

APPENDICES

Appendix 1.1 Abbreviations used throughout the text

Organisations and projects

AGSO	Australian Geological Survey Organisation
AP	Anangu Pitjantjatjara
BMR	Bureau of Mineral Resources (now AGSO)
GPA	Glen Parkinson and Associates
MESA	Mines and Energy Resources South Australia
MT	Maralinga Tjarutja
NGMA	National Geoscience Mapping Accord
SAEI	South Australian Exploration Initiative
SASE	South Australian steel and energy project

General

BIF	banded iron formation
CEF	Code of Environmental Practice
DEF	Declaration of Environmental Factors
LPG	Liquefied Petroleum Gas
OEL	Oil Exploration Licence
OOIP	original oil in place
OPL	Oil Production Licence
PEL	Petroleum Exploration Licence
PPL	Petroleum Production Licence
TD	total depth
XRD	X-ray diffraction mineral analysis
ZOCA	zone of cooperation (Timor Sea)

Measurement

°C	degrees Celsius (temperature)
API	gamma ray log units
BOPD	barrels of oil per day
ha	hectare (area; = 10 ⁴ m ²)
kL	kilolitre (volume; = 1 m ³)
kPa	kilopascal (pressure; = 1 kg/m.s ²)
L/s	Litres per second
Ma	million years before present
md	millidarcies
mmbbl	million barrels
ms	milliseconds
μ/ft	microseconds per foot
ppm	parts per million (= milligrams per litre)
rb	reservoir barrels
SCF	standard cubic feet (gas)
stb	stock tank barrel (oil)

Conversions

°C = ((°F - 32).5)/9
1 Petajoule (PJ) = 9.4781 10 ¹¹ BTU
US\$1 = A\$0.75
1 cubic metre (m ³) = 1 kilolitre (kL)
1 standard cubic metre of gas (m ³) = 5.6154 standard cubic feet of gas
1 kilolitre (kL) = 6.29 US barrels
1 kilopascal (kPa) = 0.1450 pound-force per square inch (psi)

Radiometric dating

K–Ar	Potassium 40–Argon 40
Rb–Sr	Rubidium 87–Strontium 87
U–Pb	Uranium 235, 238–Lead 207, 206

Source rock and maturity parameters

EOM	extractable organic matter
HI	Hydrogen Index
MPI	methylphenanthrene index
MPR	methylphenanthrene ratio
OI	Oxygen Index
VR _{calc}	calculated equivalent vitrinite reflectance
T _{max}	temperature of maximum generation of S ₂ hydrocarbons
TOC	total organic carbon

Reservoir, engineering and financial parameters

CAPEX	capital expenditure
FVF	formation volume factor (stb/rb)
k	permeability (md)
kh	reservoir flow capacity
NPV	net present value
OPEX	operating expenditure
OWC	oil-water contact
Sw _{irr}	irreducible water saturation

Sequence stratigraphy

HST	high stand system tract
IVF	incised valley fill
LST	low stand system tract
MFS	maximum marine flooding surface
TST	transgressive system tract

Appendix 3.1 Sections of the *Pitjantjatjara Land Rights Act 1981* relevant to petroleum exploration in the Officer Basin

PART III

10

Pitjantjatjara Land Rights Act, 1981

DIVISION III—MINING OPERATIONS ON THE LANDS

Mining operations on the lands

20. (1) Notwithstanding the provisions of any other Act, a person who, without permission under this section—

(a) carries out mining operations upon the lands;

or

(b) enters the lands for the purpose of carrying out mining operations,

shall be guilty of an offence and liable to a penalty not exceeding the maximum prescribed by subsection (2).

(2) The maximum penalty for an offence against subsection (1) is a fine of ten thousand dollars plus one thousand dollars for each day during which the convicted person—

(a) carried out unlawful mining operations on the lands;

or

(b) remained on the lands after the unlawful entry.

(2a) A person who, having permission to carry out mining operations upon part only of the lands, carries out mining operations on some other part of the lands without the permission of Anangu Pitjantjatjara acts in contravention of subsection (1)(a).

