BEFORE THE ENVIRONMENTAL PROTECTION AUTHORITY
AT WELLINGTON

IN THE MATTER	of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
AND	
IN THE MATTER	of a decision-making committee appointed to hear a marine consent application by Trans Tasman Resources Limited to undertake iron ore extraction and processing operations offshore in the South Taranaki Bight

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EXPERT EVIDENCE OF DR MIKE PATRICK ON BEHALF OF TRANS TASMAN RESOURCES LIMITED
11 DECEMBER 2016

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EXECUTIVE SUMMARY

1. In my opinion, the EEZ Act has a clear purpose in relation to consideration of marine consent and discharge applications and the relevant criteria that apply.

2. From a practical maritime management and policy viewpoint it would be unwarranted and unnecessary duplication for a decision making committee to be expected to reconsider or re-evaluate the effectiveness or otherwise of the other statutory regimes I have outlined in my evidence below.

INTRODUCTION

Qualifications and experience

3. My name is Fredric Michael Patrick, and I have a BSc. Hons. and a Ph.D in Microbiology. My Ph.D thesis was on the topic of the passage of trace metals through aquatic food chains.

4. I have 40 years' experience in virtually all fields of environmental science, including:

   (a) as a regulator, first at the then Taranaki Catchment Commission (now Regional Council), 1980-88 and at the then Maritime Safety Authority (now Maritime NZ), 1995-2000. In both roles I was extensively involved with activities of the maritime sector from a marine environmental management perspective. This included assisting with setting up, and thereafter managing New Zealand's current marine oil spill contingency planning system;

   (b) as an environmental consultant in the coastal and maritime (*inter alia*) field for two private companies, and latterly on my own behalf, both in New Zealand and in 10 countries overseas as well as Antarctica. This consulting work included advising the offshore petroleum exploration and seabed mining industries; and

   (c) Executive Officer of the Petroleum Exploration and Production Association of NZ (PEPANZ) (2000-2006). PEPANZ is the national body representing the upstream oil and gas exploration and production industry in its discussions with local and central government as well as local communities.

   (d) In my time at the Maritime Safety Authority I also represented New Zealand at the international

maritime discussions concerning marine oil spills and the international compensation funds that have been established to provide appropriate recompense to those suffering from economic and other damage caused by a marine oil spill.

5. As a result of the above experience, I have gained a detailed working knowledge of New Zealand's maritime sector, in particular the associated regimes for the management of the marine environment potentially affected by that sector, including New Zealand's marine oil spill planning and response system.

Code of conduct

6. I confirm that I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Practice Note dated 1 December 2014. I agree to comply with this Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

SCOPE OF EVIDENCE

7. Pursuant to section 59 (2) (h) of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 ("EEZ Act"), decision makers are obliged to consider, *inter alia*, "the nature and effect of other marine management regimes".

8. It is my understanding that this statutory requirement simply means that a decision maker needs to be generally aware of the relevant statutory process and roles of other statutory bodies and organisations with a regulatory role within the exclusive economic zone ("EEZ"). It is not intended that

there be any need to duplicate or second guess these other bodies.

9. My evidence will address those other regimes of relevance to the operations proposed by Trans Tasman Resources Limited ("TTR"), namely:

   (a) aspects of the Crown Minerals Act 1991 and associated Minerals Programme as pertains to the project;

   (b) aspects of the Maritime Transport Act 1994 including:

      i. the requirement for International Oil Pollution Prevention Certificates for all vessels and the Integrated Mining Vessel ("IMV");

      ii. the requirement for approved shipboard oil pollution emergency plans for all vessels, otherwise known as marine oil spill contingency plans;

      iii. how the above marine oil spill contingency plans fit within New Zealand's national marine oil spill plan and response system;

      iv. requirements for certificates of insurance to cover losses caused by a marine oil spill;

      v. the requirements with regard to management of garbage;

   (c) the requirements of the Hazardous Substances and New Organisms Act 1996 ("HSNO") regime including emergency management; and

   (d) health and safety matters for vessels and the IMV.

10. Whilst, on the face of it, the Wildlife Act 1953 and the Marine Mammals Protection Act 1978 would also be relevant to your consideration, it is my view that these at best establish

offences for which persons can be prosecuted, rather than set out regimes pertaining to the protection of species from the environmental effects of activities such as those proposed by TTR, so I will not comment on these pieces of legislation further. Furthermore, TTR's application and accompanying Environmental Impact Assessment ("EIA") specifically and appropriately address these, as well as other legislative matters.

