BEFORE THE ENVIRONMENTAL PROTECTION AUTHORITY

IN THE MATTER	of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2011 (EEZ Act)
AND	
IN THE MATTER	of an application for marine consent under section 38 of the EEZ Act by Trans-Tasman Resources Limited to undertake iron ore and processing operations offshore in the South Taranaki Bight
BETWEEN	**Trans-Tasman Resources Limited** Applicant
AND	**Environmental Protection Authority** EPA
AND	**Fisheries Inshore New Zealand Limited, New Zealand Federation of Commercial Fishermen Inc, Talley's Group Limited, Southern Inshore Fisheries Management Company Limited, and Cloudy Bay Clams Limited** Fisheries Submitters

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PRIMARY NON-EXPERT EVIDENCE OF ANTHONY LEONARD PIPER FOR THE FISHERIES SUBMITTERS

DATED: 24 January 2017

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INTRODUCTION

1. My name is Anthony Leonard Piper and, together with my son Isaac, I am the founder of Cloudy Bay Clams Limited. I have been involved in New Zealand trawl and commercial fisheries and aquaculture industry over the past 45 years.

2. In this Statement of Evidence, I will:

   (a) provide an overview of Surf Clams and the Surf Clam fishery;

   (b) discuss the development of the Surf Clam fishery in FMA 8; and

   (c) outline my concerns with the current application by Trans-Tasman Resources Limited (**TTR**).

Background and experience

3. I am a qualified Diesel Trawler Engineer holding a NZCE Civil and Structural Engineering Certificate and I also hold an Inshore Launch Master's Certificate (which allows me to skipper a commercial vessel under 20m in inshore waters). After completing my NZCE, I was employed as a soil engineer, working on soil compaction and permeability for structural earthworks. This work gave me experience and practical insights into the properties of soils. However, my passion for the sea generated a career change.

4. In the past 26 years, I have been actively involved in the development of the Surf Clam fishery. I established Cloudy Bay Clams Limited (**CBCL**) (and its pre-cursor Kai Moana Limited) and have been involved in all aspects of the development of the Surf Claim fishery in New Zealand CBCL is a family-owned company with my eldest son Isaac now the director and manager.

5. As a pioneer in this fishery, I have developed a wealth of knowledge and experience relating to Surf Clams and their environment. This knowledge has helped CBCL develop specialised harvest machinery and wet storage facilities. CBCL now has a comprehensive operation harvesting, storing, depurating and processing Surf Clams. We also undertake biomass and sanitation classification studies.

6. Over the years I have accumulated a significant practical knowledge about the physiology, habitat, and behaviour of Surf Clams.

Background to Evidence Preparation

7. I am familiar with the general site of the application and surrounding environment, as I have been researching the Surf Clam population on the Taranaki Coast for a number of years.

8. In preparing this evidence I have read the following documents:

   (a) TTR – South Taranaki Bight Offshore Iron Sand Extraction and Processing Project, Impact Assessment, dated 23 August 2016 (**IA**);

   (b) Expert evidence of Dr Alison MacDiarmid on behalf of TTR, Marine effects and benthic ecology, dated 15 December 2016;

   (c) Expert evidence of Lawrence Cahoon on behalf of TTR, Primary production and optical effects, dated 15 December 2016;

   (d) Corporate Evidence of Shawn Thompson on behalf of TTR, First Statement - Project Description, dated 16 December 2016; and

   (e) Corporate Evidence of Alan Eggers on behalf of TTR, dated 17 December 2016.

SURF CLAMS AND THE SURF CLAM FISHERY

Surf clams

9. The New Zealand Surf Clam fishery has seven species of sub-tidal molluscan bivalve Surf Clams. These species, which are indigenous to New Zealand, are all managed within the Quota Management System (**QMS**).

10. The Surf Clam habitat is a fragile benthic environment consisting of balanced particle size distribution. This means that any increase in mud or fine particles will make the habitat less hospitable for the clams.

11. The unique properties of our surf beaches generate a very special habitat that is specific for survival of Surf Clams. On shallow sloping, well-sorted sandy/gravel beaches (i.e. washed through by seawater to remove fines),

such as those found on the West coast around Taranaki, the clams are able to anchor themselves and feed on the surf diatoms that are concentrated within the breaker zone.

12. More specifically, the wave action pumps seawater through the well-sorted sand/gravels of the sea floor, where the algae and detritus are filtered out and converted to microbial, meiofaunal, microfaunal, and macrofaunal biomass within the sand. The respiration of these organisms regenerates nutrients that return to the sea from the interstitial water and supports major blooms of surf diatoms in the surf zone.

13. The clams feed by extracting water through a fine filter mechanism on their siphon and passing that water across their gills, extracting both oxygen and nutrients.

