Origin Energy Resources (Kupe) Limited
Kupe Production Station
Monitoring Programme
Annual Report
2015-2016

Technical Report 2016-21

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Executive summary

Origin Energy Resources (Kupe) Limited (the Company) operates a petrochemical production station located on Inaha Road at Manaia, in the Inaha catchment. The Kupe Production Station processes oil and gas from the offshore Kupe wells. This report for the period July 2015 to June 2016 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

The Company holds 14 resource consents in relation to the Kupe facilities, which include a total of 154 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to allow it to take and use groundwater, one consent to discharge stormwater into the Kapuni Stream, one consent to install groundwater bores, two consents to discharge emissions into the air from the production station, four coastal consents relating to the offshore facilities, and five consents which covered activities during the development phase of the Kupe project.

During the monitoring period, Origin Energy Resources (Kupe) Limited demonstrated an overall high level of environmental performance.

The Council's monitoring programme for the year under review included six inspections, three water samples collected for physicochemical analysis, two biomonitoring surveys of receiving waters and two ambient air quality surveys.

Site inspections found that the stormwater systems were constructed and maintained in accordance with consent conditions and were operating effectively.

There were no adverse effects on the environment resulting from the exercise of the air discharge consents. The ambient air quality monitoring at the site showed that levels of carbon monoxide, combustible gases, PM10 particulates and nitrogen oxides were all below levels of concern at the time of sampling. No offensive or objectionable odours were detected beyond the boundary during inspections and there were no complaints in relation to air emissions from the site.

During the year, the Company demonstrated an overall high level of both environmental performance and administrative compliance with the resource consents. There were no unauthorised incidents recorded by the Council in relation to the Company's activities. The Kupe Production Station was well managed and maintained.

For reference, in the 2015-2016 year, 71% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 24% demonstrated a good level of environmental performance and compliance with their consents.

In terms of overall environmental and compliance performance by the consent holder over the last several years, this report shows that the consent holder's performance remains at a high level.

This report includes recommendations for the 2016-2017 year, including a recommendation relating to the optional review of consents 6531-1, 6532-1, 6533-1, 6534-1, 6535-1, 6536-1, 6537-1, 6542-1, 6543-1, 6545-1, 6546-1, 6629-1, 6979-1, and 7010-1.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2015 to June 2016 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Origin Energy Resources (Kupe) Limited (Origin Energy). The Company operates a petrochemical production station situated on Inaha Road at Manaia, in the Inaha catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Origin Energy that relate to abstractions and discharges of water within the Inaha catchment, and the air discharge permits held by Origin Energy to cover emissions to air from the site.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the eighth combined annual report by the Council for the Kupe Production Station.

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about:

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by the Company in the Inaha catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted at the Kupe Production Station.

Section 2 presents the results of monitoring during the period under review, including scientific and technical data.

Section 3 discusses the results, their interpretations, and their significance for the environment.

Section 4 presents recommendations to be implemented in the 2016-2017 monitoring year.

A glossary of common abbreviations and scientific terms, and a bibliography, are presented at the end of the report.

1.1.3 The Resource Management Act 1991 and monitoring

The RMA primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

(a) the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
(b) physical effects on the locality, including landscape, amenity and visual effects;
(c) ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
(d) natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
(e) risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each activity. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of the performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by the Company, this report also assigns them a rating for their environmental and administrative performance during the period under review.

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. **Administrative performance** is concerned with the Company's approach to demonstrating consent compliance in site operations and management including the timely provision of information to Council (such as contingency plans and water take data) in accordance with consent conditions.

Events that were beyond the control of the consent holder and unforeseeable (that is a defence under the provisions of the RMA can be established) may be excluded with regard to the performance rating applied. For example loss of data due to a flood destroying deployed field equipment.

The categories used by the Council for this monitoring period, and their interpretation, are as follows:

Environmental Performance

- **High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

- **Good:** Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self reports, or in response to unauthorised incident reports, but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

  For example:

  - High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
  - Strong odour beyond boundary but no residential properties or other recipient nearby.

- **Improvement required**: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

- **Poor:** Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

- **High:** The administrative requirements of the resource consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.

- **Good:** Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided

for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

- **Improvement required:** Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.

- **Poor**: Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.

For reference, in the 2015-2016 year, 71% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 24% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Process description

Photo 1 Kupe Production Station

Development of the Kupe Production Station, offshore pipelines and offshore platform began in mid 2006. Natural gas and light oil are extracted from the Kupe Field which is located offshore, approximately 30 km south of Ohawe Beach on the South Taranaki coast. Raw gas and light oil extracted from the field offshore are transported to shore via pipeline and processed at an onshore production station. The location of the Kupe Field and the production station is shown in Figure 1.

The offshore platform is situated in approximately 35 metre deep water and comprises a topside deck supported by four legs fixed to the seabed. Installation of the offshore

platform commenced in early 2007. The offshore platform and production wells are outside of the 12 nautical mile coastal marine area (CMA) boundary and therefore outside the jurisdiction of this Council.

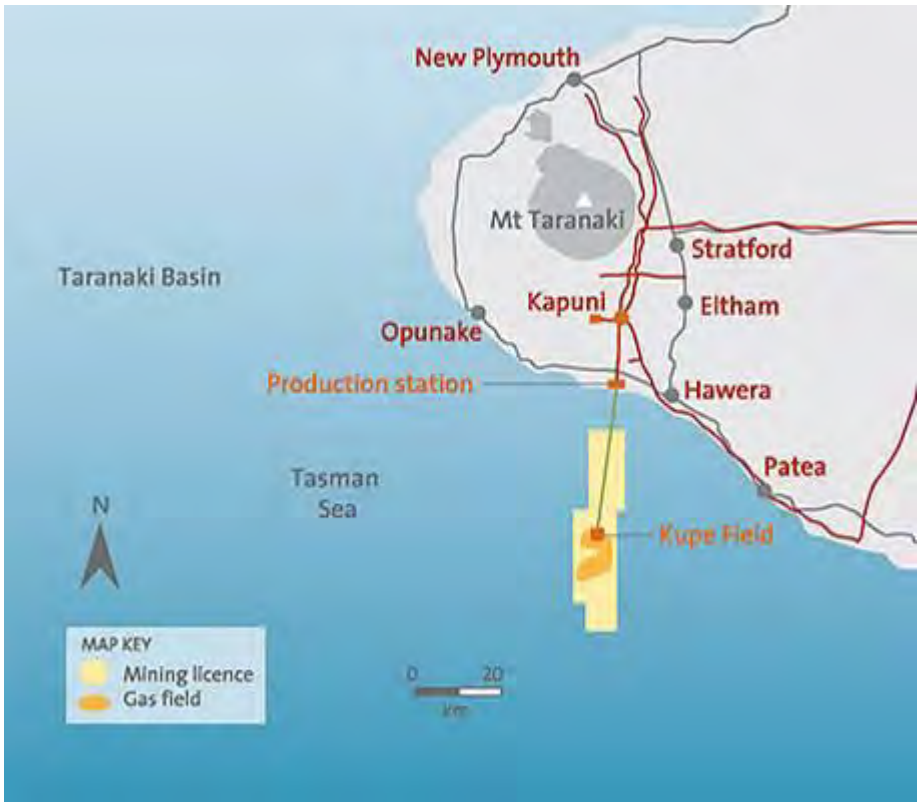

Figure 1 Location of Kupe Gas Project[1]

The single subsea pipeline enables delivery of the raw natural gas and light oil to the onshore production station. Parallel to the subsea pipeline, utility lines transfer chemicals, power and fibre optic links from the shore to the offshore platform (Figure 2). Horizontal directional drilling (HDD) was used to install the pipelines under the 40 metre high sea cliffs at the end of Inaha Road in order to link the offshore and onshore components. The HDD entry point is 500 metres inland of the coastline and the exit point emerges 1,800 metres offshore.

The production station is located at the southern end of Inaha Road, occupying roughly 19 hectares of land. It includes storage and truck loading facilities for LPG and condensate export. A low-pressure flare system is located at ground level for operational control and an elevated flare has been installed for use in emergency situations only. A series of ponds provide a natural cleaning system for stormwater before discharging from the site. Commissioning of the production station began in early 2009, with commercial production commencing in November 2009.
Onshore pipelines have been installed to enable the transfer of raw gas from the HDD shore crossing to the production station, and to transfer the sales gas from the production station to the Kapuni Gas Treatment Plant.

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[1] source: http://www.originenergy.com.au/1222/Kupe-Gas-Project

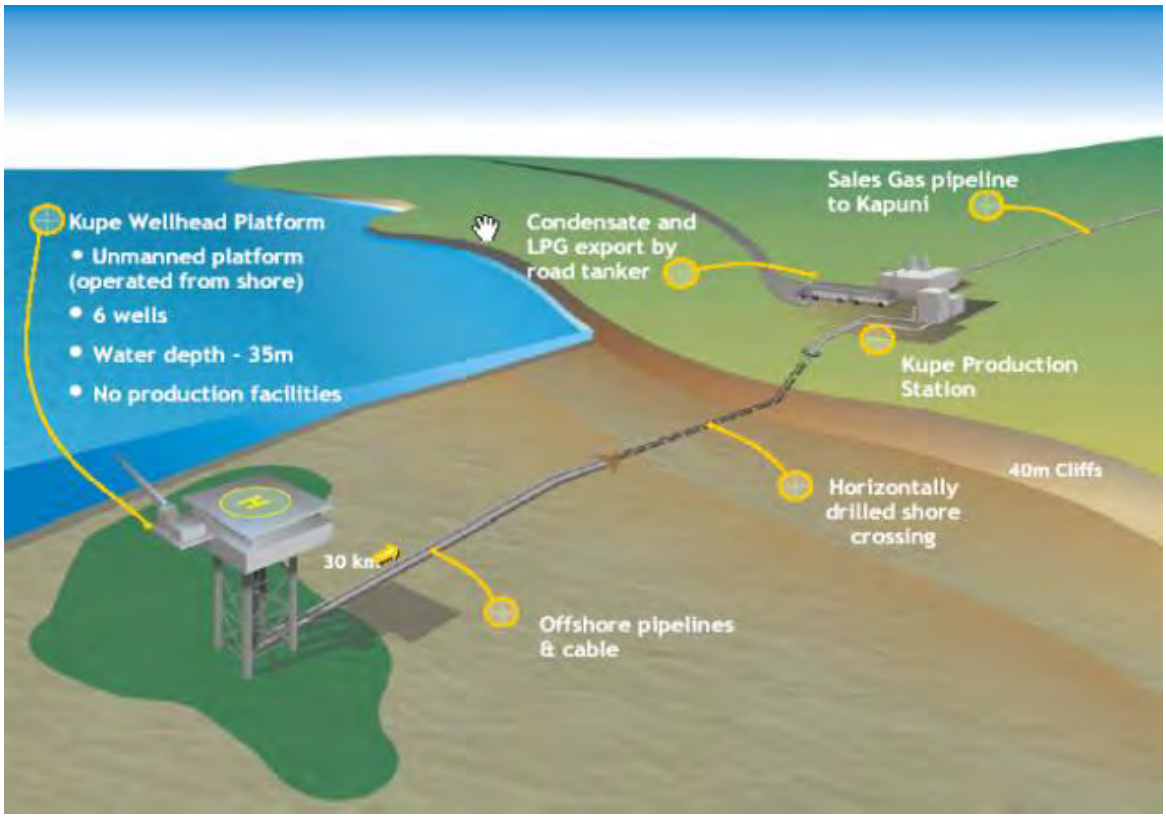

Figure 2 Components of Kupe Gas Project[2]

1.3 Resource consents

1.3.1 Water abstraction permit

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14.

Origin Energy holds water permit **7010-1** to take and use up to 3,500 m^3/day groundwater at a maximum rate of 40 l/s as a combined total from up to seven water bores in a bore field for the purpose of horizontal directional drilling, pipeline hydro-testing, production station operation at the Kupe production station and operations at the Manutahi-D, Manutahi-C, and Kauri-F wellsites. This permit was issued by the Council on 2 November 2006 under Section 87(e) of the RMA. Changes to the conditions of the consent were made on 25 July 2007 and 13 October 2011. It is due to expire on 1 June 2039.

There are 12 special conditions attached to the consent.

Condition 1 requires that the consent be exercised in accordance with the applications.

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[2] source: http://www.originenergy.com.au/1222/Kupe-Gas-Project

Condition 2 requires that the consent holder notify Council prior to the exercise of the consent.

Condition 3 requires that details of pump testing are supplied.

Conditions 4 and 5 limit the volume and rate of abstraction.

Condition 6 states that the abstraction shall not cause the intrusion of saltwater into any aquifer.

Condition 7 requires the consent holder to maintain daily records of the abstraction.

Conditions 8, 9 and 10 relate to monitoring.

Conditions 11 and 12 are lapse and review provisions.

The permit is attached to this report in Appendix I.

1.3.2 Water discharge permit

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations.

Origin Energy holds water discharge permit **6543-1** to discharge pipeline hydrotesting water and treated stormwater from the Kupe Production Station via a stormwater/firewater storage pond system, and to discharge stormwater from the Dangerous Goods Storage stormwater system into the Kapuni Stream. This permit was issued by the Taranaki Regional Council on 21 June 2005 under Section 87(e) of the Resource Management Act. Changes to the conditions of the consent were made on 14 December 2006 and 31 January 2013. It is due to expire on 1 June 2039.

There are 11 special conditions attached to the consent.

Condition 1 requires that the consent is exercised in accordance with the application.

Condition 2 requires the consent holder to provide detailed plans of the stormwater catchment and drainage pathways.

Condition 3 required the consent holder to notify the Council prior to the exercise of the consent.

Condition 4 requires the consent holder to review the contingency plan for the site and include, if necessary, the new Dangerous Goods Store.

Condition 5 requires the consent holder to adopt the best practicable option to prevent or minimise environmental effects.

Condition 6 requires that water discharged is directed for treatment through the stormwater treatment system.

Condition 7 requires that hazardous substance storage areas are bunded.

Condition 8 places limits on various contaminants not to be exceeded in the discharge, while condition 9 limits effects below the mixing zone.

Conditions 10 and 11 are lapse and review provisions.

The permit is attached to this report in Appendix I.

1.3.3 Air discharge pemits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Origin Energy holds air discharge permit **6545-1** to discharge emissions to air from combustion involving the flaring of petroleum products incidental to the treatment of gas at the Kupe Production Station. This permit was issued by the Council on 21 June 2005 under Section 87(e) of the RMA. Changes to the consent conditions were granted in April 2007. It is due to expire on 1 June 2039.

There are 21 special conditions attached to the consent.

Condition 1 requires that the consent is undertaken in accordance with the application.

Condition 2 requires that the consent holder adopt the best practicable option to prevent or minimise environmental effects.

Condition 3 requires the consent holder to minimise emissions and impacts of contaminants.

Condition 4 requires that the consent holder provide an analysis of a typical gas and/or condensate stream upon request, while condition 5 requires a report be provided in May of each year detailing various aspects of flaring.

Condition 7 requires the consent holder to supply a final site lay-out plan.

Conditions 6 and 8 to 14 deal with flaring, including notification, incidents, and flaring logs.

Conditions 15 and 16 relate to effects beyond the site boundary.

Conditions 17, 18 and 19 limit the discharge of contaminants including carbon monoxide and nitrogen dioxide.

Conditions 20 and 21 are lapse and review provisions.

Origin Energy also holds air discharge permit **6546-1** to discharge emissions to air as products of combustion from the Kupe Production Station involving equipment burning natural gas as fuel where the maximum heat release is in excess of 10 megawatts, together with miscellaneous emissions. This permit was issued by the

Council on 21 June 2005 under Section 87(e) of the RMA. It is due to expire on 1 June 2039.

There are 17 special conditions attached to the consent. These are similar to those for consent 6546-1 above.

The permit is attached to this report in Appendix I.

1.3.4 Land use permit

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Origin Energy holds water permit **6979-1** to install, construct and maintain up to seven water bores for horizontal directional drilling, pipeline hydro-testing, and production station operation purposes. This permit was issued by the Council on 1 November 2006 under Section 87(e) of the RMA. It is due to expire on 1 June 2039.

There are eight special conditions attached to the consent.

Condition 1 requires that the consent is exercised in accordance with the application.

Condition 2 requires the consent holder to supply a bore log for each bore.

Condition 3 states that the bores be cased and sealed.

Condition 4 requires the consent holder to mitigate any adverse environmental effects.

Conditions 5 and 6 relate to decommissioning of the bores.

Conditions 7 and 8 are lapse and review provisions.

The permit is attached to this report in Appendix I.

1.3.5 Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Origin Energy holds consent **6531-1** to disturb the seabed and foreshore of the coastal marine area by the process of erection, placement, use, alteration, extension, maintenance or removal of up to six pipelines and one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring. Consent 6531-1 is for a restricted coastal activity where the consent was issued by the Minister of Conservation on 9 December 2005. It is due to expire on 1 June 2039.

There are 12 special conditions attached to the consent.

Condition 1 requires that the consent is exercised in accordance with the application.

Conditions 2, 3 and 5 require the consent holder to provide a detailed pipe laying management plan, a programme of installation and a construction contingency plan.

Condition 4 requires notification prior to maintenance works.

Condition 6 states that the consent holder shall adopt the best practicable option to minimise adverse environmental effects.

Condition 7 requires that disturbance of the seabed is minimised, while condition 8 requires that this disturbance be contained within a 100 metre wide disturbance corridor.

Condition 9 requires that all works shall comply with noise standards.

Condition 10 states that work is to cease should archaeological remains be discovered.

Condition 11 requires the consent holder undertake pre and post-lay surveys of the pipeline corridor.

Conditions 12 and 13 are lapse and review provisions.

Origin Energy also holds consent **6532-1** to erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area up to six pipelines connecting an offshore wellhead/platform to the foreshore at mean high water spring, with structures situated under the seabed from approximately 1,200 metres offshore to mean high water spring, and the related occupation of the seabed. Consent 6532-1 is for a restricted coastal activity where the consent was issued by the Minister of Conservation on 9 December 2005. It is due to expire on 1 June 2039.

There are 12 special conditions attached to the consent.

Condition 1 requires that the consent is exercised in accordance with the application.

Conditions 2, 3 and 5 require the consent holder to provide a detailed pipe laying management plan, a programme of installation and a construction contingency plan.

Condition 4 requires notification prior to maintenance works.

Condition 6 states that the consent holder shall adopt the best practicable option to minimise adverse environmental effects.

Condition 7 requires all works shall comply with noise standards.

Condition 8 requires the consent holder to survey and map the position of the structures.

Condition 9 requires the consent holder undertake pre and post-lay surveys of the pipeline corridor.

Condition 10 states that the structure shall be removed and the area reinstated, if and when it is no longer required.

Conditions 11 and 12 are lapse and review provisions.

Origin Energy also holds consent **6629-1** to erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring, with structures situated under the seabed from approximately 1200 metres offshore to mean high water spring, and the related occupation of the seabed. This consent was issued by the Council on 28 October 2005 under Section 87(e) of the RMA. It is due to expire in June 2039.

There are 12 special conditions attached to the consent. They are the same as those for consent 6532-1 above.

Origin Energy also holds consent **6533-1** to occupy the coastal marine area for a distance of 250 metres either side of the centre-line of a 100 metre wide pipeline corridor, from the outer limit of the territorial sea of New Zealand to mean high water spring, in a manner that will restrict public access. Consent 6533-1 is for a restricted coastal activity where the consent was issued by the Minister of Conservation on 9 December 2005. It is due to expire on 1 June 2039.

There are six special conditions attached to the consent.

Condition 1 requires that the consent is exercised in accordance with the application.

Condition 2 states that public access shall not be restricted unless required.

Condition 3 requires notification prior to works involving the restriction of public access.

Condition 4 requires the consent holder to survey and map the position of the structure.

Conditions 5 and 6 are lapse and review provisions.

The permits are attached to this report in Appendix I.

