

## **Chatham Rock Phosphate Limited**

**Submission to The Environment Committee Komiti Whiriwhiri Take Taiao which has initiated an inquiry into seabed mining in New Zealand. This inquiry will examine the potential benefits and risks of seabed mining in New Zealand, and whether changes to New Zealand's domestic regulatory framework are required.**

Terms of reference for the select committee inquiry:

For the purpose of its inquiry, the committee is particularly interested in:

- an overview of seabed mining operations and proposals
- the opportunities that could arise from seabed mining in New Zealand, including through best-practice emerging extractive technologies
- the costs and risks of seabed mining in New Zealand, including environmental impacts.
- comparison to other methods for obtaining minerals (eg land-based)
- how seabed mining is managed internationally and in New Zealand
- how domestic regulatory settings are performing, including under the Crown Minerals Act 1991, Resource Management Act 1991, and Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
- whether any change to domestic regulatory settings should apply to the coastal marine area, the EEZ and extended continental shelf, or both
- the prospect of any change to domestic regulatory settings being supportive of Pacific countries in considering their own positions on seabed mining
- recommendations for maintaining or updating New Zealand's domestic regulatory settings
- a Te Ao Māori perspective on these issues.

## **A. An Overview of the Chatham Rise Rock Phosphate and Rare Earths Project**

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### **A.1 Executive Summary**

Chatham Rock Phosphate (NZ) Ltd was established in 2004, is based in Wellington, has over 2,000 shareholders, the majority of them New Zealanders. Since December 2013 Chatham has held a granted mining permit over an 820 square kilometre area off the coast of New Zealand with significant (23.4Mt to 35Mt) seabed deposits of rock phosphate and other potentially valuable and critical minerals including rare earths.

The in-situ value of the rock phosphate alone is >s 9(2)(b)(ii) and the value of the adjacent rare earths, if they can be extracted, is much greater.

The permit area (which represents a fifth of one percent of the Chatham Rise and an even tinier fraction of the NZ EEZ of 1.4 million square kilometres) is 450 km east of Christchurch, at 400 m water depths on the Chatham Rise and in New Zealand territorial waters.

Extraction of the rock phosphate would provide a locally produced alternative to the 800,000 tonnes of this material annually used in New Zealand and primarily imported from Morocco, thereby reducing our carbon footprint as well as high transport and foreign exchange costs. Much of the rock phosphate imported from Morocco is actually sourced from the Western Sahara, a disputed territory.

There is no viable alternative local source of rock phosphate onshore New Zealand.

The deposits are comprised of nodules lying on the seabed and the relevant technological components (dredges) for such extraction are used routinely.

Total production and sales are expected to be 1.5 million tonnes per annum starting in 2027.

s 9(2)(b)(ii)

Chatham rock phosphate will be sold directly to farmers and other organic food producers to be used as a direct application, reactive rock phosphate. This will be both a domestic and export market with overseas buyers being particularly attracted by the very low cadmium content. Until recently the major international source of low cadmium rock phosphate to Europe was PhosAgro, a Russian company.

It will also be sold to farmers as an organic substitute for high grade triple super phosphate (TSP) as independent field tests (conducted in the 1980s) and more recent glass house trials have established that Chatham rock phosphate is 85% as effective as TSP.

The rock phosphate will also be sold to fertiliser manufacturers in Australasia and Asia, to be manufactured into single superphosphate and di-calcic phosphate.

The project environmental benefits include improved water quality, enhanced soil health, significantly reduced carbon emissions, and much lower levels of cadmium, a toxic substance contained in imported rock phosphate.

Chatham will recover phosphate nodules from 30 square kilometres a year or 450 km<sup>2</sup> over the present expected project lifetime. In total this represents 0.1% of the Chatham Rise (400,000 sq. kms in total)

The mining process involves a single pass of the dredge, and dredging activity will occur for 3 days in a 12-day cycle, 30 times a year (90 days a year). This means the organisms in the vicinity will not be subjected to long term sedimentation or plume impacts.

In the same locality the fishing industry annually bottom trawls (using weighted nets) 19,000 sq. kms. The fishing yields remain consistent.

The proposed recovery operation uses a suction dredge and a closed system to bring the nodules to the ship and to return the sediment and water to the seafloor. A plume will be generated by both the collection of the nodules and the return water. The extent of the plume has been extensively modelled and reviewed by world leaders in the plume monitoring industry included Deltares (Netherlands) and HR Wallingford (United Kingdom). These experts all agreed that the plume (generated close to the seabed) would not extend far outside the boundaries of the mining permit.

Experts engaged by CRP, the fishing industry and by the EPA have concluded (EPA hearing 2014) that there is likely to be no significant impact on fishing yields or on the nearby spawning grounds.

In other caucusing held as part of the hearing independent/opposing experts also agreed that:

- Marine mammals are unlikely to be affected.
- Sea birds are unlikely to be affected.
- Primary food chain productivity is unlikely to be affected.
- Toxicology effects in water column will be very low.
- Uranium is not an issue.

These findings were signed off by the experts concerned, were lodged on the EPA website and are a matter of public record.

It's been known for at least a decade that the seafloor muds in the Chatham Rock Phosphate mining permit also include rare earths and other valuable minerals or elements. These include cerium, lanthanum, neodymium, praseodymium, yttrium, cobalt, rubidium, cesium, germanium, gallium, strontium, thallium and tungsten.

In a more recent development, we also established that the phosphate nodules themselves also contain rare earths and other valuable minerals.

These include 15 of the 17 recognised rare earths, as well as other valuable minerals including nickel, cobalt, chromium, vanadium, zirconium, elemental fluorine and strontium.

## **A.2 Introduction**

Chatham Rock Phosphate (NZ) Ltd was established in 2004, is based in Wellington and is owned by hundreds of New Zealanders. Chatham has held since December 2013 a granted mining permit over an 820 square kilometre area off the coast of New Zealand with significant (23.4Mt to 35Mt) seabed deposits of rock phosphate and other potentially valuable and critical minerals including rare earths.

The in-situ value of the rock phosphate alone is >s 9(2)(b)(ii) and the value of the adjacent rare earths, if they can be extracted, is much greater.

The permit area (which represents a fifth of one percent of the Chatham Rise and an even tinier fraction of the NZ EEZ of 1.4 million square kilometres) is 450 km east of Christchurch, at 400 m water depths on the Chatham Rise and in New Zealand territorial waters.

Extraction of the rock phosphate would provide a locally produced alternative to the 800,000 tonnes of this material annually used in New Zealand and primarily imported from Morocco, thereby reducing our carbon footprint as well as high transport and foreign exchange costs.

There is no viable alternative local source of rock phosphate onshore New Zealand.

Rock phosphate is an essential ingredient of manufactured fertiliser and can alternatively (when of the appropriate chemical composition) be applied directly to pasture with much less environmental damage from run-off into waterways than manufactured super-phosphate.

The deposits are comprised of nodules lying on the seabed and the relevant technological components (dredges) for such extraction are used routinely.

Chatham has worked since 2007 s 9(2)(b)(ii) on compiling and consolidating existing information and data pertaining to the Chatham Rise phosphate deposit and related marine environment and acquiring significant additional data to fill in any information gaps.

A wide range of reports on the physical environment of the Rise including bathymetry, geology, geomorphology, oceanography, seabed sediments and their chemistry, water properties and chemistry have been produced with much of that work being undertaken by government owed Crown Research Institutes.

Equipment used to understand the seabed environment include multi-beam echo-sounder bathymetric data, sidescan sonar data, on-board remote operated vehicle video logging of substrate and sediment grain size data from cores and grab samples.

Our Environmental Impact Report prepared for the EPA hearing conducted in 2014/15 contains more than 30 technical reports to support a 300-page summary. The reports include studies undertaken following consultation with stakeholders to either answer questions or concerns raised or to identify ways of mitigating any potential effects. Chatham has invested more than s 9(2)(b)(ii) in these and earlier studies and as a result the Chatham Rise is one of the best understood marine environments in the world.

### A.3 Key facts

1. Chatham Rise sourced rock phosphate has a chemical composition which allows it to be applied directly to the soil without additives – only simple crushing is required.
2. Direct application rock phosphate is significantly more environmentally friendly because it binds better to the soil– reducing run-off by 80%-90% and improving soil health.
3. Loss of phosphate nutrient into waterways is also wasting a finite resource.
4. It also contains exceptionally low levels of cadmium and therefore offers food safety benefits.
5. Without processing It can sell at a significant premium, because it is both “organic” and is 85% as effective (according to recent greenhouse tests) as manufactured triple superphosphate.
6. Extensive Feasibility studies undertaken by Chatham and by Royal Boskalis Westminster, our technical partner (and proposed dredging contractor) indicate the rock phosphate can be extracted using existing technology for much less than the cost of buying and importing it from Morocco.
7. Much of the rock phosphate imported from Morocco is actually sourced from the Western Sahara, a disputed territory.

