Northern Territory Government
Office of Environment and Heritage

ISSUES RAISED BY THE PUBLIC ABOUT
THE PHILLIPS' 10 MTPA LIQUEFIED NATURAL GAS (LNG) PROJECT

Responses Prepared by the Office of Environment and Heritage

July 2002

ADEQUACY OF REVIEW & CONSULTATION FOR ASSESSMENT OF PER

ISSUE: Environmental assessment of the Public Environmental Report (PER) was inadequate, and public concerns not taken into account in the Government's decision that potential or anticipated environmental impacts will be acceptable.

1. In 1997, the proponent submitted a proposal to the NT Government to construct a 3 million tonnes per annum (MTPA) LNG plant at Wickham Point, using natural gas from the Bayu-Undan field in the Timor Sea. The proposal (involving a single production pathway, or "train") went through a detailed Environmental Impact Assessment process, at the level of an Environmental Impact Statement (EIS) and received approval from Commonwealth and NT Ministers in early 1998.
2. For this EIS process, public comment was sought and obtained on the draft EIS guidelines as well as on the draft EIS produced by the proponent. The Government's Environmental Assessment Report (No. 24) was made available to the public after completion of the assessment process.
3. In March 2002, the proponent submitted a revised proposal for a 10 MTPA plant (comprising two trains, each with a maximal output of 5 MTPA) that could capture and process natural gas from additional offshore fields.
4. The NT Government directed the proponent to prepare a PER to address the additional potential or anticipated impacts associated with the proposed expansion. Draft PER guidelines and the PER were also subject to review by the public.
5. The public review process was extended a week longer than the statutory requirement, to allow for intervening public holidays, and the proponent held public meetings in Darwin, Palmerston and Litchfield to further explain the project and field questions.
6. As a result of public consultations, the proponent subsequently met individually with a number of stakeholders to address their concerns.
7. For all of the above reasons, the Office of Environment and Heritage believes that the assessment for this project provided ample opportunity for public comment and response.

8. The Assessment Report for the 10 MTPA proposal is available to the public via the internet (www.lpe.nt.gov.au/enviro) and hard copies provided to selected libraries and the Cavenagh House public information area (Ground Floor).
9. The assessment process for this proposal exceeded the basic requirements of most PER's for the following reason:

    - The PER guidelines directed that the proponent's PER focus on those environmental issues specifically related to expanding the plant from a 3 MTPA facility to a 10 MTPA facility; however, the PER included discussion of all potential environmental impacts and gave the public and government the opportunity to re-visit all issues related to the land-based facility.

POTENTIAL FOR EXPLOSIONS OR ASPHYXIATING CLOUDS OF GAS IN THE EVENT OF A LEAK

ISSUE: If an explosion occurs at the facility, it will threaten the safety and property of residents of Darwin, Palmerston and Litchfield Shire.

1. LNG is stored at atmospheric pressure and does not explode if vessels storing the material are ruptured. If this happened, the LNG would flow downhill into a containment pond to be constructed on-site. If the LNG ignited, it would burn rather than explode.
2. Natural gas is lighter than air; therefore, for an unconfined plume/release, the resulting vapour cloud would rise and diffuse the potential for an asphyxiation hazard. Further, the hazard and risk analyses (including the siting study) conclude that, in regard to public safety and flammable vapour cloud zones, the proposed site will not pose a risk to the public if the cloud ignited.
3. The Qualitative Risk Assessment (a preliminary analysis presented in the PER) demonstrated that the potential hazards to the public and on-site personnel, arising from operation of the LNG plant, would be maintained at an acceptably low level at the plant boundary or within a 1 km radius from the centre of the facility. This analysis was based on worst-case scenario incidents (e.g. simultaneous failure of all three "fail-safe systems")
4. The Office of Environment and Heritage engaged an independent consultant in WA to review the results and conclusions from the above study (as reported in the body and Appendix G: Hazard and Risk Assessment for a 10 MTPA LNG Plant) and the one included in the previous EIS. For both studies, he reported that a high level of confidence can be attached to the final conclusions and recommendations. For the hazard and risk assessment in the PER, he indicated that

    - The report is comprehensive in identifying general hazards, safety and emergency response considerations in the siting, design, construction and operation of the plant;
    - The report comprised a full review of the siting and components of the plant with respect to risks to public areas outside the property line and to personnel on site; and

- The potential hazards (to on-site personnel) that could arise from operation of the plant can be addressed in the design and operational controls.