1.3.6 Related consents

Origin Energy also holds a number of consents relating to the development phase of the Kupe facilities which did not require active monitoring during the period under review. A summary of these consents is provided in Table 1.

Table 1 Consents related to the development phase of the Kupe facilities

Consent number	Purpose	Issue date	Expiry
6534-1	To discharge up to 1000 cubic metres of contaminants [up to 600 cubic metres of drilling muds, drilling cuttings and aquifer water and up to 400 cubic metres of gauge run water] from two horizontal directional drilling exit points through the seabed approximately 1200 metres from mean high water spring within the coastal marine area	28/10/2005	2039
6535-1	To divert water from aquifers in the coastal marine area likely to be encountered during activities associated with horizontal directional drilling of two drill lines	28/10/2005	2039
6536-1	To discharge stormwater and sediment from earthworks associated with the construction of a horizontal directional drilling site onto and into land	6/11/2006	2023
6537-1	To discharge treated stormwater from a horizontal directional drilling site onto and into land	6/11/2006	2023
6542-1	To discharge stormwater and sediment from earthworks associated with the construction and installation of the Kupe Production Station and associated stormwater treatment facilities onto and into land in the vicinity of the Kapuni Stream	14/12/2006	2023

The permits are attached to this report in Appendix I.

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets obligations upon the Council to gather information, monitor and conduct research on the exercise of resource consents within the Taranaki region. The Council is also required to assess the effects arising from the exercising of these consents and report upon them.

The Council may therefore make and record measurements of physical and chemical parameters, take samples for analysis, carry out surveys and inspections, conduct investigations and seek information from consent holders.

The monitoring programme for the Kupe Production Station site consisted of four primary components.

1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Council in:

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- in discussion over monitoring requirements;
- preparation for any reviews;
- renewals;
- new consents;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

1.4.3 Site inspections

The Kupe Production Station was visited six times during the monitoring period. With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the Company were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.4.4 Chemical sampling

The Council undertook sampling of both the discharges from the site and the water quality upstream and downstream of the discharge point and mixing zone.

The production station discharge was sampled on one occasion, and the sample analysed for chlorides, conductivity, hydrocarbons, pH, suspended solids and turbidity. The Kapuni Stream was sampled concurrently, and the samples analysed for the same constituents.

The Council also undertook sampling of the ambient air quality outside the boundary of the site. A multi-gas meter was deployed on one occasion in the vicinity of the plant, with monitoring consisting of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases). A PM10 particulate monitor was deployed concurrently with the multi-gas meter. Two nitrogen oxide measuring devices were also deployed in the vicinity of the plant on one occasion during the year under review. The Company supplied data on flaring causes and flare and fuel gas volumes throughout the period.

1.4.5 Biomonitoring surveys

A biological survey was performed on two occasions in the Kapuni Stream to determine whether or not the discharge of stormwater from the Kupe Production Station has had a detrimental effect upon the communities of the stream.

2. Results

2.1 Water

2.1.1 Inspections

Six inspections were carried out at the Kupe Production Station in the 2015-2016 year. The following was found during the inspections:

29 July 2015
The site was observed to be neat and tidy at the time of the inspection. Ring drains and bunds were clear, and the fire water pond did not contain any contaminants. There was no evidence of any detrimental effects to the receiving waters at the discharge point to the Kapuni stream. The pilot flare was operating at the time of the inspection.

9 November 2015
The site was in shutdown for routine maintenance and there was a lot of activity within the plant complex. Ring drains and bunds were all observed to be satisfactory. The fire water and wetland ponds were alive with frogs and other aquatic life, demonstrating high water quality.

10 December 2015
The site inspection revealed that the stormwater system is operating as per standards required; the wetland area and fire water pond both contained an abundance of aquatic life giving an indication of good water quality. The discharge point to the Kapuni Stream showed that no effects of any previous discharge from the site had occurred. No flaring was occurring at the time of the inspection. The foreshore area in the vicinity of the pipeline was stable and other structures associated with the complex were secure.

8 March 2016
The site was observed to be neat and tidy. Ring drains and bunds were clear and there were no flaring odours or smoke. The stormwater discharge point in the Kapuni Stream was clear of contaminants.

30 May 2016
An inspection was undertaken following a prolonged period of quite heavy rainfall and squally weather. The storm water system and associated wetland showed no effect from runoff from the plant area. The perimeter drains and API separator were clear of contaminants. No odours or unusual flaring was noted.

23 June 2016
The annual inspection of the stormwater discharge to the Kapuni stream was undertaken with Origin staff, this was timed to coincide with consistent rainfall being experienced at the time. The 'onto land' stormwater discharge area and into the Kapuni stream did not give any indication that the current discharge or any previous discharge had caused any adverse effects. There was no evidence of excessive silt at the discharge point, confirming that onsite silt containment measures were effective. A small amount of stormwater was discharging at the time of the inspection, and this was most likely coming from the access road. There was no flaring being undertaken at the time of the inspection (other than the pilot flare), and no odours were noted off site.

2.1.2 Results of discharge monitoring

Water quality sampling of the discharge to the Kapuni Stream was undertaken once during the 2015-16 period. Table 2 presents the results of this sampling. Monitoring sites in relation to Kupe Production Station are shown in Figure 3. To negate any effects on the water quality of the discharge resulting from combination with the Siggs Road stormwater, which shares the same outlet at STW002086, the sample was taken on site at the outlet of the production station ponds system.

Figure 3 Location of the Kupe Production Station and associated monitoring sites

Table 2 Monitoring results for the discharge from Kupe Production Station on 29 June 2016

Parameter	Units	Stormwater pond outlet	Consent 6543-1 limits
Chloride	g/m^3	26.7	50
Conductivity	mS/m	14.7	-
Hydrocarbons	g/m^3	<0.5	15
pH		7.2	6.0 – 9.0
Suspended solids	g/m^3	3	100
Turbidity	NTU	1.2	

The results are indicative of an uncontaminated discharge, with hydrocarbon and chloride concentrations well within the consent limits, and a neutral pH level.

Origin Energy records the volume of each discharge which is pumped from the site to the outlet structure adjacent to the Kapuni Stream. A summary of the total volume of stormwater discharged each month is provided in Figure 4.

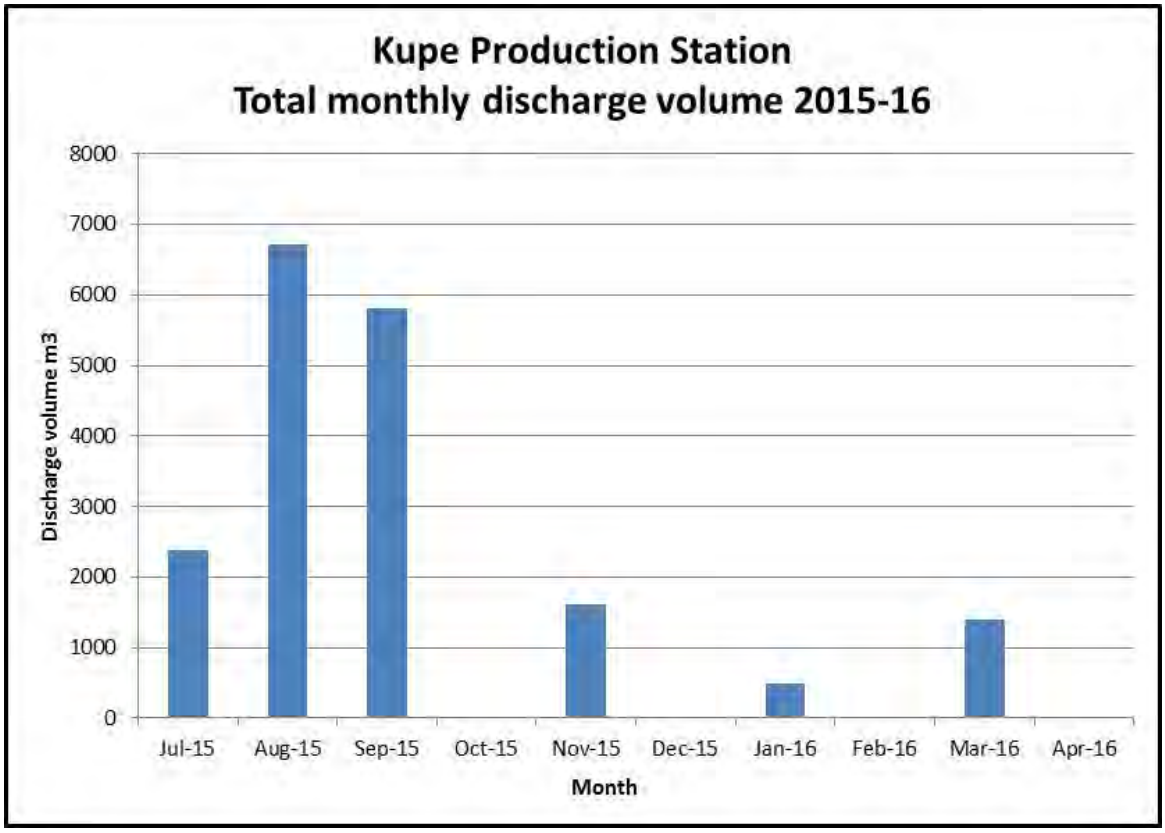

Figure 4 Stormwater discharge volumes for Kupe Production Station

2.1.3 Results of receiving environment monitoring

2.1.3.1 Chemical

Water quality sampling of the Kapuni Stream was undertaken in conjunction with stormwater discharge sampling. The results are presented in Table 3. The sampling sites are shown in Figure 3 and include upstream and downstream points.

The results indicate that the discharge was not having an effect on the receiving environment, with little or no change between upstream and downstream sites. Both turbidity and suspended solids decreased downstream. It was noted at the time that both the upstream and downstream samples were clean and clear with no sheen or odour. There was no conspicuous impact from the discharge and the effects on the receiving waters of the Kapuni Stream were no more than minor.

Table 3 Receiving environment results for the Kapuni Stream on 29 June 2016

Parameter	Units	Upstream KPN000488	Downstream KPN000492	Consent 6543-1 conditions
Chloride	g/m^3	11.9	13.3	-
Conductivity	mS/m	10.3	10.7	-
Hydrocarbons	g/m^3	<0.5	<0.5	No conspicuous oil films or foams
pH		7.6	7.6	-
Suspended solids	g/m^3	34	32	No conspicuous change
Turbidity	NTU	17	14	No conspicuous change
Temperature	Deg.C	10.5	10.6	-

2.1.3.2 Biomonitoring

The Council's standard 'kick-sampling' technique was used at three established sites to collect streambed macroinvertebrates from the Kapuni Stream. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. It may be the more appropriate index if non-organic impacts are occurring.

Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

The spring (October 2015), moderately low flow macroinvertebrate survey (the twelfth since completion of the Production Station) indicated that occasional discharges of treated stormwater from the Kupe Production Station over the previous several months had not had any recent significant detrimental effects on the macroinvertebrate communities of the Kapuni Stream. No significant changes in the moderate macroinvertebrate communities' richnesses were recorded between the upstream 'control' site and the two sites downstream of the discharge, during a period of moderately low stream flow immediately prior to the time of the survey.

The macroinvertebrate communities of the stream contained significant proportions of 'sensitive' taxa and these communities were numerically dominated almost entirely by 'sensitive' taxa resulting in relatively high $SQMCI_s$ and MCI values for the lower reaches of a ringplain stream near the coast, with MCI scores higher than predicted for such a stream reach.

MCI scores indicated that the stream communities were of 'good' generic health and 'better than expected' for the predicted condition recorded in Taranaki ringplain streams at similar altitudes and distances from the National Park boundary.

The summer (February 2016) survey recorded similar taxa richnesses, MCI scores and $SQMCI_s$ scores between sites. Taxa richnesses were higher than the median, and higher than scores recorded in the preceding survey. MCI scores in contrast were insignificantly lower than the median, and were lower than those recorded in the spring survey, although this was only significant for site 3. $SQMCI_s$ scores were insignificantly higher than those recorded in the preceding survey, and were lower than the median for all sites, although this difference was only significant for sites 1 and 2.

At the time of the survey, there were no significant differences in taxa richness, and richnesses were higher for all sites than in the preceding spring survey, as well as being higher than the median for each site. At the time of this survey there was higher than usual periphyton biomass, due to summer low flow conditions and the lack of recent large freshes (which cause scouring of the streambed, removing periphyton). For the most part, this increase in taxa is due to taxa that are commonly associated with higher periphyton abundance (for example, the caddisfly (*Oxyethira*), true fly (*Muscidae*), mollusc (*Latia*), and some worm groups).

The survey recorded MCI scores of 98, 95 and 91 for sites 1-3 respectively. These scores are not significantly different from each other (Stark 1998) and categorise all three sites as having 'fair' macroinvertebrate community health. These scores were all lower than those recorded in the preceding survey, although this difference was only significant (Stark 1998) for site 3. It is common for summer surveys to have lower MCI scores than spring surveys, due to higher periphyton biomasses and higher water temperatures in summer compared to spring. The very low flow conditions at the time of the survey will have contributed to the higher than usual periphyton biomass and slightly higher than usual summer water temperatures in the Kapuni Stream (based on data from the Kapuni Stream at Normanby Road). These low flow conditions are likely to be the main factor contributing to the MCI scores being lower or equal to the lowest previously recorded MCI score at all three sites. $SQMCI_s$ scores were slightly higher than in the preceding spring survey for all sites, and were lower than the median for all sites, although this difference was only significant for sites 1 and 2.

Overall, there is no evidence to indicate that the stormwater discharges from the Kupe Production Station had caused adverse effects on the macroinvertebrate communities of the Kapuni Stream.

2.1.4 Summary of water abstractions reported by Origin Energy

Figure 5 provides a summary of the total daily abstraction volumes for the consented groundwater take from the Kupe bore field for operational purposes at the Kupe Production Station. The abstraction volumes were well below the 3,500 m^3/day allowed by condition 4 of consent 7010-1, with a maximum take volume of 245 m^3/day in January 2016. The maximum rate of take recorded was 11.8 l/s, well below the 40 l/s allowed by the consent. The great majority of the abstraction occurred via the DT-1 bore, with less than 0.1 percent of the total take coming from the HB-1 bore.

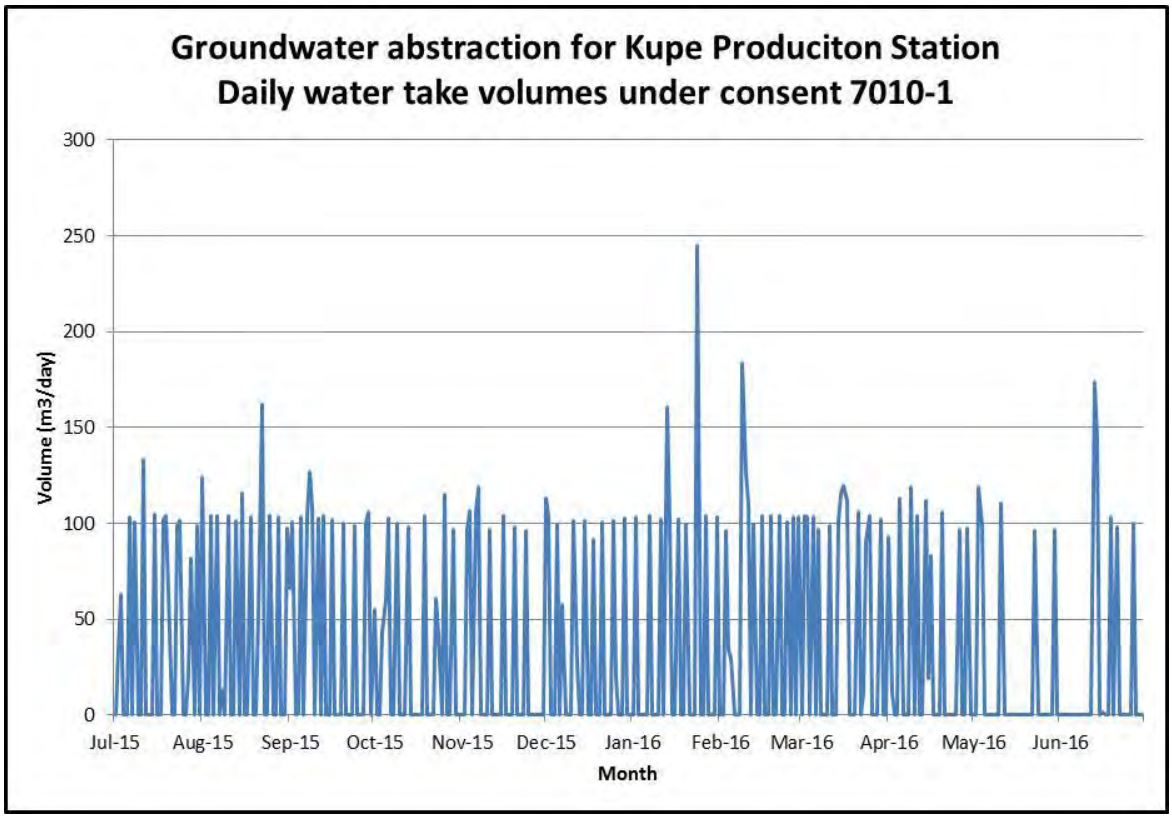

Figure 5 Daily water abstraction volumes for Kupe Production Station under consent 7010-1

2.2 Air

2.2.1 Inspections

Air inspections were carried out in conjunction with site inspections as discussed in section 2.1.1 above. No issues regarding air quality were noted during the monitoring year.

2.2.2 Results of receiving environment monitoring

2.2.2.1 Carbon monoxide and combustible gases

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 42 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases). The monitoring sites used in the year under review are shown in Figure 6.

Because of the nature of the activities on the site, it was considered that the primary information of interest in respect of gases potentially emitted from the site was the average downwind concentration, rather than any instantaneous peak value. That is, the long-term exposure levels, rather than short-term maxima, are of most interest. The gas meter was therefore set up to create a data set based on recording the average concentration measured during each minute as raw data.

Figure 6 Air monitoring sites at Kupe Production Station for 2015-2016

The details of the sample run are summarised in Table 4 and the data from the sample run are presented graphically in Figure 7.

The consents covering air discharges from Kupe Production Station have specific limits related to particular gases. Special condition 17 of consent 6545-1 sets limits on the carbon monoxide, nitrogen dioxide and fine particle (PM10) concentrations at or beyond the production station's boundary. The limit on the carbon monoxide is expressed as 10 mg/m³ for an eight hour average or 30 mg/m³ for a one hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was 0.46 mg/m³ while the average concentration for the entire dataset was 0.23 mg/m³ which comply with consent conditions. This is in line with the pattern found in previous years.

Table 4 Results of carbon monoxide and LEL monitoring at Kupe Production Station

Period		24 to 26 May2016 (42 hours)
Max	CO(ppm)	0.40
	LEL(%)	0.10
Mean	CO(ppm)	0.20
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

Notes: (1) the instrument records in units of ppm. At 25°C and 1 atm, 1ppm CO = 1.145 mg/m³
(2) because the LEL of methane is equivalent to a mixture of approximately 5% methane in air, then the actual concentration of methane in air can be obtained by dividing the percentage LEL by 20.

