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WESMINCO OIL PTY LTD WA-149-P

OFFSHORE OIL PRODUCTION

ENVIRONMENTAL PROTECTION AUTHORITY REPORT

Department of Conservation and Environment
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DEPARTMENT OF CONSERVATION AND ENVIRONMENT
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1. BACKGROUND

Wesminco Oil Pty Ltd as operator of WA-149-P has defined three small offshore oilfields, Chervil, North Herald and South Pepper, between Onslow and Barrow Island. Recoverable oil reserves are estimated at 1.7 million kl.

The Authority considered a Notice of Intent on the project in January 1984 and recommended preparation of an Environmental Review and Management Programme. The ERMP was released for public comment in February 1985 with a six week review period.

In addition to the Wesminco fields, the Harriet oil field has been defined by Bond Oil Pty Ltd north east of Barrow Island. It is likely that further small oil fields will be developed in the future.

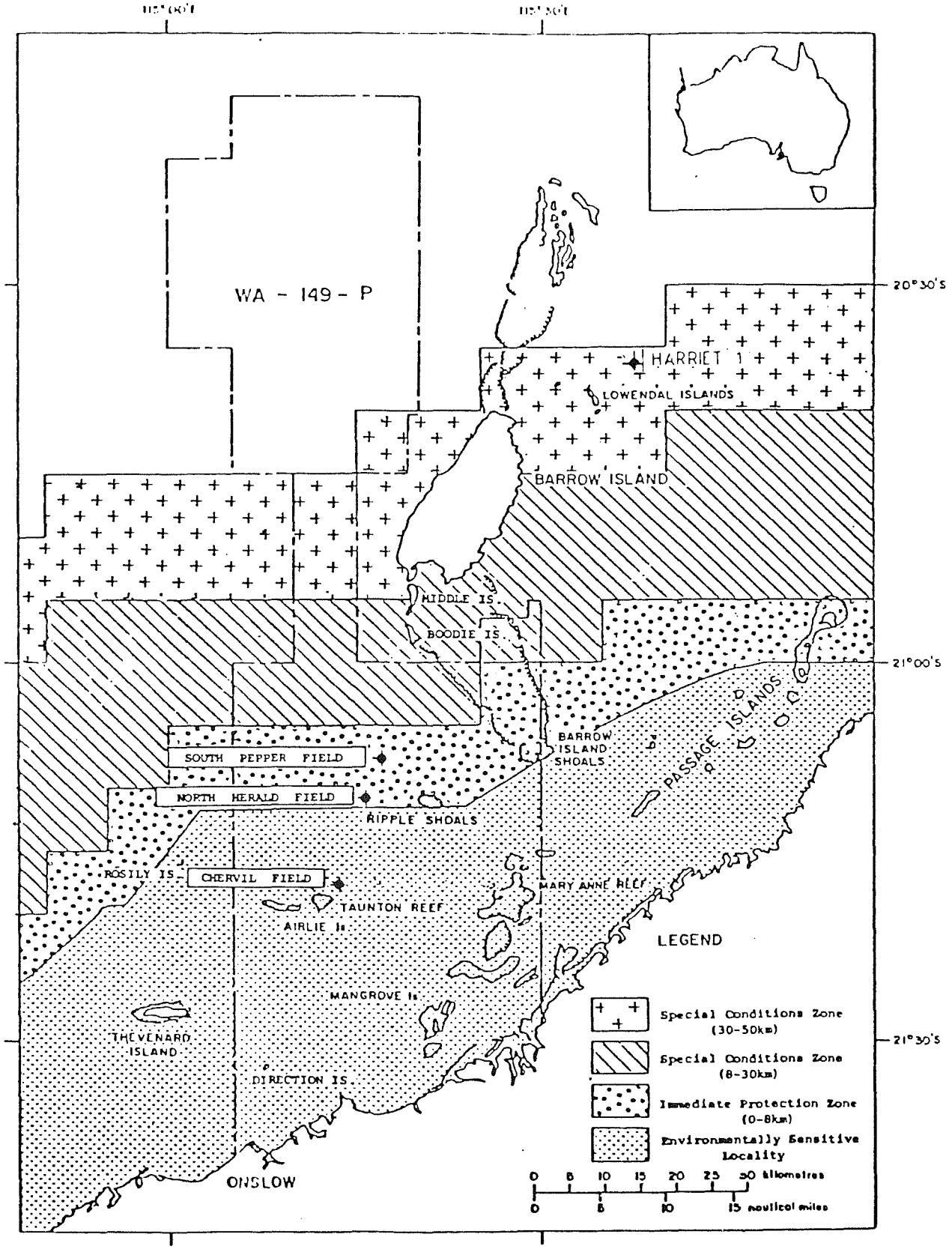
Barrow Island commenced oil production in 1967 reaching a peak of 7,900 kl/d in 1970. Current production has declined to approximately 3,800 kl/d. Barrow Island oil is stored on the island and is loaded into tankers via a concrete coated steel pipeline to a tanker mooring facility approximately 10km offshore.