5. The final Quantitative Risk Assessment (to be done when final designs are known) is likely to indicate a smaller risk than that predicted by the preliminary *qualitative* Hazard and Risk Assessment, because much more conservative assumptions are used in qualitative assessments than those required once final plant design details are known and final risk and hazard analyses are done.
6. The design and operational specifications that will apply to the facility will be based on national and international safety standards for LNG facilities, including designs to withstand potential impacts from earthquakes, cyclones, storm surge and lightning strikes.
7. A 500 m exclusion zone around the product loading jetty will ensure that recreational craft are kept outside the area of potential risk from an incident at the facility. (This restriction may have a beneficial by-product for recreational fishers, by providing a refuge for fish living within this restricted zone.)

THE FACILITY WILL INCREASE THE RISK OF TERRORIST ATTACK

ISSUE: The plant will be a target for terrorist attacks, because it will contain flammable hydrocarbons.

1. Historically, terrorist acts involving explosives tend to attack high-profile targets (sky-scrapers), installations providing essential services (e.g. power stations), or military targets. For this reason, Parliament House, the power station at Channel Island, Royal Darwin Hospital or one of the military bases would probably comprise a more likely terrorist target.
2. The risk to the public from a terrorist attack on the facility would, however, be no worse than that predicted by the hazard and risk assessment for a catastrophic failure, as reported in the PER.

POLLUTION OF THE HARBOUR BY WASTEWATER DISCHARGE

ISSUES: The 10 MTPA plant will generate 11 m^3 wastewater/hr compared to 4.5 m^3/hr for a 3 MTPA plant; discharge of this wastewater and potentially toxic hydrotest water will contaminate the Harbour.

1. To minimise the amount of treated wastewater that will need to be discharged to the Harbour, the proponent will be using as much of this water as possible to irrigate the site. Irrigation water will have to meet relevant health standards.
2. As recommended in a public submission, the proponent will evaluate the potential to plant local hardwoods for landscaping and soaking up irrigation water.
3. The proponent will discharge to the Harbour only as a contingency option, e.g. if the ground becomes saturated during the wet season.

4. The three streams of wastewater to be used for irrigation or discharged to the Harbour are

    - Stormwater run-off from clean parts of the site (i.e. clean water), which will be disharged into the intertidal zone at selected points adjacent to the site;
    - Process water, utility water (from cleaning operations or testing of fire fighting equipment) and stormwater from the process area, which might be contaminated with oil and have to be routed through a separator to remove the oil to render this wastewater suitable for irrigation or discharge; and
    - Sewage treated to a quality suitable for irrigation or discharge (including dechlorination). (Holding tanks for treated effluent will allow pre-release testing to verify suitability.)

5. Note that the treated wastewater is not expected to contain significant concentrations of toxicants or have characteristics that make it hazardous for discharge:

    - No heavy metals;
    - no visible oil or grease;
    - mid-range pH (6.5 – 8.5);
    - temperature only 1 ^{o}C above ambient; and
    - low faecal coliforms (bacteria).

6. If permitted to discharge wastewater to the Harbour, the proponent will require a Waste Discharge Licence (under the *Water Act*). This Licence will require the proponent to monitor appropriate "downstream" and control sites in the Harbour to confirm that its discharges are having no significant impact on ambient water quality. If monitoring suggests that unacceptable impact may be imminent, the proponent will be required to take appropriate action.

7. The predicted volumes of wastewater (11 m^3/hr) and any potential contaminants contained in that water (e.g. nutrients, oil, and suspended solids) will be orders of magnitude less than those entering the Harbour via run-off from the catchment.

    - For example, the predicted annual load of total nitrogen from the facility will be less than 100 kg/yr compared to nearly 600,000 kg/yr for the total catchment .