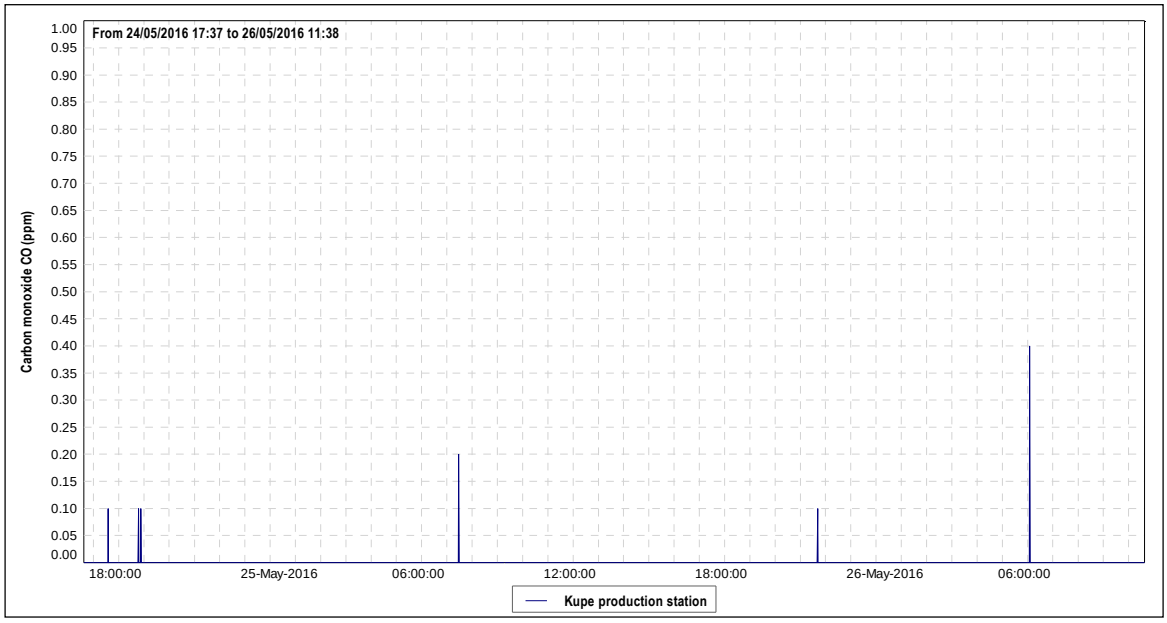

Figure 7 Ambient CO levels in the vicinity of Kupe Production Station

Lower Explosive Limit (LEL) gives the percentage of the lower explosive limit, expressed as methane that is detected in the air sampled. The sensor on the instrument reacts to gases and vapours such as acetone, benzene, butane, methane, propane, carbon monoxide, ethanol, and higher alkanes and alkenes, with varying degrees of sensitivity. The Council's Regional Air Quality Plan has a typical requirement that no discharge shall result in dangerous levels of airborne contaminants, including any risk of explosion. At no time did the level of explosive gases downwind of the Kupe Production Station reach any more than a trivial level.

2.2.2.2 PM10 particulates

In September 2004 the Ministry for the Environment enacted National Environmental Standards (NESs) relating to certain air pollutants. The NES for PM10 particulates is 50 $\mu g/m^3$ (24-hour average).

Particulates can be derived from many sources, including motor vehicles (particularly diesel), solid and oil-burning processes for industry and power generation, incineration and waste burning, photochemical processes, and natural sources such as pollen, abrasion, and sea spray.

PM10 particles are linked to adverse health effects that arise primarily from the ability of particles of this size to penetrate the defences of the human body and enter deep into the lungs, significantly reducing the exchange of gases across the lung walls. Health effects from inhaling PM10 include increased mortality and the aggravation of existing respiratory and cardiovascular conditions such as asthma and chronic pulmonary diseases.

During the reporting period, a DustTrak PM10 monitor was deployed on one occasion in the vicinity of Kupe Production Station. The deployment lasted approximately 42 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM10 concentrations.

The location of the DustTrak monitor during the sampling run is shown in Figure 6. The results of the sample run are presented in Figure 8 and Table 5.

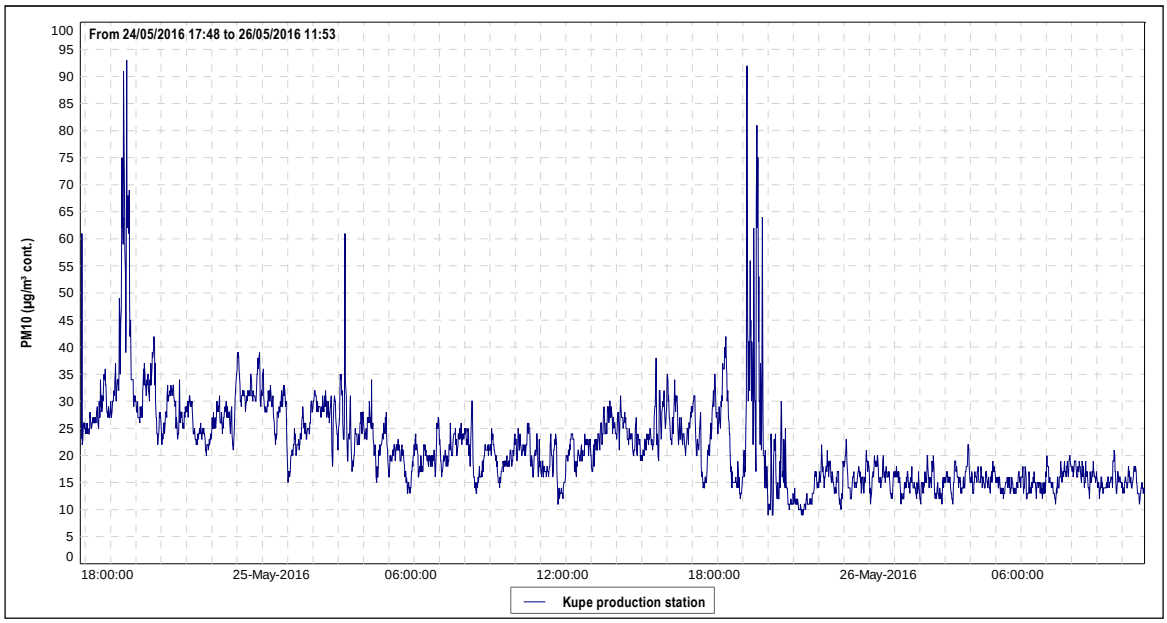

Figure 8 PM10 concentrations (µg/m³) at Kupe Production Station

Table 5 Daily averages of PM10 results from monitoring at Kupe Production Station

	24 to 26 May 2016 (42 hours)	
24 hr. set	Day 1	Day 2
Daily average	25.1 µg/m³	18.3 µg/m³
NES limit (24 hour average)	50 µg/m³	

During the 42 hour run, from 24 to 26 May 2016, the average recorded PM10 concentration for the first 24 hour period was 25.1 µg/m³ and 18.3 µg/m³ for the second 24 hour period. These daily means equate to 50.2% and 36.6% of the 50 µg/m³ value that is set by the NES. Background levels of PM10 in the region have been found to be typically around 11 µg/m³.

2.2.2.3 Nitrogen oxides

From 2014 onwards, the Council implemented a coordinated region-wide compliance monitoring programme to measure nitrogen oxides (NOx). The programme involves deploying measuring devices at 24 NOx monitoring sites (including two sites in the vicinity of Kupe Production Station) on the same day, with retrieval three weeks later. This approach assists the Council in further evaluating the effects of local and regional emission sources and ambient air quality in the region.

The consent covering air discharges from the Kupe Production Station has specific limits related to particular gases. Special condition 18 of consent 6545-1 sets a limit on the nitrogen dioxide concentration at or beyond the production station's boundary. The limit is expressed as 200 µg/m³ for a 1-hour average or 100 µg/m³ for a 24-hour average exposure.

NOx passive adsorption discs were place at two locations in the vicinity of the Kupe Production Station on one occasion during the year under review. The discs were left in place for a period of 21 days. The calculated 1-hour and 24-hour theoretical maximum NOx concentrations found at Kupe Production Station during the year under review equate to 6.02 µg/m³ and 3.19 µg/m³, respectively. The results show that the ambient ground level concentration of NOx is well below the limits set out by consent 6545-1.

The full air monitoring reports are attached to this report in Appendix III.

2.2.3 Summary of flaring volumes reported by Origin Energy

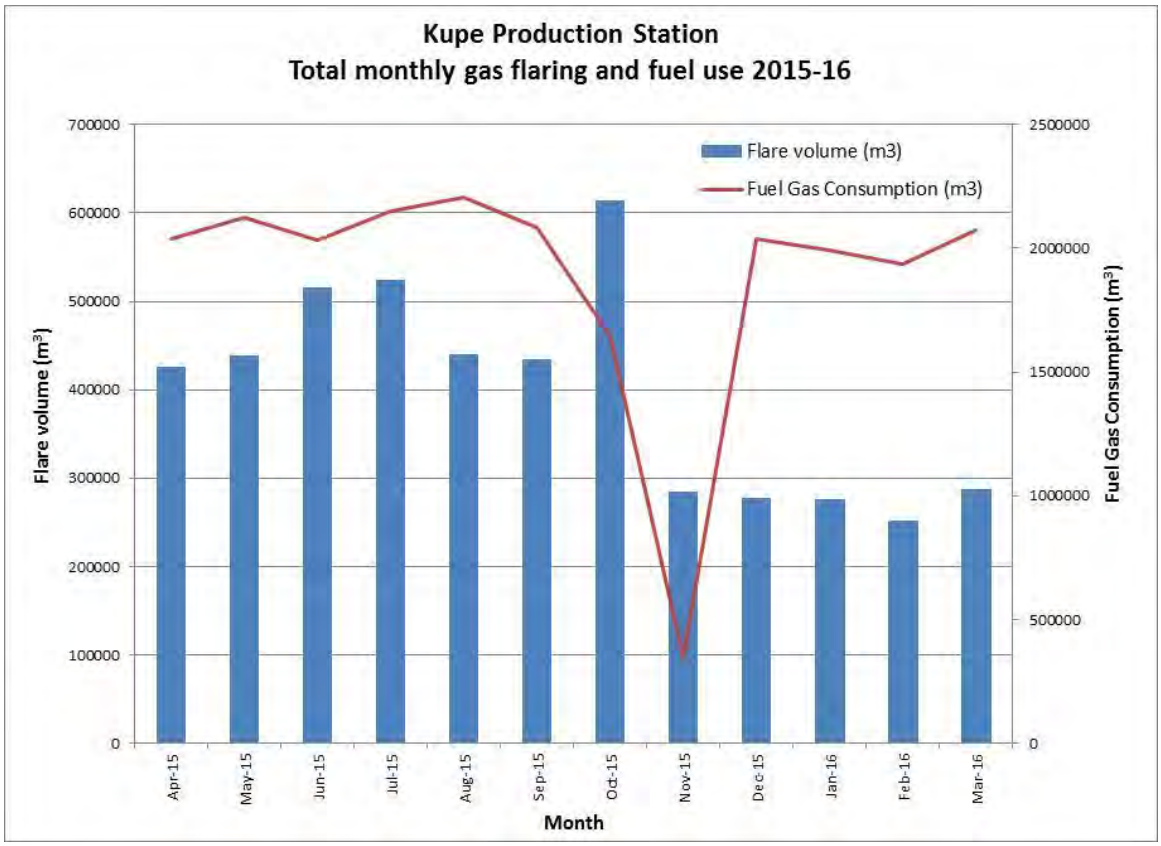

Figure 9 Monthly gas flaring and fuel use for Kupe Production Station

A summary of gas flaring and fuel use at Kupe Production Station under consents 6545-1 and 6546-1 is provided in Figure 9.

The quantities flared each month related to process changes and incidents at the site, including plant maintenance, shutdowns, restarts, compressor trips and off-specification gas flows. The total volume flared over the period (April 2015 – March 2016) was 4,769,424 m³, less than the previous 12 months (5,883,545 m³). The most flaring occurred in October 2015 while depressurising of the production station was underway prior to a scheduled maintenance shut down. No visible smoke events were recorded and no complaints regarding flaring or other air emissions at the production station were received by the Company or the Council during the 2015-2016 period.

2.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual courses of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The incident register includes events where the Company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

Complaints may be alleged to be associated with a particular site. If there is potentially an issue of legal liability, the Council must be able to prove by investigation that the identified company is indeed the source of the incident (or that the allegation cannot be proven).

In the 2015-2016 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans.

3. Discussion

3.1 Discussion of site performance

Monitoring of the Kupe Production Station during the 2015-2016 year found that the site was well managed. All consent conditions relating to site operations and management were complied with.

3.2 Environmental effects of exercise of consents

Site inspections found that the stormwater systems were constructed and maintained in accordance with consent conditions and operating effectively.

There were no adverse effects on the environment resulting from the exercise of the air discharge consents. The ambient air quality monitoring at the site showed that levels of carbon monoxide, combustible gases, PM10 particulates and nitrogen oxides were all below levels of concern at the time of sampling. No offensive or objectionable odours were detected beyond the boundary during inspections and there were no complaints in relation to air emissions from the site.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 6-14.

Table 6 Summary of performance for Consent 6531-1

Purpose: ***To disturb the seabed and foreshore of the coastal marine area by the process of erection, placement, use, alteration, extension, maintenance or removal of up to six pipelines and one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Inspection and liaison with consent holder	Yes
2. Pipe laying management plan to be provided	Provided February 2007	Yes
3. Programme of installation to be provided	Provided February 2007	Yes
4. Notification prior to maintenance work	Notifications received	Yes
5. Contingency plan to be provided	Latest update received August 2014	Yes
6. BPO to prevent or minimise adverse effects	Inspection and liaison with consent holder	Yes
7. Seabed disturbance to be minimised	Liaison with consent holder	Yes
8. Disturbance to be within a 100 m corridor	Liaison with consent holder	Yes
9. Disturbance to comply with noise standards	Liaison with consent holder	Yes

Purpose: ***To disturb the seabed and foreshore of the coastal marine area by the process of erection, placement, use, alteration, extension, maintenance or removal of up to six pipelines and one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
10. Work to cease on discovery of archaeological remains	No remains discovered	N/A
11. Consent holder to undertake pre and post lay monitoring surveys	Surveys complete	Yes
12. Lapse of consent	Consent exercised	N/A
13. Optional review provision re environmental effects	Next optional review scheduled in June 2017, recommendation attached in section 3.6	N/A
Overall assessment of environmental performance and compliance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 7 Summary of performance for Consent 6532-1

Purpose: ***To erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area up to six pipelines connecting an offshore wellhead/platform to the foreshore at mean high water spring, with structures situated under the seabed from approximately 1200 metres offshore to mean high water spring, and the related occupation of the seabed***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Inspection and liaison with consent holder	Yes
2. Pipe laying management plan to be provided	Provided February 2007	Yes
3. Programme of installation to be provided	Provided February 2007	Yes
4. Notification prior to maintenance work	Notifications received	Yes
5. Contingency plan to be provided	Latest update received August 2014	Yes
6. BPO to prevent or minimise adverse effects	Liaison with consent holder	Yes
7. Disturbance to comply with noise standards	Liaison with consent holder	Yes
8. Survey and map of position of pipeline to be provided	Provided by consent holder	Yes
9. Consent holder to undertake pre and post lay monitoring surveys	Surveys complete	Yes
10. Structures to be removed and area reinstated if and when no longer required	Structures still in use	N/A
11. Lapse of consent	Consent exercised	N/A

Purpose: ***To erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area up to six pipelines connecting an offshore wellhead/platform to the foreshore at mean high water spring, with structures situated under the seabed from approximately 1200 metres offshore to mean high water spring, and the related occupation of the seabed***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
12. Optional review provision re environmental effects	Next optional review scheduled in June 2017, recommendation attached in Section 3.6	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 8 Summary of performance for Consent 6533-1

Purpose***: To occupy the coastal marine area for a distance of 250 metres either side of the centre-line of a 100 metre wide pipeline corridor, from the outer limit of the territorial sea of New Zealand to mean high water spring, in a manner that will restrict public access***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Inspection and liaison with consent holder	Yes
2. Public access to be maintained	Inspection and liaison with consent holder	Yes
3. Notification prior to works involving restriction of public access	No works requiring restriction carried out during period	N/A
4. Consent holder to survey and map position of the structure	Provided by consent holder	Yes
5. Lapse of consent	Consent exercised	N/A
6. Optional review provision re environmental effects	Next optional review scheduled in June 2017, recommendation attached in Section 3.6	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 9 Summary of performance for Consent 6543-1

Purpose: ***To discharge pipeline hydrotesting water and treated stormwater from the Kupe Production Station via a stormwater/firewater storage pond system, and to discharge stormwater from the Dangerous Goods Storage stormwater system into the Kapuni Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Inspection and liaison with consent holder	Yes
2. Plans of stormwater catchment and drainage pathways to be provided on completion of site	Plans received	Yes
3. Notification prior to exercise of consent	Notifications received	Yes

Purpose: ***To discharge pipeline hydrotesting water and treated stormwater from the Kupe Production Station via a stormwater/firewater storage pond system, and to discharge stormwater from the Dangerous Goods Storage stormwater system into the Kapuni Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
4. Consent holder to review contingency plan for the site to include Dangerous Goods Store (DGS)	Latest update received November 2014	Yes
5. Consent holder to adopt BPO	Inspection and liaison with consent holder	Yes
6. All discharges to be treated through stormwater treatment system (excluding DGS)	Inspection	Yes
7. All hazardous substance storage areas to be bunded	Inspection	Yes
8. Limits on contaminants in discharge	Sampling	Yes
9. Effects in receiving water	Inspection, sampling and biomonitoring	Yes
10. Lapse of consent	Consent exercised	N/A
11. Optional review provision re environmental effects	Next optional review scheduled in June 2017, recommendation attached in section 3.6	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 10 Summary of performance for Consent 6545-1

Purpose: ***To discharge emissions to air from combustion involving the flaring of petroleum products incidental to the treatment of gas at the Kupe Production Station***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Inspection and liaison with consent holder	Yes
2. Consent holder to adopt BPO	Inspection and liaison with consent holder	Yes
3. Most appropriate process equipment to minimise emissions	Inspection and liaison with consent holder	Yes
4. Consent holder to provide analysis of typical gas stream on request	Not requested during period under review	N/A
5. Consent holder to supply Council with report in May each year	Received May 2016	Yes
6. Consent holder to consult with Council prior to significantly altering equipment or processes	Inspection and liaison with consent holder	Yes
7. Consent holder to provide a final site layout prior to commencement of production	Plans received	Yes

Purpose: ***To discharge emissions to air from combustion involving the flaring of petroleum products incidental to the treatment of gas at the Kupe Production Station***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
8. Notification to neighbours prior to commissioning	Letter sent by Origin Energy in October 2009	Yes
9. Notification of incidents	No incidents reported	Yes
10. Consent holder to supply record of all smoke emitting incidents upon request	Flaring report received	Yes
11. Consent holder to maintain a log of all continuous flaring incidents	Flaring report received	Yes
12. All practicable steps undertaken to minimise flaring	Measures discussed in flaring report	Yes
13. Prevention of dense black smoke from being discharged from flare	Inspection and liaison with consent holder	Yes
14. Consent holder to notify Council of continuous flaring	Notifications received	Yes
15. Discharge not to give rise to odour, dust or smoke beyond the boundary	Inspection	Yes
16. Discharge not to give rise to hazardous, toxic or noxious contaminant beyond the boundary	Inspection and ambient air monitoring	Yes
17. Limits on carbon monoxide in the discharge	Air monitoring	Yes
18. Limits on nitrogen dioxide in discharge	Air monitoring	Yes
19. Limits on other contaminants	Air monitoring	Yes
20. Lapse of consent	Consent exercised	N/A
21. Optional review of consent	Next optional review scheduled in June 2017, recommendation attached in section 3.5	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 11 Summary of performance for Consent 6546-1

Purpose: ***To discharge emissions to air as products of combustion from the Kupe Production Station involving equipment burning natural gas as fuel where the maximum heat release is in excess of 10 megawatts, together with miscellaneous emissions***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Inspection and liaison with consent holder	Yes