The regional setting is presented in Figure 1.

2. THE PROPOSAL

The project would involve the production of light crude oil from the South Pepper, North herald and Chervil fields located 25, 20 and 6km north east of Airlie Island respectively. Well head structures at these fields could be linked by subsea pipelines to a treatment and storage facility on the eastern portion of Airlie Island. Some gas flaring will occur at the South Pepper A platform but the main processing is proposed for Airlie Island. Shipment would be via an offshore tanker mooring located 3km north of the island. Estimated production for the 5 to 7 year operation would initially be 1400 kl/d with a total of 0.48 million kl in the first year decreasing to 0.02 million kl in the fifth year.

A summary of various emissions and wastes from the operation is presented in Table 1.



LOCATION

FIGURE 1

Table 1.

SUMMARY OF EMISSIONS AND WASTES (FROM ERMP)

LOCATION	EMISSION OR WASTE	VOLUME/INTENSITY	COMMENT
South Pepper A Platform	flared gas	$200x10^3$ m^3/d	Max from 6 wells
Pipelines	Test fluid	variable	Corrosion inhibitor may be used. Disposal to be determined.
Airlie Is.	Produced water	1700 kl/d max Average 400 kl/d	Marine Discharge 1.3km NE of island oil content will not exceed 50ppm. PH 7.7 to 8, Cl 21,000 mg/l, S04 40 mg/l NO3 2mg/l. Temp, radiation, metals unknown.
	Flared gas	$185x10^3$ m^3/d	maximum. Flare radiation level not to exceed 440 $Btu/ft^2/hr$ at process facility
	Process area drainage	NA	To production separator if contaminated.
	Production vessel drainage	NA	To production separator
	Tank drainage	NA	To production separator
	Rainwater in bunded area	NA	Discharged through produced water line if less than 50ppm.
	Reverse Osmosis salts	320 g/d approx.	Calc Based on design of 9000 l seawater/d capacity. Disposal not discussed.
	Sewerage	NA	leach drain overflow to ocean
	Noise from power generator	48-53dB(A) at 60m	
	Crude Tank spills, Diesel fuel spillage	NA	contained by storage tank bund
	Garbage	NA	compacted, solid material removed from island

Note: NA indicates information not available.

3. ALTERNATIVES

Alternative options considered by Wesminco included:

- the use of manned platforms on the South Pepper and North Herald fields, pumping stabilised crude oil to existing Barrow Island storage.

- using a Floating storage vessel supplied from fixed process platforms.

- using a combined floating production and storage vessel.

Disappointing appraisal drilling results and high capital costs eliminated the first alternative. The second two options were also uneconomic because of high operating costs, vulnerability to cyclone damage, high capital charges and risk of loss of production.

4. THE ENVIRONMENT

The oilfields are located in water depths of 16 to 18m. The Rowley Shelf, a broad limestone platform, underlies the coastal waters and extends to the vicinity of Barrow Island. This has resulted in shallow coastal seas with many small islands formed by limestone outcrops. Intertidal platforms fringe most islands.

The locality is subjected to strong easterly winds in winter and constant south westerlies in summer. An average of 1.5 tropical cyclones per year pass over the area.

Surface water movements are dominated by tidal current modified by windstress. Opposing flows around islands and reefs often cause complex local movements.

The islands in the area are of low relief with low shrub vegetation providing important habitats for a variety of life ranging from generally seabirds to mammals, reptiles and seabirds (eg Barrow group). Mangrove communities occur on the Mangrove Islands and extensively along the mainland coast.

The marine ecosystem of the Rowley Shelf has macroalgae, seagrass and coral communities in localised areas but these are generally distant from the proposed area. Most of the seabed is bare limestone covered in parts with loose sand and less often with broken rubble. These substrates support relatively sparse biological communities. All marine elements of the proposal are located on such substrates except for a 400m stretch of coral on the approach to Airlie Island.