8. Sourcing the rock phosphate immediately offshore New Zealand would result in a much-reduced carbon footprint from the New Zealand fertiliser industry as all rock phosphate is presently imported.
9. Sourcing this resource locally would significantly improve New Zealand's balance of payments by reducing imports as well as creating exports.
10. s 9(2)(b)(ii) [REDACTED]
11. s 9(2)(b)(ii) [REDACTED]
12. The home port would benefit significantly, both from port charges and from better utilisation of existing facilities or construction of new ones.
13. Extraction of the resource would be conducted in accordance with the environmental guidelines published by the International Marine Minerals Society "Code for Environmental Management of Marine Mining".

#### A.4 History and Background

Chatham holds 100% of Mining Permit 55549, granted in December 2013, which covers an area of seabed phosphate nodules that is situated about 450 km offshore of the east coast of New Zealand at approximately 350 to 450 m water depth.

The Chatham Rise phosphorite deposit occurs as a thin layer of phosphate-bearing glauconitic sand with thicknesses typically ranging from 0 to 1 m at depths of 350 to 450 m below sea level. The sand layer consists of mainly silt and sand-sized sediments, with phosphatised chalk nodules up to 15 cm in diameter.

The deposit of phosphate nodules, believed to have formed 7 million to 12 million years ago was first discovered on the Chatham Rise in the 1950s by a New Zealand Government survey. During the 1960s to 1980s several private and government sponsored expeditions explored the Chatham Rise and surrounding seafloor area. The most extensive surveys were conducted by an agreement between the New Zealand Department of Scientific and Industrial Research and the West German Government on cruises by the German research vessels *R.V. Valdivia* in 1978 and *R.V. Sonne* in 1981.

The 1978 *R.V. Valdivia* cruise was the first intensive sampling and research campaign to be conducted over the Chatham Rise; a total of 655 samples from 689 attempts were collected over a 300 km<sup>2</sup> area in the west of the Project area. The majority of the samples were collected using a large Van Veen-style grab of 0.12 m<sup>3</sup> volume, weighing approximately 400 kg.

The 1981 *R.V. Sonne* Cruise was the most comprehensive exploration effort to assess the Chatham Rise phosphorite deposit. In addition to oceanographic, meteorological and geophysical data, the cruise collected 19 hours of video recordings of the sea floor as well as 519 sediment samples taken by a pneumatic grab-sampler. The seafloor sediment samples

collected are the most representative sample data collected on the Chatham Rise and are considered to be of a high enough quality to include in a resource estimation.

Since acquiring the licence in 2010, CRP has conducted six research cruises in two programs in the Project area. The key objectives were to validate the previous work conducted on the Chatham Rise and to collect further geological, geotechnical, geophysical and environmental data. For phosphorite grade estimation purposes the *M.V. Tranquil Image* cruise collected 55 samples using a Van Veen grab. The *R.V. Dorado Discovery* conducted four cruises to the Project area and collected 206 box core and grab samples.

An estimated \$75 million in current dollar terms was spent on these 8 different voyages, each involving several weeks. Much of the funding from this was provided by the New Zealand and German governments.

The data collected means the deposit is now very well defined. The best-sampled area of 380 sq km has an identified resource of 23.5 million tonnes with a present market of \$10.9 billion. New Zealand presently imports, predominantly from north Africa, about 800,000 tonnes annually.

Over the 40 years since the last major exploration, extraction techniques have improved radically, and extraction costs are expected to be substantially lower than the comparative cost of buying and shipping rock phosphate from the other side of the world.

Mineral extraction is now routine in shallow seas adjacent to land masses, particularly for materials used for building and infrastructure construction. And, even in the 1970s, manganese nodules were being mined at depths 10 times greater than envisaged on the Chatham Rise.

## **A.5 Uses of Rock Phosphate**

Rock phosphate predominantly consists of phosphorous pentoxide ( $P_2O_5$ ) and calcium carbonate, is an important plant nutrient, and hence is a key raw material for fertilisers.

In NZ the main uses are for:

1. Direct Application: rock phosphate is crushed and spread on the soil, effectiveness is dependent on the particular molecular composition of the rock. The rock needs to be a “reactive rock phosphate” which Chatham rock phosphate is.
2. Single Super Phosphate (SSP): a manufactured fertiliser that results from combining rock phosphate and sulphuric acid, is one of the cheapest and most common forms of phosphorous fertilisers.
3. Dicalcic Phosphate: a blend of super phosphate that has been slurried with lime or rock phosphate and cured, it is used for pasture development and cropping.
4. Internationally, phosphate rock is mostly refined into phosphoric acid which is then used to make monoammonium phosphate (MAP), diammonium phosphate (DAP) and high-grade TSP.

Presently all the rock phosphate used for direct application and SSP manufacture here in New Zealand is imported at the rate of 800,000 tonnes a year. All MAP, DAP and TSP is also imported.

(Apart from the Chatham Rise, the only known rock phosphate deposit (estimated at 200,000 tonnes) is in Otago).

Direct application fertiliser supports a change to more sustainable, resilient farming practices in New Zealand. Direct application will improve soil qualities, reduce phosphate runoff in waterways and reduce total fertilizer application over time.

Field trials in the 1980''s and recent greenhouse trials have confirmed that Chatham rock phosphate is suitable for direct application.

The trials have also revealed that Chatham rock phosphate is 85% as effective as triple superphosphate. This is significant as TSP is a highly concentrated product which is expensive to manufacture.

Chemical analyses also show Chatham rock phosphate is also exceptionally low in cadmium.

#### **A.6 Rare Earths Present on the Chatham Rise**

It's been known for at least a decade that the seafloor muds in the Chatham Rock Phosphate mining permit include rare earths and other valuable minerals or elements. These include cerium, lanthanum, neodymium, praseodymium, yttrium, cobalt, rubidium, cesium, germanium, gallium, strontium, thallium, and tungsten.

In a more recent development, we also established that the phosphate nodules also contain rare earths and other valuable minerals.

These include 15 of the 17 recognised rare earths, as well as other valuable minerals including nickel, cobalt, chromium, vanadium, zirconium, elemental fluorine and strontium.

#### **A.7 Uses of Rare Earths**

Neodymium	Powerful magnets used in loudspeakers, computer hard drives, wind turbines, electric vehicles, lasers
Lanthanum	Camera and telescope lenses, carbon lighting applications, hydrogen storage
Cerium	Catalytic converters in cars, ceramics and glass
Praseodymium	Aircraft engines, high strength glass, magnets, lasers
Gadolinium	X-ray and MRI scanning systems, TV screens, computer memory
Yttrium	TV and computer screens, superconductors
Terbium	Lasers and fluorescent lamps

Europium	Control rods in nuclear reactors
Samarium	Used in magnets, lasers and for neutron capture
Dysprosium	Magnets and lasers
Holmium	Lasers
Erbium	Used in steel alloyed with vanadium
Thulium	Portable x-ray equipment
Ytterbium	Infrared lasers
Lutetium	Specialty glass and radiology equipment

Rare earths play a key role in our modern-day life and are increasingly being defined as critical minerals. As much of the world supply is sourced from China, Western economies are increasingly focused on finding alternative suppliers.

If these rare earths can be recovered (which is yet to be established) their economic and strategic value is potentially immense. Chatham has recently commissioned Victoria University to undertake preliminary studies on this. See appendix 4.

### **A.8 Recovery Logistics**

The dredging, separation and transport to port phases will likely be carried out by a single vessel, like the one pictured below. This is the sister ship of the vessel recently used to widen and deepen the Lyttleton Harbour shipping channel.

The dredging cycle is nominally 8 days, 50,000 tonnes being mined in each cycle.

This comprises one day shipping time to the mining permit site, three days dredging, one day return to the single base port, and three days unloading. Allowing for weather and maintenance downtime there are expected to be 30 cycles per year resulting in annual production of 1.5Mt.

The proposed contract with the dredger assumes that Chatham buys rock phosphate at a quoted cost of around 62.7 Euros/t, delivered to port, with the dredger paying all operating and capital costs.