Purpose: ***To discharge emissions to air as products of combustion from the Kupe Production Station involving equipment burning natural gas as fuel where the maximum heat release is in excess of 10 megawatts, together with miscellaneous emissions***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
2. Consent holder to adopt BPO	Inspection and liaison with consent holder	Yes
3. Most appropriate process equipment to minimise emissions	Inspection and liaison with consent holder	Yes
4. Consent holder to provide analysis of typical gas stream on request	Not requested during period under review	N/A
5. Consent holder to supply Council with report in May each year	Received May 2016	Yes
6. Consent holder to consult with Council prior to significantly altering equipment or processes	Inspection and liaison with consent holder	Yes
7. Consent holder to provide a final site layout prior to commencement of production	Plans received	Yes
8. Notification of incidents	No incidents reported	Yes
9. Consent holder to supply record of all smoke emitting incidents upon request	Flaring report received	N/A
10. Discharge not to give rise to dangerous levels of contaminants at or beyond boundary	Air monitoring	Yes
11. Discharge not to give rise to odour, dust or smoke beyond the boundary	Inspection and ambient air monitoring	Yes
12. Discharge not to give rise to hazardous, toxic or noxious contaminant beyond the boundary	Air monitoring	Yes
13. Limits on carbon monoxide in the discharge	Air monitoring	Yes
14. Limits on nitrogen dioxide in discharge	Air monitoring	Yes
15. Limits on other contaminants	Air monitoring	Yes
16. Lapse of consent	Consent exercised	N/A
17. Optional review of consent	Next optional review scheduled in June 2017, recommendation attached in section 3.6	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 12 Summary of performance for Consent 6629-1

Purpose: ***To erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring, with structures situated under the seabed from approximately 1200 metres offshore to mean high water spring, and the related occupation of the seabed***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Inspection and liaison with consent holder	Yes
2. Pipe laying management plan to be provided	Provided in 2007	Yes
3. Programme of installation to be provided	Provided in 2007	Yes
4. Notification prior to maintenance work	Notifications received February 2016	Yes
5. Contingency plan to be provided	Latest update received November 2014	Yes
6. BPO to prevent or minimise adverse effects	Inspection and liaison with consent holder	Yes
7. Works to comply with noise standards	Inspection and liaison with consent holder	Yes
8. Consent holder to survey and map position of structures	Plans received	Yes
9. Pre-lay and post-lay monitoring surveys of pipeline corridor	Surveys completed	Yes
10. Structures removed and area reinstated when no longer required	Structures still in use	N/A
11. Lapse of consent	Consent exercised	N/A
12. Review of consent	Next optional review scheduled in June 2017, recommendation attached in Section 3.6	N/A
Overall assessment of environmental performance and compliance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

Table 13 Summary of performance for Consent 6979-1

Purpose: ***To install, construct and maintain up to seven water bores for horizontal directional drilling, pipeline hydro-testing, and production station operation purposes***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Inspection and liaison with consent holder	Yes
2. Consent holder to supply bore completion log	Provided in 2007	Yes
3. Bores to be cased and sealed	Inspection and bore logs	Yes

Purpose: ***To install, construct and maintain up to seven water bores for horizontal directional drilling, pipeline hydro-testing, and production station operation purposes***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
4. Consent holder to mitigate any adverse environmental effects	Inspection and liaison with consent holder	Yes
5. Consent holder to decommission bores when no longer required	Bores still in use	N/A
6. Written notification of decommission	Bores still in use	N/A
7. Lapse of consent	Consent exercised	N/A
8. Review of consent	Next optional review scheduled in June 2017, recommendation attached in section 3.6	N/A
Overall assessment of environmental performance and compliance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

Table 14 Summary of performance for Consent 7010-1

Purpose: ***To take and use up to 3,500 m3/day groundwater at a maximum rate of 40 l/s as a combined total from up to seven water bores in a bore field for the purpose of horizontal directional drilling, pipeline hydro-testing, production station operation and operations at the Manutahi-D, Manutahi-C, and Kauri-F wellsites***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with application	Review of abstraction data	Yes
2. Notification prior to exercise of consent	Notification received in October 2006	Yes
3. Results of pump test to be provided	Provided in March 2007	Yes
4. Volume of abstraction not to exceed 3500m^3 day and 40 l/s	Review of abstraction data	Yes
5. Abstraction not to cause more than 10% lowering of static water level	Not monitored during period under review	N/A
6. Abstraction not to cause the intrusion of saltwater	Review of abstraction data	Yes
7. Consent holder to maintain daily records of abstraction	Records received	Yes
8. Consent holder to install groundwater monitoring piezometers	Piezometers installed into groundwater bores only extracting from an unconfined aquifer. Piezometers not required for the two bores installed into the confined aquifer.	Yes
9. Consent holder to install and maintain a water meter	Installed in 2007. Passed flow test in October 2014	Yes
10. Consent subject to monitoring by Council	Records reviewed and meter inspected	Yes

Purpose: *To take and use up to 3,500 m3/day groundwater at a maximum rate of 40 l/s as a combined total from up to seven water bores in a bore field for the purpose of horizontal directional drilling, pipeline hydro-testing, production station operation and operations at the Manutahi-D, Manutahi-C, and Kauri-F wellsites*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
11. Lapse of consent	Consent exercised	N/A
12. Review of consent	Next optional review scheduled in June 2017, recommendation attached in section 3.6	N/A
Overall assessment of environmental performance and compliance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

During the period under review, the Company demonstrated an overall high level of both environmental performance and administrative compliance with the resource consents as defined in Section 1.1.4. There were no unauthorised incidents recorded by the Council in relation to the Company's activities. The Kupe Production Station was well managed and maintained.

3.4 Recommendations from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

1. THAT monitoring of consented activities at the Kupe Production Station and associated facilities in the 2015-2016 year continue at the same level as in 2014-2015.

This recommendation was implemented.

3.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account:

- the extent of information made available by previous authorities;
- its relevance under the RMA;
- its obligations to monitor emissions/discharges and effects under the RMA; and
- to report to the regional community.

The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

It is proposed that for 2016-2017, monitoring of consented activities at the Kupe Production Station and associated facilities continue at the same level as in 2015-2016. A recommendation to this effect is attached to this report.

3.6 Exercise of optional review of consent

Resource consents 6531-1, 6532-1, 6533-1, 6534-1, 6535-1, 6536-1, 6537-1, 6542-1, 6543-1, 6545-1, 6546-1, 6629-1, 6979-1, and 7010-1 provide for an optional review of the consent in June 2017. Conditions of the consents allow the Council to review the consent for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Based on the results of monitoring in the year under review, and in previous years as set out in earlier annual compliance monitoring reports, it is considered that there are no grounds that require a review to be pursued or grounds to exercise the review option.

4. Recommendations

1. THAT monitoring of consented activities at the Kupe Production Station and associated facilities in the 2016-2017 year continue at the same level as in 2015-2016.

2. THAT the option for a review of resource consents 6531-1, 6532-1, 6533-1, 6534-1, 6535-1, 6536-1, 6537-1, 6542-1, 6543-1, 6545-1, 6546-1, 6629-1, 6979-1, and 7010-1 in June 2017, as set out in conditions of the consents, not be exercised on the grounds that the current conditions are adequate.

Glossary of common terms and abbreviations

The following abbreviations and terms may be used within this report:

Biomonitoring	Assessing the health of the environment using aquatic organisms.
Bund	A wall around a tank to contain its contents in the case of a leak.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident Register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
m^2	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
mS/m	Millisiemens per metre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.

PM_{10}	Relatively fine airborne particles (less than 10 micrometre diameter).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act* 1991 and including all subsequent amendments.
Sm^3	Standard cubic metre
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
UI	Unauthorised Incident.

For further information on analytical methods, contact the Council's laboratory.

Bibliography and references

Taranaki Regional Council (2016): Origin Energy Resources (Kupe) Limited Kupe Production Station Monitoring Programme Annual Report 2014-2015. Technical Report 2015-98

Taranaki Regional Council (2015): Origin Energy Resources (Kupe) Limited Kupe Production Station Monitoring Programme Annual Report 2013-2014. Technical Report 2014-125

Taranaki Regional Council (2013): Origin Energy Resources (Kupe) Limited Kupe Production Station Monitoring Programme Annual Report 2012-2013. Technical Report 2013-26

Taranaki Regional Council (2012): Origin Energy Resources (Kupe) Limited Kupe Production Station Monitoring Programme Annual Report 2011-2012. Technical Report 2012-24

Taranaki Regional Council (2011): Origin Energy Resources (Kupe) Limited Kupe Production Station Monitoring Programme Annual Report 2010-2011. Technical Report 2011-19

Taranaki Regional Council (2010): Origin Energy Resources (Kupe) Limited Kupe Production Station Monitoring Programme Annual Report 2009-2010. Technical Report 2010-27

Taranaki Regional Council (2010): Origin Energy Resources (Kupe) Limited Kupe Gas Project Monitoring Programme Report (Development Phase) 2006-2009. Technical Report 2009-09

Appendix I

Resource consents held by Origin Energy Resources (Kupe) Limited

(For a copy of the signed resource consent please contact the TRC consent department)

03-01-011/01

12674

6533-1

Office of Hon Chris Carter
MP for Te Atatu
Minister of Conservation
Minister of Housing
Minister for Ethnic Affairs

- 9 DEC 2005

Peter Canvin
Consents Manager
Taranaki Regional Council
Private Bag 713
Stratford

Dear Mr Canvin

Attached for your information is a copy of the coastal permit that I have recently granted to Origin Energy Resources [Kupe] Limited for the RCA activities associated with laying pipelines for the development of the Kupe Gas Field.

I have made the permit subject to the conditions recommended to me by the Hearing Committee, as amended by the consent order of the Environment Court.

My reasons for the decision are the same as those given by the Hearing Committee and adopted by the Environment Court.

Please note that I have advised the applicant and my appointee on the Hearing Committee, Ms Byrdie Ayres, of my decision. I understand you will be notifying other interested parties of my decision in line with the provisions of section 119A(b) and section 114 of the Resource Management Act 1991.

Yours sincerely

Hon Chris Carter MP
Minister of Conservation

Encl.

Parliament Buildings, Wellington, New Zealand Telephone: 64 4 470 6568, Facsimile: 64 4 472 8034
Email: ccarter@ministers.govt.nz Website: www.beehive.govt.nz

COASTAL PERMIT

TRC – Applications: 3501 (Consent 6531)
3502 (Consent 6532)
3503 (Consent 6533)

Pursuant to the provisions of section 119 of the Resource Management Act 1991, I Chris Carter, Minister of Conservation, hereby grant Origin Energy Resources [Kupe] Limited a coastal permit (No. SAR-05-49-03-08) to: disturb the foreshore and seabed in order to lay up to four pipelines and one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring; for the containment of more than 50,000 litres of petroleum, petroleum products and chemicals; and for the occupation of the coastal marine area for a pipeline corridor up to 500 metres wide and a length of up to 23 kilometers from mean high water spring to the outer limits of the territorial sea , generally in accordance with the application and subject to the attached conditions of consent.

Dated at Wellington this 9th day of December 2005

Hon Chris Carter

Minister of Conservation

10. Except with the written agreement of the Chief Executive, Taranaki Regional Council, all structures authorised by this consent shall be removed and the area[s] reinstated, if and when the structure[s] are no longer required. The consent holder shall notify the Chief Executive, Taranaki Regional Council in writing at least 1 month prior to any structure[s] removal. Reinstatement shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

11. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017 and/or June 2023 and/or June 2029 and/or June 2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Application 3503 [consent 6533]: occupy [restricted coastal activity]

3. That application 3503, to occupy the coastal marine area for a distance of 250 metres either side of the centre-line of a 100 metre wide pipeline corridor, from the outer limit of the territorial sea of New Zealand to mean high water spring, in a manner that will restrict public access, be submitted to the Minister of Conservation for approval so that the consent reads:

> to occupy the coastal marine area for a 100 metre wide pipeline corridor, from the outer limit of the territorial sea of New Zealand to mean high water spring

for a period to 1 June 2039, with provision for review in June 2011 and/or June 2017 and/or June 2023 and/or June 2029 and/or June 2034, subject to the following recommended conditions:

General conditions

a) That on receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) That unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) That the consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3503. In the case of any contradiction between the documentation submitted in support of application 3503 and the conditions of this consent, the conditions of this consent shall prevail.

2. With the exception of the area required for safety purposes during: construction, inspection, maintenance or removal, of the structure[s] licensed by coastal permit 6532 and 6629; or the disturbance licensed by coastal permit 6531, the exercise of this consent shall not prevent the free passage of any member of the public through the coastal marine area [subject however to any restrictions imposed under the Submarine Cables and Pipelines Protection Act 1996 in relation to fishing operations].

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council in writing at least 48 hours prior to commencement and upon completion of any subsequent maintenance works which would involve restriction of public access within the coastal marine area.

4. The consent holder shall survey and map the position of the structure[s] within 90 days of the completion of their construction, and shall provide a copy of the plan showing the precise location [to within plus or minus 5 metres] of the structure[s] on the seabed, and the location of the occupied areas to the Taranaki Regional Council, the Hydrographic Office, Royal New Zealand Navy, and the Maritime Safety Authority.

5. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

6. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017 and/or June 2023 and/or June 2029 and/or June

2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Coastal Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited Private Bag 2202 NEW PLYMOUTH 4342
Decision Date [change]:	7 March 2012
Commencement Date [change]:	7 March 2012 [Granted: 9 December 2005]

Conditions of Consent

Consent Granted:	To disturb the seabed and foreshore of the coastal marine area by the process of erection, placement, use, alteration, extension, maintenance or removal of up to six pipelines and one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring at or about (NZTM) 1699850E-5617662N
Expiry Date:	1 June 2039
Review Date(s):	June 2011, June 2017, June 2023, June 2029, June 2034
Site Location:	Kupe Project, offshore pipelines, from mean high water spring directly south of Inaha Road, Inaha, Manaia, to the coastal marine area boundary 22 km further south
Legal Description:	Seabed
Catchment:	Tasman Sea

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General condition

a. The consent holder shall pay to the Taranaki Regional Council [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of applications 3501 and 6970, and special condition 2. In the case of any contradiction between the documentation submitted in support of applications 3501 and 6970, and the conditions of this consent, the conditions of this consent shall prevail.

2. At least one month prior to the exercise of this consent the consent holder shall provide, to the written satisfaction of the Chief Executive, Taranaki Regional Council, detailed plans of the activity to confirm that the proposal is generally in accordance with the application and supporting documentation and will comply with all of the conditions of this consent.

3. At least 10 working days prior to the commencement of works the consent holder shall provide the Taranaki Regional Council with a programme for the disturbance associated with installation/construction (or removal) of the pipeline(s) including: a schedule of proposed start dates and an estimation of the duration of the works, and details of the contractor including contact information for the project manager.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to commencement and upon completion of any subsequent maintenance works which would involve disturbance of, or deposition or discharge to, the coastal marine area.

5. Prior to the exercise of this consent the consent holder shall provide to the satisfaction of the Chief Executive, Taranaki Regional Council, a written contingency plan outlining measures to be undertaken in the event of a spill as a result of works authorised by this consent.

6. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of silt, sediments or any other contaminants into coastal water or onto the foreshore or seabed and to avoid or minimise the disturbance of the foreshore or seabed and any adverse effects on coastal water quality or ecosystems.

7. The consent holder shall ensure that the duration, area and volume of seabed disturbance shall, so far as is practicable, be minimised to the satisfaction of the Chief Executive, Taranaki Regional Council.

8. The consent holder shall ensure that all disturbance, including the placement of displaced boulders, shall be contained within a 100 metre wide disturbance corridor. Outside of the 100 metre wide disturbance corridor the exercise of this consent shall not give rise to any significant adverse ecological effects including effects to kaimoana.

9. The disturbance authorised by this consent shall comply with the noise standards as outlined within section 4.4.3 of the Regional Coastal Plan for Taranaki.

10. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisations or consent have been obtained.

11. The consent holder shall undertake pre-lay and post-lay monitoring surveys of the pipeline corridor, to the satisfaction of the Chief Executive, Taranaki Regional Council. The monitoring shall include one survey prior to disturbance, one survey immediately following laying of the pipelines, and one survey approximately 1 year following laying of the pipelines. The results of the monitoring shall be provided to the Chief Executive, Taranaki Regional Council, upon request.

12. This consent shall lapse on the expiry of five (5) years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

13. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017 and/or June 2023 and/or June 2029 and/or June 2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 7 March 2012

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Coastal Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited Private Bag 2202 NEW PLYMOUTH 4342
Decision Date [change]:	7 March 2012
Commencement Date [change]:	7 March 2012 [Granted: 9 December 2005]

Conditions of Consent

Consent Granted:	To erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area up to six pipelines connecting an offshore wellhead/platform to the foreshore at mean high water spring, with structures situated under the seabed from approximately 1200 metres offshore to mean high water spring, and the related occupation of the seabed at or about (NZTM) 1699850E-5617662N
Expiry Date:	1 June 2039
Review Date(s):	June 2011, June 2017, June 2023, June 2029, June 2034
Site Location:	Kupe Project, offshore pipelines, from mean high water spring directly south of Inaha Road, Inaha, Manaia, to the coastal marine area boundary 22 km further south
Legal Description:	Seabed
Catchment:	Tasman Sea

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General condition

a. The consent holder shall pay to the Taranaki Regional Council [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of applications 3502 and 6971, and special condition 2. In the case of any contradiction between the documentation submitted in support of applications 3502 and 6971, and the conditions of this consent, the conditions of this consent shall prevail.

2. At least one month prior to the exercise of this consent the consent holder shall provide, to the written satisfaction of the Chief Executive, detailed plans of the activity to confirm that the proposal is generally in accordance with the application and supporting documentation and will comply with all of the conditions of this consent.

3. At least 10 working days prior to the commencement of works the consent holder shall provide the Taranaki Regional Council with a programme for the installation/construction of the pipeline(s), including: a schedule of proposed start dates and an estimation of the duration of the works, and details of the contractor including contact information for the project manager.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to commencement and upon completion of any subsequent maintenance works which would involve disturbance of, or deposition, or discharge to, the coastal marine area.

5. Prior to the exercise of this consent the consent holder shall provide, to the satisfaction of the Chief Executive, Taranaki Regional Council, a written construction contingency plan, outlining measures to be undertaken in the event of a spill as a result of works authorised by this consent. Further, prior to the exercise of this consent the consent holder shall provide to the Chief Executive, Taranaki Regional Council, written confirmation of the acceptance by the Maritime Safety Authority of a New Zealand Offshore Installation Site Marine Oil Spill Contingency Plan.

6. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of any contaminants into coastal water or onto the foreshore or seabed and to avoid or minimise any adverse effects on coastal water quality or ecosystems.

7. The construction, use, maintenance and removal of the structure(s) authorised by this consent shall comply with the noise standards as outlined within section 4.4.3 of the Regional Coastal Plan for Taranaki.

8. The consent holder shall survey and map the position of the pipeline(s), (including details of the pipeline(s) position in relation to the seabed), within 90 days of the completion of their construction, and shall provide a copy of the plan showing the precise location (to within plus or minus 5 metres) of the structure(s) on/in the seabed, to the Taranaki Regional Council, the Hydrographic Office, Royal New Zealand Navy, and the Maritime Safety Authority.

9. The consent holder shall undertake pre-lay and post-lay monitoring surveys of the pipeline corridor, to the satisfaction of the Chief Executive, Taranaki Regional Council. The monitoring shall include one survey prior to disturbance, one survey immediately following laying of the pipelines, and one survey approximately 1 year following laying of the pipelines. The results of the monitoring shall be provided to the Chief Executive, Taranaki Regional Council, upon request.