8. Prior to commissioning, the integrity of transfer pipes and storage tanks at the site will be determined using "hydrotest water" (freshwater or seawater with various additives, such as corrosion inhibitors). Discharge of hydrotest water will also require a Waste Discharge Licence and will require the proponent to demonstrate that

    - The hydrotest water has low toxicity (either has no toxic additives or concentrations of these in the hydrotest water are within water quality guidelines to protect marine ecosystems); or
    - The discharge will be done in such a way to minimise risk to the environment (e.g. further dilution before discharge, release during spring ebb tide only, etc.).

9. Because of the above controls and mitigating measures, exposure of fish to potential contaminants from the plant is not expected to be any greater that that associated with run-off from urban areas (containing, for example, hydrocarbons and heavy metals from roads) or run-off from rural areas (containing residues from fertilisers and pesticides). For this reason, the risk that food fish caught off Wickham Point could be tainted or unsafe for human consumption is expected to be negligible.

DREDGING IMPACTS ON THE HEALTH OF THE HARBOUR

ISSUE: Dredging and discharge of dredge spoil will threaten the health of fish and other marine life.

1. For its 10 MTPA proposal, Phillips altered the design for its previous 3 MTPA plant to reduce the length of the loading jetty by 100 m to avoid or reduce the need for dredging.
2. If dredging is required along the jetty or at the jetty head, only small volumes (less than 100,000 m^3) would need to be dredged. If the construction dock is built (as described in the PER), Phillips indicates that 145,000 m^3 of material will require dredging; however, there is some doubt as to whether the construction dock will be included in the final design.
3. For East Arm Port Stage 2, construction of the railway embankment, container terminal and wharf extension required removal (by dredging) of approximately 1,150,000 m^3 (i.e. almost 10 times more seabed sediment to be dredged compared to that for the jetty or the construction dock of the LNG plant).
4. Other than a few fish that got caught in settlement ponds as they were being closed off from the Harbour and died (probably from lack of oxygen), this extensive dredging project had no significant impact on nearby corals and mangroves that were monitored before, during and after the dredging component of that project.
5. Because corals were used to represent the potential environmental sensitivity of other attached or slow-moving organisms that could not leave the area if stressed by high turbidity (e.g. seagrass, sponges, worms), the results of the monitoring program suggest that dredging had no significant or long-term impact on the marine biota of the Habour.
6. These results are similar to those from monitoring for potential impacts from dredging associated with the initial phase of development for the new East Arm Port (Stage 1), which was completed in late 1996.
7. Neither of these very substantial dredging projects had a noticeable impact on recreational fishing in the Harbour.
8. In addition to determining potential impacts on marine biota, the anticipated impact on water quality (particularly turbidity and suspended sediments) was also monitored and found to be transitory, settling down within weeks of completion of dredging.
9. On the basis of continuing discussions with the Darwin Port Corporation, Phillips reported in the PER that maintenance dredging at the loading facility berth would

probably not be necessary; therefore, potential impacts to biota and water quality would be associated with a "once-off"construction activity.

10. The PER reported that hydrodynamic modelling for the EIS predicted that dredging would cause temporary and localised increases in water turbidity. This modelling also indicated that the risk to coral communities at Channel Island, from increased turbidity associated with dredging at the jetty, would also be low.
11. If dredge spoil is to be discharged to the Harbour, Phillips will need to obtain a Waste Discharge Licence. Conditions attached to this licence will require Phillips to monitor the impact of its discharge on turbidity and other water quality characteristics, in order to demonstrate that the biota of the Harbour are unlikely to be adversely affected.
12. The Environmental Assessment Report for the 10 MTPA plant indicates that Phillips' Environmental Management Program must contain a *Dredge and Spoil Management Plan* that evaluates options for dredging, excavation and spoil disposal and fully addresses potential environmental impacts. This *Plan* must be submitted to the NT Government for approval prior to commencement of dredging. (Page 25, Assessment Report)
13. Phillips consulted with the Darwin Aquaculture Centre nearby (on Channel Island) during preparation of its PER, regarding their concerns that dredge plumes might have an adverse impact on the quality of seawater taken up by the Centre.

    - Modelling has indicated that plumes would be unlikely to impact this facility; however, Phillips will continue to liaise with the Centre prior to commencement of any dredging (e.g. in preparation of its *Dredge Management Plan*, providing a dredging timetable to the Centre or advance notification, etc.)