The marine fauna is very diverse, including prawns, commercial fish species, turtles, whales, dugongs and various seabirds. Rock oysters are particularly well developed on the Airlie Island intertidal platform. Some green turtle nesting occurs on Airlie Island particularly at the western end of the island.

Wedgetailed shearwaters are seabirds of particular interest as they use Airlie Island as a nest site. In the area of the ERMP study the birds nest on 15 islands between November and March, the adults returning to the same nesting burrow each year to breed while the young birds select new nest sites. An estimated 29,700 burrows occur on the islands including 2720 on Airlie Island, 1000 of which occur in the proposed construction area.

To protect the area's important environmental resources, most of the islands east of WA-149-P are nature reserves as is Barrow Island to the north. The remaining islands west to Exmouth Gulf have been proposed as C class reserves by the Authority and are also listed on the Register of the National Estate. Also the permit area includes part of the Rowley Shelf environmentally sensitive locality with defined safeguards during offshore oil exploration and production. Airlie Island because of its lighthouse, is currently owned by the Commonwealth.

This region of the northwest Australia coast is of interest for petroleum exploration and development, wildlife conservation, commercial fishing, recreation, navigation requirements and the National Estate. Private individuals, companies and State and Commonwealth agencies are involved.

5. PUBLIC AND GOVERNMENT SUBMISSIONS

Three public submissions and 13 responses from State and Commonwealth government agencies were received during the public review period. A summary of issues raised is provided in Table 2.

The predominant concern was the effect of Airlie Island installations on bird life and turtles. The effects of the gas flare were of particular interest. Also a consequence of these misgivings a number of submissions stated that more consideration should be given to alternatives such as offshore processing/storage facilities or an offshore flare.

Submissions also commented on the lack of detailed baseline information on Airlie Island's vegetation and wildlife and marine reptiles and mammals.

Particular comment was also made that there should be independent assessment of Wesminco's environmental management by State and Commonwealth Government agencies.

The Company has addressed the issues raised in a subsequent letter to the Authority.

Table 2. Submissions Summary

NO OF SUBMISSIONS	ISSUE
5	Bird effects on Airlie by installations including flare, helicopters, people.
3	Turtle effects by flare.
3	Discounting of alternatives should be supported. More consideration should be given to offshore processing/storage facilities. Consider an offshore flare. Airlie preferably should not be used. Heritage Commission should conduct a review of alternatives (A).
3	Decommissioning procedures should include rehabilitation including providing habitats for bird nesting.
5	Baseline information on vegetation (including conservation status) and wildlife other than birds required for Airlie.
1	Marine reptile and mammals effects should be mentioned.
4	There will be a need for independent assessment of the Company's environmental management
2	Work force education and restrictions on use of Airlie and surroundings.
2	Quarantine.
2	Avoid contamination of reverse osmosis feeder line. Respect noise legislation.
2	Navigation light need not be moved but proposed fence may need to be shifted.
1	Effects on Onslow.
1	Underestimates of produced water discharge dispersion and oil spill movement.
1	Disposal of ballast, oily storm water runoff.
1	Brief anthropological and archaeological surveys required.
1	Longterm future of Airlie if smaller fields developed.
1	Discuss possible trawling with Fisheries.
1	A and B Class Nature reserves required in the area.

Table 2. Continued RESPONDANTS

Fund for Animals Ltd.

Dr J R Hunter

H Butler

F & W Wildlife

F & W Fisheries

Health

Lands

WA Museum

WA Museum Ab. Sites

Dept. Local Govt. & Admin Services

Arts Heritage & Environment.

Youth, Sport and Rec.

Herbarium

DRD

Tourism Comm.

Heritage Comm.

6. ENVIRONMENTAL ASSESSMENT

6.1 Production Wells

It is likely that the bulk of any drilling mud discharge from production wells will accumulate in the vicinity of each well. Some covering of the sparse but diverse epibenthos in the vicinity of the wells could occur but the ecological consequences would probably be minimal. However some drift may occur from the Chervil Field towards the macroalgal, seagrass and soft coral communities of Taunton Reef. Wesminco has proposed regular monitoring of the reef to detect this. Drilling of these wells should be in accordance with an approved oil spill contingency plan.

