major issue arising from this proposal concerns risks and hazards. The proponent has made comprehensive commitments to reduce and minimise these risks. The prediction by Det Norske Veritas of risks to be generated by the plant are as shown in figure 6, and discussed in Chapter 4.2.3. These levels show that the extra risk is so small as to be acceptable.

The Authority has received a number of submissions on the matter of the appropriateness of the preferred site. Most of those raising this issue, agreed that the proposed site would be an appropriate site to accommodate the LPG extraction plant.

The Authority believes that given:

- the need for the plant to be located in the proximity to the gas pipeline and to an export jetty;
- the adequate buffer zone around the proponent's preferred site to accommodate associated risks generated by the plant, including cumulative risks;
- the relative 'clean' nature of the proposed industry, ie minimum emission of air pollutants, wastewater and noise; (see Chapter 4.3); and
- the appropriateness of the industrial zoning of the site

the proposed site is an acceptable site to locate the LPG extraction plant.

In conclusion, the Authority believes that the proposed LPG plant proposal is acceptable on environmental grounds, subject to the Authority's recommendation in this Assessment Report and the proponent's commitments made in the Public Environmental Report and those additionally given to the Environmental Protection Authority. A summary of the proponent's commitments upon which the Authority has based its assessment of the proposal and upon which the environmental acceptability of the proposal is dependent is reproduced as Appendix 5 of this Assessment Report.

PART B

A strategy to guide management of the environmental impact of industry in the Kwinana Industrial Area, such that the beneficial uses of the area and the surrounding region are maintained.

1. INTRODUCTION

Environmental impact assessment is a process which has been directed mainly at specific proposals. The several current proposals for new developments in the Kwinana Industrial Area now make it necessary to also examine the cumulative impact of those proposals and existing industry within the region. Recognising that the cumulative environmental impact of existing and proposed developments in the Kwinana Industrial Area is a matter of concern, the Authority proposes a strategy and action plan.

The discussion is structured as follows:

- the environmental objective;
- principles and responsibilities in meeting the environmental objective;
- information needs;
- meeting the environmental objective: progress to date;
- meeting the environmental objective: what should happen next?;
- requirements for extra resources; and
- conclusion.

During the preparation of this part of the report, the Authority received considerable input from the Industrial Air Pollution Working Group, which was formed after Environmental Protection Authority recommendations to Government. This Working Group now reports to both the Authority and to the Kwinana Industries Co-ordinating Committee (which is chaired by the Department of Resources Development). A recent report and set of recommendations to the Authority from the Working Group is included as an Appendix to this part of the report. The Authority wishes to commend the Working Group for its endeavours, and acknowledges that inputs from members of the Working Group have been formative in the development of parts of this Assessment Report.

2. THE ENVIRONMENTAL OBJECTIVE

Industrial development is an important component of the Western Australian economy, and makes a significant contribution to our standard of living and the quality of our lives. The Authority believes that the overall environmental objective for an industrial area such as the Kwinana Industrial Area should be:

> **to ensure that the environmental impact of industry is not so great that the industrial area becomes unsuitable for industrial use, and that industry is so controlled that it does not have excessive impacts on the environment within the industrial area itself (in terms of its beneficial use), nor regular or excessive impacts on people outside the industrial area.**

This objective is based on the assumption that the agreed **beneficial use** for the Kwinana Industrial Area is for **industry**. A corollary is that an appropriate area surrounding Kwinana should have a designated **beneficial use** as a **buffer zone**.

"Beneficial use" is a term which essentially means "the best use of an area for the overall benefit of the community". Hence some areas

may be designated for industry, and others for housing. Similarly some water bodies may be designated for drinking water, some for swimming and still others for boating.

The Authority is aware that there are other philosphical approaches to what may be permitted on a given piece of land (eg the "best practicable" approach for technology for every industrial development, irrespective of its location or zoning). However, the Authority considers that the "beneficial use" concept is the most effective approach to land use, and is appropriate to the setting and achievement of environmental objectives.

3. PRINCIPLES AND RESPONSIBILITIES IN MEETING THE ENVIRONMENTAL OBJECTIVE

The environmental objective can be attained by the adoption of four sets of principles:

- principles of location (zoning);
- principles of project approval;
- principles of industrial management; and
- principles of monitoring and regulation.

It is desirable to follow all four of these sets of principles if the environment is to be properly protected.

These are discussed in the following sections.

3.1 PRINCIPLES OF LOCATION (ZONING)

3.1.1 Industry which has the potential for adverse impacts on people or on the environment should only be located where its impacts can be controlled. This may be achieved by siting within a properly designated and managed 'industrial zone', the **beneficial use** of which is recognised by the community as industrial. In certain instances this may necessitate a remote location.

3.1.2 An 'industrial zone' should contain only industry, and should also be separated from residential areas by an appropriate **'buffer zone'**.

3.1.3 The environmental impacts of industry should be restricted to the 'industrial zone' and 'buffer zone'. Excursions of excessive impacts beyond the buffer zone should be rare, and should only result from atypical events (either within the plant, or of the environment).

3.1.4 Land use in the 'buffer zone' should be sufficiently resilient to withstand impacts from the 'industrial zone'.

3.1.5 Land use in the 'buffer zone' should be such that it does not impact adversely on residential areas.

3.1.6 The location of particular industries within an industrial zone should be such that impacts on other industries fall within prescribed standards for environmental risk and for ongoing environmental impact.

The Authority considers that these principles of location should guide decision-making on planning for industrial proposals within the Kwinana Industrial Area. It would be desirable for such decision-making to occur in an integrated manner.

The Kwinana Industrial Area lies within the boundaries of three local government authorities: the Shire of Rockingham; the Town of Kwinana; and the City of Cockburn. It would be desirable if the zonings of these three authorities were mutually sympathetic. A lack of integration of these zonings would conflict with the principles above. Furthermore, land zoned for future residential development should be separated from industry by an adequate buffer zone.

The Authority considers that it is desirable to have co-ordination of these zonings.

3.2 PRINCIPLES OF PROJECT APPROVAL

3.2.1 Each new project with the potential for significant environmental impacts, or amendment to any existing project such as to alter its environmental impact, should be subject to environmental impact assessment. The form, content, and timing of the assessment should be determined by the Authority. It is the responsibility of proponents themselves, and of government agencies responsible for assisting and promoting industrial development, to ensure that the Authority is advised of such proposals at an early stage.

3.2.2 It should be the responsibility of the proponent to demonstrate to the Authority's satisfaction that any proposal will not impose more than an acceptable level of risk or impact to the environment or the health and well-being of the community.

3.2.3 A proposed new industry, or alteration to an existing industry should be designed to ensure that its environmental performance is appropriate to the prescribed standards for the zone in which it is proposed, and for the particular location within that zone.

3.2.4 Any new industry, or alteration to an existing industry should have adequate management procedures to control performance to specified levels for both regular operation and for contingency events.

3.2.5 Whenever a new project is assessed by the Authority, consideration should also be given to any change to the cumulative impact with existing industries in the region.

3.3 PRINCIPLES OF ENVIRONMENTAL MANAGEMENT BY INDUSTRY

3.3.1 New industry should be constructed such that it satisfies both the conditions set at project approval, and the general requirements of the zone's beneficial use.

3.3.2 The operation of any industry should be managed such that it satisfies both the conditions set at project approval, and the general requirements of the zone's beneficial use.

3.3.3 Industry should conduct periodic reviews to ensure that it retains the ongoing capacity to control performance to specified levels for both regular operation and for contingency events.

3.3.4 Such reviews should be subject to assessment by the Authority which should advise the government in respect of their adequacy and their environmental acceptability.

3.4 PRINCIPLES OF MONITORING AND REGULATION

3.4.1 Each industry should monitor its environmental impacts to ensure that they do not exceed the standards set for the beneficial use of the area impacted. Results of such monitoring should be made available to the Authority and verified by the Authority from time to time.

3.4.2 Industry should be required to advise government of the likely environmental consequences as soon as practicable after the occurrence of any unforeseen event such as an accidental discharge.

3.4.3 There should be adequate coercive powers to enable standards of performance to be enforced, should this become necessary by continuing or blatant non-compliance.

3.4.4 Standards of performance should be enforced such that beneficial use criteria are met.

4. INFORMATION NEEDS

There should be ongoing investigation of the nature and extent of the cumulative environmental impact of developments within the Kwinana Industrial Area.