11. TTR's application and supporting material also addresses aspects of the Biosecurity Act 1993 of relevance to the proposed operation, so again I will not comment further here.

12. I raise these other statutes because they contain matters that are within the jurisdiction of other agencies/authorities, and as such do not need to be considered in this forum.

OTHER REGIMES OF RELEVANCE

The Crown Minerals Act 1991

13. Whilst on the face of it not a marine environmental management regime, this Act is listed in section 7 (2) of the EEZ Act as one of the marine management regimes that you should consider.

14. This Act establishes the regime for the management of Crown-owned minerals and petroleum in New Zealand, for the benefit of New Zealand, including in the "marine space". Crown-owned minerals include petroleum, gold, silver and other metals in New Zealand's land, Territorial Sea, Exclusive Economic Zone and extended continental shelf -the EEZ being where TTR will operate.

15. The over-arching objectives, policies for and details of this management regime are set out in what is called the Minerals Programme, subsidiary to the Act. The Programme

initially sets out the basis for the regime, and this includes the following:

> *"(4) The Minister interprets the words "promote prospecting for, exploration for, and mining of Crown owned minerals" as requiring the Minister and the Chief Executive to:*
>
> *(a) ensure that parties interested in prospecting for, exploring for, and mining of Crown-owned minerals are able to do so as readily as possible within the mandate and provisions of the Act;*
>
> *(b) publicise and encourage interest and investment in prospecting for, exploring for, and mining New Zealand's Crown-owned minerals."*

And:

> *"(6) The Minister sees "for the benefit of New Zealand" as the over-arching objective of the purpose statement and as the touchstone for interpreting the rest of the purpose statement and the provisions of the Act governing various activities and processes. The Minister considers that, within the context and mandate of the Act, "the benefit of New Zealand" is best achieved by increasing New Zealand's economic wealth through maximising the economic recovery of New Zealand's Crown-owned mineral resources." [my emphasis]*

16. In my view, the Government, in granting a mining permit to TTR, has already considered key issues to have this resource mined, for the benefit of New Zealand, as long of course as the environmental effects of the mining operation can be appropriately and responsibly managed.

17. In order for an applicant to receive a mining permit, they must satisfy certain key requirements, set out in the minerals programme. These include:

    (a) the applicant must satisfy the Minister that they can mine the resource appropriately, as evidenced by a work programme that must be approved and then adhered to; and

    (b) the applicant must have, and be able to prove, their capability to undertake the mining operation proposed.

18. In reviewing applications for mining permits, the Minister looks to ensure that the Crown will receive an appropriate return from the mining of its minerals (via taxes and royalties).

Maritime Transport Act 1994

19. At the outset let me note that, despite its title, this Act has as much to do with protection of the marine environment from those industries and activities known as the maritime sector as it does with transport-related matters. This is often a matter of confusion for the layperson, who often raises concerns that the Act is not relevant to marine environmental protection – it is.

20. As noted in TTR's EIA, the IMV is denoted as an offshore installation within the Maritime Transport Act. As such, TTR is obliged to comply with Marine Protection Rules Part 131, which specifically addresses various matters pertaining to offshore installations.

21. Part 131 gives effect to the provisions of the International Convention for the Prevention of Pollution from Ships 1973/78 ("MARPOL") and the International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 ("OPRC") in respect of offshore installations.

22. TTR will also be utilising other vessels, non-installations, as part of its mining operation, and these are subject to other relevant Marine Protection Rules which address the same matters.

23. Of particular relevance to TTR's proposed operations are:

    (a) the requirement for International Oil Pollution Prevention Certificates ("IOPPC") for all vessels and the IMV;

    (b) the requirement for an approved shipboard oil pollution emergency plan ("SOPEP") for all vessels associated with TTR's operations;

    (c) the interface between the IMV marine oil spill plan and the vessel SOPEPS with the wider New Zealand marine oil spill response system;

    (d) the requirements for certificates of insurance; and

    (e) rules relating to the management of garbage (Marine Protection Rules Part 170).

24. I discuss these in more detail below.

25. I note here that recent legislative changes have transferred several of the Maritime Transport Act 1994 provisions formerly the domain of Maritime NZ to the EPA under the EEZ Act. These include the marine dumping of waste, and the requirement for what was previously known as a discharge management plan. Relevant aspects of these are part of the suite of consent applications under the EEZ Act that you are considering, and therefore I will not discuss these further.