6.2 Production Platforms

Due to the design of all structures for a 50 year return storm, high currents, high marine growth and variable structural foundations the only aspects of concern is associated with the South Pepper A platform. It is uncertain what phototrophic effects to turtles and sea birds could be caused by the flared gas.

6.3 Pipelines

With the possible exception of short buried lengths of pipelines traversing seabed dunes at South Pepper it is proposed that all pipelines will be laid directly onto the seabed and secured. The eastern approach to Airlie Island will require trenching through coral. Care should be taken to minimise disturbance to these corals, especially through trench spoil placement and turbidity.

These are two concerns with laying pipelines on the seafloor. Firstly there will always be the possibility of a ship anchor breaking the pipe, although the area is infrequently visited and pipelines will be marked on navigation charts. Secondly, cyclones produce strong currents which could lead to localised stresses on the pipe, particularly in sandy areas subject to scour. Wesminco has designed the pipelines to ensure adequate stability under wave and current forces and free span conditions across uneven seabed. As a result the Authority is satisfied that pipeline damage would be unlikely and extensive costly burial is unnecessary.

Some interest has been shown in fish trawling of the project area and the company has undertaken to consult with the Fisheries Department and the fishing industry on this matter.

Wesminco does not believe that corrosion inhibitor treatment of pipelines test water will be required. However if so it has undertaken to consult with the Department of Conservation and Environment prior to disposal.

6.4 Airlie Island Processing and Storage Facility.

The major environmental disruptions of the project would be caused by the construction and operation of the Airlie Island Facilities. These would be located in the eastern section of the island with disturbance occupying about 10 ha of the 24 ha island.

6.4.1 Wildlife

No rare or poorly collected flora occur on the island and the project would not reduce vegetation diversity. However approximately 1000 of the island's 2720 wedge tailed shearwater burrows occur within the construction area and many will be disturbed. Adult birds return consistently to their same burrow for nesting each year while young birds find new sites. It is not known what would be the fate of birds returning to nests covered say by tanks or accommodation units. Many may die without breeding but to ascertain what actually occurs, the Company has initiated a Shearwater monitoring programme including bird banding. Disturbance and covering of nesting sites should be minimised. In particular land between the proposed helipad and marshalling area should not be disturbed unless entirely necessary. This area should be fenced to protect existing burrows.

The proposed gas flare could have large effects on the whole Shearwater colony and also on the breeding success of turtles although the turtle nesting is predominantly at the western end of the island. Wesminco is conducting engineering studies into the use of a flare pit or a fully enclosed flare in a large diameter duct to reduce flare visibility. Such shielding of the flare should be seriously considered. If phototrophic effects on wildlife are found to be significant during flare operation, relocation or significant redesign would be necessary. Relocation alternatives would have to include siting the flare offshore, say at Chervil. It will be unlikely that an unshielded flare on the island would be satisfactory.

Lights are known to attract turtle hatchlings and it is important that lights on the island are not visible from the sea. Again, a shielded flare is probably necessary to avoid disruption to turtles.

The Company has recognised the potential for disruption to wildlife by the work force and has undertaken to minimize access to the south east sand spit used extensively by roosting birds, the western beach having the majority of turtle nests and the western vegetated section which supports the balance of the Shearwater colony.

Although there have been no apparent effects on nesting wedgetailed shearwaters during helicopter visits, flights over the western section of the island will not be permitted by the Company to avoid disturbing nesting birds.

6.4.2 Education

In conjunction with restriction of access the company has undertaken to conduct staff training and education as an integral part of environmental management. Details of the training should be discussed with the Department of Conservation and Environment. It should involve both construction and permanent work forces.

6.4.3 Quarantine

To minimise the risk of introducing weeds, rodents and other animals such as cats and dogs to the island, Wesminico has proposed adopting quarantine regulations at least equivalent to those followed by Wapet for Barrow Island. The effectiveness of this approach will have to be monitored.

6.4.4 Produced Water

Produced water containing oil at up to 48ppm will be discharged 1.3km north east of Airlie Island. Modelling has shown that this should not interfere with Airlie Island or Taunton Reef and would be at acceptable levels 350m to 800m from the outfall. Oil contaminated storm water and process drainage water would be similarly treated and discharged. To ensure that pollution does not occur and to be able to assess the effectiveness of the oily water separator, the treated water should be continually monitored with results being available for a minimum of 6 months after collection. Also a warning system should be installed to show when total hydrocarbon concentrations exceed 48 ppm.