Two major studies represent important starting points: the Cockburn Sound Environmental Study 1976-1979 (DCE, 1979), and the Kwinana Air Modelling Study (DCE, 1982). These, together with associated background studies, form good bases which should be kept updated to ascertain the impact of industry on Cockburn Sound, the Kwinana airshed, and the land itself.

There should be recommendations on the **assimilative capacity** of the different components of the environment. For example, the assimilative capacity of Cockburn Sound for nitrogen might be determined as the maximum amount which can be discharged without causing algal blooms or interfering with the growth of seagrass.

5. MEETING THE ENVIRONMENTAL OBJECTIVE: PROGRESS TO DATE

In the context of the existing level of environmental impact in the Kwinana Industrial Area, and in the context of several new proposals, the Authority has made a number of key recommendations to Government in 1985/86. These include the following:

- the setting-up of a Working Group to develop solutions to the most acute of the air problems at Kwinana and to report to the Environmental Protection Authority. The Environmental Protection Authority sought Government approval for this to be chaired by a senior officer of the Department of Resources Development. This

was approved by the Minister for Resources Development, who also then established the Kwinana Industries Co-ordinating Committee. The industrial Air Pollution Working Group then assumed the role of also reporting to the Co-ordinating Committee. The Industrial Air Pollution Working Group's Interim Report is included as an Appendix to this Assessment Report. A second Working Group has reviewed existing planning and environmental procedures for the establishment of new industries, and has made recommendations on ways in which integration and streamlining should occur.

- the call for a cumulative risk and hazard analysis for the whole industrial area. This study is in progress, and being co-ordinated by the Department of Resources Development, and is to be provided to Environmental Protection Authority.

- the recommendation that a solution be found to the situation in which residents of Kwinana Beach were inappropriately located in an industrial zone. Government has made a commitment to manage this problem over the next year.

- the recommendation to Government that there be sufficient powers to implement the principles of project approval, of environmental management by industry, and of monitoring and regulation, which have been described in this Assessment Report.

- the recommendation to Government that there be co-ordination of zoning controls for the Kwinana Industrial Area. Government has recently announced its intention to do this.

- the recommendation to Government that the Authority establish a regional unit in Kwinana. The unit will be responsible for the day-to-day control of pollution, including air quality and the waters of Cockburn Sound. It will maintain close links with all the local government authorities of the region an with the community and will be able to respond quickly (on a 24 hour basis) to local problems. Government has recently accepted this recommendation.

- the recommendation to Government that an industry and environment expert should be appointed. The expert should assist with the review of the performance of established industries, and provide input into the environmental assessment of major new projects. Government has announced its acceptance of the recommendation.

- extensive investigations and negotiations with Nufarm (formerly Chemical Industries Kwinana) to control emission of chlor-phenols. The process involving chlor-phenols has now ceased. Details are given in the Appendix, in which the Industrial Air Pollution Working Group has concluded that:

  > "The problem will not reappear, given the commitment by the new management to only recommence manufacture involving chlor-phenols using technology...which is known to be free of nuisance odours."

6. MEETING THE ENVIRONMENTAL OBJECTIVE: WHAT SHOULD HAPPEN NEXT?

The Authority considers that a series of actions are now necessary:

- a policy commitment to achieving the environmental objective;
- comprehensive environmental legislation with appropriate implementation and enforcement mechanisms;
- planning and implementation of zoning controls within and around the Kwinana Industrial Area;
- ongoing assessment of the cumulative environmental impact of industrial developments in the area, and the assimilative capacity of components of the environment;
- the development by the Authority of performance criteria and standards which should apply to industrial developments. These should be based on the beneficial use criteria for an industrial area, and the assimilative capacity of the environment. The Authority intends to elaborate on the environmental objectives and to set beneficial uses. The policy would be implemented having regard to the principles in Section 3 above;
- an understanding and acceptance of performance criteria by industry, government and the community; and
- the provision of resources to do all of these (see Section 7 below).

Recommendation 2

The Environmental Protection Authority recommends that, in order to achieve the environmental objective given in this Assessment Report, a regional plan should be developed. This plan should encompass and define the Kwinana Industrial Area, an appropriate buffer zone, and adjacent residential zones. Following the endorsement of the regional plan by Government, the local planning schemes of the relevant local authorities should be revised and zonings implemented in a manner consistent with the regional plan.

The Authority considers that such a plan will be an essential mechanism by which the environmental objective can be attained.

7. REQUIREMENTS FOR EXTRA RESOURCES

Extra resources will be required to meet the stated environmental objective.

The Authority can develop the basis of an environmental policy for the Kwinana Industrial Area using existing resources.

However, for the Authority to implement and enforce pollution control in the Kwinana Industrial Area it will require additional resources, including the following:

- staff for a regional unit based in Kwinana (two professional officers, two inspectors, and two support staff);
- support facilities (including vehicles and a boat);
- monitoring equipment;
- accommodation in Kwinana; and
- operating funds.

This unit will be the most effective and efficient means of controlling the environmental performance of industry, and facilitating an appropriate level of interaction with the community. (Government has this week announced its intention to establish such a unit).

It is important that this unit be established, equipped, and funded as a matter of priority.

8. CONCLUSION

The Authority considers that the implementation of the strategy recommended in this Assessment Report, together with the allocation of appropriate resources, should ensure satisfactory management of the environmental impact of industry at Kwinana.

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APPENDICES

Appendix 1 The Proponent's response to issues raised in submissions.

PUBLIC ENVIRONMENTAL REPORT
PROPOSED LPG EXTRACTION PLANT

PROPONENT'S RESPONSE TO PUBLIC SUBMISSIONS

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- Prepared for -

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March 1986

TABLE OF CONTENTS

ATTACHMENTS

So far as sulphur compound odours are concerned these are primarily attributable to, and acknowledged by, the BP Refinery. The Company has provided an outline of the short interim and long-term actions that are proposed (Appendix 3). The Working Group has endorsed these actions but is concerned that the solution may still be some time away. The Company believes that the installation of a new flare tip at the end of this year will remove the odour problem. The Working Group is generally attracted to the proposition that, a sulphur recovery plant would provide a definite assurance that odours would be removed as a problem, with the bonus that sulphur dioxide emissions would be greatly reduced. On this basis early installation would seem to be desirable.

However, the Company has argued that sulphur recovery, as a project, would not meet Company investment criteria and believed that the actions outlined in the letter particularly the installation of a new flare tip would remove the odour problem. Also, if the odours persisted, there were other methods that could be employed at less cost. Equally, the Company acknowledged that sulphur emissions could be reduced by the project, if that was required, and this would also remove odour problems.

Faced with this argument for delay pending review of the success or otherwise of other actions the Working Group recommends that:

- **If odours persist after installation of the new flare tip the Company should be required to present immediate proposals for a sulphur recovery plant or an equally effective alternative means to finally and completely remove the odour problem.**

- **These proposals should be developed in the light of the results from the sulphur dioxide monitoring equipment at Wattleup and Hope Valley and if these results indicate that there is a case for reduction in sulphur dioxide emissions then a sulphur recovery plant should be insisted upon by Government.**

- **The Company should be required to take whatever steps are necessary between now and the flare tip installation with the aim of ensuring that odour episodes are eliminated.**

(PJM052:AMS)

RESPONSE TO CHAIRMAN EPA REQUESTS

The Working Group has given specific consideration to the problem of odours.

So far as weedicides, pesticides, etc. are concerned the issue is related only to the Chemical Industries Kwinana site at Mason Road, which was purchased in mid-1985 by Nufarm Chemicals Ltd and renamed Nufarm Ltd. The Working Group was assisted in its consideration by a full and frank briefing from the Nufarm Manager, Mr. David Pullan.

The primary problem in the past has been the fugitive emission of chlor-phenols, contributed to in large measure by poor plant operation. The problem is now in a controlled situation under the new management. The Working Group has concluded that:

- The previous management had, by allowing the plant and equipment to operate poorly, directly contributed to an already difficult handling problem presented by the sensitivity of humans to chlor-phenol odours.

- The new management is more responsible and has a proven track record in Victoria in satisfactorily handling these chemicals.

- The new management have acted responsibly by ceasing the manufacturing process that involved chlor-phenols, dismantling and cleaning the previously used equipment.

- The problem will not reappear, given the commitment by the new management to only recommence manufacture involving chlor-phenols using technology based on that used in the Company's Victorian plant, which is known to be free of nuisance odours.