The rock phosphate will be stockpiled portside (requiring an area of 4 hectares) and sold from there with no further processing required.



### A.9 Wider Economic Benefits

1. Sourcing the rock phosphate from the Chatham Rise would result in a much-reduced carbon footprint from the New Zealand fertiliser industry as all rock phosphate is presently imported.
2. Sourcing this resource locally would also significantly improve New Zealand's balance of payments by reducing imports as well as generating exports.
3. s 9(2)(b)(ii)  
[Redacted text]
4. s 9(2)(b)(ii)  
[Redacted text]
5. The home port would benefit significantly, both from port charges and better utilisation of existing facilities or construction of new ones.

### A.10 Project Economics – Fertiliser Sales

Chatham rock phosphate will be sold directly to farmers and other organic food producers to be used as a direct application, reactive rock phosphate. This will be both a domestic and export market with overseas buyers being particularly attracted by the very low cadmium content. Until recently the major international source of low cadmium rock phosphate to Europe was PhosAgro, a Russian company.

It will also be sold to farmers as an organic substitute for high grade triple super phosphate as independent field tests (conducted by the New Zealand Government in the 1980s) and

more recent glass house trials (conducted by Lincoln University and Ag Research) have established that Chatham rock phosphate is 85% as effective as TSP.

The rock phosphate will also be sold to fertiliser manufacturers in Australasia and Asia, to be manufactured into single superphosphate and dicalcic phosphate.

The rock will also be packaged into retail packs to be sold through garden centres and retail chains such as Bunnings and Mitre 10 for home gardeners.

Total production and sales are expected to be 1.5 million tonnes per annum starting in 2027. Based on current prices discounted by 15% the annual gross margin is forecast to be \$NZ 526 million.

### A.11 Chatham Rise Project Economics – The Bottom Line

s 9(2)(b)(ii)



s 9(2)(b)(ii)



### A.12 Project Environmental Benefits (see appendix 6)

1. Water quality – when applied to the soil in its natural form there is 80% to 90% less run off into waterways due to its slow-release characteristics. (also see appendices 1 & 5)
2. Improved soil health – when directly applied Chatham rock phosphate (a reactive phosphate rock or RPR) works with plant root eco-systems. Manufactured fertilisers tend to bypass these and feed the top of the plant directly. As a result, the plant root eco-systems atrophy over time and the soils become inert.

3. Significantly reduced (90% lower) carbon emissions due to closer location to market and less frequent application to the land as a result of the slow release. (see appendix 2)
4. Chatham rock phosphate contains approximately 2 ppm cadmium, ultra-low by world standards. Most of the major exporting countries have levels well over 60 ppm.
5. The European Union has just introduced a limit of 60 ppm eventually falling to 20ppm. (see appendix 3. This action is being taken as its now recognised that cadmium accumulates in red meat and is directly linked to cancer in humans.

## **B. The costs and risks of seabed mining of Chatham Rise rock phosphate in New Zealand, including environmental impacts.**

### **B.1 Environmental Effects**

Chatham will recover phosphate nodules from 30 square kilometres a year or 450 km<sup>2</sup> over the present expected project lifetime. In total this represents 0.1% of the Chatham Rise (400,000 sq. kms in total)

The mining process involves a single pass of the dredge, and dredging activity will occur for 3 days in a 12-day cycle, 30 times a year (90 days a year). This means the organisms in the vicinity will not be subjected to long term sedimentation or plume impacts.

In the same area the fishing industry annually bottom trawls (using weighted nets) 19,000 sq. kms. The fishing yields remain consistent.

The proposed recovery operation uses a suction dredge and a closed system to bring the nodules to the ship and to return the sediment and water to the seafloor. A plume will be generated by both the collection of the nodules and the return water. The extent of the plume has been extensively modelled and reviewed by world leaders in the plume monitoring industry included Deltares (Netherlands) and HR Wallingford (United Kingdom)

Experts engaged by CRP, the fishing industry and by the Environmental Protection Agency (EPA) have concluded in Chatham's Marine consent hearing in 2014 that there is likely to be no significant impact on fishing yields or on the nearby spawning grounds.

In other caucusing held as part of the hearing independent/opposing experts also agreed that:

- Marine mammals are unlikely to be affected
- Sea birds are unlikely to be affected
- Primary food chain productivity is unlikely to be affected
- Toxicology effects in water column will be very low
- Uranium is not an issue

This findings were signed off by the experts concerned, were lodged on the EPA website and are a matter of public record.

### **B.2 How Environmental Effects will be minimised.**

Key operating features include:

- No chemicals will be used in the dredging process or released into the sea.
- A specialised return down pipe utilising international best practice will manage the return of dredged sands close to the seabed, limiting plume and impact to the water column and marine ecosystem.
- Sound propagation studies concluded that noise levels generated during dredging would be similar to whale-watching vessels, merchant ships and fisherman's ships

that already regularly transit this area, proving the system is not a threat to marine mammals.

- Dredging will be limited to thirty square kilometres each year, which means the project would operate in only a tiny proportion of the concession area each year.
- Dredging will occur for 3-day cycles 30 times a year, in deliberately separated diverse locations.
- Independent experts representing the fishing industry agreed in 2014 that there will be no material impact on local fisheries and spawning grounds.
- The project would not be visible from the shoreline and would not impact tourism or coastal activities.
- Precautionary mitigation measures were incorporated into the development plan in line with best-practice global operational standards.
- The dredging technology proposed to recover the phosphate sands has been safely used all over the world for more than 100 years on hundreds of projects, many of which were much closer to land masses.

### **B.3 Risks**

#### **Shipwreck**

This is theoretically possible but unlikely given that the dredging vessel will be operating in deep waters, hundreds of kilometres from any land mass, in a focused location where fishing boats do not operate.

Our likely dredging contractor and technical adviser since 2011, is Royal Boskalis Westminster, which has over 1,000 vessels and has operated all over the world for over 100 years. Boskalis is a world leading expert in its field and routinely operate (when dredging rivers and ports) in confined spaces without incident.

#### **Chemical Pollution**

There are no chemical agents used in the dredging or phosphate nodule separation process.

#### **Spill of Phosphate or seafloor muds**

The phosphate nodules are effectively vacuumed off the seafloor and transported to the ship in a riser pipe which is a robust, secure, closed circuit. After separation the seafloor sand and muds are returned in a parallel sinker pipe and released just above the seafloor to a location only a few dozen metres from where they came.

### **c. Comparison to other methods for obtaining minerals (eg land-based)**

There are no other rock phosphate deposits in New Zealand of sufficient size.

**D. How domestic regulatory settings are performing, including under the Crown Minerals Act 1991, Resource Management Act 1991, and Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012**

Chatham concurs with the views of Professor Paul Myburgh, School of Law, AUT University, who recently commented:

*I suspect the core problem is that the purposes and ideologies underpinning the various pieces of domestic legislation currently in play do not align.*

*In particular, the Crown Minerals Act 1991 operates largely on an economic model – the Crown issues permits to companies to undertake economic activities to exploit mineral resources in our EEZ. The Crown is entitled to do so under international law, which generates rather handy revenue for the Government.*

*“The Resource Management Act 1991, and the Exclusive Economic Zone (EEZ) Acts are of course much more focused on the ‘conserving’ aspect, and this generates tension within the legal framework.*

*“It seems rather counter-intuitive and inconsistent to grant a licence to survey and exploit on the one hand, and then when a valuable resource is found, to say on the other hand, ah, but we won’t let you touch it because you will cause material harm to the environment. In a sense, the Crown Minerals Act is writing out cheques that the EEZ Act and the Resource Management Act will not cash.*

*“So, I think at the most fundamental level, the relationship between the Crown Minerals Act and the two marine environmental statutes needs to be explored so that any future granting of permits and consents follows a logical and consistent process. I suspect the difficulty for the Government is that the Supreme Court’s interpretation of the EEZ Act has in effect made seabed mining in New Zealand’s EEZ impracticable or even impossible, at least if it involves significant dredging and/or dumping”*

Chatham further comments:

In our experience conventional mining consents in most jurisdictions include environmental conditions within the mining permit which eliminates the possibility of conflict between two statutes with different objectives.

Chatham was granted the Mining Permit in December 2013 and has subsequently paid annual permit fees now totalling \$1.45 million despite being unable to progress the project.

**E. Whether any change to domestic regulatory settings should apply to the coastal marine area, the EEZ and extended continental shelf, or both.**

Chatham does not propose to operate in the coastal marine area, which is under the jurisdiction of the Resource Management Act and therefore has no comment on the present setting of that act. We operate in the EEZ which is actually largely defined by the extended continental shelf, as determined by the International Law of the Sea.