International Oil Pollution Prevention Certificate

26. All vessels and the IMV associated with TTR's operations are required by New Zealand law to have an IOPPC, which has been approved generally by the Flag State of those vessels,

and which must be available for inspection by the relevant New Zealand authority at all times (Maritime NZ).

27. These IOPPCs set out how the arrangements, equipment and systems aboard each vessel are sufficient to prevent as far as practicable a marine oil spill. The "exceptions" of course are those major or catastrophic events for which no amount of oily water separators, slops tanks, fuel tank protection measures, automatic shut-off valves on discharge pipes etc. can cope with, such as collision damage, a tank rupture following a grounding, sabotage, etc. Refer below re how such events are responded to.

28. Maritime NZ inspectors are required to view these IOPPCs on a regular basis for currency, and can require the vessel to cease operating if the IOPPC is not current.

29. With regard to the potential for a catastrophic discharge of oil into the sea resulting from a collision between vessels, I note that TTR will be operating within a navigational precautionary area established by the International Maritime Organisation in 2006 (refer map attached as **Appendix 1**). This zone was put in place to reduce the chances of collisions between vessels and the various offshore petroleum mining operations and associated platforms that occur around the Taranaki Coast (Maui, Maari, Tui, Pohokura, and Kupe developments). As a consequence, all vessels sailing in or through this area are required to navigate with particular caution, and have automatic vessel positioning and tracking systems in operation.

30. I would also note here that TTR will be seeking to have a navigational exclusion zone established around the IMV, promulgated as Regulations under the Continental Shelf Act. Such zones currently exist around the offshore petroleum production platforms listed above. All vessels are prohibited

from entering these exclusion zones except those authorised by the operator, which in this case would be TTR.

Shipboard Oil Pollution Emergency Plan

31. Marine Protection Rules Part 130A require every New Zealand and foreign vessel of 400 gross tonnage ("grt") or greater, and every oil tanker of 150 grt or greater operating in New Zealand water to carry an approved SOPEP. A SOPEP is usually approved by the Flag State of the vessel concerned.

32. The SOPEP sets out for these vessels all operations and activities that could pose a potential risk of a spill of oil into the sea; the consequences of those spills; and how the vessel operator will respond to a spill.

33. Similarly, Marine Protection Rules Part 131 requires that any offshore installation has an approved marine oil spill contingency plan, the equivalent of a vessel SOPEP.

34. In the event that the spill is of such a magnitude, or occurs in conditions, which mean that the operator is unable to deal with the spill, the response would escalate to either a regional or a national spill response. The latter would be managed by the national response team as was, for example, the response to the Rena oil spill (see below).

35. As with the other approvals under the Maritime Transport Act discussed above, vessels and installations cannot operate without an approved SOPEP/contingency plan in place, and monitoring for compliance and enforcement is by Maritime NZ.

Interface between Installation Oil Spill Plans and vessel SOPEPS with New Zealand's wider marine oil spill response system

36. New Zealand has an internationally-recognised, conventional three-tiered marine oil spill response system in place, made up as follows:

(a) vessels and offshore installations must have their own response plans, aka Tier 1, as noted above, and these are used in the first instance to combat a marine oil spill;

(b) if however a spill occurs within the territory of a regional council, i.e. within the 12 nautical mile Territorial Sea, and that spill exceeds the response capability of the spiller, then a regional response "kicks into place", under the management of the relevant regional council and its Regional On-Scene Commander and response team – aka Tier 2; and

(c) if the spill exceeds the response capability of that regional plan, or if the spill is beyond the Territorial Sea and exceeds the Tier 1 response capability of the spiller, then the national response system kicks in, under the management of a National On-Scene Commander or Commanders and the national response team - aka Tier 3. Part of a Tier 3 response also may involve the calling in of pre-arranged international assistance, as occurred for example with the recent Rena spill. That spill was also an example of the response very rapidly escalating from Tier 1 to Tier 2 to Tier 3 (the grounding was within the Territorial Sea, and thereby Bay of Plenty Regional Council's jurisdiction).

37. In terms of TTR's operations, which are in the main beyond the Territorial Sea, any potential spill that exceeds the

response capability of the vessels and/or IMV will immediately trigger a national (Tier 3) response.