(3) An application for permission to carry out mining operations upon the lands—

(a) may be made only by a person who has applied for a mining tenement in respect of the lands or a part of the lands and has been notified by the Minister of Mines and Energy that he approves the making of an application under this section;

(b) must be in writing and lodged with the Executive Board;

and

(c) must contain, or be accompanied by, all information submitted by the applicant to the Minister of Mines and Energy in support of his application for a mining tenement.

(4) The applicant shall, at the request of Anangu Pitjantjatjara, furnish in writing such further information as it may reasonably require to determine the application.

(5) The applicant shall, as soon as practicable after making his application, or furnishing information under subsection (4), send to the Minister of Mines and Energy a copy of the application or of the document by which the information was furnished.

(6) Upon an application under this section, Anangu Pitjantjatjara may—

(a) grant its permission unconditionally;

(b) grant its permission subject to such conditions (which must be consistent with the provisions of this Act) as it thinks fit;

or

(c) refuse its permission.

(7) Anangu Pitjantjatjara shall, upon deciding an application under this section, notify the applicant, in writing, of its decision and the applicant shall, within seven days after receiving that notification, furnish the Minister of Mines and Energy with a copy of the notification.

(7a) The reasonable costs and expenses incurred by Anangu Pitjantjatjara in dealing with an application under this section may be recovered from the applicant as a debt.

(7b) Any payment made in satisfaction of a liability arising under subsection (7a) shall, if the application is subsequently determined in favour of the applicant but on condition that compensation be paid to Anangu Pitjantjatjara, be regarded as a payment made on account of that compensation.

(8) Where—

(a) Anangu Pitjantjatjara refuses its permission under this section or grants its permission but subject to conditions that are unacceptable to the applicant;

or

(b) the applicant has not, at the expiration of one hundred and twenty days from the date of the application, received notice of a decision by Anangu Pitjantjatjara upon the application.

the applicant may request the Minister of Mines and Energy to refer the application to an arbitrator.

(9) If the Minister of Mines and Energy receives a request under subsection (8), the application shall be referred to an arbitrator appointed by the Minister of Mines and Energy.

(10) At least twenty-one days before an arbitrator is appointed under subsection (9), the Minister of Mines and Energy must inform Anangu Pitjantjatjara of whom he proposes to appoint and he must consider any representations of Anangu Pitjantjatjara in relation to the proposed appointment.

(11) The arbitrator must be a judge of the High Court, the Federal Court of Australia, or the Supreme Court of a State or Territory of Australia.

(12) The arbitrator—

(a) shall have the powers of a commission of inquiry under the *Royal Commissions Act*;

and

(b) may state a case for the opinion of the Supreme Court on a question of law.

(13) A case stated under subsection (12) shall be heard and determined by the Full Court.

(14) After hearing such evidence and submissions as—

(a) Anangu Pitjantjatjara;

(b) the applicant;

(c) the Minister of Mines and Energy;

and

(d) the Minister of Aboriginal Affairs,

may desire to make to him, and such other evidence and submissions as he thinks fit to receive, the arbitrator may—

(e) affirm, vary or reverse the decision of Anangu Pitjantjatjara;

or

(f) where no decision has been made by Anangu Pitjantjatjara upon the application—determine the application as the arbitrator thinks fit.

(14a) The arbitrator may, if the arbitrator thinks fit, award against the applicant and in favour of Anangu Pitjantjatjara an amount that represents, in the arbitrator's opinion, the reasonable costs and expenses incurred by Anangu Pitjantjatjara in relation to the arbitration.

(14b) An amount awarded under subsection (14a) may be recovered by Anangu Pitjantjatjara as a debt.

(15) In arriving at his determination, the arbitrator shall have regard to—

(a) the effect of the grant of the mining tenement upon—

- (i) the preservation and protection of Pitjantjatjara ways-of-life, culture and tradition;
- (ii) the interests, proposals, opinions and wishes of the Pitjantjatjara people in relation to the management, use and control of the lands;
- (iii) the growth and development of Pitjantjatjara social, cultural and economic structures;
- (iv) freedom of access by Pitjantjatjaras to the lands and their freedom to carry out on the lands rites, ceremonies and other activities in accordance with Pitjantjatjara traditions;

(b) the suitability of the applicant to carry out the proposed mining operations and his capacity, in carrying out those operations, to minimize disturbance to the Pitjantjatjara people and the lands;

(c) the preservation of the natural environment;

and

(d) the economic and other significance of the operations to the State and Australia.