In our view the provisions in the EEZ Act that relate to mineral extraction should be incorporated into a new, revised Crown Minerals Act in order to harmonise the existing contradictory situation.

**F. The prospect of any change to domestic regulatory settings being supportive of Pacific countries in considering their own positions on seabed mining**

Chatham does not see how our domestic regulatory settings could or should influence those of other independent countries in the Pacific (or anywhere).

**G. Recommendations for maintaining or updating New Zealand's domestic regulatory settings**

In our view the provisions in the EEZ Act that relate to mineral extraction should be incorporated into a new, revised Crown Minerals Act in order to harmonise the existing contradictory situation.

**H. A Te Ao Māori perspective on these issues.**

Since its inception Chatham has consulted iwi, and particularly Ngāti Mutunga O Wharekauri AHC (**Ngāti Mutunga**), based on the Chatham Islands and who fish in the surrounding water.

The communities of the Chatham Islands, represented by and including Ngāti Mutunga o Wharekauri, Moriori, and the Chatham Islands Enterprise Trust (CIET), are the stakeholders most directly affected by the operations of our proposed rock phosphate recovery operation. Significantly these stakeholders also have major fishing industry investments in the waters surrounding the Chatham Islands.

We are proud to have reached an accord with **Ngāti Mutunga** in April 2019 and here is an extract from the announcement we jointly released at the time.

“CRP holds a mining permit to extract rock phosphate from an offshore area located on the Chatham Rise (the **Project**). In order to pursue the Project CRP needs to obtain a marine consent under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (**Marine Consent**).

Ngāti Mutunga is a wholly owned subsidiary of Ngāti Mutunga o Wharekauri Iwi Trust, based on the Chatham Islands and has a significant interest in protecting the Chatham Islands marine environment and securing the economic, social and cultural well-being of the Chathams community.

Following discussions between the Parties they now wish to formally collaborate on the Project with a view to:

- Developing a CRP Marine Consent application that meets the environmental, economic, social and cultural objectives of both Parties individually and together;
- In the event that the content of such an application is mutually agreed, to formally support the lodging of the CRP Marine Consent application for approval;
- In the event that the CRP Marine Consent application is successful, ensuring that all operations implemented under that consent are carried out in a manner that best mitigates environmental effects and respects indigenous rights, beliefs and customs to protect the interests of the Chatham Islands community; and
- Ensuring that the Chatham Islands community realises tangible benefits from the Project.

The first objective of the Parties is to arrange close engagement with the Chatham's community to ensure that the Project proceeds in a form that satisfactorily addresses both the reasonable concerns and aspirations of that community. The agreement will be a success if it results in formal community support for the Project. If mutually agreed ways of addressing reasonable community concerns and aspirations cannot be found then the terms of the agreement will no longer apply.

Ngāti Mutunga o Wharekauri Asset Holding Company director Tom McClurg said “we consider this Project to be one that can potentially work for the benefit of our people, our economy and the environment. We look forward to working closely with the Chatham Rock Phosphate team to ensure that commercial, social and cultural benefits are realised by this Project and that these benefits are not at the expense of the marine environment that is so important to us all. We applaud the willingness of CRP to share information and respond to community perspectives that is evidenced by this innovative agreement”.

See appendix 7 for the complete announcement.

## **APPENDICES – A SELECTION OF RELEVANT CHATHAM ROCK PHOSPHATE STOCK EXCHANGE FILINGS**

- Appendix 1 – Water quality release
- Appendix 2 – Carbon emissions release
- Appendix 3 – Cadmium releases
- Appendix 4 – Establishment of Pacific Rare Earths
- Appendix 5 – Comment on Government Water Quality Objectives
- Appendix 6 – Letter to Ministers 2018
- Appendix 7 – Ngāti Mutunga Accord release 2019

### **Appendix 1- Water Quality Release**



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[www.rockphosphate.co.nz](http://www.rockphosphate.co.nz) [www.widespread.co.nz](http://www.widespread.co.nz)

NEWS RELEASE 17-26

24 October 2017

### **Chatham rock phosphate use would improve water quality by dramatically reducing farm run-off, says CRP**

Chatham Rock Phosphate (NZ: CRP, TSX.V: NZP) (“CRP” or “the Company”) this week advised that improved water quality will result from the use by farmers of Chatham rock phosphate.

Fertiliser run-off into waterways can be dramatically reduced, without any loss of production, by using naturally occurring reactive phosphate rock (RPR), according to Chatham Rock Phosphate chief executive Chris Castle.

Mr Castle said scientific studies over many years have shown RPR offers strong environmental benefits.

Studies comparing the use of RPR and superphosphate on farmland show that, when applied directly, RPR is both a very effective sustained-release fertiliser and not susceptible to run-off.

CRP holds New Zealand’s only material source of RPR.

The findings of the studies – some going back decades – are supported by Dr Bert Quin, probably New Zealand’s pre-eminent expert on the use of different phosphate rocks as phosphate fertilisers. Dr Quin designed and coordinated New Zealand’s ‘National Series’ of RPR vs superphosphate field trials while working as a senior government agricultural research scientist during the 1980s.

Dr Quin believes phosphate nutrient continues to enter waterways from agricultural land mainly because we use predominantly water-soluble types of chemically-manufactured phosphate fertiliser, especially single superphosphate (‘super’), which supplies phosphorus (P) and sulphate-sulphur.

“Super is prone to run-off of applied phosphorus into waterways during run-off events in the first 8-10 weeks after application, entering streams, rivers and lakes, and causing eutrophication in the form of excessive water-weed growth and algal blooms” says Dr Quin. “It can even be leached right through soils with low phosphorus retention such as those in Northland and on the West Coast.

Dr Quin estimates switching from superphosphate to RPR and RPR/DAP (diamonium phosphate) blends would reduce average run-off losses of phosphorus by 80%.

“This would take P losses back below the trigger levels that have resulted in most of our lakes becoming eutrophied. Within 5-10 years, water quality in the Rotorua lakes, for example, would be massively improved.

“By far the most cost-effective option for phosphorus is reactive phosphate rock or ‘RPR’. This is a natural mineral, formed on the sea floor originally, which is a very effective source of sustained-release phosphorus, ideal for maintaining high-producing pasture and extremely resistant to run-off losses”.

Dr Quin says that he has been very disappointed that the NZ fertiliser industry, ironically largely comprised of a duopoly owned by farmers, has not had the courage to follow the example set by Summit-Quinphos over the period 1989 to 2007. “For their management to replace true RPR with agronomically ineffective ‘direct application phosphate rock’ from Morocco is as cynical as anything I have seen” he says. “The time is right for people with the political will and determination to save New Zealand’s environment to stand up and force change”.

He also says anecdotal evidence over the nearly 30 years some New Zealand farmers have been using RPR shows maintenance requirements for phosphorus start to drop significantly because of both reduced run-off and reduced fixation onto soil clay particles. The higher P run-off from soluble P in the 8-10 weeks after application comes largely from particles and granules of the soluble fertiliser being floated off in run-off. RPR particles are 50% heavier. At the other end of the scale, the very low pH that exists around granules of super lead to increased fixation of P onto allophanic clay particles. So it is a lose-lose for super.”

He believes there is a need for specific advice for farmers regarding managing or minimising any minor lag in production following a switch to RPR. “The easiest way is to use a bit of DAP mixed with the RPR for the first 2 years”.

### **About Chatham Rock Phosphate**

Chatham Rock Phosphate is the custodian of New Zealand’s only material resource of environmentally friendly pastoral phosphate fertiliser. Our key role is connecting the resource with those who need it.

Using this phosphate will support sustainable farming practices, including healthier soils and reduced accumulation of the heavy metal cadmium, dramatically lowering P runoff to waterways and shrinking fertiliser needs over time.

The resource has an estimated worth of \$5 to \$7 billion, representing one of New Zealand's most valuable mineral assets and is of huge strategic significance because phosphate is essential to maintain New Zealand's high agricultural productivity.

New Zealand's current access to phosphate is vulnerable to economic and political events in the six countries controlling 98% of the world's phosphate reserves, with 85% of the total in the Western Saharan state of Morocco.

Chatham takes very seriously the responsibility vested in it through its mining permit to use the world's best knowledge and technology to safely extract this resource to help sustainably feed the world.

Our initial environmental consenting process established extraction would have no significant impact on fishing yields or profitability, marine mammals or seabirds.