14. Surf Clams are able to anchor themselves to the sand/gravel using their foot (which acts as a complex hydraulic digging and mechanical anchoring mechanism). By digging and securing themselves in the seabed, they are able to resist being dislodged by wave action.

15. The Surf Clams can withstand periodic storm events (which change the interstitial pressure in the sand) by digging themselves deeper into the sand, and respiring using the sand as a natural filter to access oxygenated water. Clam siphons can exclude the suspended sands, but cannot exclude finer particles such as mud.

16. While Surf Clams are robust (they need to be to survive their surf habitat) they are very sensitive to environmental change. They are sentinel in function around our coast line as real time monitoring in their flesh can detect changes to the natural environment. For example, they are ideal for identifying accumulated toxins, heavy metals, and biological contaminants in the water.

17. In addition, as I note above, any change to the benthic properties of their habitat will affect the health of the population. Many other factors influence the abundance and distribution of Surf Clams species on our beaches, including, but not limited to, water depth, sediment particle size distribution, wave action, climate and whether the beach is depleting or aggrading. Typically, areas of high sediment discharge, particularly around river mouths,

are often barren and uninhabitable for these species because of the elevated levels of mud.

18. In summary, Surf Clams rely on a complex eco-system that produces nutrients for the growth of diatoms, which is their primary food source. Anything that affects this eco-system, including any physical change to their habitat (for example excessive fines (mud)) and the availability of food, will affect Surf Clam populations.

The Surf Clam fishery

19. The New Zealand Surf Clam fishery is still in its early stages of development and there is very little information as to how populations of each species are distributed around the New Zealand coastline. Large areas of beach in each Fisheries Management Area (**FMA**) are still being assessed and developed. CBCL intends to complete a national biomass survey to assess the full potential for development. I have spent considerable time exploring beaches around the coast (including FMA 8) and by observing shell-cast, in conjunction with our own research and earlier work conducted by MAF Research, I have concluded that there are significant commercial quantities of these species on the South Taranaki coast.

20. Hydraulic dredges are used to harvest clams from the inshore waters of countries such as USA, Japan, Holland and Italy. These dredges employ high pressure jets to dig out the shellfish and to flush away sediment through the dredge catch bag.

21. These hydraulic dredges were used in the first commercial fishing of Surf Clams in New Zealand. However, the high pressure digging jets effectively water-blasted the clams resulting in extensive mortality and rendering the fishery uneconomic.

22. We invested significant time and money in the development of the “Piper” Hydraulic Winnowing Clam Rake in the early to mid-1990s to reduce clam mortality. The unique design and configuration minimises mortality and any negative environmental effects upon the seabed. Performance of the rake can be varied by altering water pressure, jet size, jet angle and bit-bar placement to meet the requirements of varying substrates and does not

destroy delicate organisms in the sediment or injure the mantle or shell of Surf Clams.

23. The "Piper" Hydraulic Winnowing Clam Rake has been shown to cause virtually no incidental mortality, and juveniles pass through the gear uninjured and survive after re-burial. The use of this clam rake allows the full potential of the Surf Clam fishery to be realised.

24. With our harvesting technology, growth in production has gone from less than 100t/year to just on 1,000t in 2016. FMA 8 should sustain an annual Total Allowable Commercial Catch (**TACC**) of at least 10,000 ton returning gross income of $100m/year, and it is estimated this will sustain 50 full-time employees plus associated service providers in the region.

THE DEVELOPMENT OF THE SURF CLAM FISHERY IN FMA 8

25. The development of a new Surf Clam fishery requires:

    (a) An exploratory survey to establish the general distribution of Surf Clams and whether the abundance is commercially viable, followed by an in-depth bio-mass survey to identify spatial distribution and establish a TACC; and

    (b) An initial Sanitation Survey to identify potential sources of pollution and to determine sanitary quality of water followed by a full classification of the area to establish health standards fit for human consumption and export market access.

26. CBCL commissioned a biomass survey in FMA 8 in October and November 2012, off the Manawatu coast, covering 20 kilometres on either side of the Manawatu River. This site was selected because sanitation sampling work was already underway, and CBCL is continuing with seven research projects to increase our knowledge of this relatively unknown group of species. I estimate the costs involved in doing the initial survey and sanitation work to be in excess of NZ$370,000. It is important to note that these species have been found in greater water depths at lesser densities, however at this stage development is focussed on the surf zone out to 10 metres. With more research, it is likely that future development of the fishery may well extend

beyond 10 metres. We have chosen a conservative approach until we better understand the benthic environment at greater depth.

27. The biomass survey estimated the current combined biomass of the 4 main species of surf clams at 18,384 tonnes for a total sample area of approximately 40kms. If this sample is extrapolated over the whole area of FMA 8, this would most likely result in a total biomass exceeding 60,000t.