(16) The arbitrator shall hear and determine the arbitration as expeditiously as possible.

(17) A determination under this section is binding upon Anangu Pitjantjatjara, the applicant and the Crown.

(18) The *Arbitration Act, 1891-1974*, does not apply to an arbitration under this section.

(19) This section does not apply in relation to prospecting or mining for precious stones on the Mintabie precious stones field.

(20) Where a person applies under this section for permission to prospect and mine for precious stones, and the proposed mining operations are to be carried out within a prescribed area, no compensation, or other consideration, shall be paid or given to Anangu Pitjantjatjara under or in respect of a permission granted under this section.

(21) No regulation prescribing an area for the purposes of subsection (20) shall be made unless—

(a) the area to be prescribed has been delineated or otherwise identified by plan, photograph or other document;

and

(b) the plan, photograph or other document has been deposited in the General Registry Office by the Minister of Mines and Energy with the consent of Anangu Pitjantjatjara,

and any such regulation may be made by reference to a plan, photograph or other document so deposited.

Interaction of this Act and Mining and Petroleum Acts

21. (1) Where prospecting or mining is permitted upon the lands in pursuance of this Division, the person in whose favour the permission was granted and his agents, contractors and employees may, subject to the conditions (if any) upon which the permission was granted, and to the provisions of the *Mining Act, 1971-1978*, or the *Petroleum Act, 1940-1978*, as the case may require (but without requiring any further permission or authority to enter the lands under the provisions of either of those Acts), enter the lands for the purpose of prospecting or mining.

(2) A mining tenement shall not be granted in respect of the lands or a part of the lands except to a person who has permission to carry out mining operations on the lands under this Division, but this Act does not prevent the taking of any step under the *Mining Act* or the *Petroleum Act* antecedent to the grant of a mining tenement.

(3) Before a mining tenement is granted in pursuance of the *Mining Act* or the *Petroleum Act* in relation to the lands or a part of the lands, the Minister administering the relevant Act shall afford Anangu Pitjantjatjara a reasonable opportunity to make submissions relating to the conditions subject to which the tenement should be granted.

(4) If a person—

(a) makes a payment or gives other consideration in contravention of section 23;

or

(b) in relation to—

(i) obtaining the permission of Anangu Pitjantjatjara for the carrying out of mining operations on the lands;

or

(ii) the carrying out or proposed carrying out of mining operations on the lands,

makes a payment, or gives some other consideration, to Anangu Pitjantjatjara (not being a payment or consideration otherwise permitted or provided for in this Act) otherwise than in conformity with—

(iii) conditions imposed by Anangu Pitjantjatjara under this Division in granting its permission for the carrying out of the mining operations;

(iv) conditions determined or approved by an arbitrator under this Division;

or

(v) an agreement of which the Minister of Mines and Energy has been notified under this Division,

then—

(c) the amount of the payment, or the value of the consideration, is recoverable as a debt due to the Crown;

and

(d) (i) no mining tenement in respect of the lands will be granted to the person and the person is precluded from applying for another mining tenement in respect of the lands for the period of three years;

and

(ii) if a mining tenement in respect of the lands is held by the person, that tenement is cancelled.

* * * * *

Royalty

22. (1) Royalty paid in respect of minerals recovered from the lands shall be paid into a separate fund maintained by the Minister of Mines and Energy.

(2) Subject to subsection (3), the royalty shall be applied as follows:

(a) one-third shall be paid to Anangu Pitjantjatjara;

(b) one-third shall be paid to the Minister of Aboriginal Affairs to be applied towards the health, welfare and advancement of the Aboriginal inhabitants of the State generally;

and

(c) one-third shall be paid into the General Revenue of the State.

(3) If the income of the fund maintained under subsection (1) exceeds in any financial year the prescribed limit, the excess shall be paid in full into the General Revenue of the State.