10. Except with the written agreement of the Chief Executive, Taranaki Regional Council, all structures authorised by this consent shall be removed and the area(s) reinstated, if and when the structure(s) are no longer required. The consent holder shall notify the Chief Executive, Taranaki Regional Council in writing at least 1 month prior to any structure(s) removal. Reinstatement shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

11. This consent shall lapse on the expiry of five (5) years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017 and/or June 2023 and/or June 2029 and/or June 2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 7 March 2012

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Coastal Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited 12 Waione Street Petone WELLINGTON
Consent Granted Date:	28 October 2005

Conditions of Consent

Consent Granted:	To discharge up to 1000 cubic metres of contaminants [up to 600 cubic metres of drilling muds, drilling cuttings and aquifer water and up to 400 cubic metres of gauge run water] from two horizontal directional drilling exit points through the seabed approximately 1200 metres from mean high water spring within the coastal marine area at or about GR: P21:099-794
Expiry Date:	1 June 2039
Review Date(s):	June 2011, June 2017, June 2023, June 2029, June 2034
Site Location:	Kupe Project, offshore pipelines, from mean high water spring directly south of Inaha Road, Inaha, Manaia, to the coastal marine area boundary 22 km further south
Catchment:	Tasman Sea

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3504. In the case of any contradiction between the documentation submitted in support of application 3504 and the conditions of this consent, the conditions of this consent shall prevail.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the commencement and upon completion of the discharge.

3. The consent holder shall maintain a record of the discharge, including date, duration, and volume discharged, and shall provide the information to the Chief Executive, Taranaki Regional Council, upon request.

4. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of silt, sediments or any other contaminants into coastal water or onto the foreshore or seabed and to avoid or minimise the disturbance of the foreshore or seabed and any adverse effects on coastal water quality or ecosystems.

5. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

6. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and / or June 2017 and / or June 2023 and / or June 2029 and / or June 2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 28 October 2005

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Coastal Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited 12 Waione Street Petone WELLINGTON
Consent Granted Date:	28 October 2005

Conditions of Consent

Consent Granted:	To divert water from aquifers in the coastal marine area likely to be encountered during activities associated with horizontal directional drilling of two drill lines at or about GR: P21:099-794
Expiry Date:	1 June 2039
Review Date(s):	June 2011, June 2017, June 2023, June 2029, June 2034
Site Location:	Kupe Project, offshore pipelines, from mean high water spring directly south of Inaha Road, Inaha, Manaia, to the coastal marine area boundary 22 km further south
Catchment:	Tasman Sea

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3505. In the case of any contradiction between the documentation submitted in support of application 3505 and the conditions of this consent, the conditions of this consent shall prevail.

2. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

3. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and / or June 2017 and / or June 2023 and / or June 2029 and / or June 2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 28 October 2005

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited P O Box 38721 Petone WELLINGTON
Change To Conditions Date:	6 November 2006 [Granted: 21 June 2005]

Conditions of Consent

Consent Granted:	To discharge stormwater and sediment from earthworks associated with the construction of a horizontal directional drilling site onto and into land at or about GR: Q21:100-797
Expiry Date:	1 June 2023
Review Date(s):	June 2011, June 2017
Site Location:	Kupe Project, west of Inaha Road, east of Kapuni Road [being a paper road] and south of Siggs Road [being a paper road], Inaha, Manaia
Legal Description:	Secs 55 & 56 Pt Secs 53 & 54 Sbdn 1 of Pt Sec 53 Sbdn 1 of Pt Sec 54 DP 2201 Blk VII Waimate SD
Catchment:	Inaha

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

Condition 1 – changed

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3506 and 4421. In the case of any contradiction between the documentation submitted in support of application 3506 and 4421 and the conditions of this consent, the conditions of this consent shall prevail.

Conditions 2 to 10 – unchanged

2. At least 10 working days prior to the commencement of works the consent holder shall provide the Taranaki Regional Council with a programme for the installation of the horizontal directional drilling site, including: a schedule of proposed start dates and an estimation of the duration of the works, and details of the contractor including contact information for the project manager.

3. Prior to the exercise of this consent, the consent holder shall provide to the satisfaction of the Chief Executive, Taranaki Regional Council, a site erosion and sediment control management plan.

4. Prior to the exercise of this consent, the consent holder shall provide to the satisfaction of the Chief Executive, Taranaki Regional Council, a written contingency plan, outlining measures to be undertaken in the event of a spill as a result of works authorised by this consent.

5. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise the discharge of stormwater and sediment to any surface water body and to prevent or minimise any adverse effects of the discharge on any surface water body.

6. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities to the satisfaction of the Chief Executive, Taranaki Regional Council.

7. The discharge onto and into land shall occur a minimum of 20 metres from any surface water body. Discharge shall be onto and into land and there shall be no direct discharge to surface water.

8. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisations or consents have been obtained.

9. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 6 November 2006

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited P O Box 38721 Petone WELLINGTON
Change To Conditions Date:	6 November 2006 [Granted: 21 June 2005]

Conditions of Consent

Consent Granted:	To discharge treated stormwater from a horizontal directional drilling site onto and into land at or about GR: Q21:100-797
Expiry Date:	1 June 2023
Review Date(s):	June 2011, June 2017
Site Location:	Kupe Project, west of Inaha Road, east of Kapuni Road [being a paper road] and south of Siggs Road [being a paper road], Inaha, Manaia
Legal Description:	Secs 55 & 56 Pt Secs 53 & 54 Sbdn 1 of Pt Sec 53 Sbdn 1 of Pt Sec 54 DP 2201 Blk VII Waimate SD
Catchment:	Inaha

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

Condition 1 – changed

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3507 and 4432. In the case of any contradiction between the documentation submitted in support of application 3507, 4432, and the conditions of this consent, the conditions of this consent shall prevail.

Conditions 2 to 5 – unchanged

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to any horizontal directional drilling operation commencing.

3. Prior to the exercise of this consent, the consent holder shall provide to the satisfaction of the Chief Executive, Taranaki Regional Council, a stormwater management plan.

4. Prior to the exercise of this consent, the consent holder shall provide to the satisfaction of the Chief Executive, Taranaki Regional Council, site specific details relating to contingency planning for the horizontal directional drilling site.

5. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects of the discharge on any water body.

Conditions 6 and 7 – changed

6. The maximum stormwater catchment area shall be no more than 36,000 square metres [m^2].

7. All stormwater to be discharged from the HDD pad area shall be directed for treatment through the stormwater treatment system for discharge in accordance with the special conditions of this consent.

Conditions 8 to 13 – unchanged

8. Any above ground hazardous substances storage areas shall be bunded with drainage to sumps, or other appropriate recovery systems, and not directly to the stormwater catchment.

9. The following concentrations shall not be exceeded in the discharge:

Component	**Concentration**
pH (range)	6.0 – 9.0
suspended solids	100 gm^{-3}
total recoverable hydrocarbons [infrared spectroscopic technique]	15 gm^{-3}
chloride	50 gm^{-3}

This condition shall apply prior to the entry of the treated stormwater onto and into land at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

10. The discharge onto and into land shall occur a minimum of 20 metres from any surface water body. Discharge shall be onto and into land and there shall be no direct discharge to surface water.

11. The Chief Executive, Taranaki Regional Council, shall be advised in writing at least 48 hours prior to the reinstatement of the site and the reinstatement shall be carried out so as to minimise effects on stormwater quality.

12. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

13. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 6 November 2006

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources [Kupe] Limited P O Box 38721 Petone WELLINGTON
Change To Conditions Date:	14 December 2006 [Granted: 21 June 2005]

Conditions of Consent

Consent Granted:	To discharge stormwater and sediment from earthworks associated with the construction and installation of the Kupe Production Station and associated stormwater treatment facilities onto and into land in the vicinity of the Kapuni Stream at or about GR: P21:098-802
Expiry Date:	1 June 2023
Review Date(s):	June 2011, June 2017
Site Location:	Kupe Project, west of Inaha Road, east of Kapuni Road [being a paper road] and south of Siggs Road [being a paper road], Inaha, Manaia
Legal Description:	Secs 55 and Pt Secs 53 and Sbdn 1 of Pt Sec 54 [DP 2201] Blk VII Waimate SD
Catchment:	Kapuni Inaha

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

Condition 1 – changed

1. The exercise of this consent shall be undertaken in general accordance with the documentation submitted in support of application 3512 and 4467. In the case of any contradiction between the documentation submitted in support of application 3512 and 4467 and the conditions of this consent, the conditions of this consent shall prevail.

Conditions 2 to 10 – unchanged

2. At least 10 working days prior to the commencement of works the consent holder shall provide the Taranaki Regional Council with a programme for the installation of the Kupe Production Station, including: a schedule of proposed start dates and an estimation of the duration of the works, and details of the contractor including contact information for the project manager.

3. Prior to the exercise of this consent, the consent holder shall provide for the written approval of the Chief Executive, Taranaki Regional Council, a site erosion and sediment control management plan.

4. Prior to the exercise of this consent, the consent holder shall provide to the satisfaction of the Chief Executive, Taranaki Regional Council, a written contingency plan, outlining measures to be undertaken in the event of a spill as a result of works authorised by this consent.

5. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise the discharge of stormwater and sediment to any surface water body and to prevent or minimise any adverse effects of the discharge on any surface water body.

6. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities to the satisfaction of the Chief Executive, Taranaki Regional Council.

7. The discharge onto and into land shall occur a minimum of 20 metres from any surface water body. Discharge shall be onto and into land and there shall be no direct discharge to surface water.

8. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisations or consents have been obtained.

9. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 14 December 2006

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited Private Bag 2202 NEW PLYMOUTH 4342
Decision Date (Change):	31 January 2013
Commencement Date (Change):	31 January 2013 (Granted: 21 June 2005)

Conditions of Consent

Consent Granted:	To discharge pipeline hydrotesting water and treated stormwater from the Kupe Production Station via a stormwater/firewater storage pond system, and to discharge stormwater from the Dangerous Goods Storage stormwater system into the Kapuni Stream at or about (NZTM) 1699150E-5618661N
Expiry Date:	1 June 2039
Review Date(s):	June 2017, June 2023, June 2029, June 2034
Site Location:	Kupe Production Station, 192 Lower Inaha Road, Inaha, Manaia
Legal Description:	Secs 55 & 56 Pt Secs 53 & 54 Blk VII Waimate SD (Discharge source and site)
Catchment:	Kapuni

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

    i) the administration, monitoring and supervision of this consent; and
    ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken in general accordance with the documentation submitted in support of applications 3513, 4468, 7277 and special condition 2. In the case of any contradiction between the documentation submitted in support of applications 3513, 4468, 7277 and the conditions of this consent, the conditions of this consent shall prevail.

2. Within one month of the completion of the development of the site the consent holder shall provide, to the written satisfaction of the Chief Executive, Taranaki Regional Council, detailed plans of stormwater catchment and drainage pathways, including clean areas, potentially contaminated areas, and bunded areas, and the containment, treatment and discharge systems put into place.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent.

4. The consent holder shall review the contingency plan for the site and include, if necessary, the new Dangerous Goods Store. The consent holder shall provide the plan for the written approval of the Chief Executive, Taranaki Regional Council. The plan shall include site specific details relating to contingency planning for the site.

5. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects of the discharge on any water body.

6. All stormwater and hydrotest water to be discharged under this permit shall be directed for treatment through the stormwater treatment system for discharge, excluding the stormwater discharge from the Dangerous Goods Storage stormwater system, which shall be discharged into the Kapuni Stream, in accordance with the special conditions of this consent.

7. Any above ground hazardous substances storage areas shall be bunded with drainage to sumps, or other appropriate recovery systems, and not directly to the stormwater catchment.

8. The following concentrations shall not be exceeded in the discharge:

Component	**Concentration**
pH (range)	6.0-9.0
suspended solids	100 gm^{-3}
total recoverable hydrocarbons (infrared spectroscopic technique)	15 gm^{-3}
chloride	50 gm^{-3}

This condition shall apply prior to the entry of the treated stormwater into the Kapuni Stream at a designated sampling point(s) approved by the Chief Executive, Taranaki Regional Council.

9. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not give rise to any of the following effects in the receiving waters of the Kapuni Stream:

a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
b) any conspicuous change in the colour or visual clarity;
c) any emission of objectionable odour;
d) the rendering of fresh water unsuitable for consumption by farm animals;
e) any significant adverse effects on aquatic life.

10. This consent shall lapse on the expiry of five (5) years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

11. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017 and/or June 2023 and/or June 2029 and/or June 2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 31 January 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited P O Box 38721 Petone WELLINGTON
Change To Conditions Date:	2 April 2007 [Granted: 21 June 2005]

Conditions of Consent

Consent Granted:	To discharge emissions to air from combustion involving the flaring of petroleum products incidental to the treatment of gas at the Kupe Production Station at or about GR: P21:098-802
Expiry Date:	1 June 2039
Review Date(s):	June 2007, June 2009, June 2011, June 2017, June 2023, June 2029, June 2034
Site Location:	Kupe Project, west of Inaha Road, east of Kapuni Road [being a paper road] and south of Siggs Road [being a paper road], Inaha, Manaia
Legal Description:	Secs 55 and Pt Secs 53 and Sbdn 1 of Pt Sec 54 [DP 2201] Blk VII Waimate SD

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

Condition 1 – changed

1. The exercise of this consent shall be undertaken in general accordance with the documentation submitted in support of applications 3515 and 4498. In the case of any contradiction between the documentation submitted in support of application 3515 and 4498 and the conditions of this consent, the conditions of this consent shall prevail.

Conditions 2 to 5 – unchanged

2. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effects on the environment associated with the discharge of contaminants into the environment arising from the emissions to air from the flare.

3. The consent holder shall minimise the emissions and impacts of air contaminants discharged from the flare by the selection of the most appropriate process equipment, process control equipment, emission control equipment, methods of control, supervision and operation, and the proper and effective operation, supervision, control and maintenance of all equipment and processes.

4. The consent holder shall make available to the Chief Executive upon request an analysis of a typical gas and/or condensate stream from the Kupe field, covering sulphur compound content and the content of compounds containing six or more carbon atoms in their molecular structure.

5. The consent holder shall provide to the Taranaki Regional Council during May of each year, for the duration of this consent, a report:

a) detailing gas combustion at the production station flares, including but not restricted to routine operational flaring and flaring logged as per condition 11;

b) detailing any measures that have been undertaken by the consent holder to improve the energy efficiency of the production station;
c) detailing any measures to reduce smoke emissions;
d) detailing any measures to reduce flaring,
e) addressing any other issue relevant to the minimisation or mitigation of emissions from the production station flare; and
f) detailing any complaints received and any measures undertaken to address complaints.

Condition 6 – changed

6. Prior to undertaking any alterations to the plant equipment, processes or operations, which may substantially alter the nature or quantity of flare emissions other than as notified in consent applications 3515 and 4498, the consent holder shall first consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991.

Conditions 7 to 21 – unchanged

7. Prior to the commencement of production, the consent holder shall supply to the Chief Executive, Taranaki Regional Council, a final site lay-out plan, demonstrating configuration of the facilities and equipment so as to avoid or mitigate the potential effects of air emissions.

8. At least 3 days before the commissioning of the plant, the consent holder shall undertake all practicable measures to notify owners or occupiers of properties within 1 kilometre of the boundary of the property on which the production station flare is located, of the possibility of flaring and smoke emissions. The consent holder shall include in the notification a 24-hour contact telephone number for a representative of the consent holder.

9. Any incident having an environmental effect or potential effect which has caused or is liable to cause substantiated complaint or a hazardous situation beyond the boundary of the property on which the production station flare is located, shall be notified to the Taranaki Regional Council, as soon as possible, followed by a written report to the Chief Executive, Taranaki Regional Council, within one week of the incident, with comment about the measures taken to minimise the impact of the incident and to prevent re-occurrence.

10. The consent holder shall keep and make available to the Chief Executive, Taranaki Regional Council, upon request, a record of all smoke emitting incidents, noting time, duration and cause. The consent holder shall also keep, and make available to the Chief Executive, upon request, a record of all complaints received as a result of the exercise of this consent.

11. The consent holder shall keep and maintain a log of all continuous flaring incidents longer than 5 minutes and any intermittent flaring lasting for an aggregate of 10 minutes or longer in any 60-minute period. Such a log shall contain the date, the start and finish times, the quantity and type of material flared, and the reason for flaring.

This log shall be made available to the Chief Executive, Taranaki Regional Council, upon request, and summarised annually in the report required under condition 5. Flaring, under normal operation in the low pressure flare, of rich mono-ethylene glycol degasser vapour, condensate tank vapours, non-condensibles from tri-ethylene glycol/mono-ethylene glycol regeneration and purge gas shall be excluded from this requirement.

12. All practicable steps shall be taken to minimise flaring.

13. Other than in emergencies, the rate of depressurisation of the plant, or sections of the plant, shall be managed to prevent dense black smoke from being discharged from the flare.

14. The consent holder shall, whenever practicable, notify the Chief Executive, Taranaki Regional Council, whenever the continuous flaring of hydrocarbons [other than the flaring of rich mono-ethylene glycol degasser vapour, condensate tank vapours, non-condensibles from tri-ethylene glycol/mono-ethylene glycol regeneration and purge gas] is expected to occur for more than five minutes in duration.

15. The discharges authorised by this consent shall not, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, give rise to any levels of odour or dust or smoke that are offensive or obnoxious or objectionable at or beyond the site boundary in the opinion of an enforcement officer of the Taranaki Regional Council.

16. The consent holder shall not discharge any contaminant to air from the site at a rate or a quantity such that the contaminant, whether alone or in combination with other contaminants, is or is liable to be hazardous or toxic or noxious at or beyond the boundary of the property where the production station is located, or at any dwellinghouse.

17. The consent holder shall control all discharges of carbon monoxide to the atmosphere from the flare, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, in order that the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 milligrams per cubic metre [eight-hour average exposure], or 30 milligrams per cubic metre [one-hour average exposure] at or beyond the boundary of the property on which the production station flare is located.

18. The consent holder shall control all discharges of nitrogen dioxide or its precursors to the atmosphere from the flare, whether alone or in conjunction with any other discharges to the atmosphere from the site arising through the exercise of any other consent, in order that the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 200 micrograms per cubic metre [one hour average exposure], or 100 micrograms per cubic metre [twenty-four hour average exposure], at or beyond the boundary of the property on which the production station flare is located.

19. The consent holder shall control discharges to the atmosphere from the flare of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, in order that the maximum ground level concentration for any particular contaminant arising from the exercise of this consent, measured at or beyond the boundary of the property on which the production station flare is located, is not increased above background levels:

    a) by more than 1/30th of the relevant Workplace Exposure Standard-Time Weighted Average [exposure averaged over a duration as specified for the Workplace Exposure Standard-Time Weighted Average], or by more than 1/10th of the Workplace Exposure Standard-Short Term Exposure Limit over any short period of time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour]; or
    b) if no Short Term Exposure Limit is set, by more than the General Excursion Limit at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

20. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

21. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent within six months of receiving a report prepared by the consent holder pursuant to condition 5 of this consent, or by giving notice of review during the month of June 2007 and/or June 2009 and/or June 2011 and/or June 2017 and/or June 2023 and/or June 2029 and/or June 2034, for the purposes of:

    a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and/or
    b) requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and/or
    c) to alter, add or delete limits on mass discharge quantities or discharge or ambient concentrations of any contaminant or contaminants; and/or
    d) taking into account any Act of Parliament, regulation, national policy statement or national environmental standard which relates to limiting, recording, or mitigating emissions of carbon dioxide and/or nitrogen dioxide, and which is relevant to the air discharge from the Kupe Production Station.

Signed at Stratford on 2 April 2007

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited 12 Waione Street Petone WELLINGTON
Consent Granted Date:	21 June 2005

Conditions of Consent

Consent Granted:	To discharge emissions to air as products of combustion from the Kupe Production Station involving equipment burning natural gas as fuel where the maximum heat release is in excess of 10 megawatts, together with miscellaneous emissions at or about GR: P21:098-802
Expiry Date:	1 June 2039
Review Date(s):	June 2007, June 2009, June 2011, June 2017, June 2023, June 2029, June 2034
Site Location:	Kupe Production Station, west of Inaha Road, east of Kapuni Road [being a paper road] and south of Siggs Road [being a paper road], Inaha, Manaia
Legal Description:	Secs 55 56 Pt Secs 53 54 Sbdn 1 of Pt Sec 53 Sbdn 1 of Pt Sec 54 DP 2201 Blk VII Waimate SD Sec 17 Blk VIII Waimate SD

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3516. In the case of any contradiction between the documentation submitted in support of application 3516 and the conditions of this consent, the conditions of this consent shall prevail.