There has also been an ongoing problem of "white haze" caused by fugitive hydrochloric acid fumes from the acid manufacturing process on-site combining with fugitive ammonia fumes from the KNC plant. As with the chlor-phenols this has been exacerbated by less than satisfactory past management practices. The Working Group has been assured that the new management intends to instal improved fume extraction and scrubber facilities by end July 1986 to prevent hydrochloric acid fumes escaping from the manufacturing process.

The Working Group endorses the actions being taken by the new management, but is conscious of the public perception of this particular operation and accordingly recommends that:

- **The EPA maintains a close watch on and liaison with the new management to ensure that problems do not resurface in the future.**

- **The EPA ensures that the Company instals the plant required to deal with the hydrochloric acid fumes.**

14. A similar procedure should be adopted toward potential pollutants to identify and reduce the possibility of accidental discharge of pollutants through equipment failure.

(PJM051)

is evident that the public interest would be well served by more comprehensive information relating to established and proposed industries. Also there is a need to inform the public about the relevant government agencies. To cover these points the Working Group has a number of recommendations:

5. **Continuing public education programmes on industry and Departments involved in the area should be carried out to ensure that residents are aware of what they are, and do, and who, and where, the public should contact to obtain assistance, information, or register complaint.**

6. **Industrial, buffer and residential zones be clearly defined.**

7. **All industrial proposals for the area be required to submit a Notice of Intent to the EPA with a copy to the local authority before final approval is given.**

8. **The present survey of health statistics be extended to include the setting up of procedures to ensure that accurate, and consistent, health statistics are collected on an ongoing basis and in a form that would allow cross checking against meteorological and industry information.**

9. **That environmental assessment include an analysis of risks and hazards and that a similar process be applied to social and infrastructure implications of industrial developments.**

The hazards posed by industry, both cumulative and individual, have attracted attention and the government has announced that a consultant study into the cumulative hazards will be carried out for the Kwinana area. While this is apparently beyond the Working Group brief accidental emissions of air pollutants can present substantial hazards to the public. For this reason the Working Group has made the following recommendations:

10. **Comprehensive emergency procedures should be established for the area and a public education programme instituted to ensure that residents are aware of procedures they should follow in the event of emergencies involving industry discharges that may affect their areas.**

11. **The Kwinana Industries Mutual Aid Group (KIMAG) should be reactivated and its operations integrated with State emergency procedures in the area.**

12. **Industries should carry out hazard and operability (HAZOP) studies of all new or replacement plant before installation. Similar studies should be carried out retrospectively on existing plant. These studies should all be reviewed at regular intervals to ensure that they continue to represent the true hazard potential.**

13. **HAZOP studies should be available for review by government to determine the acceptability of the risks and the remedial measures proposed by industry.**

any unauthorised emission;
- **identification and control of non-point and fugitive emissions.**

Hand in hand with improved legislation must go improved enforcement otherwise there is a considerable risk that the legislation will not achieve its aims. Again government has outlined initiatives that are intended. The Working Group recommends the following to government.

3. **That the enforcement of environmental legislation would be made more effective by:**

   - **frequent random checks of industry compliance, both with and without notice, and of sufficient duration to ensure that normal operational conditions are determined;**
   - **establishing a permanent and comprehensive monitoring network to monitor ambient levels of pollutants and to provide data needed for modelling studies;**
   - **establishing a permanent inspectorial presence in the Kwinana area to be on call 24 hours a day.**
   - **establishing ongoing research programmes into the impact of industry, in all its facets, on the total Kwinana/Cockburn Sound environment.**
   - **carrying out prosecutions of offenders against the legislation;**
   - **establishing the total industrial emissions that can be sustained in the industrial area without exceeding ambient standards;**

Substantial concerns have been expressed regarding the protections and exemptions that existing industries are believed to derive from ratified Agreements. While the Agreements have a function in setting out the arrangements reached for the setting up of a project the Working Group did not see any justification for these to extend to environmental matters. The government has already taken some steps in this regard through the recent amendments to the BP Refinery Agreement. This is endorsed by the Working Group and should be extended to all future and existing Agreements. Accordingly the Working Group recommends that:

4. **All future Agreements should include, and all existing Agreements should be amended (where necessary), to include specific clauses for:**

   - **Approval to be obtained where a company plans to significantly modify, expand or otherwise vary its activities.**
   - **Reporting on environmental measures being taken by the Company.**
   - **No exemption from environmental laws.**

Concerns have also been expressed at the lack of information flowing to the public on the environmental aspects of projects. This extends to other aspects of projects such as hazard, public health, social and infrastructure implications. While these other aspects are beyond the committee brief it

RECOMMENDATIONS TO KICC

In its deliberations the Working Group became very aware of the role that political will has played in the situation that has developed at Kwinana. It is evident that the regulatory and control agencies can be rendered ineffective if government does not provide support and encouragement to these agencies. If this Working Group was to make only one recommendation it would be this:

1. **That the State Government should declare that the pollution regulatory and control agency has its full support in putting into effect the provisions of the pollution control legislation including prosecution for offences under the legislation.**

While a number of other specific recommendations follow this is seen as the one recommendation that makes the others effective and is strongly supported by the Working Group.

The Government has announced that there will be major new environmental legislation prepared and has outlined some of the contents. The Working Group supports the need urgently to update and consolidate environmental legislation. To assist the government in drafting the Working Group recommends:

2. **That the new environmental legislation includes provisions for:**

   - **penalties that will act as genuine deterrents and, if enforced, as genuine penalites;**
   - **both lower and upper limits for penalties;**
   - **immediate access for inspectors unless there are safety considerations that require delay;**
   - **access to be provided to all actual or potential emission points that is adequate to allow for sampling and testing by inspectors;**
   - **emission limits for all pollutants to be set;**
   - **ambient levels for all pollutants to be set on the basis of protecting all but the most sensitive members of the community and elements of the environment;**
   - **best practicable means be used in all new and replacement plant without regard for the fact that emissions may thereby be lower than the required standards;**
   - **immediate reporting of unauthorised emissions (including accidental, unexpected or emergency) with regular reporting of the steps, and their effectiveness, being taken to prevent the emission;**
   - **should the steps being taken to correct an unauthorised emission be ineffective plant shutdown to be initiated**
   - **clean up by industry of any unauthorised emissions that escape beyond industry boundary and are capable of recovery;**
   - **industry to be responsible for the adverse effects of**

2. Progressively improving air quality.

3. Establishing a long-term mechanism for air quality management consistent with the continuing development of industry in the area".

The Chairman EPA requested the Working Group to provide a report and specific recommendations within the next few months (from December 1985) giving specific consideration to odours associated with:

1. weedicides, pesticides, etc;

2. sulphur compounds especially hydrogen sulphide, sulphur dioxide and mercaptans; and

advice on any long-term issues which need consideration.

Site visits were made to Alcoa and CSBP to give members first hand appreciation of industry and its approach to emission control and safety. In addition representatives from the BP Refinery, WMC Nickel Refinery, SEC Power Station Kwinana and Nufarm briefed the committee.

KWINANA INDUSTRIES CO-ORDINATING COMMITTEE

INDUSTRIAL AIR POLLUTION WORKING GROUP

INTERIM REPORT

INTRODUCTION

The rejection, by the Kwinana Town Council, of CSBP's application for planning approval for a chlor-alkali plant focussed the government's attention on the evident and increasing polarisation between the Kwinana community and industry. As a result Cabinet decided in December 1985 to establish the Kwinana Industries Co-ordinating Committee to address the concerns being expressed over existing and future industrial development in the Kwinana Industrial Area.

At the same time air pollution was identified as an area requiring immediate action. The Industrial Air Pollution Working Group was set up and given a dual reporting role to both the Co-ordinating Committee and the Chairman, EPA.