6.4.5 Occupational Noise

The company has undertaken to design project facilities and machinery to ensure satisfactory working and living conditions, taking into account Hearing Conservation and Noise Abatement (Neighbourhood Annoyance) Regulations. The necessary approvals from the Shire of West Pilbara will also be obtained.

6.4.6 Rehabilitation

During the operations phase Wesminco would establish 2 or 3 trial plots to test rehabilitation approaches

for use upon decommissioning. The aim would be to particularly develop soil conditions suitable for wedge tailed shearwater burrows and plant regeneration.

In addition to the trials it is likely that actual rehabilitation work will be required to stabilise areas disturbed during construction. Storage of the top 200mm of soil from areas such as the marshalling area and oil storage would assist in the work.

Rehabilitation techniques should be discussed with the Department of Conservation and Environment prior to commencing trials or actual work.

The Mines Department should consider setting a realistic bond to guarantee satisfactory decommissioning (ie removal of infrastructure) and subsequent land stabilisation and rehabilitation at the conclusion of the project.

6.4.7 Fire Fighting

It is proposed that sea water will be used for fire fighting. This would be satisfactory for installation fires but would be highly damaging to vegetation. A combination of fire breaks and freshwater should be used for combatting fires in vegetation.

6.4.8 Other Wastes

The sewerage treatment system proposed is a septic tank with leach drain overflow directed to the sea. This would be satisfactory if the outfall is distant from the potable water inlet pipe and soil conditions are suitable.

Brine from the reverse osmosis plant will need to be disposed of to the sea in a controlled manner.

6.4.9 Land tenure

With the current land tenure, management of the Airlie Island operations could be difficult because of Commonwealth ownership of the island. For efficient management by State government agencies it would be desirable for the island to revert to State control with the land outside the production lease being a C class nature reserve vested in the National Parks and Wildlife Commission. This is in keeping with the Authority's System 9 recommendations for islands of this region.

In the future other oil fields may be discovered in the region and it would be desirable to utilise the Airlie Island, Barrow Island or Lowendal Island facilities rather than develop another site. As a

result lease conditions for Airlie should be written to accommodate sharing of facilities.

6.4.10 Aboriginal Sites

The Authority notes the Wesminco decision to carry out an anthropological and archaeological survey of Airlie Island. Results should be provided to the Authority for information.

6.4.11 Alternatives to Airlie Island

As a result of concerns expressed about the use of the island due to potential wildlife effects, the company was asked to detail the reasoning for the Airlie option. A similar question was asked of Bond Oil Pty Ltd in relation to its Lowendal Island proposals. Pipelines to Barrow Island and utilising its storage were not economic in the longer term when smaller fields were incorporated. This approach also created a high degree of uncertainty to continuity of supply because of a lack of control of facilities.

The Authority considers that storage tankers should only be used in the short term because of the higher risk of oil spills. Wesminco also found that total offshore production from platforms with associated storage barge would have potential lost production and capital cost penalties such as to render that option uneconomic.

Overall the Authority accepts that on economic grounds Airlie Island is the acceptable option.

6.5 Oil Spills

Oil spills are recognised as the most common cause of environmental pollution associated with offshore activity. However statistics indicate that the vast majority of spills are small.

Spills from the Oil storage on Airlie Island would be contained by the bunded area which would need to be suitably sealed.

Offshore spills may result from: pipeline accidents; oil well blow outs; explosion and fire; severe storms; and tanker accidents and operations.

The following discussion concerns offshore spills.

6.5.1 Spill probabilities

Wesminico have shown that there is a very low probability of a large spill. There is a probability of 1 for spills of less than $4m^3$ but for spills of more than 50 $000m^3$ the probability is only $8x10^{-4}$.

6.5.2 Nature of the Oil

The crude oil contains a large percentage of low molecular weight hydrocarbons and approximately 80 to 90% of the oil would be lost after 6 hours.

6.5.3 Trajectory analysis

Estimates have been made of oil spill trajectories under spring and neap tides. These show that any major spill in the project area is most likely to remain at sea in relatively deep water where it would quickly evaporate. However intertidal areas of Airlie Island are well within the 48 hour risk zone. Subtidal areas in the vicinity of the spill (eg Taunton Reef) would not be exposed to oil unless it was dispersed through the water column.

For Middle and Boodie Islands to the north and the Mangrove Islands to the east there is a remote possibility of an oil spill reaching their shores.