38. With regard to any spill from fuel transfer operations between vessels, the advantage of the requisite notification of the proposed transfer to Maritime NZ pursuant to Marine Protection Rules Part 103 is that it puts the national marine oil spill response team "on alert", meaning that it can respond to a major spill much more quickly and effectively. Similarly, any oil transfer operation must only occur in situations where the vessels involved have in place an approved marine oil spill contingency plan.

Certificates of insurance

39. Pursuant to the Maritime Transport Act and Marine Protection Rules Part 102, all of TTR's vessels over 400 grt and offshore installations (the IMV and FSO), as well as the tanker being used to re-fuel the IMV and FSO, are required to hold public liability insurance to cover any claims for damages arising from a marine oil spill.

40. The amount of insurance varies between vessels, installations and tankers, based on various factors, in accordance with international maritime law.

41. Each vessel and installation must hold a certificate attesting to the holding of the requisite insurance, and these certificates must be available for inspection by Maritime NZ. In my experience operators of vessels and offshore installations hold far greater levels of liability insurance than the law requires – this is because it is significantly cheaper to have that insurance in place and paid up in the event of say a major oil spill than it is to have the minimum required insurance and have to make up the difference, in terms of clean-up costs, from their bank accounts.

Management of garbage

42. Marine Protection Rules Part 200 covers the management of garbage upon an offshore installation. Marine Protection Rules Part 170 does likewise for other vessels.

43. Pursuant to recent changes within the MARPOL regime with regard to garbage, there is now a prohibition on the discharge into the sea of any garbage except for ground-up food waste of a size no greater than 25 mm. The only exceptions are for when a discharge of garbage is required to secure the safety of the vessel or installation, or saving life at sea, or for any accidental loss of garbage overboard.

44. As a consequence, operators of vessels and offshore installations must have in place an approved garbage management plan, appropriate signs and placards to ensure that the rules are complied with, and a garbage record book noting the fate of all garbage.

Hazardous Substances and New Organisms Act 1996

45. Certain materials and their management on the IMV fall within the ambit of the HSNO regime.

46. That Act sets out controls on the storage, use and management of hazardous substances to ensure that there are no (in particular) health and safety issues arising from, for example, the accidental release of a hazardous substance from containment, or the mixing of one substance with another such as to cause a major incident (explosion, toxic vapour release etc.).

47. Several of the chemicals and agents used aboard the IMV fall within the ambit of the HSNO regime whether because of flammability or hazardous chemical nature/potential. As a consequence TTR is obliged to comply with HSNO and

associated Regulations, with enforcement by the Environmental Protection Authority.

48. In the main these chemicals are those associated with the "cleaning in place" process which keeps the reverse osmosis filters working (part of the ore separation process), as listed in section 2.12.5 of the EIA, as well as any acutely flammable materials, such as heavy fuel oil and marine diesel.

49. I note here that HSNO Regulations[1] also address emergency management issues, and establish requirements accordingly, although these Regulations do not apply to any hazardous chemical or fuel used for the motive power or control of, or in a process on a ship – this is under the purview of the Maritime Transport Act. These Regulations would however appear to apply to an offshore installation, and thereby the IMV. Either way however, in terms of which legislative regime applies, the requirement for emergency plans remains.

Health and Safety

50. It is an old adage at sea that if you look after safety, you thereby look after the environment. Whilst in the main that safety aspect would involve ensuring that vessels don't sink, collide, explode etc., it also covers aspects of the safety of crew and personnel, and hence it is a relevant environmental consideration.

51. All aspects of the health and safety of crew and others aboard all vessels and offshore installations are addressed within the Health and Safety at Work Act 2015 ("HSWA") regime, which is blended in with still-current Maritime Rules made under the Maritime Transport Act 1994.

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[1] Hazardous Substances (Emergency Management) Regulations 2001.

52. In particular, section 11 (1) of the HSWA states that:

> *"This Act applies to –*
>
> *(a) a workplace in the exclusive economic zone or in or on the continental shelf if an activity that is regulated under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 or the Crown Minerals Act 1991 is carried out at the workplace;"*

53. Relevant duties and responsibilities with regard to working on offshore installations are the responsibility of Worksafe NZ, whilst for ships these duties and responsibilities are delegated to Maritime NZ personnel warranted under both pieces of legislation. Both agencies however recognise the potential issues arising with the IMV when anchored and working versus when it ups anchor and moves to another location, and thereby potential inconsistencies in the application of the Act. Given the intimate linkage between TTR's vessel operations and the IMV, it would be logical that all duties and responsibilities under the HSWA were undertaken by one agency only, on the face of it Maritime NZ given that Worksafe NZ to my knowledge has no experience with ships and ship-board operations. Both agencies are currently in discussion about this matter.