GENERATION, TREATMENT AND DISPOSAL OF SOLID AND SEMI-LIQUID WASTES

ISSUE: The facility will produce large amounts of intractable wastes that cannot be safely or adequately treated or disposed of in the NT.

1. Annually, the 10 MTPA plant will generate the equivalent non-hazardous waste of approximately 158 people, which can be easily accommodated at the Shoal Bay Waste Disposal Site (SBWDS).
2. The SBWDS is not suitable for disposal of the following wastes:

- Waste lubricating oils;
- Spent oils;
- Biological sludge;
- Inorganic sludge;
- Oily sludge; and
- Spent solvents.

The proponent will arrange for these wastes to be disposed of by commercial waste management contractors as appropriate, and the proponent will review waste-tracking documentation from the contractor to ensure these wastes are disposed in a manner approved by the Office of Environment and Heritage.

AVIATION HAZARD

ISSUES: Ground or marine flares will comprise a risk to aircraft using Darwin Airport; mitigation may divert aircraft over population centres; and indigenous airlines would be particularly disadvantaged if restrictions were to apply; birds chasing insects entrained in plumes will comprise an aviation risk.

1. The flare system (to dispose of waste gases) is comprised of two types of flares: a ground flare and a marine flare. The ground flare (375 m long and 70 m wide) burns hydrocarbon releases from the LNG plant. The marine flare (up to 13 m high) combusts vapours displaced from the ships' tanks during initial loading periods.

2. The ground flares are expected to operate less than 108 hrs/year.

3. The marine flare will operate up to 400 hours/year.

4. For programmed flares, Darwin Airport controllers will be given advance notice and will be able to use this information in the management of air traffic. Modelling for aircraft under visual or instrument control indicates planes will easily be able to avoid any airspace subject to unplanned thermal plumes during the relatively infrequent periods of time that such a flare would be occurring.

5. Information received to date indicates that the potential risk to aircraft is very small and easily managed, for example by diverting planes to alternative runways if a flare is occurring.

6. The proponent is in ongoing discussions with the Civil Aviation Safety Authority (CASA) and their consultants to identify and quantify any potential risks to aircraft from the facility and in developing appropriate measures for mitigation.

7. The final consultants' report from aviation risk modelling will be delivered to CASA in the near future (e.g. August/September 2002); however, OEH has independently confirmed with both the consultants and CASA that the risk to aviation will be very low and manageable using conventional means.

8. CASA and their consultants have not identified entrainment by insects in thermal plumes (from flaring) and attraction by birds to these insects as a credible risk to aviation.

AIR POLLUTION – Non-Greenhouse Gas Emissions

ISSUES: Predictive models were not adequate, and concern that increased atmospheric emissions will pollute the air over nearby population centres, compromising visual amenity, generating acid rain and posing a public health risk.

Adequacy of Modelling and Cumulative Effects

1. The air dispersion model for predicted emissions from the plant was appropriate for the range of relevant contaminants and for regional atmospheric and meteorological conditions. The model was based on conservative assumptions about the potential impact of humidity, such that the forecasts are likely to be worse than the actual emissions. Further, the model included the potential cumulative effect of emissions from the LNG plant and those from the Channel Island Power Station.
2. On advice from the Bureau of Meteorology, data from Darwin Airport were considered preferential to those from the Channel Island monitoring station, because the Airport data set is more complete (40,000 hourly records over a five year period), with more stringent quality control; therefore, the dispersion modelling was based on the Airport dataset. Further, the air quality predicted for the Airport would be similar to that at Wickham point, because of mixing and transport by winds. For example, levels of particular emissions at one place might occur 10 minutes earlier or an hour later at one site compared to the other.
3. Results from modelling indicated that worst-case concentrations of all non-greenhouse gas emissions (including during periods of inversions) would meet standards for the Ambient Air Quality National Environment Protection Measures (NEPM), with no adverse impacts on the residents of population centres. (The standards of the Ambient Air Quality NEPM apply to all Australian jurisdictions.) Note that during inversions (fogs), the hot exhaust gases exiting from stacks are expected to have enough momentum and buoyancy to penetrate the inversion layer and not get trapped by it. (Typically, the potential for air pollutants to be 'trapped' by inversions is associated with smaller, more dispersed emission sources, e.g. vehicles, light commercial facilities or wood fires, which are generally low-level sources with limited upward momentum or thermal buoyancy.)
4. A licence issued under the *Waste Management and Pollution Control Act* will require the proponent to verify these predictions by periodic emissions testing.