6.5.4 Oil Spill contingency Plan

The draft oil spill contingency plan should take into account the revised approach to the use of dispersants discussed in the Department of Conservation and Environment publication, Bulletin 104. In conjunction with the construction phase a spill trajectory model such as the National Plan OSSM model should be developed to assist in the control of oil spills.

6.6 Monitoring

Wesminco has proposed a biological monitoring programme covering: the subtidal Taunton Reef and produced water discharge site; intertidal monitoring adjacent to Airlie, North Mangrove Island, Anchor Island and Weld Island; and supratidal monitoring of birds, vegetation and rehabilitation on Airlie and a control island.

This monitoring should be finalised after discussion with the Department of Conservation and Environment. If the monitoring showed that unacceptable biological or physical changes were occurring, it would be necessary for alterations to be made to the operation.

6.7 Reporting

The Company has undertaken to make regular reports on the results of monitoring studies to relevant State and Federal government Departments. It is considered that comprehensive triennial reports on the environmental management programme covering work carried out and

plans for the next triennium should be provided for review by the Authority. These reports should be supplemented by brief annual reports outlining progress with the environmental work, any notable results, and any notable changes to the programme. The first report should be prepared following commencement of production. This should summarise the results of baseline studies and discuss progress with the environmental management programme. The last report should follow decommissioning and certain triennial report detail.

7. CONCLUSIONS

The low risk of oil pollution from the production well heads, together with their localised construction and operating effects indicate that this aspect of the project should be environmentally acceptable.

The Authority accepts that the pipelines are designed for stability under storm conditions and extensive burial is not considered necessary.

The Authority understands that the Airlie Island facilities are necessary for the economic viability of the project. During the five to seven year life of the operation, disruption will occur to adult wedgetailed shearwaters. There also may be detrimental effects on turtles. However if the recommendations of the Authority are followed this aspect of the project would also be environmentally acceptable.

8. RECOMMENDATIONS

The project would be environmentally acceptable if the Company follows its proposed environmental management commitments and adopts the following recommendations.

1. Wesminco

1.1 Drilling of production wells should be in accordance with an approved oil spill contingency plan.

1.2 Regular monitoring should be conducted on the effects of the South Pepper A flare on turtles and seabirds.

1.3 During pipeline construction care should be taken to minimise disturbance to corals.

1.4 Disturbance and covering of bird nesting site on Airlie Island should be minimised. Land east of the proposed helipad and camp should not be disturbed unless entirely necessary. This area should be fenced to protect existing burrows.

1.5 The Airlie island gas flare should be either fully enclosed, set in a flare pit or sited offshore, eg at Chervil.

1.6 Lights on Airlie Island should be designed so that they are not visible from turtle breeding beaches.

1.7 Details of the proposed staff training and education on environmental aspects should be discussed with the Department of Conservation and Environment. This training should involve both construction and permanent workforces.

1.8 The effectiveness of quarantine measures will need to be monitored.

1.9 Treated produced water should be continuously monitored to ensure no exceedance of 48ppm total hydrocarbon.

1.10 Rehabilitation of disturbed construction areas will be required. Store topsoil for this purpose. Rehabilitation techniques should be discussed with the Department of Conservation and Environment prior to commencing trials or actual work.

1.11 Fighting of fires in vegetation should not use salt water.

1.12 Site the sewerage outfall distant from the potable water inlet and use a septic tank and leach drain only if soil conditions are suitable.

1.13 Brine from the reverse osmosis plant will need to be disposed of to the sea in a controlled manner.

1.14 Aboriginal Site Survey results should be provided to the Authority for information.

1.15 The draft oil spill contingency plan should take into account the revised approach to the use of dispersants discussed in DCE Bulletin 104.

1.16 During the construction phase develop a spill trajectory model such as the National Plan OSSM model.

1.17 Monitoring should be finalised after discussion with the Department of Conservation and Environment.

1.18 Monitoring shows unacceptable changes, alterations to the operations would be required.

1.19 Provide brief annual and comprehensive triennial reports to the Authority for review.

2. Government

2.1 Mines Department should consider setting a bond to guarantee satisfactory decommissioning and rehabilitation.

2.2 Airlie island should revert to State control with land outside the production lease being a C class Nature reserve.

2.3 Mines Department lease conditions for Airlie Island should be written to accommodate sharing of facilities.