### **Other New Zealand and international research**

Reports of research into P run-off into waterways by New Zealand and overseas scientists considered by CRP were:

**1. RPR revisited (1): Research, recommendations, promotion and use in New Zealand** by BF Quin and M Zaman.

**2. RPR revisited (2): Long-term farmer experience helps define the role of RPR in grazed pastures** by M Zaman and BF Quin.

**3. Phosphorus fertiliser form affects phosphorus loss to waterways: a paired catchment study** by R. W. McDowell, R. P. Littlejohn and J. D. Blennerhassett.

**4. Evaluation of two management options to improve the water quality of Lake Brunner, New Zealand** by RW McDowell.

**5. Potential phosphorus losses in overland flow from pastoral soils receiving long-term applications of either superphosphate or reactive phosphate rock** by RW McDowell, RM Monaghan and PL Carey.

**6. Rainfall intensity and phosphorus source effects on phosphorus transport in surface runoff from soil trays** by Francirose Shigaki, Andrew Sharpley and Luis Ignacio Prochnow.

**7. Phosphorus Leaching in an Acid Tropical and Triple Superphosphate** by E Gikonyo, AR Zaharah, MM Hanafi, and R Anuar.

**8. Effectiveness of rock phosphate, coastal superphosphate and single superphosphate for pasture on deep sandy soils** by MDA Bolland, MF Clarke, and JS Yeates.

Contact Chris Castle on s 9(2)(a)

**Appendix 2 – Carbon emissions releases**

NEWS RELEASE 17-33

November 23, 2017

**Chatham Rise rock phosphate project will reduce carbon emissions.**

**WELLINGTON New Zealand** – Chatham Rock Phosphate Limited (TSXV: “NZP” and NZAX: “CRP” or the “Company”) estimates that its process of recovering rock phosphate from offshore New Zealand will reduce annual carbon emissions by 76,000 tonnes compared with importing the rock from Morocco. This reduction of 95% of the present emission level equates to immediately taking at least 19,000 petrol driven vehicles off the roads.

This is significant in the context that there are approximately 5,000 electric vehicles registered now and the national target is 64,000 by the end of 2021.

Further carbon emission savings will result when Chatham rock phosphate is applied to the land, as being a slow release fertiliser it can be applied less frequently.

The other directly beneficial environmental effects of using Chatham rock phosphate that we have advised on numerous occasions are reduced run off, improved water quality, a healthier soil profile, and much lower cadmium being applied to soils.

For further information please contact:

Chris Castle  
President and Chief Executive Officer  
Chatham Rock Phosphate Limited  
s 9(2)(a)

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NEWS RELEASE 19-05

February 12, 2019

## CHATHAM OFFERS EASY PATHWAY TO REDUCING CARBON EMISSIONS

**WELLINGTON New Zealand** –Chatham Rock Phosphate Limited (TSXV: “NZP” and NZAX: “CRP” or the “Company”) is calling on the government to support its project if it wants to transition to a lower emissions economy.

“We’re on the same page and have been for years,” Chief Executive Chris Castle said in commenting on Cabinet papers just released regarding its Just Transitions Unit tasked with finding ways for industry to reduce carbon emissions.

Chatham offers a much simpler and immediately available solution, and it is on New Zealand’s doorstep.

“No new technology is required; all the government needs to do is work in parallel with our privately funded project to help get this new phosphate extraction industry on its feet. This can best be done by ironing out the existing anomalies in the permitting process and relevant legislation.”

The papers say the Government will intervene heavily in markets to achieve its aims. An undated Cabinet paper, led by Megan Woods, the Minister responsible for the Just Transitions Unit, says, “from time to time, the Government may also need to act in entrepreneurial mode to help drive the transition through”. Such action could support the development of new technologies and industries, “where it is necessary to fully realise emerging opportunities e.g. clean energy”.

Dr Woods also proposes the private sector will lead “the large-scale investments required to effect meaningful and positive change”.

“We are ready, willing and able to invest in New Zealand in a project that will deliver multiple environmental and economic benefits.”

Mr Castle said Chatham has been talking to successive Ministers since 2012 about the role Chatham can play in reducing emissions.

“We have calculated that 800,000 tonnes of rock phosphate nodules mined from the Chatham Rise would entail 4000 tonnes of carbon dioxide in transport emissions. That compares with 80,000t of CO2 emissions from mining and shipping the same quantity of product from Morocco to New Zealand.

“The fact the Moroccan phosphate transport emissions are 20 times that of New Zealand sourced phosphate ought to resonate with the Government, and its drive to reduce emissions. Putting it another way, local production of rock phosphate would have the immediate effect of taking 19,000 petrol driven vehicles off the roads.”

The Cabinet papers refer to how a just transition can understand the different pathways to transform New Zealand's economy to one that is more productive, sustainable and inclusive.

This includes partnering with business, Maori/iwi, local government, communities and the workforce to identify, create and support new opportunities, new jobs, new skills and new investments that will emerge from transition.

The Cabinet papers reveal the Government will intervene heavily in markets to achieve its aims and "from time to time, the Government may also need to act in entrepreneurial mode to help drive the transition through".

Such action could support the development of new technologies and industries, "where it is necessary to fully realise emerging opportunities e.g. clean energy".

The report says the Government has a critical role to play in facilitating a market response to the climate change challenge, including through an effective ETS, high-quality regulation and effective standards.

Mr Castle called on the Government to seize opportunities such as Chatham that can help New Zealand become a more sustainable economy.

We will continue to seek meetings with the key Ministers to better communicate the carbon emission related benefits of the Chatham Rise project, which are supplemented with a range of water and soil quality related benefits. We have communicated these benefits to Ministers of this and previous governments a number of times and the message must inevitably get through.

### **About Chatham Rock Phosphate**

Chatham Rock Phosphate is the custodian of New Zealand's only material resource of ultra-low cadmium, environmentally friendly pastoral phosphate fertiliser. Our key role is connecting the resource with those who need it.

The resource represents one of New Zealand's most valuable mineral assets and is of huge strategic significance because phosphate is essential to maintain New Zealand's high agricultural productivity.

New Zealand's current access to phosphate is vulnerable to economic and political events in the six countries controlling 98% of the world's phosphate reserves, with 85% of the total in the Western Saharan state of Morocco.

Chatham takes very seriously the responsibility vested in it through its granted mining permit to use the world's best knowledge and technology to safely extract this resource to help sustainably feed the world.

Our initial environmental consenting process independently established extraction would have no significant impact on fishing yields or profitability, marine mammals or seabirds.

Our project ticks all the boxes: environmental, health, ethical, security of supply, economic, regional development, rare earths and other green minerals

- ✓ Our rock is a proven reactive phosphate rock. Using it results in much less run-off into waterways and an improved soil profile compared with the effects of manufactured fertilisers.
- ✓ It's an organic fertiliser with no additives and with the only processing being grinding and possible pelletisation
- ✓ It contains ultra-low levels of cadmium, a cancer-causing heavy metal with much greater concentrations in other rock phosphate deposits
- ✓ Being locally sourced and needing to be applied less frequently results in much lower carbon emissions (in effect increasing the present NZ electric vehicle fleet from 10,000 to 29,000 vehicles)
- ✓ It is New Zealand's only significant source of phosphate and seabed extraction involves a far smaller environmental impact than that imposed on local overseas communities which mine phosphate
- ✓ The rock is located within one day's sailing distance and supply is far more secure (and more ethical) than phosphate rock imported from unstable regions on the other side of the world
- ✓ The project economics are attractive and Chatham will pay significant royalties and income taxes
- ✓ The project will generate new jobs in environmental monitoring, on the mining ship, in the home port and in the science and agricultural sectors
- ✓ Chatham rock phosphate has been independently shown to be as effective as other phosphate fertilisers used in New Zealand. We could provide the two fertiliser co-ops supplying most of New Zealand's fertiliser with a green fertiliser alternative to naturally complement their other products.

For further information please contact:

Chris Castle  
President and Chief Executive Officer  
Chatham Rock Phosphate Limited

s 9(2)(a)

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## Appendix 3 – Cadmium releases



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www.rockphosphate.co.nz

NEWS RELEASE 21-15

September 23, 2021

### **CHATHAM ROCK PHOSPHATE LIMITED JOINS SAFER PHOSPHATES**

**WELLINGTON New Zealand** – Chatham Rock Phosphate Limited (TSXV: “NXP” and NZX: “CRP” or the “Company”) aims to be the premier supplier of direct application low cadmium phosphate to the global agricultural sector.