Sulphur Dioxide (SO_2)

1. The maximum ground level concentrations of SO_2 from the plant, operating at full capacity, are not expected to pose an unacceptable risk to regional air quality or public health.
2. The maximum concentrations of SO_2 (averaged on an annual basis) are predicted to be only 2% of the NEPM or 1% of the World Bank Guidelines (for maxiumum predicted concentrations, averaged over one year).

3. In the original 3 MTPA proposal, hydrogen sulfide gas (H_2S; from the amine treatment unit) would have been vented to the atmosphere or only partially combusted, and this could have generated odours and comprised a safety hazard.
4. For the current proposal, all H_2S will be combusted, but this will generate more sulfur dioxide (SO_2) than for the 3 MTPA plant: 130 – 706 tonnes SO_2 per annum compared to 6 TPA for the 3 MTPA plant.
5. Despite this increase, the air dispersion modelling for the PER indicated that the maxiumum ground level concentrations of SO_2 will be less than 10% of the current acceptable ambient standard in the NEPM (based on the maximum concentration of H_2S likely to be in the feedstock gas, 15 ppm).

Nitrogen Oxides (NO_x)

1. Adverse impacts of NO_x on public health or regional air quality are unlikely.
2. The maximum predicted concentration of NO_x , from the cumulative emissions from the LNG plant and the Channel Island Power Station, will be only 4% of the NEPM standard and only 3% of the World Bank guideline.
3. Should the proponent wish to upgrade or expand the facility such that NO_x emissions would be substantially increased, such a proposal would require further assessment and approval by the NT Government.

Acid Rain

1. Sulphur dioxide (SO_2) emissions are responsible for 60-70% of global acid deposition.
2. Maximum annual SO_2 emissions will be only 2% of the NEPM standard and 1% of the World Bank Guideline.
3. The "Final Impact Statement for the Ambient Air Quality NEPM" indicates that "compliance with the NEPM (annual average for SO_2) should ensure that any effects of acid deposition remain minor."
4. For this reason, emissions from the LNG plant are not expected to result in acid rain.

Carbon monoxide (CO)

- The maximum predicted ground-level concentration of carbon monoxide (CO) is expected to be less than 1% of the NEPM and World Bank standards; therefore, CO generated from the facility will be well within recommended guidelines for maintenance of public health and acceptable air-quality.

Odours

1. No significant off-site odours are anticipated from the LNG facility.

2. The design for the 10 MTPA plant will incorporate an acid gas incinerator, which will combust all hydrogen sulphide removed from the feedstock gas by the amine unit. Venting hydrogen sulphide would have generated odours.
3. Further, all domestic and sanitary wastes will be professionally handled and managed by a waste management contractor, in accordance with the *Waste Management and Pollution Control Act* and other requirements of the NT Government.

AIR POLLUTION – Greenhouse Gas Emissions

ISSUE: In a regional context, the facility will produce a significant amount of greenhouse gases, especially carbon dioxide (CO_2).