2. The consent holder shall at all times adopt the best practicable option, as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effects on the environment associated with the discharge of contaminants into the environment arising from the emissions to air from the site.

3. The consent holder shall minimise the emissions and impacts of air contaminants discharged from the site by the selection of the most appropriate process equipment, process control equipment, emission control equipment, methods of control, supervision and operation, and the proper and effective operation, supervision, control and maintenance of all equipment and processes.

4. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request an analysis of a typical gas and / or condensate stream from the Kupe field, covering sulphur compound content and the content of compounds containing six or more carbon atoms in their molecular structure.

5. The consent holder shall provide to the Taranaki Regional Council during May of each year, for the duration of this consent, a report:

   a) detailing gas combustion at the production station;
   b) detailing any measures that have been undertaken by the consent holder to improve the energy efficiency of the production station;
   c) detailing any measures to reduce smoke emissions;
   d) detailing any measures to reduce flaring;
   e) addressing any other issue relevant to the minimisation or mitigation of emissions from the production station; and
   f) detailing any complaints received and any measures undertaken to address complaints.

6. Prior to undertaking any alterations to the plant, processes or operations, which may significantly change the nature or quantity of contaminants emitted to air from the site, the consent holder shall first consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991.

7. Prior to the commencement of production, the consent holder shall supply to the Chief Executive, Taranaki Regional Council, a final site lay-out plan, demonstrating configuration of the facilities and equipment so as to avoid or mitigate the potential effects of air emissions.

8. Any incident having an environmental impact or potential environmental impact which has caused or is liable to cause substantiated complaint or a hazardous situation beyond the boundary of the property on which the production station is located, shall be notified to the Taranaki Regional Council, as soon as possible, followed by a written report to the Chief Executive, Taranaki Regional Council, within one week of the incident, with comment about the measures taken to minimise the impact of the incident and to prevent re-occurrence.

9. The consent holder shall keep and make available to the Chief Executive, Taranaki Regional Council, upon request, a record of all smoke emitting incidents and all relief valve releases, noting time, duration and cause. The consent holder shall also keep, and make available to the Chief Executive, upon request, a record of all complaints received as a result of the exercise of this consent.

10. The discharges authorised by this consent shall not, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, give rise to any dangerous levels of airborne contaminants at or beyond the boundary of the property including but not limited to any risk of fire or explosion.

11. The discharges authorised by this consent shall not, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, give rise to any levels of odour or dust or smoke that are offensive or obnoxious or objectionable at or beyond the boundary of the property on which the production station is located in the opinion of an enforcement officer of the Taranaki Regional Council.

12. The consent holder shall not discharge any contaminant to air from the site at a rate or a quantity such that the contaminant, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, is or is liable to be hazardous or toxic or noxious at or beyond the boundary of the property where the production station is located, or at any dwellinghouse.

13. The consent holder shall control all discharges of carbon monoxide to the atmosphere from the site, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, in order that the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 milligrams per cubic metre [eight-hour average exposure], or 30 milligrams per cubic metre [one-hour average exposure] at or beyond the boundary of the property on which the production station is located.

14. The consent holder shall control all discharges of nitrogen dioxide or its precursors to the atmosphere from the site, whether alone or in conjunction with any other discharges to the atmosphere from the site arising through the exercise of any other consent, in order that the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 200 micrograms per cubic metre [one hour average exposure], or 100 micrograms per cubic metre [twenty-four hour average exposure], at or beyond the boundary of the property on which the production station is located.

15. The consent holder shall control discharges to the atmosphere from the site of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, in order that the maximum ground level concentration for any particular contaminant arising from the exercise of this consent, measured at or beyond the boundary of the property on which the production station is located, is not increased above background levels:

    a) by more than 1/30th of the relevant Workplace Exposure Standard-Time Weighted Average [exposure averaged over a duration as specified for the Workplace Exposure Standard-Time Weighted Average], or by more than 1/10th of the Workplace Exposure Standard-Short Term Exposure Limit over any short period of time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour]; or

    b) if no Short Term Exposure Limit is set, by more than the General Excursion Limit at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

16. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

17. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent within six months of receiving a report prepared by the consent holder pursuant to condition 5 of this consent, or by giving notice of review during the month of June 2007 and/or June 2009 and/or June 2011 and/or June 2017 and/or June 2023 and/or June 2029 and/or June 2034, for the purposes of:

    a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and/or
    b) requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and/or

c) to alter, add or delete limits on mass discharge quantities or discharge or ambient concentrations of any contaminant or contaminants; and/or

d) taking into account any Act of Parliament, regulation, national policy statement or national environmental standard which relates to limiting, recording, or mitigating emissions of carbon dioxide and/or nitrogen dioxide, and which is relevant to the air discharge from the Kupe Production Station.

Signed at Stratford on 21 June 2005

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Coastal Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited 12 Waione Street Petone WELLINGTON
Consent Granted Date:	28 October 2005

Conditions of Consent

Consent Granted:	To erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring, with structures situated under the seabed from approximately 1200 metres offshore to mean high water spring, and the related occupation of the seabed at or about GR: P21:099-794
Expiry Date:	1 June 2039
Review Date(s):	June 2011, June 2017, June 2023, June 2029, June 2034
Site Location:	Kupe Project, offshore pipelines, from mean high water spring directly south of Inaha Road, Inaha, Manaia, to the coastal marine area boundary 22 km further south
Catchment:	Tasman Sea

General Conditions

a) That on receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) That unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) That the consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3502, and special condition 2. In the case of any contradiction between the documentation submitted in support of application 3502 and the conditions of this consent, the conditions of this consent shall prevail.

2. At least one month prior to the exercise of this consent the consent holder shall provide, to the written satisfaction of the Chief Executive, Taranaki Regional Council, a detailed pipe laying management plan. The purpose of the management plan is to set out the investigations to be undertaken and the procedure to be adopted to minimise the disturbance to the seabed as a result of laying the pipelines. The management plan shall include, as a minimum:

   a) a description of the results of the investigations undertaken by remotely operated vehicle to determine the optimum pipeline route;
   b) a description of the method to be used to remove boulders from the pipeline route;
   c) the timeframe over which the boulder clearing will be undertaken;
   d) confirmation that the proposed activity is generally in accordance with the application and supporting documentation, and will comply with all the conditions of this consent; and
   e) an outline of the measures to be used to ensure that consent conditions will be met.

   The management plan shall be prepared in consultation with interested submitters to the application. However, the consent holder shall not be in breach of this condition if any party choses not to comment on the draft management plan. Nor is the consent holder under any obligation to incorporate any particular suggestions or proposals advanced by any party.

3. At least 10 working days prior to the commencement of works the consent holder shall provide the Taranaki Regional Council with a programme for the installation/construction of the structure[s], including: a schedule of proposed start dates and an estimation of the duration of the works, and details of the contractor including contact information for the project manager.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to commencement and upon completion of any subsequent maintenance works which would involve disturbance of, or deposition, or discharge to, the coastal marine area.

5. Prior to the exercise of this consent the consent holder shall provide, to the satisfaction of the Chief Executive, Taranaki Regional Council, a written construction contingency plan, outlining measures to be undertaken in the event of a spill as a result of works authorised by this consent. Further, prior to the exercise of this consent the consent holder shall provide to the Chief Executive, Taranaki Regional Council, written confirmation of the acceptance by the Maritime Safety Authority of a New Zealand Offshore Installation Site Marine Oil Spill Contingency Plan.

6. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of any contaminants into coastal water or onto the foreshore or seabed and to avoid or minimise any adverse effects on coastal water quality or ecosystems.

7. The construction, use, maintenance and removal of the structure[s] authorised by this consent shall comply with the noise standards as outlined within section 4.4.3 of the Regional Coastal Plan for Taranaki.

8. The consent holder shall survey and map the position of the structure[s], [including details of the structure[s] position in relation to the seabed], within 90 days of the completion of their construction, and shall provide a copy of the plan showing the precise location [to within plus or minus 5 metres] of the structure[s] on/in the seabed, to the Taranaki Regional Council, the Hydrographic Office, Royal New Zealand Navy, and the Maritime Safety Authority.

9. The consent holder shall undertake pre-lay and post-lay monitoring surveys of the pipeline corridor, to the satisfaction of the Chief Executive, Taranaki Regional Council. The monitoring shall include one survey prior to disturbance, one survey immediately following laying of the pipelines, and one survey approximately 1 year following laying of the pipelines. The results of the monitoring shall be provided to the Chief Executive, Taranaki Regional Council, upon request.

10. Except with the written agreement of the Chief Executive, Taranaki Regional Council, all structures authorised by this consent shall be removed and the area[s] reinstated, if and when the structure[s] are no longer required. The consent holder shall notify the Chief Executive, Taranaki Regional Council in writing at least 1 month prior to any structure[s] removal. Reinstatement shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

11. This consent shall lapse on the expiry of five [5] years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and / or June 2017 and / or June 2023 and / or June 2029 and / or June 2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 28 October 2005

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Land Use Consent

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited P O Box 38721 Petone WELLINGTON
Consent Granted Date:	1 November 2006

Conditions of Consent

Consent Granted:	To install, construct and maintain up to seven water bores for horizontal directional drilling, pipeline hydro-testing, and production station operation purposes at or about GR: P21:099-802
Expiry Date:	1 June 2039
Review Date(s):	June 2011, June 2017, June 2023, June 2029, June 2034
Site Location:	Lower Inaha Road, Inaha
Legal Description:	Subdivision 1 Sec 54 Blk VII Waimate SD
Catchment:	Inaha

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken in general accordance with the documentation submitted in support of application 4392. In the case of any contradiction between the documentation submitted in support of application 4392 and the conditions of this consent, the conditions of this consent shall prevail.

2. The consent holder shall, within 28 days of the completion of each bore, provide a bore completion log to the satisfaction of the Chief Executive, Taranaki Regional Council.

3. The bores shall be cased and sealed to prevent the potential for aquifer cross-contamination and/or leakage from the surface.

4. The consent holder shall take all reasonable steps to mitigate any adverse environmental effects that may be caused by structural failure in any of the bores.

5. The consent holder shall properly decommission any bore no longer required.

6. The consent holder shall provide written notification to the Chief Executive, Taranaki Regional Council following the decommissioning of any bore, within 28 days of completion.

7. This consent shall lapse on the expiry of five years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

8. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017 and/or 2023 and/or 2029 and/or 2034 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 1 November 2006

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Water Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Origin Energy Resources (Kupe) Limited Private Bag 2202 NEW PLYMOUTH 4342
Decision Date [Change]:	13 October 2011
Commencement Date [Change]:	13 October 2011 [Granted: 2 November 2006]

Conditions of Consent

Consent Granted:	To take and use up to 3,500 m^3/day groundwater at a maximum rate of 40 l/s as a combined total from up to seven water bores in a bore field for the purpose of horizontal directional drilling, pipeline hydro-testing, production station operation and operations at the Manutahi-D, Manutahi-C, and Kauri-F wellsites at or about (NZTM) 1699935E-5618466N
Expiry Date:	1 June 2039
Review Date(s):	June 2017, June 2023, June 2029, June 2034
Site Location:	Lower Inaha Road, Inaha [Kupe Production Station/Manutahi-D/Manutahi-C/Kauri-F]
Legal Description:	Subdivision 1 Sec 54 Blk VII Waimate Survey District [Site of take & use]
Catchment:	Inaha

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken in general accordance with the documentation submitted in support of applications 4430, 4585 and 6908 and shall ensure the efficient and effective use of water. In the case of any contradiction between the documentation submitted in support of applications 4430, 4585, and 6908 and the conditions of this consent, the conditions of this consent shall prevail.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent.

3. Prior to the exercise of this consent, the consent holder shall provide a report to Chief Executive, Taranaki Regional Council, detailing the results of pump testing (24-hour constant discharge at 40 l/s and recovery tests) of the bores used for water supply to show (1) that the abstraction is sustainable, and (2) the effects of the abstraction on flows in the Inaha Stream and the Kapuni Stream.

4. The volume of groundwater abstracted shall not exceed 3,500 cubic metres per day at a rate not exceeding 40 litres per second as a combined total from the bores in the bore field.

5. The abstraction shall not cause more than a 10% lowering of the static water level by interference in any adjacent registered bore located beyond the boundary of the bore field.

6. The abstraction shall not cause the intrusion of saltwater into any freshwater aquifer.

7. The consent holder shall maintain daily records of the abstraction from each bore including date, abstraction rate and daily volume, and pumping hours, and make these records available to the Chief Executive, Taranaki Regional Council, no later than 31 July of each year, or upon request.

8. Prior to the exercise of this consent for any groundwater bore extracting water from an unconfined aquifer, the consent holder shall install groundwater monitoring piezometers between the Kapuni Stream and Inaha Stream and the bore for the purposes of monitoring groundwater levels.

9. The consent holder shall install and maintain a water meter approved by the Chief Executive, Taranaki Regional Council, on each bore for the purposes of accurately recording the abstraction of water.

10. This consent shall be subject to monitoring by the Taranaki Regional Council and the consent holder shall meet all reasonable costs associated with the monitoring.

11. This consent shall lapse on the expiry of five years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017 and/or 2023 and/or 2029 and/or 2034, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 13 October 2011

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Appendix II

Biomonitoring reports

To Job Manager, Callum Mackenzie
From Scientific Officer, C R Fowles
Doc No 1591286
Report No CF645
Date October 2015

Biomonitoring of the Kapuni Stream in relation to stormwater discharges from the Kupe Production Station of Origin Energy Resources Ltd, surveyed in October 2015

Introduction

This was the first of two scheduled biomonitoring surveys relating to the Kupe Production Station, for the 2015-2016 monitoring year. Special condition 9e of Consent 6543-1 for the discharge of treated stormwater into the Kapuni Stream requires:
"that after allowing for reasonable mixing over 50 metres downstream of the discharge point, 'there shall be no significant adverse effects on aquatic life'."

Stormwater discharges had occurred from time to time through the late winter-early spring months prior to this survey, with four discharges over the latter two weeks of September 2015. This (spring) survey provides additional baseline data in relation to the lower reaches of the Kapuni Stream (see Fowles, 2014a), as this section of the stream (approximately 700m from the coast) had had no previous macroinvertebrate monitoring history prior to the inaugural Kupe PS monitoring survey of spring 2009 (CF497). [Note: The Kapuni Stream has an extensive macroinvertebrate database (from 1981 to date) for the length of the stream from its upper reaches at Opunake Road to lower-middle reaches at Normanby Rd (approximately 8km upstream of these Kupe Production Station sites) which is monitored in association with industrial usage in mid-catchment (Stark, 2014 and Fowles, 2014a)].

This spring survey was performed on 9 October 2015 during relatively low flow conditions with four moderate stream freshes during the previous three week period.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from riffle habitats at three established sites (sites 1, 2 and 3) in the Kapuni Stream (Table 1, Figure 1) on 9 October 2015. This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

Table 1 Biomonitoring sites in the Kapuni Stream, sampled in relation to the Kupe Production Station

Site No.	Site code	Map reference	GPS location	Location
1	KPN000488	BK29:992187	E1699156 N5618688	Upstream of Production Station stormwater discharge
2	KPN000490	BK29:992186	E1699158 N5618595	50 m downstream of Production Station stormwater discharge
3	KPN000492	BK29:992185	E1699237 N5618533	200 m downstream of Production Station stormwater discharge

Samples were preserved with Kahle's Fluid for later sorting and identification under a stereomicroscope according to Taranaki Regional Council methodology using protocol P1 of NZMWG protocols for sampling macroinvertebrates in wadeable streams (Stark et al. 2001). Macroinvertebrate taxa found in each sample were recorded as:

R (rare)	= less than 5 individuals;
C (common)	= 5-19 individuals;
A (abundant)	= estimated 20-99 individuals;
VA (very abundant)	= estimated 100-499 individuals;
XA (extremely abundant)	= estimated 500 individuals or more.

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. By averaging the scores obtained from a list of taxa taken from one site and multiplying by a scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained. The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. More 'sensitive' communities inhabit less polluted waterways.

A semi-quantitative MCI value (SQMCIs) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCIs is not multiplied by a scaling factor of 20, so that its corresponding range of values is 20x lower.

Results and discussion

At the time of this survey there was a moderately low, uncoloured flow in the Kapuni Stream at all sites upstream and downstream of the production station stormwater outfall. Flow rate at the TRC Normanby Road recorder site was 1810 litres/sec which represented a flow well above the minimum monthly mean October flow (973 litres/sec) but below the average monthly mean October flow (2,474 litres/sec) recorded for the period 1999-2014. The survey was performed seven days after a fresh in excess of 3x median stream flow and 51 days after a fresh in excess of 7x median flow conditions. Water temperature at these three sites ranged from 10.1˚C to 10.4˚C at the time of this mid morning survey.

Periphyton mats were very thin at all sites and there were no filamentous algae present on the predominantly sandy-gravel-cobble-boulder substrates of all of these unshaded sites. Moss was patchy at the two downstream sites. There was no stormwater discharge from the rock rip-rap outfall at the time of the survey but there had been discharges of treated stormwater on many occasions over the period since the previous summer survey with total monthly discharges of 2380, 6720, and 5807 cubic metres during July, August, and September 2015 respectively.

Macroinvertebrate communities

Twelve previous macroinvertebrate surveys had been performed at these three sites. The results of these surveys and historical data for the nearest monitored site in the stream (at Normanby Road [Site: KPN000400] some 8 km upstream), are provided for comparative background purposes in Table 2.

Figure 1 Biomonitoring sites in the Kapuni Stream in relation to the Kupe Production Station

Table 2 Numbers of macroinvertebrate taxa and MCI values recorded in previous surveys of the Kapuni Stream at Normanby Road (1982 to 2013 (Stark, 2014)) and at three sites in the lower reaches associated with the Kupe PS (since December 2009)

Site	Number of previous surveys	Numbers of taxa		MCI values	
		Median	Range	Median	Range
KPN000400	26	14	9-26	106	83-136
KPN000488	12	20	12-27	105	98-107
KPN000490	12	19	14-28	105	96-116
KPN000492	12	19	15-27	98	91-113

The results of the current survey are presented in Table 3 and discussed as follows.

Site 1 (upstream of Production Station outfall)

Taxa number was equivalent with median richness (20 taxa) found at site 1 which was six taxa more than the median number of taxa from previous surveys at the nearest upstream site at Normanby Road, but seven taxa fewer than the maximum recorded at this site to date (Table 2). The community was characterised by one 'highly sensitive' taxon [the ubiquitous mayfly (*Deleatidium*)], three moderately sensitive taxa [mayfly (*Coloburiscus*), stonefly (*Zelandobius),* and extremely abundant stony-cased caddisfly (*Pycnocentrodes*)], and only one 'tolerant' taxon [orthoclad midges]. The numerical dominance by these 'sensitive' taxa (particularly the mayfly and stony-cased caddisfly) resulted in a relatively high $SQMCI_s$

value (5.4 units) for the lower reaches of a ringplain stream (TRC, 2015a) and indicative of good preceding physicochemical water quality and physical habitat, in the presence of minimal periphyton mats substrate cover, far less than typically found in the lower reaches of ringplain streams.