We are passionate about the benefit of direct application fertiliser to sustainable farming and agricultural practices.

With our current low cadmium projects in New Zealand and French Polynesia and now prospective phosphate mines in Australia and Canada we are growing our capability to meet the global demand originating from organic and regenerative farmers.

In particular, our Makatea Project in French Polynesia looks to meet the demands of farmers in Metropolitan France for low cadmium phosphate.

And we are delighted to announce that the Company has just been admitted to membership of Safer Phosphates.

The Safer Phosphates coalition whose members are Arianne Phosphate (Canada), Foskor (South Africa), Kazphosphate (Kazakhstan), Kropz (Southern Africa), PhosAgro (Russia) and Tradiant (Egypt) will now be joined by CRP ( New Zealand and French Polynesia).

*Safer Phosphates™* is an informal coalition of committed international companies willing to contribute to EU policy & regulatory debates around fertilisers which seeks to increase the awareness about the presence of contaminants in fertilising products and, indirectly, our food, stressing the availability of low-contaminated products both in Europe and globally. The ultimate objective of the Coalition is promoting a sustainable agriculture and better food in Europe through enhanced competition on the European market of low-contaminated fertilisers. See [Home | Safer Phosphates](#)

The presence of heavy metals in soil is a major threat to the human food-chain.

According to the World Health Organization, almost 200,000 people die every year from

chemical poisoning, including heavy metals. Most of these could be prevented with protective measures and effective regulation.

Dietary intake of cadmium and other heavy metals remains an area of concern, which is why regulation has been proposed in Europe to limit contamination of soils.

The mission of Safer Phosphates™ is to share knowledge and address concerns about heavy metals that are present in some phosphate-based fertilisers. This encompasses improved understanding of the potential risks and promotion of solutions that optimize fertiliser choice, in order to support food security and sustainable agriculture.

As a prospective operator of several low cadmium phosphate mining operations CRP looks forward to working with the other members of the Safer Phosphates Coalition in this critical food safety initiative.

For further information please contact:

Chris Castle  
President and Chief Executive Officer  
Chatham Rock Phosphate Limited  
s 9(2)(a)

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NEWS RELEASE 18-13

June 7, 2018

### **CRP showcases phosphate project at New Zealand National Fieldays**

**WELLINGTON, New Zealand** – Chatham Rock Phosphate Limited (TSXV: “**NZP**” and NZAX: “**CRP**” or the “**Company**”) announces that Chatham Rock Phosphate will be showcasing its project at the National Field Days at Mystery Creek in Hamilton next week.

The Fieldays event, the largest agribusiness show in the southern hemisphere, attracted more than 133,000 over four days last year and attendance in previous years has proven to be a success for Chatham, according to Chief Executive Chris Castle.

In the past we have had a stream of people coming to our stall, wanting to know about the project, our phosphate product and the investment opportunity.

In recent months we have had significant investor interest from Waikato-based investors and it's also timely to be discussing our product's water and soil quality benefits with the multitude of farmers that will be attending.

We expect again to be visited by farmers who have followed our project over the past decade in the media, by companies involved in the industry, by people who are simply curious to learn more about the project's technical innovations and by loyal shareholders."

Mr Castle said shareholders are welcome to come and meet the company's representatives from early Wednesday morning until 5pm on Saturday. Our stall is very strategically positioned right in the west entrance of the main pavilion.

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The resource represents one of New Zealand's most valuable mineral assets and is of huge strategic significance because phosphate is essential to maintain New Zealand's high agricultural productivity.

New Zealand's current access to phosphate is vulnerable to economic and political events in the six countries controlling 98% of the world's phosphate reserves, with 85% of the total in the Western Saharan state of Morocco.

Chatham takes very seriously the responsibility vested in it through its mining permit to use the world's best knowledge and technology to safely extract this resource to help sustainably feed the world.

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**For more information contact Chris Castle on s 9(2)(a) or check out [www.rockphosphate.co.nz](http://www.rockphosphate.co.nz)**

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NEWS RELEASE 19-09

May 30, 2019

## **Chatham Rock Phosphate scores huge food safety win**

**WELLINGTON, New Zealand** – Chatham Rock Phosphate Limited (TSXV: “**NZP**” and NZAX: “**CRP**” or the “**Company**”) wishes to advise shareholders that a final decision has been taken by the European Parliament and the European Council to limit the sale of phosphate-based fertilizers containing high levels of heavy metals everywhere in the EU from 2022 and to introduce voluntary green labelling for fertilizers with less than 20 mg Cd/kg P<sub>2</sub>O<sub>5</sub>, starting this year.

The decision is aimed at improving the safety and sustainability of agriculture in Europe, as well as reducing risks to human health and the environment around the world.

The decision of the European Council is the final step to establishing the cadmium limit in phosphate-based fertilizers across Europe. EU-wide cap on cadmium levels will come into full effect in 3 years.

A number of European countries as early as the 1980s already recognised the importance of this issue and unilaterally introduced strict cadmium limits for fertilizers. Limits are currently in place in 21 EU countries, with the strictest in Switzerland, which limits cadmium to 21 mg/kg P<sub>2</sub>O<sub>5</sub> in 1986, Sweden (44 mg / kg P<sub>2</sub>O<sub>5</sub>), the Netherlands (31 mg/kg P<sub>2</sub>O<sub>5</sub>), Hungary and Slovakia (20 mg/kg P<sub>2</sub>O<sub>5</sub>) and Finland (22 mg/kg P<sub>2</sub>O<sub>5</sub>).

### **The Implications for Chatham Rock Phosphate**

Shareholders will recall that we referred last year to an article by Richard Taylor in International Policy Digest that commented on the effects of the proposed lowering of accepted cadmium levels in phosphate rock imported into EU countries.

In this article it was estimated that a lowering of the limit to 20 gm/kg will effectively bar 95% of phosphate ore from entering the EU market.

CRP cannot confirm that estimate but we do know that the reduced cadmium limits will affect a significant proportion of traded rock phosphate including rock sourced from Egypt, Israel, Boucraa & Youssoufia (Western Sahara/Morocco), Senegal, Togo, Tunisia, Nauru and Christmas Island.

As the EU ban on high cadmium levels has arisen due to food safety concerns, it would be logical to assume that similar restrictions will occur in other regions. There have been voluntary restrictions in place in New Zealand for many years.

According to Chatham Rock Phosphate managing director Chris Castle “the good news for Chatham Rock Phosphate shareholders is that cadmium levels in Chatham Rise rock phosphate are among the lowest in the world.”

Mr Castle said the rock, located on the Chatham Rise seabed east of New Zealand showed an average of 2.2 parts per million (expressed as mg/kg of P) from a range of samples gathered by CRP in 2012 from 11 separate locations. The lowest value was 1.3 parts per million with a high of 5.3 parts per million.

Rock phosphate is already the scarcest of the three fertiliser constituents used to sustain world food and primary sector production. And if world-wide sales restrictions are placed on 95% of that resource the likely effect on the market value of the remaining 5% of traded phosphate rock (and its producers) can only be imagined.

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- ✓ Our rock is a proven reactive phosphate rock. Using it results in much less run-off into waterways and an improved soil profile compared with the effects of manufactured fertilisers.
- ✓ It’s an organic fertiliser with no additives and with the only processing being grinding and possible pelletisation
- ✓ It contains ultra-low levels of cadmium, a cancer-causing heavy metal with much greater

- ✓ concentrations in other rock phosphate deposits
- ✓ Being locally sourced and needing to be applied less frequently results in much lower carbon emissions (in effect increasing the present NZ electric vehicle fleet from 10,000 to 29,000 vehicles)
- ✓ It is New Zealand's only significant source of phosphate and seabed extraction involves a far smaller environmental impact than that imposed on local overseas communities which mine phosphate
- ✓ The rock is located within one day's sailing distance and supply is far more secure (and more ethical) than phosphate rock imported from unstable regions on the other side of the world
- ✓ The project economics are attractive and Chatham will pay significant royalties and income taxes
- ✓ The project will generate new jobs in environmental monitoring, on the mining ship, in the home port and in the science and agricultural sectors
- ✓ Chatham rock phosphate has been independently shown to be as effective as other phosphate fertilisers used in New Zealand. We could provide the two fertiliser co-ops supplying most of New Zealand's fertiliser with a green fertiliser alternative to naturally complement their other products.