(4) No moneys shall be paid out of the fund maintained under subsection (1) unless a regulation is in force prescribing a limit for the purposes of subsection (3).

(5) In this section—

“royalty” means royalty payable under the *Mining Act, 1971-1978*, or the *Petroleum Act, 1940-1978*.

Offence in relation to obtaining permission to carry out mining operations

23. (1) A person who, without the consent of the Minister of Mines and Energy, gives, offers, or agrees to give a payment or other consideration to another person (not being a payment or consideration otherwise permitted or provided for in this Act) in connection with obtaining the permission of Anangu Pitjantjatjara to carry out mining operations upon the lands shall be guilty of an offence and liable to a penalty not exceeding two thousand dollars.

(2) Where a body corporate commits an offence against subsection (1), each director of the body corporate shall be guilty of an offence and liable to a penalty not exceeding two thousand dollars unless he proves that he could not, by the exercise of reasonable diligence, have prevented the commission of the offence by the body corporate.

Certain payments or other consideration to Anangu Pitjantjatjara must represent fair compensation

24. (1) This section applies to payments made, or to be made, or consideration given, or to be given, to Anangu Pitjantjatjara (not being a payment of royalty under section 22) in respect of the carrying out or proposed carrying out of mining operations on the lands.

(2) A payment or consideration to which this section applies must be reasonably proportioned to the disturbance to the lands, the Pitjantjatjara people, and their ways-of-life, that has resulted or is likely to result from the grant of the relevant mining tenement.

(3) A person who makes or gives, or agrees to make or give, a payment or consideration to which this section applies shall, within fourteen days of the date of making or giving the payment or consideration, or entering into the agreement, notify the Minister of Mines and Energy of the amount or value of the payment or consideration, or of the terms of the agreement.

Penalty: Two thousand dollars.

Appendix 3.2 Sections of the *Maralinga Tjarutja Land Rights Act 1984* relevant to petroleum exploration in the Officer Basin

PART III

10

Maralinga Tjarutja Land Rights Act, 1984

DIVISION IV—MINING OPERATIONS ON THE LANDS

Mining operations on the lands

21. (1) Notwithstanding the provisions of any other Act, a person who, without permission under this section—

(a) carries out mining operations upon the lands;

or

(b) enters the lands for the purpose of carrying out mining operations,

shall be guilty of an offence and liable to a penalty not exceeding the maximum prescribed by subsection (2).

(2) The maximum penalty for an offence against subsection (1) is a fine of ten thousand dollars plus one thousand dollars for each day during which the convicted person—

(a) carried out unlawful mining operations upon the lands;

or

(b) remained upon the lands after the unlawful entry.

(3) An application for permission to carry out mining operations upon the lands—

(a) may be made only by a person who has applied for a mining tenement in respect of the lands or a part of the lands and has been notified by the Minister of Mines and Energy that he approves the making of an application under this section;

(b) must be in writing and lodged with the Council;

and

(c) must contain, or be accompanied by, all information submitted by the applicant to the Minister of Mines and Energy in support of his application for a mining tenement.

(4) The applicant shall, at the request of Maralinga Tjarutja, furnish in writing such further information as it may reasonably require to determine the application.

(5) The applicant shall, as soon as practicable after making his application, or furnishing information under subsection (4), send to the Minister of Mines and Energy a copy of the application or of the document by which the information was furnished.

(6) Upon an application under this section, Maralinga Tjarutja may—

(a) grant its permission unconditionally;

(b) grant its permission subject to such conditions (which must be consistent with the provisions of this Act) as it thinks fit;

or

(c) refuse its permission.

(7) Maralinga Tjarutja shall, upon deciding an application under this section, notify the applicant, in writing, of its decision and the applicant shall, within seven days after receiving that notification, furnish the Minister of Mines and Energy with a copy of the notification.

(8) The reasonable costs and expenses incurred by Maralinga Tjarutja in dealing with an application under this section may be recovered from the applicant as a debt.

(9) Any payment made in satisfaction of a liability arising under subsection (8) shall, if the application is subsequently determined in favour of the applicant but on condition that he pay compensation to Maralinga Tjarutja, be regarded as a payment made on account of that compensation.