The Working Group had the following membership:

Dr Peter Murphy (Chairman)	Principal Project Officer, Department of Resources Development (DRD)
Mr Mike Fraser	Town Clerk, Town of Kwinana
Mrs Christine Jerovich	Wattleup Progress Association
Mrs Kath Wheatley	Kwinana and Localities Environmental Action Network (KLEAN)
Mr Peter Browne-Cooper	Assistant Director, Department of Conservation and Environment (DCE)
Mr Ron Powell	Principal Assistant, Air Quality Branch (DCE)
Mr Ian Cameron	Technical Adviser, Department of Industrial Development
Mr Ken Thomas	Operations Manager, BP Refinery, representing Kwinana Industry
Mr David Bachman (Secretary)	Assistant Project Officer (DRD)

The Terms of Reference for reporting to the Co-ordinating Committee were:

"To recommend means of:

1. Immediately preventing further deterioration of air quality in the Kwinana area.

Appendix 2 The Department of Resources Development response to submissions

Your Ref:
Our Ref: 58/84R (TS-031:MI)
Enquiry Mr: Dr Sanders

DEPARTMENT OF RESOURCES DEVELOPMENT

"ATRIUM"
170 ST. GEORGE'S TERRACE, PERTH
WESTERN AUSTRALIA 6000

G.P.O. BOX L897, PERTH 6001

TELEPHONE 327 5454
TELEX AA 94929

ADDRESS ALL CORRESPONDENCE TO THE CO-ORDINATOR

Mr B Carbon
Chairman
ENVIRONMENTAL PROTECTION AUTHORITY

Dear Mr Carbon

This is to confirm that the letter recently sent to you on April 7, 1986 concerning the "Proposed LPG Extraction Plant Kwinana" (copy attached) can be used as an attachment to the EPA's public statement on that project.

Yours sincerely

S A Hohnen
CO-ORDINATOR

April 29, 1986

Att.

Your Ref:
Our Ref: 58/84R (TS-031:MI)
Enquiry Mr: Dr Sanders

DEPARTMENT OF RESOURCES DEVELOPMENT

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ADDRESS ALL CORRESPONDENCE TO THE CO-ORDINATOR

Mr B Carbon
Chairman
ENVIRONMENTAL PROTECTION AUTHORITY

Dear Mr Carbon

PROPOSED LPG EXTRACTION PLANT KWINANA

The public submissions that were received during the public review period of the "Proposed LPG Extraction Plant" Public Environmental Review (PER) have been studied with interest. Certain issues raised in those submissions are pertinent to the Kwinana area in general and not specific to the proposed LPG facility and in this regard I advise as follows:

Cumulative Risk Assessment

To obtain an authoritative understanding of the cumulative effects of risks and hazards, the Department of Resources Development has initiated a study to investigate risks and hazards in the whole of the Kwinana area. It is envisaged that the results of this study, will provide useful input in the planning for optimising future plant locations to minimise risk and hazard.

The results of the hazard study should also highlight any necessity for ugrading emergency procedures in the area.

Aesthetics and Landscaping

Recently, Cabinet endorsed a recommendation of the Kwinana Industries Co-ordinating Committee concerning this issue and the WA Government will seek the practical and financial participation of Kwinana industries in a regional landscape improvement scheme to rehabilitate degraded industrial areas and vacant land planting and landscaping to a standard demonstrably achievable in other well planned and managed industrial areas.

Thus it is expected that there will be joint planning between industry, local Government and relevant Government Departments with an initial landscape proposal and plan funded by the State.

Yours sincerely

Stuart Hohnen

S A Hohnen
CO-ORDINATOR

April 7, 1986

Appendix 3 Review of Submissions

ANALYSIS OF PUBLIC AND GOVERNMENT AGENCY SUBMISSIONS

A total of 28 submissions were received on the proposed LPG plant at Kwinana; 22 from Government agencies and 6 public submissions.

The main issues addressed in all submissions are indicated in Section 1 and Table 1 of the Assessment Report. This Appendix provides a more detailed analysis of the issues raised and comments made in the submissions received by the Environmental Protection Authority.

The issues that received most frequent comment in the submissions related to the following broad categories

1. Risks and Hazards
2. Site Selection and Land Use Planning
3. Air pollution and odours
4. Liquid and Solid Wastes
5. Occupational Health
6. Amenity and Social Impacts
7. Others

1. RISKS AND HAZARDS

1.1 EMERGENCY DISASTER PLAN

It was mentioned in a number of submissions that an emergency disaster plan should be developed and implemented before construction is allowed to commence.

1.2 CUMULATIVE RISK ASSESSMENT

A number of submissions indicated that the Kwinana Industrial Strip is saturated with industrial plants and every additional one makes the collective effect in respect to pollution and accidents worse. This suggests that cumulative risk assessment is essential. It was also suggested by one submission that a risk analysis could have been considered for the BP site for comparison with the BHP/ Australian Iron and Steel(AIS).

1.3 TRANSPORT AND LOADING

Several submissions were concerned at the risk associated with the transportation and loading of the gas. These included the risk from ship loadings, ship traffic (and the possibility of collision), the pipeline to the jetty and risks from truck loading and transport. Other comments specific to these included the possible danger to built up areas with the transportation of the gas and the increase in LPG tankers, the suggestion that it would be advantageous to locate the load-out facility to an isolated area of the plant and finally the concern that significant risks associated with loading the product aboard ship were confined to the immediate vicinity of the loading arm. Also the risk of catastrophic explosion with regard to the transportation and loading mechanics was mentioned.

1.4 PUBLIC ACCESS TO KWINANA BEACH

One submision expressed concern that while there may be no official public access to Kwinana Beach because Mason Road is not a public road in its entirety, the public do access the beach area adjacent to the proposed location of the pipeline. This submission pointed out that it was important that adequate measures are taken to

either stop public access to the beach or to ensure that the pipeline and the jetty are inaccessible to the public. Also to provide alternative access from Kwinana Beach other than Mason Road in the event of a gas leak at the plant.

1.5 AUDITING AND MONITORING

Several submissions commented on the need for regular independent safety audits to be undertaken during plant operation as mentioned in the Public Environmental Report (p ix), to ensure safety standards are maintained. However, one submission questioned the implementation of this safety auditing as there are no facilities within the Government to do this.

1.6 STORAGE TANKS

One of the main areas of risk in the plant perceived by the people making submissions was the refrigerated and pressurized storage tanks. These tanks store large amounts of flammable gas and there was concern at the danger of a tank containing the LPG rupturing and causing a catastrophic explosion. The submissions also expressed concern that the large refrigerated LPG storage vessels appear to be too close to the site boundary, the process area and Mason Road.

One submission made the suggestion that locating these vessels below ground would be a safer option. Other comments related to the distance between the storage tanks, including maintain a generous radiation distance between them and a suggestion to make kidney shape instead of a circle to increase the distance between the two pressurised storage vessels. One submission believed that neither Public Environmental Report nor the Preliminary Risk Analysis adequately treated the issue of quantified risk analysis for multiple storage tanks of various volumes.

1.7 PIPELINE SAFETY

One of the perceived risk areas in the plant is the pipeline to the jetty. A submission made comment on the fact that residents of the Kwinana area may be concerned to know the proposed route of the link line to the plant. Another submission pointed out that the gas pipeline crossing to the jetty will be required to be constructed to the same standards as all of the other railway/natural gas pipeline crossings.

1.8 ROCKINGHAM ROAD AND MTT BUS STATION

Some submissions expressed concern at the proximity of Rockingham Road and it bus station. One submission mentioned that if a storage tank ruptured a gas cloud could extend for up to two kilometres and explode and Rockingham Road and the MTT Bus Station lie within two kilometres of the plant. Another submission said that consolidation of the industrial uses in the Kwinana area would be preferred particularly if this will result in a reducation of risk levels on the MTT Bus Station and Rockingham Road. Another comment was that Rockinham road was expected to remain an important regional not revert to a local road as described at item 6.3.2. in the Public Environmental Report.

1.9 UTILIZATION AND ALTERNATIVE TO MASON ROAD

Three submissions commented that the proximity of the proposed plant to the only current access road to BP Refinery, Mason Road, still needs further consideration in relation to the Emergency Disaster Plan as Mason Road is only one hundred metres from the nearest tank. It was also mentioned in the submissions that the developer should provide alternative access for the public from Kwinana Beach other than Mason Road in the event of a gas leak at the plant.

2. SITE SELECTION AND LAND USE PLANNING

2.1 DECENTRALISATION

Three of the 28 submissions stated that the Kwinana Industrial Strip is presently saturated with industrial plants and believe that every additional one makes the collective effect in respect to pollution and accidents worse. These submissions expressed the view that acceptable guidelines for the future development of Kwinana should be established. One submission thought it was time the Government and the Department gave serious and immediate consideration to decentralisation and to locate this and other proposed plants away from Kwinana.

2.2 ZONING

This issue refers to the appropriate zoning of the area to ensure adequate management of the site. The submissions believe that the site should be rezoned under the Metropolitan Region Scheme to Special Industry and to an appropriate industrial zone under the Town of Kwinana's Town Planning Scheme and that the proposed use should be classified as a hazardous industry.