Table 3 Macroinvertebrate fauna of the Kapuni Stream in relation to the Kupe Production Station stormwater discharge sampled on 9 October 2015

Taxa List	Site Number	MCI score	1	2	3
	Site Code		KPN000488	KPN000490	KPN000492
	Sample Number		FWB15255	FWB15256	FWB15257
ANNELIDA (WORMS)	Oligochaeta	1	R	R	R
MOLLUSCA	*Potamopyrgus*	4	R	R	R
CRUSTACEA	Copepoda	5	-	-	R
	Paracalliope	5	-	-	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	C	R	C
	Coloburiscus	7	A	C	A
	Deleatidium	8	VA	A	VA
PLECOPTERA (STONEFLIES)	*Acroperla*	5	R	-	-
	Zelandobius	5	A	A	VA
COLEOPTERA (BEETLES)	Elmidae	6	C	C	C
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	C	R	C
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	C	C	A
	Costachorema	7	C	C	C
	Hydrobiosis	5	R	R	-
	Beraeoptera	8	C	C	C
	Pycnocentria	7	R	C	C
	Pycnocentrodes	5	XA	XA	XA
DIPTERA (TRUE FLIES)	*Aphrophila*	5	-	R	R
	Eriopterini	5	R	-	R
	Harrisius	6	-	-	R
	Maoridiamesa	3	C	C	A
	Orthocladiinae	2	A	A	A
	Polypedilum	3	-	R	-
	Tanytarsini	3	-	-	C
	Empididae	3	R	R	R
	Austrosimulium	3	R	-	-
		No of taxa	20	19	22
		MCI	102	102	103
		SQMCIs	5.4	5.0	5.3
		EPT (taxa)	11	10	9
		%EPT (taxa)	55	53	41
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa			

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

The MCI score (102 units) was indicative of the relatively high proportion of 'sensitive' taxa (65% of taxa richness) comprising the community at this site in the lower reaches of a ringplain stream. This score was only four units lower than the median score recorded at the site 8 km upstream at Normanby Road, and an insignificant three units lower than the median recorded by the twelve previous surveys at this site (Table 2). The score was also five units below the score recorded by the previous spring (2014) survey. It was a very

significant 17 units (Stark, 1998) higher than predicted for a site at this altitude (10 m a.s.l.) and 10 units higher than predicted for this site 35.3 km downstream from the National Park in ringplain streams (Stark and Fowles, 2009). This score (102 units) categorised the site as having 'good' generic stream health (TRC, 2015) at the time of this spring survey, and 'better than expected' predictive health (TRC, 2015) for a ringplain site in the lower reaches near the coast.

Site 2 (50 m downstream of Production Station discharges)

A comparatively similar richness of 19 taxa was found at site 2, one taxon fewer than the richness at the upstream site and equivalent with the median richness previously found at site 2. The community was characterised by all but one ('moderately sensitive' taxon) of the four taxa that were dominant at site 1. The numerical dominance by one 'sensitive' taxon in particular contributed to the relatively high $SQMCI_s$ value (5.0 units), only 0.4 unit lower than the value at the upstream site 1, indicative of good physical habitat and preceding physicochemical water quality, coincident with very thin periphyton mats substrate cover.

The MCI score (102 units) was identical with the score at site 1, also reflecting the relatively high proportion (63% of richness) of 'sensitive' taxa in the community for a site in the lower reaches of a ringplain stream. It was also an insignificant three units lower than the median of the range of scores recorded by the twelve previous surveys at this site. In comparison with the MCI value upstream, this score was indicative of no significant impacts of preceding stormwater discharges on the macroinvertebrate community at this site. It was significantly (Stark,1998) 17 units above the predicted score for a site at an elevation of 10 m a.s.l. and an insignificant 10 units higher than predicted for a site 35.4 km downstream from the National Park in ringplain streams (Stark and Fowles, 2009). This MCI score (102 units) categorised the site as having 'good' generic stream health (TRC, 2015) at the time of this summer survey and 'better than expected' predictive health (TRC, 2015) for a site in the lower reaches of a ringplain stream near the coast.

Site 3 (200 m downstream of Production Station discharge)

A comparatively similar richness (22 taxa) was found at this site, three taxa more than the median richness previously found at this site, three more taxa than at site 2, and two more taxa than the richness found at the upstream 'control' site. The community was characterised by all of the same taxa as dominant at sites 1 and 2 and two additional 'tolerant' taxa [net-building caddisfly (*Hydropsyche-Aoteapsyche*) and midge (*Maoridiamesa*)]. The numerical dominance by three of the 'sensitive' taxa in particular resulted in the relatively high $SQMCI_s$ value (5.3 units) which was only 0.1 unit lower than the score recorded at the upstream 'control' site and well above those typically found in the lower reaches of ringplain streams and rivers near the coast (TRC, 2015a).

The three sites' communities' shared 16 common taxa (62% of the total of 26 taxa found in the surveyed reach), indicative of the relative similarity in community compositions particularly considering the similarities in characteristic (dominant) taxa at the three sites.

The MCI score (103 units) reflected the relatively high proportion of 'sensitive' taxa (68% of the richness) in the community and was an insignificant one unit higher than the score recorded at the upstream 'control' site. The MCI score was five units higher than the median of scores found by the twelve previous surveys at this site (Table 2). The MCI score (103 units) was also significantly 18 units (Stark, 1998) above that predicted for a ringplain site at this altitude and a significant 11 units higher than that predicted for a site 35.6 km

downstream from the National Park in ringplain streams (Stark and Fowles, 2009). The score categorised this site as having 'good' generic stream health (TRC, 2015) at the time of this spring survey coincident with very thin periphyton substrate cover, and 'better than expected' predictive health for a site near the mouth of a ringplain stream.

Conclusions

This spring 2015, macroinvertebrate survey of the Kapuni Stream indicated that previous stormwater discharges from the Kupe Production Station had not had any recent impacts upon the macroinvertebrate communities downstream of the stormwater outfall. Moderate community richnesses were recorded, coincident with very thin periphyton mat substrate cover (much less extensive than typical of lower reaches of ringplain streams) under moderately low flow conditions. Relatively high proportions of 'sensitive' taxa constituted and numerically dominated all three communities. This resulted in relatively high $SQMCI_s$ values, above those typical of the lower coastal reaches of ringplain streams and rivers. There were minimal significant changes in individual taxon abundances between sites as reflected in the very narrow range (0.4 unit) of $SQMCI_s$ values found over this reach of the stream.

This survey has provided further baseline macroinvertebrate fauna data under spring, moderately low flow conditions for future reference and comparative monitoring purposes.

The very narrow range of MCI scores (102 to 103) categorised this reach of the stream as having 'good' generic biological health consistent with good physical habitat and preceding physicochemical water quality and 'better than expected' predicted health for the lower reaches of a ringplain stream very close to the coast. These scores were also higher than predicted scores for ringplain sites at equivalent altitudes and distances downstream of the National Park indicative of the comparatively better biological health of the lower Kapuni Stream than that of equivalent reaches in the majority of other ringplain rivers and streams in the region (Fowles, 2014a and TRC, 2015).

Summary

The Council's standard 'kick-sampling' technique was used at three established sites to collect streambed macroinvertebrates from the Kapuni Stream. Samples were sorted and identified to provide the number of taxa (richness), MCI score and $SQMCI_s$ score for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_s$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities particularly if non-organic impacts are occurring. Significant differences in either the MCI or the $SQMCI_s$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

This spring, moderately low flow macroinvertebrate survey (the twelfth since completion of the Production Station) indicated that occasional discharges of treated stormwater from the Kupe Production Station over the previous several months had not had any recent significant detrimental effects on the macroinvertebrate communities of the Kapuni Stream. No significant changes in the moderate macroinvertebrate communities' richnesses were

recorded between the upstream 'control' site and the two sites downstream of the discharge, during a period of moderately low stream flow immediately prior to the time of the survey.

The macroinvertebrate communities of the stream contained significant proportions of 'sensitive' taxa and these communities were numerically dominated almost entirely by 'sensitive' taxa resulting in relatively high $SQMCI_s$ and MCI values for the lower reaches of a ringplain stream near the coast, with MCI scores higher than predicted for such a stream reach.

MCI scores indicated that the stream communities were of 'good' generic health and'better than expected' for the predicted condition recorded in Taranaki ringplain streams at similar altitudes and distances from the National Park boundary.

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To Job Manager, Callum MacKenzie
From Technical Officer, Katie Blakemore
Document 1675801
Report No KB003
Date 27 April 2016

Biomonitoring of the Kapuni Stream in relation to stormwater discharges from the Kupe Production Station, February 2016

Introduction

This was the second of two scheduled biomonitoring surveys relating to the Kupe Production Station, owned by Origin Energy Resources LTD, for the 2015-2016 monitoring year. The Production Station discharges treated stormwater into the Kapuni Stream under Consent 6543-1. Special condition 9e of this consent requires:
"that after allowing for reasonable mixing over 50 metres downstream of the discharge point, 'there shall be no significant adverse effects on aquatic life'."

Stormwater discharges had occurred on three occasions since the previous spring survey was carried out, with the last discharge almost a month prior to this survey being carried out.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from riffle habitats at three established sites (sites 1, 2 and 3) in the Kapuni Stream (Table 1, Figure 1) on 15 February 2015. This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

Table 1 Biomonitoring sites in the Kapuni Stream, sampled in relation to the Kupe Production Station

Site No.	Site code	Map reference	GPS location	Location
1	KPN000488	BK29:992187	E1699156 N5618688	Upstream of Production Station stormwater discharge
2	KPN000490	BK29:992186	E1699158 N5618595	50 m downstream of Production Station stormwater discharge
3	KPN000492	BK29:992185	E1699237 N5618533	200 m downstream of Production Station stormwater discharge

Samples were preserved with Kahle's Fluid for later sorting and identification under a stereomicroscope according to Taranaki Regional Council methodology using protocol P1 of NZMWG protocols for sampling macroinvertebrates in wadeable streams (Stark et al. 2001). Macroinvertebrate taxa found in each sample were recorded based on the abundance categories in Table 2.

Table 2 Macroinvertebrate abundance categories

Abundance category	Number of individuals
R (rare)	1-4
C (common)	5-19
A (abundant)	20-99
VA (very abundant)	100-499
XA (extremely abundant)	>499

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. By averaging the scores obtained from a list of taxa taken from one site and multiplying by a scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained. The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. More 'sensitive' communities inhabit less polluted waterways. A difference of 11 or more MCI units is considered significantly different (Stark 1998). A gradation of biological water quality conditions based upon MCI ranges which has been adapted for Taranaki streams and rivers (TRC, 2013) from Stark's classification (Stark, 1985; Boothroyd and Stark, 2000) (Table 3).

Table 3 Macroinvertebrate community health based on MCI ranges which has been adapted for Taranaki streams and rivers (TRC, 2013) from Stark's classification (Stark, 1985 and Boothroyd and Stark, 2000)

Grading	MCI
Excellent	>140
Very Good	120-140
Good	100-119
Fair	80-99
Poor	60-79
Very Poor	<60

A semi-quantitative MCI value (SQMCIs) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCIs is not multiplied by a scaling factor of 20, so that its corresponding range of values is 20x lower.

Figure 1 Biomonitoring sites in the Kapuni Stream in relation to the Kupe Production Station

Results and discussion

At the time of this survey there was a swift, low flow in the Kapuni Stream at all sites surveyed. The water was clear and uncoloured at all three sites. The survey was carried out 27 days after a fresh in excess of 3x median stream flow and 180 days after a fresh in excess of 7x median stream flow, during a period of stable low flows, with only two moderate freshes in the preceding five weeks. At the time of the survey, flows were very similar to the five year return low flow level. Water temperature at the three sites ranged from 19.2 - 19.5 °C at the time of this survey.

At the time of the survey, there was no stormwater discharge from the Production Station occurring. Stormwater had been discharged on only three occasions since the previous spring survey, with stormwater discharge volumes totalling 1620 and 499 cubic metres for the months of November 2015 and January 2016 respectively.

Periphyton mats were patchy at all sites, while filamentous periphyton was patchy at sites 1 and 2, and widespread at site 3. There was no moss, leaves, wood or macrophytes present at any sites. There was no shading at any site, while only site 2 had some overhanging vegetation present. Substrate was predominantly cobble at all sites, with varying amounts of boulder, coarse gravel, fine gravel and sand also present. There was no stormwater discharge occurring at the time of the survey.

Macroinvertebrate communities

Thirteen previous macroinvertebrate surveys had been undertaken at these 3 sites. Data from these surveys is summarised in Table 4 for comparative purposes. The results of the current survey are provided in Table 5 and are also summarised in Table 4 with the past results.

Table 4 Summary of previously recorded number of taxa, MCI values and $SQMCI_s$ values together with results from the February 2016 survey

Site	Number of previous surveys	Numbers of taxa			MCI values			$SQMCI_s$ values		
		Median	Range	Current Survey	Median	Range	Current Survey	Median	Range	Current Survey
1	13	20	12-27	21	105	98-107	98	6.2	5.4-7.8	5.2
2	13	19	14-28	21	103	96-116	95	6.3	5.0-7.4	5.4
3	13	19	15-27	26	98	91-113	91	6.4	5.3-7.8	5.9

Table 5 Macroinvertebrate communities of the Kapuni Stream in relation to the Kupe Production Station stormwater discharge sampled on 15 February 2016

Taxa List	Site Number	MCI score	1	2	3
	Site Code		KPN000488	KPN000490	KPN000492
	Sample Number		FWB16071	FWB16072	FWB16073
NEMERTEA	Nemertea	3	C	C	C
ANNELIDA (WORMS)	Oligochaeta	1	-	A	C
	Lumbricidae	5	-	-	R
MOLLUSCA	*Latia*	5	R	-	-
	Potamopyrgus	4	VA	A	VA
CRUSTACEA	Ostracoda	1	-	R	R
	Paracalliope	5	R	-	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	A	C	A
	Coloburiscus	7	A	C	A
	Deleatidium	8	VA	VA	XA
	Zephlebia group	7	-	R	-
COLEOPTERA (BEETLES)	Elmidae	6	C	C	C
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	A	C	C
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	VA	VA	VA
	Costachorema	7	R	-	R
	Hydrobiosis	5	C	C	A
	Neurochorema	6	-	R	R
	Beraeoptera	8	C	A	C
	Oxyethira	2	-	-	R
	Pycnocentrodes	5	XA	VA	XA
DIPTERA (TRUE FLIES)	*Aphrophila*	5	A	C	A
	Eriopterini	5	-	R	R
	Maoridiamesa	3	C	-	A
	Orthocladiinae	2	A	C	A
	Polypedilum	3	-	-	R
	Tanytarsini	3	C	C	A
	Empididae	3	R	R	R
	Muscidae	3	R	R	R
	Austrosimulium	3	R	-	-
		No of taxa	21	21	26
		MCI	98	95	91
		SQMCIs	5.2	5.4	5.9
		EPT (taxa)	8	9	9
		%EPT (taxa)	38	43	35

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

Site 1: upstream of Production Station discharge

A moderate taxa richness of 21 taxa was recorded on this sampling occasion. This is very similar to the median for this site (median taxa richness 20; Table 4) and to the preceding survey (taxa richness 20). The macroinvertebrate community was characterised by one 'highly sensitive' taxon (the ubiquitous mayfly *Deleatidium*), five 'moderately sensitive' taxa [mayflies (*Austroclima* and *Coloburiscus*), toe-biter (*Archichauliodes*), caddisfly (*Pycnocentrodes*) and cranefly (*Aphrophila*)] and three 'tolerant' taxa [snail (*Potamopyrgus*), caddisfly (*Hydropsyche*) and midge (orthocladiinae)] (Table 5).

The recorded MCI score was 98, which is not significantly different (Stark 1998) to the median score for this site (median MCI score 105; Table 4), or to the score of 102 recorded in the preceding survey. This is equal to the lowest previously recorded MCI score for this site (Table 4). The MCI score categorises this site as having 'fair' macroinvertebrate community health. The $SQMCI_s$ score calculated from this sample was 5.2, significantly lower than the median (median $SQMCI_s$ score 6.2; Table 4) but similar to the previously recorded score of 5.4.

Site 2: 50m downstream of Production Station discharge

A moderate taxa richness of 21 taxa was recorded at this site. This is very similar to the median for this site (median taxa richness 19; Table 4) and to the previously recorded score of 19 taxa. The macroinvertebrate invertebrate community was characterised by six taxa, two 'highly sensitive' taxa [mayfly (*Deleatidium*) and caddisfly (*Beraeoptera*)], one 'moderately sensitive' caddisfly (*Pycnocentrodes*) and three 'tolerant' taxa [snail (*Potamopyrgus*), caddisfly (*Hydropsyche*) and worm (oligochaeta)] (Table 5).

The recorded MCI score for this site was 95, which is not significantly different (Stark 1998) from the median score for this site (median MCI score 103; Table 4) or the previously recorded score of 102 units. However, it is the lowest recorded score for this site to date (Table 4), with the previous low score of 96 recorded in February 2012. The MCI score of 91 categorises the site as having 'fair' macroinvertebrate community health. The $SQMCI_s$ score recorded was 5.4, significantly lower than the median $SQMCI_s$ score of 6.3 (Table 4) but slighter higher than the previous score of 5.0 units.

Site 3: 200m downstream of Production Station discharge

A moderately high taxa richness of 26 taxa was recorded at this site. This is seven taxa more than the median recorded for this site (Table 4) and is four taxa more than the previously recorded score (22 taxa). The community was characterised eleven taxa, one 'highly sensitive' mayfly (*Deleatidium*), five 'moderately sensitive' taxa [mayflies (*Austroclima* and *Coloburiscus*), caddisflies (*Hydrobiosis* and *Pycnocentrodes*) and cranefly (*Aphrophila*)] and five 'tolerant' taxa [snail (*Potamopyrgus*), caddisfly (*Hydropsyche*), and midges (*Maoridiamesa*, orthocladiinae, and tanytarsini)] (Table 5).

The recorded MCI score for this site was 91, equal to the lowest recorded MCI score for this site (Table 4) and significantly lower (Stark 1998) than the previous score of 103.
This score categorises the site as having 'fair' macroinvertebrate community health. The $SQMCI_s$ score was 5.9, higher than the previously recorded score (5.3 units) and lower than the median $SQMCI_s$ (6.4 units) for this site.

Discussion and conclusions

The Council's 'kick-sampling' technique was used at three sites to collect streambed macroinvertebrates from the Kapuni Stream in relation to the stormwater discharge from the Kupe Production Station. This has provided data to assess any potential impacts the discharge has had on the macroinvertebrate communities of the stream. Samples were processed to provide number of taxa (richness), MCI, and $SQMCI_s$ scores for each site.

Taxa richness is the most robust metric when ascertaining whether a macroinvertebrate community has been exposed to toxic discharges. When exposed to toxic discharges, macroinvertebrates may die and be swept downstream or deliberately drift downstream as an avoidance mechanism (catastrophic drift). The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with differing sensitivity to organic pollution. The $SQMCI_s$ is similar to the MCI, but accounts for relative abundances of the taxa found as well as sensitivity to pollution. Significant differences in taxa richness, MCI or $SQMCI_s$ between sites may indicate the degree of adverse effects (if any) of the discharges being monitored.

At the time of the survey, there were no significant differences in taxa richness, and richnesses were higher for all sites than in the preceding spring survey, as well as being higher than the median for each site. At the time of this survey there was higher than usual periphyton biomass, due to summer low flow conditions and the lack of recent large freshes (which cause scouring of the streambed, removing periphyton). For the most part, this increase in taxa is due to taxa that are commonly associated with higher periphyton abundance (for example, the caddisfly (*Oxyethira*), true fly (*Muscidae*), mollusc (*Latia*), and some worm groups).

The survey recorded MCI scores of 98, 95 and 91 for sites 1-3 respectively. These scores are not significantly different from each other (Stark 1998) and categorise all three sites as having 'fair' macroinvertebrate community health. These scores were all lower than those recorded in the preceding survey, although this difference was only significant (Stark 1998) for site 3. It is common for summer surveys to have lower MCI scores than spring surveys, due to higher periphyton biomasses and higher water temperatures in summer compared to spring. The very low flow conditions at the time of the survey will have contributed to the higher than usual periphyton biomass and slightly higher than usual summer water temperatures in the Kapuni Stream (based on data from the Kapuni Stream at Normanby Road). These low flow conditions are likely to be the main factor contributing to the MCI scores being lower or equal to the lowest previously recorded MCI score at all three sites. $SQMCI_s$ scores were slightly higher than in the preceding spring survey for all sites, and were lower than the median for all sites, although this difference was only significant (Stark 1998) for sites 1 and 2.