**For more information contact Chris Castle on s 9(2)(a) or check out [www.rockphosphate.co.nz](http://www.rockphosphate.co.nz)**

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## Appendix 4 – Establishment of Pacific Rare Earths



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**NEWS RELEASE 18-21**

**September 5, 2018**

### **CHATHAM ROCK PHOSPHATE RECOGNISES RARE EARTHS IN ROCK PHOSPHATE AND ESTABLISHES PACIFIC RARE EARTHS LIMITED**

**WELLINGTON New Zealand** – Chatham Rock Phosphate Limited (TSXV: “NZP” and NZAX: “CRP” or the “Company”) is pleased to announce that it has recently formed a 100% owned subsidiary **Pacific Rare Earths Limited**.

This company has been formed to project-manage a work programme aimed at quantifying the extent, value and recoverability of Rare Earths Elements (REE) and other potentially strategic or valuable minerals contained in the rock phosphate nodules on the Chatham Rise.

In addition, the company will be investigating the existence and recovery potential of rare earths and other valuable minerals in seafloor muds on the Rise.

#### **Rare Earths in phosphate**

A recent study of marine phosphate nodules by the United States Geological Survey reveals that there are significant quantities of REE contained within the phosphate nodules on the Chatham Rise. Of the 17 recognised rare earths, 15 are present in Chatham Rise rock phosphate nodules, as well as varying concentrations of other valuable minerals including nickel, cobalt, chromium, vanadium, zirconium, fluorine and strontium. Collectively these minerals, if they can be efficiently extracted as by-products, represent not only an immensely strategic asset for New Zealand but could significantly improve the already attractive forecast project economics.

The presence of these minerals within the phosphate rock is highly significant because the contained value may be released onshore (if extraction proves feasible and economically viable) without any change to the proposed mining system, and without any additional environmental impacts in the Project area.

#### **Rare Earths in seafloor muds**

Shareholders will recall that we established and announced some time ago that there were significant quantities of rare earths and other valuable minerals in the seafloor muds in our permit area. These include cerium, lanthanum, neodymium, praseodymium, yttrium, cobalt, rubidium, cesium, germanium, gallium, strontium, thallium and tungsten.

The primary challenge associated with the production of rare earths from the muds is the extraction process, and the advancement of processing technology that will be required in order to demonstrate the feasible and economically viable separation of any of these minerals. In addition, recovery of rare earths from muds will involve the development of a new marine mining system, and therefore will be considered for development separately from the existing CRP rock phosphate nodules project.

### **Further Independent Research**

The information CRP already holds about REEs and other valuable minerals in its permit areas was generated by independent organisations, with some of this work undertaken up to a decade ago. The current knowledge confirms that REEs occur over a wide area, and estimates of the average grades and therefore the size of the potential deposits have been made at a conceptual level. The current conceptual information, when assessed against current price data, confirms the significance of potential value.

As a result of the extremely favourable preliminary research, CRP has commenced a dialogue with appropriated skilled and funded external parties, based both in New Zealand and internationally, in order to further develop better understanding of the extraction and recovery potential of the minerals.

CRP is excited to be engaging in the investigation of REE recovery, which is a strategic priority of the New Zealand Government in relation to the mineral sector, as recently stated by the Honourable Dr Megan Woods, Minister of Energy and Resources.

The Chatham Rise rock phosphate and rare earths deposit has the potential to contribute to the understanding of REE potential in New Zealand, given that it is likely that there is more information already available about the REE minerals in the Chatham Rise deposit than any other rare earths deposit in New Zealand.

CRP expects to be in a position to release more information on this exciting initiative in forthcoming months.

For further information please contact

Chris Castle  
President and Chief Executive Officer  
Chatham Rock Phosphate Limited

s 9(2)(a)

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## Appendix 5 – Comment on Government Water Quality Objectives



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www.rockphosphate.co.nz

NEWS RELEASE 18-22

October 10, 2018

### CHATHAM ROCK PHOSPHATE COMMENTS ON NZ GOVERNMENT WATER QUALITY OBJECTIVES

**WELLINGTON New Zealand** – Chatham Rock Phosphate Limited (TSXV: “NZP” and NZAX: “CRP” or the “Company”) noted the Government announcement this week concerning its water quality objectives and believes it can contribute significantly to those aims.

The Government is promising a noticeable improvement in water quality within five years and released a blueprint to improve freshwater quality.

Minister David Parker noted the Government expects central and local government, farmers and businesses to do more. New rules will be in place by 2020 to stop freshwater quality degradation through a new National Policy Statement for Freshwater Management and a new National Environmental Standard. The rules will include controls on intensive land use practices.

Minister Damien O’Connor said primary sectors are crucial to an environmentally sustainable high-value economy supporting the wellbeing of all New Zealanders to grow a sustainable and productive primary sector within environmental limits. With respect to agriculture the key issue being addressed is fertiliser run-off into waterways, particularly nitrogen and phosphate.

This is an issue Chatham Rock Phosphate has highlighted for several years, as we have a proven, very effective solution to the problem. In 2012 we provided detailed briefing notes on this to the then Minister for the Environment and said:

*Chatham Rise rock phosphate, being a direct application fertiliser, offers the solution to run-off into waterways as a range of scientific studies over many years has shown direct application rock phosphate offers strong environmental benefits.*

CRP has evaluated studies comparing the use of rock phosphate and super phosphate on New Zealand and international farmland. They show when applied directly reactive rock phosphate (RPR) is both a highly effective sustained release fertiliser and resistant to leaching.

The findings of the studies – some going back several years – are supported by Dr Bert Quin, probably New Zealand’s pre-eminent expert on the use of rock phosphate fertiliser, who

first conducted extensive field trials while working as a scientist for government agencies during the 1980s.

Dr Quin believes nutrients continue to enter waterways from agricultural land, simply because of the type of fertilisers we use. He says traditional fertilisers used in New Zealand have been single superphosphate ('super'), which supplies phosphorus (P) and sulphur (S), and urea for nitrogen (N). He says their biggest problems are they are 'leaky' fertilisers.

"Super is prone to run-off of applied phosphorus into waterways in the weeks after application, leaching into shallow sub-surface drains and water bodies on dairy farms, and being leached right through soils with low phosphorus retention such as those in Northland and the West Coast. Urea is prone to volatilisation (evaporation) losses as ammonia gas to the atmosphere, nitrate leaching and nitrous oxide GHG emission.

"By far the most cost-effective option for phosphorus is reactive phosphate rock or 'RPR'.

This is a natural mineral, formed on the sea floor originally, which is a very effective source of sustained-release phosphorus, ideal for maintaining high-producing pasture and extremely resistant to leaching.

Dr Quin estimates switching from super phosphate to RPR and RPR/DAP (diamonium phosphate) blends would reduce average run-off losses of P into waterways by 80-90%.

"This would take P losses below the trigger levels necessary to keep our lakes in a eutrophied state. In 5-10 years, water quality in the Rotorua lakes, for example, would be massively improved.

"Sulphur requirements are easily met by adding in just the required amount of elemental S, by itself or with a bit of gypsum in dry areas. Like RPR, elemental S is a sustained release fertiliser. The water-soluble sulphate form of S in super is very easily leached from many soils. As this happens, it takes valuable cations such as calcium and magnesium with it."

Dr Quin said back in 2012: "the time is right for people with the political will and determination to save New Zealand's environment to stand up and be counted, and force change. "If we do not, we will come to be viewed as the 'gutless generation' by our children and grandchildren."

It would appear the Government is finally on the same page as very similar sentiments were included in this week's announcement – "we're not going to leave the hard issues for future generations."

Chatham has this week written to Ministers Parker and O'Connor pointing out using Chatham Rise rock phosphate offers these significant water quality benefits as well as improved soil health, reduced carbon emissions, minimal cadmium levels, sourcing a significant proportion of our phosphate fertiliser needs from an ethical source, significant export earnings, regional port development and annual income tax and royalties (based on present fertiliser prices) of over \$40 million.

We remain confident that these benefits will result in this project gaining the support within Parliament and other stakeholders that it so richly deserves.

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For further information please contact

Chris Castle  
President and Chief Executive Officer  
Chatham Rock Phosphate Limited  
s 9(2)(a)

*Neither the Exchange, its Regulation Service Provider (as that term is defined under the policies of the Exchange), or New Zealand Exchange Limited has in any way passed upon the merits of the Transaction and associated transactions, and has neither approved nor disapproved of the contents of this press release.*

## Appendix 6 – Letter to Ministers 2018



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www.rockphosphate.co.nz

**NEWS RELEASE 18-25**

**December 11, 2018**

### **Chatham Rock Phosphate and Our Government - a 12 month Report Card**

**WELLINGTON New Zealand** – Chatham Rock Phosphate Limited (TSXV: “NZP” and NZAX: “CRP” or the “Company”) wishes to advise that a year after first communicating with the incoming government it’s timely for the Company to reiterate the messages it has sent directly to key Ministers during this period.