(10) Where—

(a) Maralinga Tjarutja refuses its permission under this section or grants its permission but subject to conditions that are unacceptable to the applicant;

or

(b) the applicant has not, at the expiration of one hundred and twenty days from the date of the application, received notice of a decision by Maralinga Tjarutja, upon the application,

the applicant may request the Minister of Mines and Energy to refer the application to an arbitrator.

(11) Upon the receipt of a request under subsection (10), the Minister of Mines and Energy shall confer with the Minister of Aboriginal Affairs, Maralinga Tjarutja and the applicant with a view to resolving the matter by conciliation.

(12) If steps taken under subsection (11) have failed to resolve the matter within a reasonable time after receipt of the request, the Minister of Mines and Energy shall refer the application to an arbitrator.

(13) The arbitrator shall—

(a) in relation to an application for permission to carry out exploratory operations—be a Judge of the Supreme Court of South Australia (being a Judge upon whom the jurisdiction of the Land and Valuation Court is conferred) or a legal practitioner of not less than ten years standing appointed by the Minister of Mines and Energy to be arbitrator;

or

(b) in any other case—be a Judge of the High Court, the Federal Court of Australia or the Supreme Court of a State or Territory of Australia or a legal practitioner of not less than ten years standing appointed by the Minister of Mines and Energy to be arbitrator,

the Minister having first afforded Maralinga Tjarutja and the applicant a reasonable opportunity to make representations as to that appointment.

(14) The arbitrator—

(a) shall have the powers of a commission of inquiry under the *Royal Commissions Act*;

and

(b) may state a case for the opinion of the Supreme Court on a question of law.

(15) A case stated under subsection (14) shall be heard and determined by the Full Court.

(16) After hearing such evidence and submissions as—

(a) Maralinga Tjarutja;

(b) the applicant;

(c) the Minister of Mines and Energy;

and

(d) the Minister of Aboriginal Affairs,

may desire to make to him, and such other evidence and submissions as he thinks fit to receive, the arbitrator may—

(e) affirm, vary or reverse the decision of Maralinga Tjarutja;

or

(f) where no decision has been made by Maralinga Tjarutja upon the application—determine the application as the arbitrator thinks fit.

(17) The arbitrator may, if he thinks fit, award against the applicant and in favour of Maralinga Tjarutja an amount determined by the arbitrator as representing the reasonable costs and expenses incurred by Maralinga Tjarutja in relation to the arbitration.

(18) An amount awarded under subsection (17) may be recovered by Maralinga Tjarutja as a debt.

(19) In arriving at his determination, the arbitrator shall have regard to—

(a) the effect of the grant of the mining tenement upon—

(i) the preservation and protection of ways-of-life, culture and tradition of the traditional owners;

(ii) the interests, proposals, opinions and wishes of the traditional owners in relation to the management, use and control of the lands;

(iii) the growth and development of social, cultural and economic structures of the traditional owners;

(iv) freedom of access by traditional owners to the lands and their freedom to carry out on the lands rites, ceremonies and other activities in accordance with their traditions;

(b) the suitability of the applicant to carry out the proposed mining operations and his capacity, in carrying out those operations, to minimize disturbance to the traditional owners and the lands;

(c) the preservation of the natural environment;

and

(d) the economic and other significance of the operations to the State and Australia.

(20) The arbitrator shall hear and determine the arbitration as expeditiously as possible.

(21) A determination under this section is binding upon Maralinga Tjarutja, the applicant and the Crown.

(22) The *Arbitration Act, 1891*, does not apply to an arbitration under this section.

(23) Mining operations in pursuance of a mining tenement that was in force in relation to a part of the lands immediately before it became subject to the application of this Act shall be deemed to have been unconditionally permitted under this section.

Application for mining tenements and sacred sites

22. (1) Where an application has been made for a mining tenement in respect of a part of the lands, the Minister of Mines and Energy and the Minister of Aboriginal Affairs shall consult with Maralinga Tjarutja to determine whether any sacred site or part of a sacred site registered on a register kept pursuant to section 16 is within the land to which the application relates.