28. These species are distributed throughout the coast of FMA 8, (not just the Foxton beach area) including areas within 12 to 20 nm of the proposed mining site. After the biomass study was completed, the Ministry for Primary Industries (**MPI**) recommended an increase in the TACCs for the following surf clam species:

    (a) *Paphies donacina* (PDO), 263 T;

    (b) *Crassula aequilatera* (SAE), 1730 T;

    (c) *Mactra murchisoni* (MMI), 599 T; and

    (d) *Dosinia anus* (DAN), 224 T.

29. Given that the survey area was less than one-third of the identifiable fishable beach in FMA 8, extrapolated out, it is reasonable to suggest that a TACC could be 10,000 tonne or more per year. Assuming NZ$10 per kilo (finished sale price), the potential value to New Zealand is NZ$100 million per year (as a conservative estimate). We anticipate our total fishing production for the fishing year 2017 should be around 2,000 ton with 1,000 ton coming from FMA 8 with a new vessel due to be launched in the next two months which will be dedicated to this area.

30. CBCL also holds 80% of PRK 8 (prawn killer) quota (1000kgs) in FMA 8. CBCL has yet to develop this species, which we consider exists throughout FMA 8, and will occur in the South Taranaki Bight (**STB**). No mention is made of this species in the application documents that I have read. I am troubled by this and whatever else may have been overlooked in carrying out the IA.

31. The costs of entry into this fishery are significant, because of a combination of high gear costs (purpose built vessels and clam rakes) and the requirement

to conduct shellfish sanitation surveys[1]. Before harvesting can begin, each harvest area must meet specific shellfish sanitation requirements overseen by MPI Verification Services. This requires weekly, monthly and annual testing for:

(a) Weekly bio-toxin testing to monitor toxicity in the flesh as well as phytoplankton sampling as an event precursor;

(b) Monthly microbiological studies testing for coliforms and e-coli as the indicator species of contaminants to establish a classification for the growing area coastal water; and

(c) Heavy metal testing to monitor accumulated levels generally on an annual basis.

32. Current research shows that Surf Clams are distributed in commercial densities sub-tidally to depths of 10 metres, each species being found generally within a distinct depth zone. However significant evidence of populations beyond this zone have been observed in trawl gear.

CONCERNS WITH TTR'S APPLICATION

33. TTR has overlooked the Surf Clam industry in its IA and plume modelling information. There is very little reference to Surf Clams anywhere in the application, either in relation to the proposed mining area or in the discussion of the effects of the sediment plume.

34. As I have said, the Surf Clam's habitat is a fragile benthic environment consisting of balanced particle size distribution and I fear this may be compromised by regular deposition of fine sediment by TTR. While Surf Clams can withstand periodic storm events, they may not be able to withstand the effect of regular deposition of sediment generated from the plume created by the re-deposition of sediment by TTR. As noted above, clam siphons are able to exclude suspended sands but will not be able to cope with regular deposition of fines in significant volumes. If their filter mechanisms and gills are smothered, they would suffocate and die.

[1] Animal Products (Regulated Control Scheme – Biovalve Molluscan Shellfish) Regulations 2006.

35. Furthermore, I am concerned that the fines generated by the sediment plume may generate a layer covering the deeper benthic environment (outside the surf zone) creating an anaerobic shield destroying the clam's food source (diatoms) and any other organisms important to clams and the greater food chain.

36. I refer to the expert evidence of Dr Barbara for the Fisheries Submitters, dated 23 January 2017, at paragraph [33] where he states:

> … modelling however has been based on the assumption that the mined sands contain less than 4% clay and silts. In the event the concentrations of clays and silts are greater than 4%, then deposition of clays and silts is likely to travel further distances and these would therefore have greater impacts than the modelled sand deposition.

37. I have grave concerns that sediment containing a greater concentration of mud and fines than that described by TTR and used in the modelling will impact significantly on the Surf Clam habitat and food sources with serious consequences for the fishery. As Dr Barbara states at paragraph [40] *"if mud deposition or clay exceeds 4cm in areas, fisheries species such as surf clams would also suffer"*. The clams would be smothered and their food source would be affected, potentially destroying the fishery in that area.

38. It is concerning to note that the current TTR IA seems to have removed the bore sample information that was contained in the previous application in 2013. The bore samples, I recall, identified mud content up to 80%. The absence of this information is concerning as it does not provide any comfort that the sediment plume modelling is based on accurate baseline information.