1. At full capacity (two process trains producing a total of 10 MTPA LNG), the facility will produce more than 4.5 MTPA of carbon dioxide (CO_2) per year, 92% of which is produced from two sources:
   - 53% from the operation of gas turbines; and
   - 39% from the incineration of acid gas removed from the feed gas (to avoid generation of odours and to meet air-quality standards for H_2S emissions).
2. In redesigning the facility from a 3 MTPA to a 10 MTPA plant, the proponent has considered and implemented several mitigation measures to lower greenhouse gas emissions per unit volume of LNG produced, for example
   - Recovery of waste heat from the gas turbine exhaust to meet various heating requirements within the plant, thereby avoiding the need to use gas-fired equipment for the same heating requirements);
   - Recovery of gas vapour displaced from LNG tankers as they are loaded, to minimise the need for flaring, which generates greenhouse gas emissions;
   - Use of more efficient gas turbines (than those included in the design of the 3 MTPA plant) will reduce the amount of fuel per horsepower generated, resulting in an 82,000 TPA reduction in greenhouse gas generation (on a CO_2 equivalent basis); and
   - Use of appropriate fuel will reduce NO_x emissions by approximately 30% compared to emissions for the same turbine using other fuel sources (e.g. those with a higher methane content).
3. Overall, these mitigation measures will reduce by 15% the amount of carbon dioxide equivalents generated by the plant when operating at full capacity compared to the amount generated by the 3MTPA plant (per unit of LNG).
4. Other mitigation measures were considered, e.g. re-injection of CO_2 into offshore reservoirs; however, these methods are still under development and are not viable options at present.
5. Predicted emissions of total organic carbon (TOC) and methane (CH_4) are lower for the 10 MTPA facility than for the 3 MTPA plant, because venting of acid gas has been eliminated in the revised design of the facility.

- The 3 MTPA plant would have generated approximately 1,700 tonnes/year TOC/CH_4; however, the 10 MTPA plant will burn acid gas in an incinerator, converting the TOC/CH_4 into CO_2 and water vapour, and releasing approximately 460 tonnes/year TOC/CH_4.

6. Further, in a global context, greenhouse gas emissions will be offset by reduced emissions of CO_2 from LNG customers: per unit energy produced, burning LNG will produce less CO_2 than burning other fossil fuels and no SO_2 or particulates, which are of concern to public health.
7. The proponent has indicated that it intends to participate in the Commonwealth Government's *Greenhouse Challenge Program*, which will require Phillips to
   - Continually improve its energy efficiency, including annual energy audits and reporting results and actions to the Australian Greenhouse Office;
   - Develop and implement a greenhouse gas management strategy for the LNG facility; and
   - Continue to explore technological and other approaches to minimise its greenhouse emissions.
8. To offset the generation of greenhouse gases, the proponent is working with the NT Government to identify options such as
   - Afforestation and reforestation of land;
   - Plantations (e.g. oil mallee) in temperate Australia;
   - Protection of local remnant rainforest; and
   - Options for rehabilitation of degraded vegetation.

LIGHT EMISSIONS (at night)

ISSUE: The facility's lights will detract from the beauty of the night sky and/or will be an eyesore.

1. At night, light emissions from the facility will be able to be seen from some vantage points around the Darwin CBD and other places.
2. Peak Hill and other ridges on Wickham Point will provide some shielding of these vantage points from light emanating from the plant.
3. The proponent has undertaken to use only the minimal amount of light necessary to safely operate the plant at night, and shielding will be installed where it is cost-effective.

SHIPPING ACCIDENTS AND OIL SPILLS FROM LNG VESSELS

ISSUES: The 2-3 large vessels per week that will load LNG will comprise a navigational risk to other vessels and will result in a catastrophic oil spill from a collision or grounding.

1. The proponent considers the main threat of significant, irreversible environmental damage associated with the project would be from a shipping incident in the Harbour, which could result in a substantial oil spill with consequential mortality of mangroves and associated biota.
2. The risk will, however, be mitigated by controls on navigation, the double-hulled design of vessels, and oil spill contingency plans to be prepared by the proponent and included in its *Environmental Management Program*.
3. Shipping movements will be coordinated through the Darwin Port Corporation. Vessels will be escorted by tugs in the vicinity of the loading jetty and will be under the control of a pilot within Harbour waters, to ensure compliance with all procedures for safe navigation, including maintenance of required separation distances from other vessels.
4. A 500 m "moving exclusion zone" around each LNG ship as it proceeds through the Harbour to the product-loading jetty is proposed, to minimise safety risks. The proponent will also liaise with the Royal Australian Navy to eliminate traffic conflicts and minimise risks from possible interactions with naval traffic.
5. Simulation of vessel movements was required to identify any restrictions to be applied to vessel movements to ensure safe berthing and departing procedures. As a result, issues such as berth location, berth alignment, tug requirements, berth availability, and dredging requirements were reviewed and are being integrated into the design of the jetty.
6. Shipping associated with the LNG plant should also be put into a context that recognises that the Port of Darwin is a busy and growing Australian port, with significant marine traffic involving large vessels.
    - Between 1997 and 1999, more than 3000 large vessels (e.g. container ships and cruise liners) came through Darwin Harbour.
    - Maritime defence training exercises are run fairly regularly off the Top End and involve large numbers of military ships (including huge aircraft carriers) using Darwin Harbour.
    - Traffic of large military vessels in Darwin Harbour was also substantial during the East Timor crisis.
7. The increased use of Darwin Harbour by LNG vessels should therefore not be considered as introducing a new or unacceptable risk.