(2) Where the Minister of Mines and Energy and the Minister of Aboriginal Affairs are satisfied that a sacred site or part of a sacred site registered on a register kept pursuant to section 16 is within the land to which the application relates, the Minister of Mines and Energy—

(a) shall provide the applicant with such information as to the sacred site and its location as he and the Minister of Aboriginal Affairs determine to be appropriate;

and

(b) shall, subject to subsection (3)—

(i) in granting any mining tenement upon the application, make necessary provision for the protection of the sacred site—

(A) in the case of a sacred site that has been identified with particularity—by excluding land from the tenement or imposing conditions on the tenement;

or

(B) in the case of a sacred site that is known to exist but which has not been identified with particularity—by imposing conditions on the tenement to protect the sacred site until it is so identified;

and

(ii) in the case of a sacred site referred to in subparagraph (i)(B), when it is so identified, make further or other provision for the protection of the site by excluding land from the tenement or imposing conditions on the tenement.

(3) The Minister of Mines and Energy shall not, in granting a mining tenement relating to land to which another mining tenement (being a mining tenement granted in respect of the land after it became subject to the application of this Act) previously related, make provision under subsection (2)(b) for the protection of any sacred site within the land unless provision for the protection of that sacred site was made under that subsection in granting that earlier tenement.

(4) Land may be excluded from a mining tenement under this section, and, subject to subsection (5), conditions may be imposed, varied or revoked under this section in respect of a mining tenement, by notice in writing to the holder of the tenement.

(5) Conditions shall not be imposed under this section in respect of a mining tenement, and any conditions so imposed shall not be varied or revoked, without the consent of Maralinga Tjarutja.

(6) Where information is provided as to a sacred site and its location pursuant to subsection (2), the Minister of Mines and Energy may, in consultation with the Minister of Aboriginal Affairs, impose conditions prohibiting or restricting disclosure of the information and any person who knowingly contravenes any such condition shall be guilty of an offence and liable to a penalty not exceeding five thousand dollars.

Interaction of the Act and the Mining and Petroleum Acts

23. (1) Where prospecting or mining is permitted upon the lands in pursuance of this Division, the person in whose favour the permission was granted and his agents, contractors and employees may, subject to the conditions (if any) upon which the permission was granted, and to the provisions of the *Mining Act, 1971*, or the *Petroleum Act, 1940*, as the case may require (but without requiring any further permission or authority to enter the lands under the provisions of either of those Acts), enter the lands for the purpose of prospecting or mining.

(2) A mining tenement shall not be granted in respect of the lands or a part of the lands except to a person who has permission to carry out mining operations upon the lands under this Division, but this Act does not prevent the taking of any step under the *Mining Act* or the *Petroleum Act* antecedent to the grant of a mining tenement.

(3) Before a mining tenement is granted in pursuance of the *Mining Act* or the *Petroleum Act* in relation to the lands or a part of the lands, the Minister administering the relevant Act shall afford Maralinga Tjarutja a reasonable opportunity to make submissions relating to the conditions subject to which the tenement should be granted.

(4) If a person—

(a) makes a payment, or gives some other consideration, in contravention of section 25;

or

(b) in relation to—

(i) obtaining the permission of Maralinga Tjarutja for the carrying out of mining operations upon the lands;

or

(ii) the carrying out or proposed carrying out of mining operations upon the lands,

makes a payment, or gives some other consideration, to Maralinga Tjarutja (not being a payment or consideration in discharge or partial discharge of a liability arising under this Act, and not being a payment of royalty under section 24) otherwise than in conformity with—

(iii) conditions imposed by Maralinga Tjarutja under this Division in granting its permission for the carrying out of the mining operations;

(iv) conditions determined or approved by an arbitrator under this Division;

(v) an agreement of which the Minister of Mines and Energy has been notified under this Division,

then—

(c) the amount of the payment, or the value of the consideration, is recoverable as a debt due to the Crown;

and

(d) no mining tenement in respect of the lands shall be granted to the person by whom the payment was made or the consideration given, and any such mining tenement held by that person shall be cancelled.

Royalty

24. (1) Royalty paid in respect of minerals recovered from the lands shall be paid into a separate fund maintained by the Minister of Mines and Energy.