39. I do not believe the laboratory testing and modelling has considered all the potential factors that will impact on the characteristics and extent of the sediment plume and its potential to re-suspend fines. We have observed tidal swirls and thermal interfaces along the coastline that may both exclude and/or entrap this plume. These have not been considered. Significant volumes of fines are obviously transported well away from the mine site within the plume (which may be significantly greater than modelled) and can potentially re-suspend during subsequent significant storm or earthquake events. I am also concerned that these fines may be ingested or attached to other suspended

micro-organisms and transported further afield and into the food chain, thus affecting the potential food sources of the clams.

40. Huge volumes of processed material, around 7,200 t/hr, are to be returned to the sea by the mining operation, whereas the rivers (11 rivers including the Manawatu and Wanganui) carry around 1,343t/hr of sediment.[2] TTR's experts tell us that the sediment plume will not be any worse than what is already encountered in the area. But what happens when the rivers are in flood during a storm – sending extraordinary amounts of sediment into the sea? This, combined with the additional sediment plume created by TTR, will impact significantly on Surf Clams and other marine life.

41. TTR's experts agree the plume will affect fish populations but state that any effects will be minimal. For example, Dr MacDiarmid in her evidence for TTR on marine effects and benthic ecology, dated 15 December 2016 concludes that fish will be able to avoid the plume. Surf Clams and other sedentary species, such as paua and horse mussels, are not able to move away to avoid the plume. This has not been considered by TTR or its experts. I am concerned that there is little said about:

    (a) The possible influence of increased sediment on algal blooms and plankton densities as these are of vital importance to Surf Clams;

    (b) The risk that algal blooms will affect the Surf Clams with the accumulation of these toxins in the clam flesh having implications for our ability to harvest the clams as they may not be fit for human consumption.

    (c) The real consequences of diminished sunlight penetration (that I believe will affect the diatom population);

    (d) The effect on dissolved oxygen levels both within and under this plume;

    (e) Salinity and thermal change caused by the discharges; and

[2] (NIWA Sediment Plume Modelling Report, October 2015. P 22 (Total of river sediment rate 373kg/s))

(f) Dissolved and non-visible contaminants including chlorates and treatment chemicals from the Reverse Osmosis process.

42. These potentially all affect the food sources of the Surf Clams and, therefore, the whole food chain as many other species (such as Snapper) rely on clams as a food source.

Magnitude of the Proposed Operation

43. I am concerned about the sheer volume of sediment, water and chlorides that will be introduced into the ocean; for example:

(a) 36,000t/hr total sea water used of which approximately 20,000 m^3/hr at 37 parts per million salinity (increase of 9% over normal seawater);

(b) Processed solids returned constantly (24/7) of approximately 7,200t/hr (five times greater than the total river discharges); and

(c) The rate at which the de-ored sediment is to be returned to the seabed.

44. These are huge volumes of water and de-ored sediments that are being returned to the marine environment raising concern as to the short and long term impacts of this operation on our fishery and the food chain. There are too many unanswered questions to give me any confidence in the proposed operation.

45. The pits and mounds left behind following the deposition of sediment cause me concern as these can be as deep as 11m and as high as 9m in an area where the water depth is only 30-40m. This could represent a change in depth of up to 50%. This is non-compacted unstable material (whereas prior to extraction it was well compacted and stable). It is not clear from TTR's IA and evidence how this sediment will behave in storm events or during strong currents. There is potential for it to move during significant storms. Also, in light of the Kaikoura earthquake and its effect on the seabed, I believe there is potential for the mounds to be moved during an earthquake, stirring up massive volumes of the already loose fine sediment.

46. Mining on the scale proposed is unprecedented internationally, and I do not consider New Zealand should be a test case for its operation and effects.

Consultation

47. In the IA, TTR states that it is committed to transparency and mutually respectful and beneficial relationships. Alan Eggers, in his evidence for TTR, dated 17 December 2016, at paragraph [32] states that TTR has undertaken "extensive engagement and consultation". No one from TTR has ever contacted me or CBCL, despite me, on behalf of CBCL, giving both a written submission and oral evidence at the hearing in 2014. CBCL is not a member of FINZ. I have a very demanding job, and it takes a significant amount of time to read the IA and all the reports and expert evidence to sift through the differences between this application and the previous one. The information provided is highly technical, and I consider someone from TTR could have approached us, as a holder of significant rights in FMA 8, to explain their new approach and the differences to the previous failed application. The sheer volume of the information is overwhelming, and I consider that much of my time could have been saved had TTR sought to directly contact and engage with me and CBCL in respect of its latest application.

48. I have made a career and business of studying the marine environment and developing sustainable Surf Clam harvesting operations. I am dismayed at the prospect of a large mining operation being located so close to a highly productive fishery. I am concerned that the operation will detrimentally affect the entire coastline in the STB. I oppose the granting of the consent. However if consent is granted it must be accompanied by restrictive conditions and/or bonds.

Dated this 24th day of January 2017

Anthony Piper