We keep sending these messages as the benefits of this project include a well documented and established range of environmental and health related benefits as well as providing an obvious boost to our economy.

Chatham rock phosphate is already located here in New Zealand and doesn’t have to be imported from the other side of the world. Its ownership is also undisputed, unlike the rock being imported from the Western Sahara. And our permit area contains significant by-products including rare earths and other green minerals.

The area we would disturb during our mine life (less than 500 sq km in total or 30 sq km a year) represents less than a quarter of one percent of the Chatham Rise, a tiny area compared with the 19,000 sq km of the Rise bottom trawled annually in the area by the fishing industry with few identified ill-effects; the impacts on the seafloor are broadly the same.

Chatham is a really good news story which is why it’s worth repeating these messages again below. And it’s also why we will continue to request meetings with our key ministers in order to communicate these messages in person.

This project deserves to be supported by any government, in any country, and particularly so by the Labour/Green/NZ First coalition we have in New Zealand.

In summary it ticks all the boxes: environmental, health, ethical, security of supply, economic, regional development, rare earths and other green minerals

- ✓ Our rock is a proven reactive phosphate rock. Using it results in much less run-off into waterways and an improved soil profile compared with the effects of manufactured fertilisers.
- ✓ It’s an organic fertiliser with no additives and with the only processing being grinding and possible pelletisation
- ✓ It contains ultra-low levels of cadmium, a cancer-causing heavy metal with much greater concentrations in other rock phosphate deposits

- ✓ Being locally sourced and needing to be applied less frequently results in much lower carbon emissions (in effect increasing the present NZ electric vehicle fleet from 10,000 to 29,000 vehicles)
- ✓ It is New Zealand's only significant source of phosphate and seabed extraction involves a far smaller environmental impact than that imposed on local overseas communities which mine phosphate
- ✓ The rock is within one day's sailing distance and supply is far more secure (and more ethical) than phosphate rock imported from unstable regions on the other side of the world
- ✓ The project economics are attractive and Chatham will pay significant royalties and income taxes
- ✓ The project will generate new jobs in environmental monitoring, on the mining ship, in the home port and in the science and agricultural sectors
- ✓ Chatham rock phosphate has been independently shown to be as effective as other phosphate fertilisers used in New Zealand. We could provide the two fertiliser co-ops supplying most of New Zealand's fertiliser with a green fertiliser alternative to naturally complement their other products.

We repeat our request to meet and brief the key Ministers of this government in order to gain the support that this project so richly merits. It's good for the environment, good for the economy and good for New Zealand.

Regards

Chris Castle, President and CEO

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## Appendix 7 – Ngāti Mutunga Accord release



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www.rockphosphate.co.nz

NEWS RELEASE 19-07

April 16 2019

### Ngāti Mutunga and Chatham Rock Phosphate sign agreement

**WELLINGTON, New Zealand** – Chatham Rock Phosphate Limited (TSXV: “**NZP**” and NZAX: “**CRP**” or the “**Company**”) advises with great pleasure that today we executed an Information Sharing and Collaboration agreement with Ngāti Mutunga O Wharekauri AHC (**Ngāti Mutunga**).

CRP holds a mining permit to extract rock phosphate from an offshore area located on the Chatham Rise (the **Project**). In order to pursue the Project CRP needs to obtain a marine consent under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (**Marine Consent**).

Ngāti Mutunga is a wholly owned subsidiary of Ngāti Mutunga o Wharekauri Iwi Trust, based on the Chatham Islands and has a significant interest in protecting the Chatham Islands marine environment and securing the economic, social and cultural well-being of the Chathams community.

Following discussions between the Parties they now wish to formally collaborate on the Project with a view to:

- Developing a CRP Marine Consent application that meets the environmental, economic, social and cultural objectives of both Parties individually and together;
- In the event that the content of such an application is mutually agreed, to formally support the lodging of the CRP Marine Consent application for approval;
- In the event that the CRP Marine Consent application is successful, ensuring that all operations implemented under that consent are carried out in a manner that best mitigates environmental effects and respects indigenous rights, beliefs and customs to protect the interests of the Chatham Islands community; and
- Ensuring that the Chatham Islands community realises tangible benefits from the Project.

The first objective of the Parties is to arrange close engagement with the Chathams community to ensure that the Project proceeds in a form that satisfactorily addresses both the reasonable concerns and aspirations of that community. The agreement will be a success if it results in formal community support for the Project. If mutually agreed ways of addressing reasonable community concerns and aspirations cannot be found then the terms of the agreement will no longer apply.

Ngāti Mutunga o Wharekauri Asset Holding Company director Tom McClurg said “we consider this Project to be one that can potentially work for the benefit of our people,

our economy and the environment. We look forward to working closely with the Chatham Rock Phosphate team to ensure that commercial, social and cultural benefits are realized by this Project and that these benefits are not at the expense of the marine environment that is so important to us all. We applaud the willingness of CRP to share information and respond to community perspectives that is evidenced by this innovative agreement”.

Chatham CEO Chris Castle noted “the communities of the Chatham Islands, represented by and including Ngāti Mutunga o Wharekauri, Moriori, and the Chatham Islands Enterprise Trust (CIET), are the stakeholders most directly affected by the operations of our proposed rock phosphate recovery operation. Significantly these stakeholders also have major fishing industry investments in the waters surrounding the Chatham Islands.

It’s very exciting that we have reached a point where we can begin working together to ensure that this project can proceed in a manner that protects and benefits all concerned. The signing of this collaboration agreement is a very, very significant milestone for Chatham Rock Phosphate as it signals important support for our project (if it is appropriately managed) from such directly affected stakeholders.

We are also gratified that Ngāti Mutunga o Wharekauri is proposing to make a significant future investment in Chatham Rock Phosphate if the agreement proceeds and the Marine Consent is obtained. In those circumstances Ngāti Mutunga o Wharekauri and possibly Moriori and the CIET would receive options that are in total equal to 15% of the number of shares on issue at the time a Marine Consent that has their support is granted (being 5% per party). The exercise price of these options will reflect and recognise the accumulated investment made to that date by our shareholders.

### **About Ngāti Mutunga o Wharekauri**

**Ngāti Mutunga o Wharekauri** is a Maori iwi (tribe) of New Zealand, whose original rohe (tribal lands) were in north Taranaki. They migrated from Taranaki, first to Wellington, and then to the Chatham Islands in 1835. The *rohe* of the iwi includes all of Chatham Island (Wharekauri), Te Whānga Lagoon and all of the outlying islands of the Chathams Group.

### **About Chatham Rock Phosphate**

Chatham Rock Phosphate is the custodian of New Zealand’s only material resource of ultra-low cadmium, environmentally friendly pastoral phosphate fertiliser. Our key role is connecting the resource with those who need it.

The resource represents one of New Zealand’s most valuable mineral assets and is of huge strategic significance because phosphate is essential to maintain New Zealand’s high agricultural productivity.

New Zealand’s current access to phosphate is vulnerable to economic and political events in the six countries controlling 98% of the world’s phosphate reserves, with 85% of the total in the Western Saharan state of Morocco.

Chatham takes very seriously the responsibility vested in it through its granted mining permit to use the world's best knowledge and technology to safely extract this resource to help sustainably feed the world.

Our initial environmental consenting process independently established extraction would have no significant impact on fishing yields or profitability, marine mammals or seabirds.

Our project ticks all the boxes: environmental, health, ethical, security of supply, economic, regional development, rare earths and other green minerals

- ✓ Our rock is a proven reactive phosphate rock. Using it results in much less run-off into waterways and an improved soil profile compared with the effects of manufactured fertilisers.
- ✓ It's an organic fertiliser with no additives and with the only processing being grinding and possible pelletisation
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- ✓ Chatham rock phosphate has been independently shown to be as effective as other phosphate fertilisers used in New Zealand. We could provide the two fertiliser co-ops supplying most of New Zealand's fertiliser with a green fertiliser alternative to naturally complement their other products.

For more information contact Chris Castle on s 9(2)(a)

or s 9(2)(a) or check out [www.rockphosphate.co.nz](http://www.rockphosphate.co.nz)

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