(2) Subject to subsection (3), the royalty shall be applied as follows:

(a) one-third shall be paid to Maralinga Tjarutja;

(b) one-third shall be paid to the Minister of Aboriginal Affairs to be applied towards the health, welfare and advancement of the Aboriginal inhabitants of the State generally;

and

(c) one-third shall be paid into the General Revenue of the State.

(3) If the income of the fund maintained under subsection (1) exceeds in any financial year the prescribed limit, the excess shall be paid in full into the General Revenue of the State.

(4) No moneys shall be paid out of the fund maintained under subsection (1) unless a regulation is in force prescribing a limit for the purposes of subsection (3).

(5) In this section—

“royalty” means royalty payable under the *Mining Act, 1971*, or the *Petroleum Act, 1940*.

Offence in relation to obtaining permission to carry out mining operations

25. (1) A person who, without the consent of the Minister of Mines and Energy, gives, offers, or agrees to give, a payment or other consideration to another person (not being a payment or consideration in discharge or partial discharge of a liability arising under this Act) in connection with obtaining the permission of Maralinga Tjarutja to carry out mining operations upon the lands shall be guilty of an offence and liable to a penalty not exceeding two thousand dollars.

(2) Where a body corporate commits an offence against subsection (1), each director of the body corporate shall be guilty of an offence and liable to a penalty not exceeding two thousand dollars unless he proves that he could not, by the exercise of reasonable diligence, have prevented the commission of the offence by the body corporate.

Certain payments or other consideration to Maralinga Tjarutja must represent fair compensation

26. (1) This section applies to payments made, or to be made, or consideration given, or to be given, to Maralinga Tjarutja (not being a payment or consideration in discharge or partial discharge of a liability arising under this Act, and not being a payment or royalty under section 24) in respect of the carrying out or proposed carrying out of mining operations upon the lands.

(2) Subject to subsection (3), a payment or consideration to which this section applies must be reasonably proportioned to the disturbance to the lands, the traditional owners, and their ways-of-life, that has resulted or is likely to result from the grant of the relevant mining tenement.

(3) A person shall not be required to make or give, or to agree to make or give, any payment or consideration to which this section applies in respect of the carrying out or proposed carrying out of exploratory operations upon the lands other than a payment of such amount (if any) as is or would become payable as compensation under the *Mining Act, 1971*, or the *Petroleum Act, 1940*, (as the case may require) in respect of the carrying out of such operations.

(4) A person who makes or gives, or agrees to make or give, a payment or consideration to which this section applies shall, within fourteen days of the date of making or giving the payment or consideration, or entering into the agreement, notify the Minister of Mines and Energy of the amount or value of the payment or consideration, or of the terms of the agreement.

Penalty: Two thousand dollars.

APPENDIX 12.1 Economic model data and assumptions

Costs

The following assumptions have been made (all cash values below are Australian dollars unless indicated):

Conversion from US\$ to A\$:	\$0.79 (December 1996–January 1997).
Crude oil price:	High case of US\$25/bbl (January 1997) and low case of US\$18/bbl were selected.
Real discount rate:	12.5% (before tax).

Exploration

PEL area in model:	4297 km ² .
Cost of exploration well:	\$1.015 million.
Cost of seismic:	\$3500/km.
Seismic data:	Existing regional seismic grid = 1808 km; New exploration seismic = 570 km.
Seismic per exploration well:	475 km.

Capital expenditure

Cost of development well:	\$0.832 million.
Road construction:	The Department of Transport provided rough estimates for road construction costs in outback South Australia (1997). Total cost = \$21 500/km which includes: <ul style="list-style-type: none">• \$20 000 forming and sheeting road• \$25 000 per water bore with four bores per 100 km of road• \$50 000 per 100 km Aboriginal and environmental clearances. For the model, wells are located on or within 20 km of the existing MESA seismic grid, which was left as tracks at the request of the landholder.
Road tanker capacity:	30 m ³ /tank (190 bbl/tank; GPA, 1996), up to a maximum of three tanks.
Flowlines (100 mm):	\$70/km (GPA 1996).
Trunkline (150 mm):	\$94/m (GPA, 1996); trunkline capacity = 790 bbl/day (125.6 m ³ /day).
Trunkline (300 mm):	\$187/m (capital costs for Moomba–Port Bonython trunkline; McDonough, 1996; Section 5.0); trunkline capacity = 33 000 bbl/day (5250 m ³ /day).
Completion cost per well:	\$350 000 (BRS, 1996).
Pumps:	\$102 000 (GPA, 1996).
Wellhead:	\$150 000 (GPA, 1996).
Oil storage tanks:	US\$18.75/bbl (BRS, 1996).
Vehicle:	\$50 000 (typical 4WD), replaced every three years.