2.3 SITE SELECTION

Several of the submissions objected to the construction of the plant at the suggested location. They did not oppose the construction of the plant per se but its proposed location at Kwinana and were of the opinion that the industry could be more suitably located elsewhere. However no alternative location was identified.

3. AIR POLLUTION AND ODOURS

3.1 NOXIOUS ODOURS (IE MERCAPTANS)

One submission stated that they will not support the proposal on the grounds of smells emitted from the plant. Other submissions were of the belief that the inconvenience caused to residents by these odour releases will influence people's acceptance of the project. There was also concern about the high potential hazard associated with odours arising principally from mercaptans due to their volatility and toxicity.

3.2 AIR QUALITY/POLLUTION

Comments were made to the effect that this facility (ie the LPG Plant) could contribute incrementally to the further degradation of air quality. As there is already an air quality problem in the Kwinana area there is concern that further industrial development without effective measures being adopted may have serious consequences. A request was made in one submission that certain existing companies clean up their pollution.

3.3 SULPHUR DIOXIDE POLLUTION

One submission expressed concern that this plant will increase the levels of sulphur dioxide, already prevalent in the Kwinana area, by the incineration of Mercaptans as explained in the Public Environmental Report. (It should be noted that the proponent has modified the proposal such that mercaptans would now be recycled and not incinerated).

4. LIQUID AND SOLID WASTE

4.1 DISPOSAL OF SOLID WASTE

An issue of concern expressed in 6 submissions was the disposal of the dessicant collected from the dehydration section. These submissions stated that confidence in the sanitary landfill method would be enhanced by the inclusion in the report of a reasonable indication of the nature of the dessicant and any contaminant material it could be expected to carry with it. According to one submission it is also not stated in the report where the sanitary landfill site would be situated. Another submission mentioned that local residents and workers are apprehensive about the adequacy of waste management techniques and recommended that it be demonstrated that waste from the plant was to be disposed of in an environmentally responsible way.

4.2 FATE OF LIQUID WASTE

One submission expressed concern at the fate of the oil contaminated liquid waste and recommended that it be demonstrated that this waste was to be disposed of in an environmentally responsible way.

4.3 RECYCLING OF MERCAPTANS

It was recommended in some submissions that detailed plans for mercaptan disposal, whether reinjection or incineration, should be submitted. It is thought that the best solution to the potential mercaptan problem would be reuse of the odourants by passing them back continuously into the SECWA gas stream.

5. OCCUPATIONAL HEALTH

5.1 EDUCATION AND TRAINING

According to a submission made to the Environmental Protection Authority education and training of personnel has not yet been fully documented. It was recommended in one submission that well trained staff should be appointed, at least initially, to ensure safe commissioning and operation of the plant and that an appropriate construction company, with extensive experience in this field, be employed. Also, the same submission noted that no mention was made in the report of health criteria when selecting personnel.

5.2 WATER SAFETY

One area which was not dealt with in the Public Environmental Report was the safety of the workers. It was urged that every aspect of worker safety be incorporated into the plant design.

5.3 NOISE LEVEL RESTRICTIONS IN THE PLANT

One submission was concerned at the fact that, although noise levels at employee work stations will comply with the Hearing Conservation Regulations, there would be no noise level restrictions on areas not frequented by staff.

6. AMENITY AND LAND USE PLANNING

6.1 ACOUSTIC EMISSION

Although noting that noise impact on surrounding areas will not occur, one submission made the comment that while noise generated by traffic on Rockingham Road could provide considerable acoustic masking in the daytime, the night-time situation could be different. It was mentioned that consideration should be given to acoustic monitoring.

6.2 TRAFFIC

One submission believed that the proposed plant is unlikely to generate signficant volumes of traffic and therefore unlikely to cause any problems. It said that no mention was made in either report of any smoke generation from the plant and its possible affect on motorists. A few submissions mentioned concern at the 40% increase in LPG tank movements per day through the Kwinana district and the risk associated with that increase.

6.3 BUFFER ZONE

Concern was expressed in one submission regarding the buffer zone to minimise the cumulative impact of operational hazards between the BP refinery and the proposed LPG plant. Although this was the advantage the BHP/AIS site had over the BP site it was mentioned that the BHP/AIS site also has a large amount of vacant land surrounding it which could be developed in later years thus negating the purpose of having a buffer zone between the two plants.

Also regarding the issue of a buffer zone, it was suggested that a buffer zone be established to improve the area's aesthetics, contribute to residents and road users safety and provide additional usable open space and recreation areas.

6.4 EMPLOYMENT

A number of submissions expressed the opinion that it would be beneficial to locate the plant at Kwinana as this area currently suffers from above average rate of unemployment and it would appear that labour requirements for the plant could be adequately met from the local labour force. However, the report is not clear on what type of labour is required during the construction and opertion phase and, as the predominant unemployed in the area are unskilled and semi-skilled workers, employment of skilled workers will mean that Kwinana will not benefit by the estalishment of the plant. Clarity to this matter was sought.

6.5 RESIDENTS IN THE AREA

One submission was of the opinion that there were more residents in the area tham implied in the Report and that the estimates in Table 5.2, p38 of the Public Environmental Report may not be entirely correct. It was also mentioned that the residents were concerned about the prospects of being able to continue to obtain cheap rental accommodation in the area.

7. OTHER

7.1 NATURAL RESOURCES AND THE ENVIRONMENT

The LPG facility will make optimal use of Western Australia's natural gas resources, according to one submission, and Western Australia's demand for LPG will be totally met by local production. However, residents and others have a growing anxiety about the continuing deterioration of the environment.

One submission was of the opinion that this project may amount to more wasteful consumption of a non-renewable resource for short term partially expedient reasons with no consideration for the future.

7.2 ADEQUACY OF PER

A number of submissions made the comment that the Public Environmental Report lacks adequate technical detail to permit thorough assessment and that the authors may have influenced adversely the public's perception of the project by remaining silent on a number of key issues and by the frequent use of unqualified statements.

7.3 NO COMMENT

Five submissions made no comments on the report for a number of reasons including lack of technical expertise to evaluate the report, it was outside the scope of the department or group or the Public Environmental Report was generally satisfactory in relation to matters concerning them.

1 INTRODUCTION

The Public Environmental Report (PER) and associated Risk Analysis for the proposed LPG extraction plant were advertised for public comment on Saturday 21 December 1985, initiating an eight week review period. During this period, government departments were required to respond as part of the statutory approval process, and private organizations and individuals were also invited to respond. A total of twenty-five submissions were lodged with the Department of Conservation and Environment, of which the proponent was given the following:

- Department of Conservation and Environment
- Department of Mines
- Government Chemical Laboratories
- State Planning Commission
- Western Australian Fire Brigades Board
- Western Australian Police Department
- Air Quality Branch
- Department of Resources Development
- Department of Community Services
- Department of Occupational Health, Safety and Welfare
- Town of Kwinana
- City of Cockburn
- Main Roads Department
- Fremantle Port Authority
- Department of Industrial Development
- Noise Control Branch
- Shire of Rockingham
- Local Government Association of Western Australia (Inc.)
- Westrail
- Conservation Council of W.A.
- Private submission
- Private submission

The proponent considers that, in general, the issues raised in the submissions were addressed adequately in the PER. However, as a clarification, these issues have been categorized as follows and discussed further, where necessary, in Section 3:

- cumulative risks
- planning
- odours/mercaptans handling and control
- waste disposal and atmospheric emissions
- future auditing
- monitoring, management, hazard and operability (HAZOP) studies
- occupational health
- noise
- design details
- miscellaneous

Some submissions referred to aspects of the plant and process that have, since the release of the PER, been changed or finalized. These changes are discussed in Section 2.

2 PLANT AND PROCESS CHANGES SINCE THE PER

Since the publication of the PER, the proponent has progressed with the finalization of the feasibility study and has re-evaluated certain areas of the plant and process. In addition, the inlet natural gas specification has been resolved with the State Energy Commission of Western Australia (SECWA) and this has allowed the selection of the molecular sieves used in the dehydration section of the process.

The significant changes to the plant or process since the publication of the PER are summarized as follows:

- Molecular sieves in the dehydration section of the process, which allow all the water, mercaptans and sulphur-bearing compounds stripped from the inlet natural gas to be returned to the lean natural gas leaving the plant, have been selected. This aspect, which is discussed further in Section 3.3, obviates the need to dispose of these waste products.