TTR MANAGEMENT PLANS

54. Section 5.6 of TTR's EIA sets out the details of various management plans for the operation.

55. All of the matters I have addressed above in terms of emergency management are addressed within those plans, as is required to be addressed by the relevant legislative regimes, in particular the Maritime Transport Act, the Health and Safety at Work Act, and HSNO.

EPA KEY ISSUES REPORT

56. The EPA key issues report raises economic benefits to New Zealand as being one of six key issue areas. While the evidence of Mr Jason Leung-Wai addresses the specific questions raised in this report regarding economic benefits, I reiterate my comment at paragraph [16] above, that the Crown has deemed this project to be in the national economic benefit, otherwise it would not have granted TTR a mining permit.

MATTERS RAISED BY SUBMITTERS

57. Several submitters have raised as a concern or argument the requirements and obligations accruing to a State Party to the United Nations Convention on the Law of the Sea, and latter Treaties and Conventions. Unfortunately, those submissions are not sufficiently specific for me to provide anything other than a general response, which I set out below.

58. The matter commonly raised is that the grant of the consents sought would result in New Zealand being in breach of its obligations under the United Nations Convention on the Law of the Sea ("UNCLOS"), the Convention on Biological Diversity ("CBD"), and the Noumea Convention, with regards to protection of the marine environment.

59. These submissions however are at best misinformed, at worst disingenuous.

60. Prior to UNCLOS, coastal States had a 3 nautical mile Territorial Sea, being an historic anachronism, the rough distance a shore-based cannon could fire with accuracy – hence a State could defend this area of sea, and therefore those coastal States claimed sovereignty over the Territorial Sea.

61. However for many decades from the early 20th Century, particularly after WWII, coastal States demanded more, both from the point of view of an extended Territorial Sea due to vast improvements in weaponry, but also with an eye to utilising the vast resources beyond the Territorial Sea.

62. UNCLOS was the resultant compromise following many years of debate and discussion. In short, UNCLOS established a new regime, as follows:

- Territorial Seas are now 12 nautical miles wide, wherein States have full sovereignty – that is, the same rights as for their land area;
- States also have a further 12 nautical miles as a Contiguous Zone, wherein a State may exercise such powers it requires to manage customs, fiscal and immigration operations as and when required;
- Out to 200 nautical miles, an Exclusive Economic Zone – and I would ask you to consider those words. States have sovereign rights within the EEZ, as distinct from full sovereignty, namely the utilisation of the resources of the water column and seabed; and
- Beyond that, to a distance determined by under-sea topography, an extended area known as the Continental Shelf, wherein States have sovereign rights to utilise the resources of the seabed.

63. Submitters in my view are referring to Articles 192-194 of the Convention. I have attached these as **Appendix 2**.

64. As you can see, these Articles do not in any way require States to preserve and protect the marine environment at any cost – these environmental Articles are subservient to the rest of the Convention that sets up the new maritime regimes, and the sovereign rights of State Parties to the Convention, including of course those rights of resource utilisation within the EEZ.

65. With regard to the CBD and Noumea Conventions, and indeed other later maritime Conventions, these are subservient to UNCLOS, insofar as these latter Conventions do nothing to impinge upon the sovereign rights of coastal States signatory to UNCLOS. Indeed Article 3 of the CBD reads as follows:

> ***"Article 3. Principle***
>
> *States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."*

66. As you can see, this is in essence a simple re-statement of the basis for UNCLOS – obviously too, it is inconceivable that a State Party to UNCLOS would ever sign a latter Convention which would impinge upon or detract from those hard-won sovereign rights as set out in UNCLOS.

67. Furthermore, the legislation under which the TTR applications are made is *inter alia part of* those "environmental policies" noted in Article 3 above.