Operating costs

Trucking cost:	\$10.80/bbl (McDonough, 1996).
Downhole well maintenance:	\$45 000/well/year (R. McDonough, MESA, pers. comm., 1996).
Pump maintenance:	8% CAPEX/year (GPA, 1996).
Pump fuel cost:	\$1500/hp/year (GPA, 1996).
Flowline maintenance:	3% CAPEX (GPA, 1996).
Trunkline maintenance:	2.5% CAPEX (GPA, 1996).
Marla operation:	\$50 000/year.
Head office:	\$150 000/year.
Road maintenance:	\$1100 average cost of patrol grading to suitable standard for heavy vehicles (Department of Transport, 1997); the range is \$800–1400/km/year, depending on weather conditions.

Reservoir engineering data

The spreadsheet Oil_prod.xls calculates total production rate, annual and cumulative production, wells needed and the recovery factor.

Max. wells:	Five (discovery well and four development wells).
Max. field rate:	1000 bopd (158.9 m ³ /day).
Field area:	Case 1: 75 km ² , Case 2: 150 km ² (the average area of prospects and leads delineated by Mackie (1994) is 97 km ² ; area ranges from 16 to 299 km ²). The field is assumed to be circular.
Pay thickness:	60 m (average closure mapped by Mackie (1994) is 173 m, closure ranges from 125 to 750 m).
Original Oil in Place:	Two cases were modelled: Case 1 = 5–30 mmbbl, Case 2 = 50–200 mmbbl. Note that original oil in place is referred to throughout the text, not recoverable oil.
Recovery factor:	Oil recoveries did not exceed 25%.
Reservoir depth:	1750 m (5743 ft), primary reservoir Murnaroo Formation (D. Gravestock, MESA, pers. comm., 1996).
Reservoir pressure:	17 427 kPa (2527 psia), based on hydrostatic gradient.
Bottomhole pressure:	3250 kPa (500 psia), assumed.
Reservoir kh:	250, 1000, 9200 and 17 700 md.ft were selected.
Water gradient:	0.44 psi/ft (assumed).
Temperature gradient:	20°C/km.
Surface temperature:	25°C.
Reservoir temperature:	60°C (140°F, 600 R).
Oil API gravity:	50 (based on Mereenie Pacoota P3).
GOR:	800 scf/stb (based on Mereenie Pacoota P3).
Gas gravity:	0.76 (based on Mereenie Pacoota P3).
Initial Oil FVF:	1.42 rb/stb (calculated from correlation). The Marla region is overmature and oil here is likely to be more gas-rich than other parts of the Officer Basin.
Rock compressibility	4x10 ⁻⁶ .psi ⁻¹ (assumed).
Water compressibility	3x10 ⁻⁶ .psi ⁻¹ (assumed).
Water saturation	50% (assumed).

Oil production above the bubble point is calculated using the material balance equation. Oil production below the bubble point is calculated using the Tracy Material Balance Method (Smith and Tracy, 1986). For a given pressure decrement, the oil production volume is calculated. Individual well flow rates are determined based on reservoir pressure and flowing bottomhole pressure. The number of wells required (up to a maximum of five) to produce at the target field flow rate is then calculated. Based on the total rate, the time to produce the oil volume for the pressure decrement is calculated to develop a oil production profile with time.

Oil properties are based on Mereenie Field data, (oil gravity, gas gravity, GOR). Correlations are then used to calculate bubble point pressure, oil formation volume factor, oil viscosity, etc.