- The secondary containment system to the refrigerated storage tanks has been modified. The proposal described in the PER was based upon earth backed concrete walls to a height of three-quarters of the refrigerated tanks. This has been modified to the use of free-standing reinforced concrete walls to the full height of the refrigerated tanks. The effect of this modification will be to reduce the fire water requirements of these tanks due to greater shielding from heat radiation. In addition, the risk levels to the surrounding areas will also be reduced due to the greater security of containment and the increased shielding to the tanks from heat and missiles.

- The fire fighting system is presently being reviewed. Options being considered are the use of large capacity bores as a source of water and the provision of pumps on the run-off collection pond to allow reuse of the fire water.

3 RESPONSES TO SUBMISSIONS

3.1 CUMULATIVE RISKS

The issue of cumulative risk relating to the proposed plant and the Kwinana industrial area is discussed in a separate letter from Det norkse Veritas to the EPA.

3.2 PLANNING

The proponent has received confirmation from the State Planning Commission that the site is appropriately zoned as industrial in both the Town of Kwinana's Town Planning Scheme No. 1 and the Metropolitan Region Scheme.

The plant will be clean and neat and, as discussed in the PER, will have only a minor impact when compared with its immediate industrial context. The perimeter of the plant will be landscaped to improve the appearance, but this landscaping will need to be consistent with safety (fire) and security requirements. The strip of remnant native vegetation existing between Mason Road and the railway reserve will not be affected and this will serve to screen the plant from users of Mason Road.

The option of siting the plant on vacant land on the BP Refinery site was rejected during the site selection phase principally because the chosen site established a buffer zone between the two plants, thereby minimizing the cumulative impact of operational hazards. The fate of this buffer zone is beyond the control of the proponent and it will be the responsibility of the State and local governments to assess any future development proposals in relation to the surrounding industries.

It is possible for the public to access the beach near the loadout jetty and pipeline. In fact, although this section of beach is not very popular, walkers and people exercising horses are sometimes seen in the area. This does not affect the results of the preliminary risk analysis presented in the PER as the calculated risk levels along the beach are well within the EPA recommendations for recreational areas. In the event of an emergency in this area or at the plant, personal safety of people on the beach will not be an issue as there will always be a means of egress, either along the beach or by one of the access roads to the adjacent industries.

In the event of an emergency affecting Mason Road, an alternative means of egress for employees at the BP Refinery would be via gates on the refinery's southern boundary or along the beach. The proponent will offer all possible co-operation with the relevant government authorities and BP Refinery to develop contingency plans for this area.

Risk levels associated with the plant along Rockingham Road and also the MTT park-and-ride transfer station are well within the EPA recommendations and, therefore, the presence of these public utilities is not considered an issue in relation to the location of plant.

3.3 ODOURS/MERCAPTANS HANDLING AND CONTROL

The PER identified the possible sources of odours from the plant as being the handling and disposal of mercaptans and the disposal of other sulphur-bearing compounds contained as impurities within the natural gas. These mercaptans and sulphur compounds are extracted from the natural gas together with the water by molecular sieves. Periodically, the molecular sieves are regenerated with hot gases that strip the water, mercaptans and sulphur compounds from the surface of the molecular sieve particles.

The fate of the stripped materials depends upon the molecular sieves being used which, in turn, depend upon the impurities contained within the natural gas. At the time of preparing the PER, the natural gas composition specification had not been resolved with SECWA, hence the molecular sieves could not be selected. However, two options for disposal were identified:

- return to the lean natural gas leaving the plant;
- extraction and disposal of the water by evaporation, and the sulphur compounds and mercaptans by incineration.

Subsequent to the PER, the natural gas composition specification has been resolved with SECWA, and this allows the former option to be used for the proposed plant. Therefore, the disposal of water, sulphur compounds and mercaptans ceases to be an issue, and an EMP should not be required.

Mercaptans will be used to odorize LPG destined for the local market. The dosing plant will be a fully enclosed system to ensure that mercaptans are not accidentally released.

3.4 WASTE DISPOSAL AND ATMOSPHERIC EMISSIONS

The PER identified the following waste products that would require periodic disposal:

- water from dehydration;
- mercaptans and sulphur compounds forming impurities in the natural gas;
- inert desiccant from the molecular sieves;
- light combustible gases, such as methane and ethane, which would be flared;
- light wastes from cleaning facilities and stormwater which may be oil-contaminated;
- domestic sewage.

Developments in the process design since the publication of the PER have resulted in the water from dehydration, mercaptans and sulphur compounds being returned to the natural gas leaving the plant, as discussed in Sections 2 and 3.3. This obviates the need to consider disposal.

The behaviour and characteristics of the desiccant from the molecular sieves appear to have been misunderstood by a number of respondents. This material is an inert, clay or gravel-like material selected for its ability to strip inpurities

from natural gas by trapping on its surface the water and sulphur particles. Upon heating with hot gases, the trapped particles are released back into the gas stream, thereby regenerating the molecular sieve. This process is highly efficient, and, when the molecular sieves are used in pairs, one allows the stripping of impurities from the inlet natural gas whilst the other is being regenerated and releasing the impurities into the lean natural gas leaving the plant.

The molecular sieves are operated continuously on this stripping/regeneration cycle until their efficiency is impaired by the build-up of carbon particles on the surface of the desiccant. At this stage, the desiccant is replaced, at the rate of 40 tonnes every 2 years.

The desiccant requiring disposal will be stripped of all hydrocarbons, mercaptans and sulphur compounds prior to disposal and will therefore not present an odour problem nor impact the environment when disposed of by sanitary landfill, as is the practice with other plants.

The condensate (gasoline) storage tank will be typical of the many fixed roof storage tanks that already exist in the Kwinana industrial area. These tanks are not designed for internal pressures and are therefore vented to the atmosphere during filling. As some vapour will always exist above the liquid condensate, the venting will release small quantities of hydrocarbons into the atmosphere. The quantities will be sufficiently small and intermittent so as not to be detectable outside the plant boundary. Further, the condensates will be removed from the inlet natural gas by the North-West Shelf project partners after 1990. This tank will then no longer be required.

As discussed in the PER, the plant cooling system has not been finalized at this stage, with the exception that sea water cooling will not be used. Therefore, the two options being considered are:

- air cooling
- closed circuit water cooling.

If the latter is adopted, an occasional small quantity of bleed water, containing common rust inhibitors, will need to be disposed of. This will either be evaporated in a sealed pond or carted away by liquid contractors.

The plant will not generate any smoke and, therefore, this is not an issue.

The incremental effect on air pollution will be restricted to the following:

- accidental releases of hydrocarbons;

- products of combustion resulting from intermittent flaring of hydrocarbons;

- products of combustion resulting from the use of natural gas-fired turbines as power sources in various areas of the plant. These products of combustion or exhaust gases will contain small quantities of nitrous oxides and burnt mercaptans in similar proportions to natural gas used for domestic and industrial purposes.

LPG extraction plants are generally considered clean by industry standards. The proposed plant will not contribute to the sulphur load in the atmosphere, which is the primary cause of the present odour problem in the area.

3.5 FUTURE AUDITING

Section 7.5 of the PER commits the proponent to undertake regular independent safety audits to ensure compliance with commitments to safeguard people and property.

These audits will be undertaken in accordance with petroleum industry standards by one of a number of internationally recognized organizations specializing in this type of work.

At the present time, there is no statutory requirement in Western Australia for these safety audits to be undertaken or reported. However, the proponent will provide the results to interested government authorities upon request.

3.6 MONITORING, MANAGEMENT AND HAZOP STUDIES

Petroleum industry standard practice is to undertake detailed HAZOP studies prior to commissioning the plant. The philosophy and methodology of HAZOP studies are outlined in Section 6.4 of the PER.

The proponent will be undertaking a full HAZOP study in accordance with the above.

An important consequence of the HAZOP study is the formulation of a detailed Plant Emergency Plan covering all aspects of plant safety and emergency contingency planning. This Plant Emergency Plan will be provided to the relevant government authorities, the Kwinana Town Council and State emergency groups.

3.7 OCCUPATIONAL HEALTH

The PER, being a public environmental document targeted at regional issues, does not specifically address hazards to the construction and operational workforce. However, this does not mean that the proponent will not place major emphasis on the safety of all workers involved with the plant. The proponent will ensure that all statutory rights with respect to work safety will be met by adopting the generally more stringent petroleum industry standards.