Dr Mike Patrick

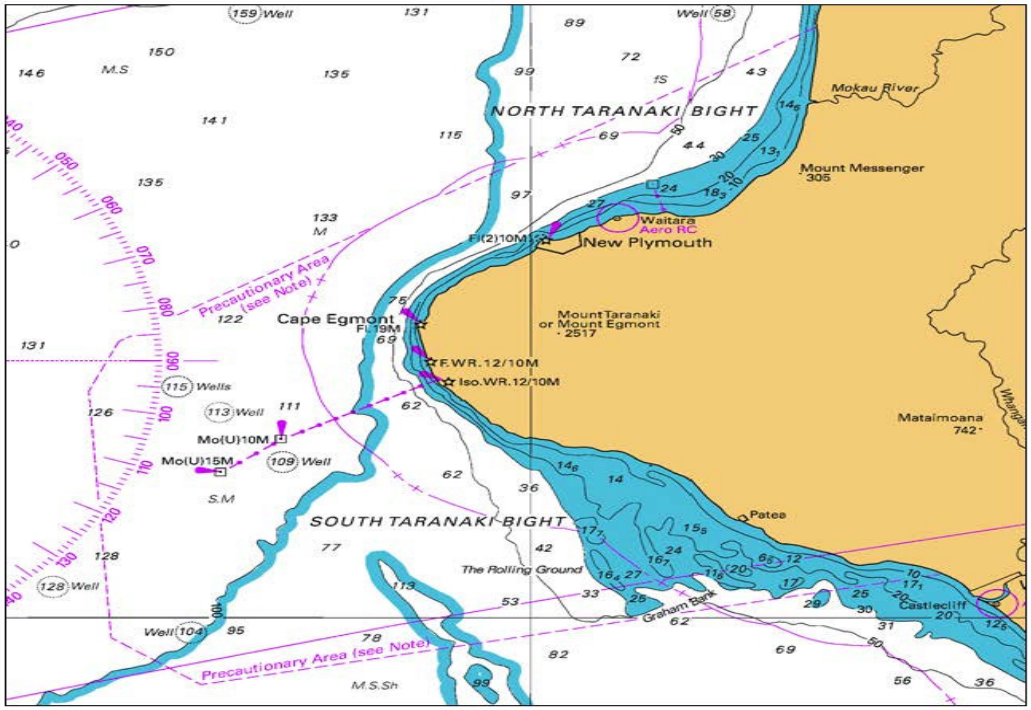
11 December 2016

APPENDIX 1 -THE WEST COAST, NORTH ISLAND NAVIGATIONAL PRECAUTIONARY AREA

Taranaki Offshore Area

(1) The charted line of MHWS at approximately 38° 31'.00S 174° 37'.80E
(2) 39° 18'.50S 173° 05'.00E
(3) 39° 26'.00S 173° 01'.00E
(4) 40° 03'.00S 173° 04'.00E
(5) 40° 10'.00S 173° 16'.00E
(6) The charted line of MHWS at approximately 39° 53'.50'S 174° 54'.50E

An extended area off the Taranaki coast has been declared a precautionary area with effect from 2007. The area covers a high level of offshore petroleum operations including two floating production, storage and offloading facilities serviced by offtake tankers. All ships should navigate with particular caution in order to reduce the risk of a maritime casualty and resulting marine pollution.



APPENDIX 2 - PART XII PROTECTION AND PRESERVATION OF THE MARINE ENVIRONMENT

SECTION 1. GENERAL PROVISIONS

Article 192 General obligation

States have the obligation to protect and preserve the marine environment.

Article 193 Sovereign right of States to exploit their natural resources

States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment.

Article 194 Measures to prevent, reduce and control pollution of the marine environment

1. States shall take, individually or jointly as appropriate, all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and they shall endeavour to harmonize their policies in this connection.

2. States shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention.

3. The measures taken pursuant to this Part shall deal with all sources of pollution of the marine environment. These measures shall include, inter alia, those designed to minimize to the fullest possible extent:

    (a) the release of toxic, harmful or noxious substances, especially those which are persistent, from land-based sources, from or through the atmosphere or by dumping;

    (b) pollution from vessels, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, preventing intentional and unintentional

discharges, and regulating the design, construction, equipment, operation and manning of vessels;

(c) pollution from installations and devices used in exploration or exploitation of the natural resources of the seabed and subsoil, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices;

(d) pollution from other installations and devices operating in the marine environment, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices.

4. In taking measures to prevent, reduce or control pollution of the marine environment, States shall refrain from unjustifiable interference with activities carried out by other States in the exercise of their rights and in pursuance of their duties in conformity with this Convention.

5. The measures taken in accordance with this Part shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.