IMPACTS OF SHIPPING ON DUGONGS AND TURTLES

ISSUE: Increased boat traffic and noise will cause dugongs and turtles to avoid preferred foraging habitat and put them at unacceptable risk from boat strikes.

1. A local expert has identified a preferred feeding habitat for turtles and dugong close to Channel Island. He indicates that anecdotal sightings of dugongs suggest that animals that forage at Channel Island probably have to transit past Wickham Point to exit and enter the Harbour.

2. He suggested (in his written submission during the public review period for the PER) that increased boat traffic and noise could cause dugongs to avoid their preferred feeding area, resulting in a reduction in their available foraging habitat.
3. The potential for collisions between LNG vessels and dugongs/turtles was also raised.
4. Risk of boat strike (a documented cause of dugong mortality) is primarily associated with smaller, faster-moving boats. Results from studies by an expert based at James Cook University (Townsville) indicate that dugongs are inconsistent in their avoidance of moving vessels.
5. In the region containing two of the busiest ports in north Queensland (Lucinda and Townsville), there has been no discernible effect from shipping on the local dugong population.
6. Available information suggests that slow-moving large vessels are less a threat to dugongs and turtles than fast, shallow-draught recreational boats.
7. Further, the Port of Darwin already has significant vessel traffic, with more than 3,000 ship visits between 1997 and 1999, and dugongs continue to use the Harbour despite this.
8. From the above, the OEH believes that there is no compelling evidence either way, regarding potential impacts of the facility (and associated shipping) on turtles or dugongs.

COMPATIBILITY OF AN LNG PLANT WITH THE VALUES OF DARWIN HARBOUR

ISSUE: "Major industrial development is not compatible with the significant ecological values of Darwin Harbour."

1. The development will require removal of up to 68 ha of regionally significant dry rainforest; however, the proponent is working with the NT Government to acquire another area of equivalent or better quality rainforest for conservation and thus offset the loss of this habitat within the footprint of the facility.
2. Regarding potential impact on federally listed migratory species (e.g. the Melville Cicadabird and White-Bellied Sea Eagle), information from Parks and Wildlife indicates that local populations of these species are unlikely to be affected by the loss of habitat resulting from the development.
3. The potential introduction of noxious marine pests from shipping will be prevented by compliance with Australian guidelines for the management of ballast water (e.g. guidelines of the Australian Quarantine and Inspection Service), including re-ballasting at sea.

IMPACTS ON TOURISM

ISSUE: A highly-visible petrochemical plant is incompatible with marketing Darwin as a tourist destination offering natural beauty, recreational fishing and other tourism values.

1. Phillips' LNG plant (which is not a "petrochemical plant") will not be highly visible from most vantage points around the Harbour.
2. Tourism in Dampier (WA) has actually increased as a result of the Northwest Shelf plant, drawing both residents and visitors to the area (i.e. the plant itself has become a tourist attraction).
3. Further, the tourism websites providing details about Kenai, Alaska, all portray the Phillips' LNG plant as a desirable feature of the locale.

MISCELLANEOUS ISSUE

ISSUE: Assertions that the LNG plant is a "refinery" that will generate odours and other unacceptable emissions, and will comprise a hazard for explosions.

- The LNG plant is NOT a refinery. Refineries take crude oil and separate it into its various components (e.g. gasoline, diesel, etc.) by "cracking". (Cracking is the breaking of long carbon chains, by boiling). LNG plants take natural gas and chill it to convert this feedstock into a liquid. LNG plants are traditionally much cleaner facilities than refineries.