As discussed in the PER, the proponent has an excellent record in personnel training, particularly in respect to the safe handling of LPG products. In fact, the proponent, in this regard, is widely considered to be an industry leader. Personnel education programmes will be developed for the project and implemented on a regular basis. With sponsorship from the proponent, these programmes will be offered to employees of relevant adjacent industries, the Fremantle Port Authority and other government agencies in regular contact with the plant.

3.8 NOISE

The plant will be designed to petroleum industry standards, which require that noise levels within any area of the plant are less than 85 dB(A). Any equipment causing a higher noise level than acceptable will be appropriately shielded to ensure compliance with the standards adopted.

Employee work stations, where employees will spend the majority of their time, will always be maintained at noise levels much lower than the standard nominated for the rest of the plant.

3.9 DESIGN DETAILS

The plant will incorporate a large number of safety features to minimize risks, and these are summarized in Attachment A to this report.

The site layout will not be finalized until the completion of the detailed design. However, the plant layout will be arranged to minimize possible risks. Petrochemical industries generally are characterized by an excess of land above that required for the physical dimensions of the plant, resulting from a desire within the industry to maximize separation distances between critical components. The proposed plant will be designed using a similar approach as the site chosen is of sufficient size to allow separation distances far in excess of normal requirements.

The proponent will make design details available for review by relevant government authorities, providing that this information does not contravene secrecy agreements entered into with process equipment suppliers.

All aspects of the plant will comply with relevant legislation.

The route of the supply and return lines between the plant and the Domgas line is the province of SECWA.

3.10 MISCELLANEOUS

Hazards in the event of ship collision are addressed in Section 5.3.5 of the Preliminary Risk Analysis report by Det norske Veritas. Four to six shipping movements per year are anticipated and each of these will be under the strict control of the Fremantle Port Authority.

The proponent recognizes that the multiple use jetty is not ideal for the loading of LPG. However, in this instance, the proposal is considered acceptable for the following reasons:

- the small number of loading operations per year;
- proposed modifications to the jetty including upgrading of the fire system and provision for isolation of all electrical equipment;
- the use of all intrinsically safe equipment for the LPG loading operations;
- establishment of an appropriate commissioning and decommissioning procedure for each shipment.

In order to achieve the maximum safety for the plant and the public, the proponent is committed to employing only the best available skilled workforce for both the construction and operation of the plant.

The option of multiple storage for the refrigerated LPG product was not addressed in detail in either the PER or the Preliminary Risk Analysis report. This matter was considered on a qualitative basis at the commencement of the risk analysis studies. A large number of smaller tanks obviously reduces the

quantity of LPG held in any one tank and, potentially, the quantity of LPG released during a catastrophic event. However, a large number of tanks and fittings increases the probability of release events and, therefore, public safety is not necessarily improved. For the proposed plant, the proponent considered it appropriate to ensure public safety by adopting a minimum number of tanks and incorporating into these a secondary containment system. This has the effect of limiting the rate of LPG release by limiting the heat available for boiling the LPG.

On-site tank construction will be closely monitored by a comprehensive quality assurance programme, as is standard practice in the petroleum industry.

Appendix 4 Letter from Det Norske Veritas re: Risk Analysis

DET NORSKE
VERITAS

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SOUTH PACIFIC REGION
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2nd Fl, 165 Walker St, Nth Sydney
Telex no. 26447 DNV
Telegr.adr. Noritas, Sydney, N.S.W.
Tel. (02) 9221966
BANKERS: National Australia Bank
A/c No: 082318 269330

4th February 1986

Mr. W. Pradhan
Department of Conservation & Environment
1 Mount Street
Perth, W.A. 6000

Dear Sir,

We enclose a letter advising of our independence as an organisation and the suitability of our recent risk analysis report for planning and approval purposes.

We have no objection to the publication of that letter if appropriate to your department's purposes.

Yours faithfully,
for DET NORSKE VERITAS

JOHN R. CASTLEMAN
Manager, Technical Services

JC/bp

DET NORSKE
VERITAS

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28th February 1986

The Chairman
Environment Protection Authority
Department of Conservation & Environment
1 Mount Street
Perth, W.A. 6000

Dear Sir,

This letter is to advise that Veritas has completed its Preliminary Risk Analysis Study for the proposed LPG Extraction Plant for Wesfarmers Kleenheat Gas Pty. Ltd.

The study was carried out by Messrs J.R. Castleman, R.K. Nayak, M.F. Jarman and E. Skramstad of Det norske Veritas. The results of the study are reported in Veritas Report No.859020 completed on the 18th December 1985.

Copies of this report have been forwarded to your office on our behalf by Kinhill Stearns, Perth.

We advise that in its internationally recognised role as an independent Classification and Certification body, Det norske Veritas conducts its studies with an objective independent approach. Our aim is to provide assessment based on factual non-biased information and impartial analysis. Internal quality assurance measures are adopted to help ensure objectivity and high technical standards. As a result we contend that risk analysis studies may be utilised for planning and approval purposes by responsible authorities. Detailed informations on Det norske Veritas and its activities have been previously forwarded to your office for your records.

Should clarification of any aspect of our report be required we would be prepared to assist at your request.

Yours faithfully,

ERNST B. MARTHINUSSEN
Regional Manager

JOHN R. CASTLEMAN
Manager, Technical Services

JC/bp

encl:

Appendix 5 Summary List of Proponent's Commitments and Safeguards

WESFARMERS KLEENHEAT GAS PTY LTD

PROPOSED LPG EXTRACTION PLANT

PLANT SAFEGUARDS

- Prepared by -

Kinhill Stearns
47 Burswood Road
Victoria Park W.A. 6100

Ref: P85075/216:88

March 1986

TABLE OF CONTENTS

1 INTRODUCTION

This document summarizes the safeguards that are to be incorporated into the proposed LPG extraction plant at Kwinana, and confirms the proponent's commitment to these.

For referencing purposes, the safeguards have been itemized under the following headings:

- Process
- Storage
- Operation
- Load-out pump and pipeline
- Ship loading
- Shipping
- Construction

Sections 2-8 deal with each of these areas or phases of plant operation.

2 PROCESS

- All critical components will be duplicated.
- All electrical, instrumentation and mechanical items will be installed in accordance with relevant codes.
- Adequate separation distances between equipment items will be maintained in accordance with established industry standards.
- Where possible, vessels will be oriented so they do not point towards storage tanks.
- Process vessels and pipes will be protected against over-pressure by relief valves that feed either into the flare tower or to another part of the plant.
- Compressors will be provided with safety interlocks including anti-surge control where applicable, remote shut-down system in case of emergency, and initiation of blow-down system where applicable.
- Remote operated block valves will be installed on pump lines from large inventory vessels for emergency shut-down.
- Automatically activated combustible gas and fire detectors will be provided.
- Plant hazardous areas will be defined and all potential ignition sources designed to the appropriate safe standards.
- Appropriate fire protection will be provided.

3 STORAGE

3.1 REFRIGERATED STORAGE (EXPORT)

- Design of the refrigerated storage tanks will be undertaken by an experienced process design contractor in accordance with Australian and United States statutory codes, which specify construction materials and require testing of welding procedures, qualification of welding personnel, and inspection and testing of tanks.

- Primary relief valves in the refrigerated tanks will vent to the flare tower; secondary valves will vent to the atmosphere in controlled quantities.

- Provision will be made for back-up holding refrigeration to storage tanks in the event of equipment or power failure.

- The secondary containment system, consisting of a reinforced concrete wall, will be capable of holding the entire contents of the refrigerated tanks.

- The refrigerated tanks will be externally insulated and provided with deluge fire protection.

3.2 DOMESTIC STORAGE

- The pressurized storage tanks will be designed in accordance with relevant codes, which specify fire protection criteria, vessel location, pressure relief, and explosion-proof or intrinsically safe fittings.

- Fire protection will include a deluge system.

4 OPERATION

4.1 ABNORMAL CONDITIONS

. A flare tower will be installed to dispose of combustible gas in abnormal conditions only. A detection device will monitor the pilot flame, and relighting will be automatic. A safety zone will surround the flare tower.

. All care will be taken to prevent the accidental release of hydrocarbons to the environment.

. Automatically activated diesel generator back-up units will be installed with the two SECWA power connections to ensure safe shut-down of the plant.

. Automatic and manual shut-down systems will be provided.

4.2 EMERGENCY PROCEDURES

. Detailed contingency plans will be formulated in consultation with relevant government departments to ensure fast remedial action in the event of an emergency.

4.3 FIRE PROTECTION

. The proponent will join and participate in the fire fighting co-operative already established by industrial operators in the area.

. Fire water supply will be provided with spare pumps.

. Fire pump drivers will be both electric and diesel.

. Distribution of fire water around the plant will be operated automatically, with a loss of pressure in the fire main resulting in activation of the fire pumps.

4.4 MAINTENANCE

. The plant will receive regular preventative maintenance.

4.5 MATERIALS HANDLING - DOMESTIC MARKET

. The domestic transfer facility will be equipped with self-sealing hose breakaway joints, a deluge fire protection system and automatic boom gate barriers.

. The critical equipment items - positive displacement pump and vapour compressor - will be duplicated.

4.6 SECURITY

- Chain-link boundary fences will surround the plant, and closed circuit television cameras will monitor plant activities.

4.7 FURTHER STUDIES

- A detailed final risk analysis will be undertaken in conjunction with the plant designers to confirm or improve upon the recommendations made in the initial risk analysis.

- A full hazards and operability study will be undertaken, and plant personnel will undergo training in safe operating practices and emergency procedures.

4.8 MONITORING

- The plant will undergo regular safety audits to monitor the effectiveness of safeguards and procedures.

5 LOAD-OUT PUMP AND PIPELINE

- The load-out pipeline will be equipped with detectors to enable automatic shut-down of the supply pumps in the event of an emergency.
- All electrical, instrumentation and mechanical items will be installed in accordance with relevant codes and will be suitable for hazardous areas.
- Pumps will be spared.
- Pumps will be able to be controlled from a local stop/start station or by the emergency shut-down (ESD) system.
- Activation of the ESD system will stop pumps automatically.
- Suction and discharge lines will be provided with pressure and temperature gauges that indicate readings at the control room.
- Gas detection will be provided in the pump compound with both high level alarm and ESD functions.
- Automatic water deluge fire protection, in accordance with AS 1596, will be installed to protect the pump area, together with fire monitors and/or hydrants.
- Pumps will be fitted with temperature differential alarms between suction and discharge with both local alarm and ESD functions..
- Both the load-out and vapour return pipelines will be provided with pressure and temperature gauges, and isolation valves at the wharf end that automatically close on operation of the ESD system.
- The load-out pipeline will be provided with a safety relief valve.
- The load-out pipeline will be filled with inert gas close to atmospheric pressure when not in use.
- A comprehensive quality assurance programme will be initiated to cover the manufacture and installation of pipelines, pipeline supports, valves and flanges.
- The load-out and recirculation pipelines will be insulated.
- The pipeline will be monitored throughout the ship loading operation.
- The pipeline will be corrosion protected.

6 SHIP LOADING

- A comprehensive quality assurance programme will be initiated to cover the manufacture and installation of the marine loading arm and hoses.

- Procedures will be formulated to deal with every aspect of the ship loading operation.

- The marine loading arm will be equipped with quick action shut-off valves and release mechanisms.

- Vapours released at the loading terminal will be returned to the refrigerated tanks at the plant via a vapour return line.

- The loading arm arrangement in the mounted position and connections to liquid and vapour lines will have a design failure rate no greater than one chance in a million per year. A qualified third party will confirm the rate determined by the designers.

- During ship loading, only electrical equipment approved for hazardous areas will be activated - all other activities will cease and warning procedures will be initiated to this effect.

- Two audible range alarms will sound automatically on excessive movement of the loading arm, the second of which will automatically activate the emergency release coupling.

- Isolation valves at the end of liquid and vapour lines will be automatically closed on operation of the ESD system or operation from out of range alarms.

- An ESD station will be provided near the loading arm.

- An operator will be stationed at the wharf throughout the entire loading operation.

- The loading arm will be protected from corrosion.

- If flexible hoses are used (to be decided during detailed design), they will be tested to in excess of the expected working pressure prior to each loading operation commencing.

7 SHIPPING

- The tankers will be under compulsory control of the Fremantle Port Authority from the time they enter the port to the time they berth, and vice versa.

8 CONSTRUCTION

- Site clearing will be limited as far as is practicable.
- Dust generation will be reduced by carrying out construction in winter months and suppressed by sprinkler watering practices.
- Construction materials and practices will be in accordance with the requirements of relevant Australian or, in their absence, international codes.
- Noise generated during construction will not exceed those levels deemed acceptable by relevant legislation.

Appendix 6 Letter from Det Norske Veritas re: Cumulative risk

DET NORSKE
VERITAS

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A/c No: 082318 269330

March 24, 1986

The Chairman
Environment Protection Authority
Ministry of Conservation and Environment
Mount Street
Perth W.A. 6000

Dear Chairman,

Re: Preliminary Risk Analysis for Proposed LPG Plant - Kwinana

Further to recent discussions with your office we advise the following with respect to responses received to the PER and Preliminary Risk Analysis for the proposed Kleenheat Gas LPG extraction Plant.

1. Domino Effects

a) Credible causes of possible domino effects arising from neighboring facilities as well as within the proposed plant were considered in the analysis. This consideration was based on an assumption that the adjacent plants were typical of their respective industries, and we have no reason to doubt this. For each event considered, the likely frequency of occurrence was broadly estimated and included in the events identified and evaluated in the risk analysis. For example:

   (1) in the event of a toxic gas release from the B.P. refinery or AIS the LPG plant could be safety shut down,

   (2) in the event of fire or explosion in adjacent plants, most damaging effects would be contained within their respective sites and any effects impacting on the LPG plant are included within the event frequencies e.g. tank failure or vessel failure considered.

b) The other case considered was the risk of the LPG plant impacting upon adjacent facilities. The level of these risks is shown in the risk contours to be very low and within the criteria set for the study.

   This includes the risks of effects from unignited flammable gas cloud, fire and explosion on the closest facility, AIS, and on the refinery, CIG and Coogee Chemicals.

   The need for a contingency plan for emergencies is however identified and the proponent has undertaken to complete a contingency/emergency plan as part of the project development.

2. Cumulative risk

The assessment of cumulative risk for the whole Kwinana industrial area requires risk assessment of each facility. We understand that such a study is being arranged.

Pending the outcome of this study, it is the view of the risk analysis team on this LPG plant proposal that cumulative risk contours for fire and explosion risks would be little different at the risk criteria level of 1×10^{-6} per year than for the individual contours for each plant due to the separations between facilities in proximity to the LPG plant site.

This holds for the residential areas for which the LPG plant risk contribution is calculated to be less than one in ten million per year.

We trust that the above, together with the more detailed comments within the risk analysis clarifies the issues raised.

Yours faithfully,
for DET NORSKE VERITAS

J.R. CASTLEMAN
Manager, Technical Services

JC/bp

Appendix 7 Industrial Air Pollution Working Group - Interim Report

APPENDIX TO PART B:

INDUSTRIAL AIR POLLUTION WORKING GROUP INTERIM REPORT

The Environmental Protection Authority wishes to record its appreciation for the work of the Industrial Air Pollution Working Group. Its Interim Report, included here as an Appendix, together with inputs from members of the Working Group over several months, has been formative in the development of parts of this Assessment Report.

However, by including the Interim Report of the Working Group in this Assessment Report, the Authority does not thereby endorse all the recommendations of the Working Group. For example, the Working Group has adopted a "best practicable means" approach to the control of emissions, whereas the Authority considers the "beneficial use" approach to be more appropriate.

DEPARTMENT
OF RESOURCES
DEVELOPMENT

"ATRIUM"
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ADDRESS ALL CORRESPONDENCE TO THE CO-ORDINATOR

Your Ref.
Our Ref 74/86 DB002:AMS
Enquiry Mr Bachman

Chairman
ENVIRONMENTAL PROTECTION AUTHORITY

KWINANA INDUSTRIES CO-ORDINATING COMMITTEE
INDUSTRIAL AIR POLLUTION WORKING GROUP

As advised in my letter dated April 24, 1986, the Working Group met on May 1, 1986, to specifically discuss the draft report that was forwarded to you.

Enclosed is a copy of an interim report which has been accepted by the Working Group.

As indicated in my letter dated April 24, 1986, the Working Group's final report should be available within the next four/six weeks. It will include sections dealing with specific pollutants which are not covered in the interim report.

You have also requested this Department for approval to incorporate the Working Group's interim report in the EPA report which is being made available for public review and comment. This has been discussed with Mr George White, Deputy Co-ordinator, who has given his approval to your request.

P. Murphy
CHAIRMAN
INDUSTRIAL AIR POLLUTION WORKING GROUP

May 2, 1986

Enc.