Overall, these metrics provide no evidence that the stormwater discharge from the Kupe Production Station is causing any adverse effects on the macroinvertebrate communities of the Kapuni Stream. Higher than median taxa richnesses and lower than median MCI scores for all sites can be attributed to habitat differences caused by higher than usual periphyton biomass, which is related to low flows preceding the current survey.

Summary

A macroinvertebrate survey was carried out at three sites in the Kapuni Stream to determine whether stormwater discharges from the Kupe Production Station had caused any adverse effects on the stream macroinvertebrate communities.

The survey recorded similar taxa richnesses, MCI scores and $SQMCI_s$ scores between sites. Taxa richnesses were higher than the median, and higher than those recorded in the preceding survey. MCI scores in contrast were insignificantly lower than the median, and were lower than those recorded in the preceding survey, although this was only significant for site 3. $SQMCI_s$ scores were insignificantly higher than those recorded in the preceding survey, and were lower than the median for all sites, although this difference was only significant for sites 1 and 2.

Overall, there is no evidence to indicate that the stormwater discharges from the Kupe Production Station had caused adverse effects on the macroinvertebrate communities of the Kapuni Stream. The primary influence on the communities at this time appeared to be the summer low flow conditions, and consequent high periphyton biomass.

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Appendix II

Air monitoring reports

Memorandum

To	Fiza Hafiz, Scientific Officer – State of the Environment Job Managers - Callum MacKenzie, Emily Roberts, James Kitto
From	Brian Cheyne, Scientific Officer – Air Quality
File	Frodo # 1718841
Date	22 July 2016

Monitoring of nitrogen oxides (NOx) levels in Taranaki near the NOx emitting sites, year 2015-2016

From 2014 onwards, the Taranaki Regional Council (TRC) has implemented a coordinated region-wide monitoring programme to measure NOx, not only at individual compliance monitoring sites near industries that emit NOx, but simultaneously at the urban sites (the Council regional state of the environment programme) to determine exposure levels for the general population. The programme involves deploying all measuring devices on the same day, with retrieval three weeks later. This approach will assist the Council to further evaluate the effects of local and regional emission sources and ambient air quality in the region.

Nitrogen oxides

Nitrogen oxides (NOx), a mixture of nitrous oxide (N2O), nitric oxide (NO) and nitrogen dioxide (NO2), are produced from natural sources, motor vehicles and other fuel combustion processes. Indoor domestic appliances (gas stoves, gas or wood heaters) can also be significant sources of nitrogen oxides, particularly in areas that are poorly ventilated. NO and NO2 are of interest because of potential effects on human health.

Nitric oxide is colourless and odourless and is oxidised in the atmosphere to form nitrogen dioxide. Nitrogen dioxide is an odorous, brown, acidic, highly corrosive gas that can affect our health and environment. Nitrogen oxides are critical components of photochemical smog – nitrogen dioxide produces the brown colour of the smog.

Environmental and health effects of nitrogen oxides

Nitrogen dioxide is harmful to vegetation, can fade and discolour fabrics, reduce visibility, and react with surfaces and furnishings. Vegetation exposure to high levels of nitrogen dioxide can be identified by damage to foliage, decreased growth or reduced crop yield.

Nitric oxide does not significantly affect human health. On the other hand, elevated levels of nitrogen dioxide cause damage to the mechanisms that protect the human respiratory tract and can increase a person's susceptibility to, and the severity of, respiratory infections and asthma. Long-term exposure to high levels of nitrogen dioxide can cause chronic lung disease. It may also affect sensory perception, for example, by reducing a person's ability to smell an odour.

National environmental standards and guidelines

In 2004, national environmental standards (NES) for ambient (outdoor) air quality were introduced in New Zealand to provide a guaranteed level of protection for the health of New Zealanders. The national standard for nitrogen dioxide (NO2) is set out below.

In any 1-hour period, the average concentration of nitrogen dioxide in the air should not be more than 200 µg/m³.

Before the introduction of the national environmental standards, air quality was measured against the national air quality guidelines. The national guidelines were developed in 1994 and revised in 2002 following a comprehensive review of international and national research and remain relevant. The national guideline for nitrogen dioxide (NO2) is set out below.

In any 24-hour period, the average concentration of nitrogen dioxide in the air should not be more than 100 µg/m³.

Nitrogen dioxide limits are also set in the special conditions of the resource consents. The consents limits are the same as those imposed under the NES and MfE's guideline.

Measurement of nitrogen oxides

The Taranaki Regional Council has been monitoring nitrogen oxides (NOx) in the Taranaki region since 1993 using passive absorption discs. Research to date indicates that this is an accurate method, with benefits of simplicity of use and relatively low cost. To date more then 660 samplers of nitrogen oxides have been collected in Taranaki region. Discs are sent to EUROFINS ELS Ltd. Lower Hutt for analysis. Passive absorption discs are placed at the nominated sites. The gases diffuse into the discs and any target gases (nitrogen dioxide or others) are captured.

In the 2015-16 year, passive absorption discs were placed on one occasion at twenty four sites, staked about two metres off the ground for a period of 21 days, for the purpose of Compliance Monitoring.

Conversion of exposure result to standardised exposure time period

From the average concentration measured, it is possible to calculate a theoretical maximum daily or one hour concentrations that may have occurred during the exposure period. Council data on NOx is gathered over a time period other than exactly 24 hours or one hour. There are mathematical equations used by air quality scientists to predict the maximum concentrations over varying time periods. These are somewhat empirical, in that they take little account of local topography, micro-climates, diurnal variation, etc. Nevertheless, they are applied conservatively and have some recognition of validity.
One formula in general use is of the form:

$$C(t_2) = C(t_1) \times \left(\frac{t_1}{t_2}\right)^P$$

where C(t) = the average concentration during the time interval t, and p = a factor lying between 0.17 and 0.20. When converting from longer time periods to shorter time periods, using p = 0.20 gives the most conservative estimate (i.e. the highest calculated result for time period t_2 given a measured concentration for time period t_1). Using the 'worst case' factor of p = 0.20, the monitoring data reported above has been converted to equivalent 'maximum' 1-hour and 'maximum'24-hour exposure levels.

Results

The location of the NOx monitoring sites are shown in Figure 1 and the details of the NOx results are presented in Table 1 and Figure 2.

Table 1 Actual (laboratory) and recalculated ambient NOx results, NES and MfE guideline.

	Survey at	Site code	NOx(µg/m³) Lab. results	NOx 1/hr (µg/m³) Theoretical max.	NOx 24/hr (µg/m³) Theoretical max.
Petrochemical	McKee PS	AIR007901	1.9	6.5	3.5
		AIR007902	8.1	27.8	14.8
	Turangi PS	AIR007922	3.8	13.1	6.9
		AIR007824	3.3	11.3	6.0
	Kaimiro PS	AIR007817	1.2	4.1	2.2
		AIR007818	4.0	13.8	7.3
	Sidewinder PS	AIR007831	0.8	2.8	1.5
		AIR007832	0.8	2.8	1.5
	Maui PS	AIR008201	1.3	4.5	2.4
		AIR008214	2.4	8.3	4.4
	Kupe PS	AIR007827	2.1	7.2	3.8
		AIR007830	1.4	4.9	2.6
	Kapuni PS	AIR003410	5.9	20.3	10.7
		AIR003411	7.0	24.1	12.7
	Cheal PS	AIR007841	1.5	5.2	2.7
		AIR007842	2.0	6.9	3.6
	Waihapa PS	AIR007815	1.5	5.2	2.7
		AIR007816	2.6	8.9	4.7
	Ballance AUP	AIR003401	4.2	14.4	7.7
		AIR003404	6.9	23.8	12.6
Dairy factory	Fonterra	AIR002410	3.4	11.7	6.2
		AIR002711	4.8	16.5	8.7
		AIR002412	4.3	14.8	7.8
		AIR002413	4.1	14.1	7.5
National Environmental Standard (NES) and MfE guideline				**200 (NES)**	**100 (guideline)**

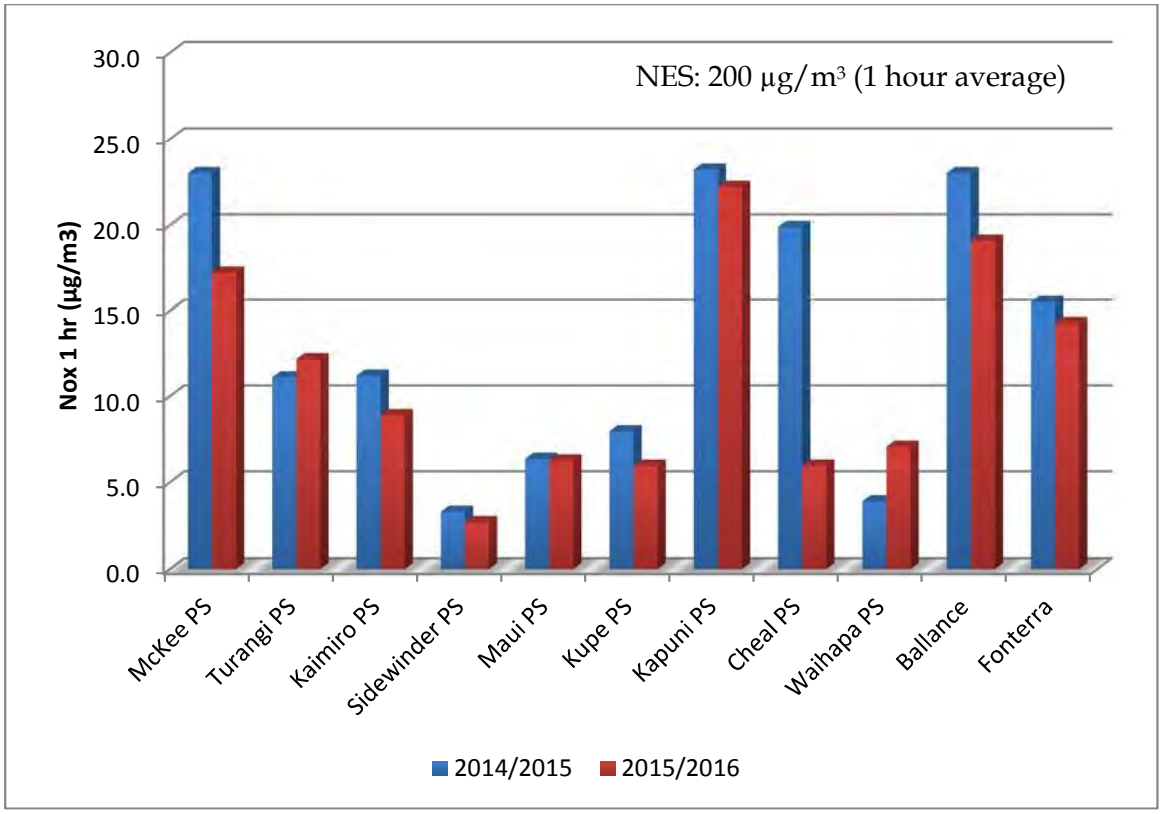

Figure 2 Average NOx levels at 11 surveyed locations throughout the region (year 2014-2016).

Discussion

The calculated 1-hour and 24-hour theoretical maximum concentrations (using a power law exponent of 0.2) ranged from 2.8 µg/m³ to 27.8 µg/m³ and 1.5 µg/m³ to 14.8 µg/m³ respectively. The highest results in 2015-16 monitoring year were obtained from the NOx emitting sites at four different locations:

1. Around the Fonterra's Whareroa co-generation plant.
2. In Kapuni heavy industrial area around the STOS production station and
3. Ballance ammonia/urea plant.
4. And from the sites at McKee production station and power generation plant.

All values were within the National Environmental Standards, Ministry for the Environment Ambient Air Quality Guidelines and the respective resource consents limits. This continues the pattern found in previous years.

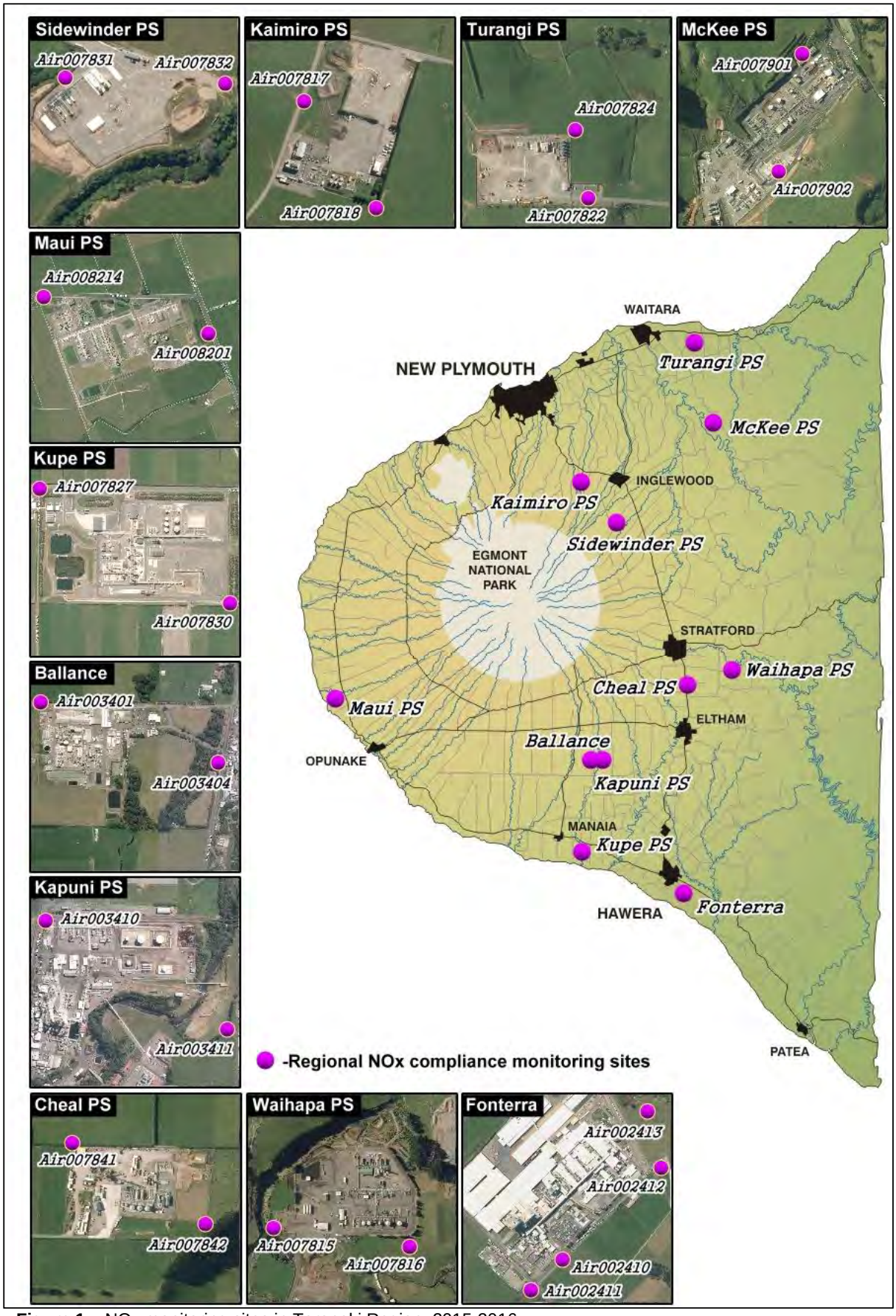

Figure 1 NOx monitoring sites in Taranaki Region, 2015-2016

Ministry for the Environment environmental performance indicator

Ministry for the Environment uses an environmental performance indicator to categorise air quality. These categories are set out in Table 2 and further details of the entire NOx results are set out in Table 3.

Table 2 Environmental Performance Indicator air quality categories

Measured value	Less than 10% of NES	10-33% of NES	33-66% of NES	66-100% of NES	More than 100% of NES
Category	*excellent*	*good*	*acceptable*	*alert*	*action*

Table 3 Categorisation of results (2015-16 monitoring year)

National Environmental Standard for NO2 = 200 µg/m³- 1 hour average.		
Category	**Measured values**	
Excellent	<10% of the NES, (0-20µg/m³)	**20** (83%)
Good	10-33% of the NES, (20-66µg/m³)	**4** (17 %)
Acceptable	33-66% of the NES, (66-132 µg/m³)	**0** (0%)
Alert	66-100% of the NES, (132-200 µg/m³)	**0** (0%)
Total number of samples		**24** (100%)

Conclusion

The monitoring showed that 83% of the 1-hour average results fell into Ministry's 'excellent' categories and 17% of the results lay within Ministry's 'good' category. No results ever entered the 'acceptable' or 'alert' categories, i.e., no results ever exceeded the National Environmental Standard of 200µg/m³.

These results, and all regional monitoring to date, have shown that Taranaki has very clean air, and on a regional basis there are no significant pressures upon the quality of the air resource.

Memorandum

To Job Manager, Callum MacKenzie
From Scientific Officer - Air Quality, Brian Cheyne
File 1722871
Date August 01, 2016

Ambient Gas (PM10, NOx, CO and LEL) Monitoring at Kupe Production Stations during 2015-2016 monitoring year

Introduction

In January 2016 and May 2016 as part of the compliance monitoring programme for the Kupe production station, a survey of ambient air quality sampling was carried out by the Taranaki Regional Council (the Council) in the vicinity of the plant. The main objectives were to measure:

- The concentrations of PM10 using a portable data logging TSI 'DustTrak';
- To measure the concentrations of the nitrogen oxides (NOx) using a passive sampling method, that gives a result for average exposure;
- And to measure carbon monoxide (CO) using a portable multi gas meter that provides instantaneous data throughout the monitoring period.

The findings of this study are presented in this memorandum, together with the locations of the monitoring sites which are provided in Figure 1.

Carbon monoxide (CO) and Lower explosive limit (LEL)

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 42 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases).

Because of the nature of the activities on the site, it was considered that the primary information of interest in respect of gases potentially emitted from the site was the average downwind concentration, rather than any instantaneous peak value. That is, the long-term exposure levels, rather than short-term maxima, are of most interest. The gas meter was therefore set up to create a data set based on recording the average concentration measured during each minute as raw data.

Figure 1 Air monitoring sites at Kupe production station (2015-2016)

The details of the sample run are summarised in Table 1 and the data from the sample run are presented graphically in Figure 2**.**

The consents covering air discharges from the Kupe production station have specific limits related to particular gases. Special condition 17 of consent 6545-1 set a limit on the carbon monoxide concentration at or beyond the production station's boundary. The limit is expressed as 10 mg/m³ for an eight hour average or 30 mg/m³ for a one hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was 0.46 mg/m³ with average concentration for the entire dataset was only 0.23 mg/m³ which comply with consent conditions. This is in line with the pattern found in previous years.

Table 1 Results of carbon monoxide and LEL monitoring at Kupe production station

Period (from-to)		24/05/2016 17:37 to 26/05/2016 11:38
Max	CO(ppm)	0.40
	LEL(%)	0.10
Mean	CO(ppm)	0.20
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

Note: (1) the instrument records in units of ppm. At 25°C, 1 atm.
1ppm CO = 1.145 mg/m^3

(2) See text for explanation of LEL. Because the LEL of methane is equivalent to a mixture of approximately 5% methane in air, then the actual concentration of methane in air can be obtained by dividing the percentage LEL by 20.

LEL gives the percentage of the lower explosive limit, expressed as methane that is detected in the air sampled. The sensor on the instrument reacts to gases and vapours such as acetone, benzene, butane, methane, propane, carbon monoxide, ethanol, and higher alkanes and alkenes, with varying degrees of sensitivity. The Council's Regional Air Quality Plan has a typical requirement that no discharge shall result in dangerous levels of airborne contaminants, including any risk of explosion. At no time did the level of explosive gases downwind of the Kupe production station reach any more than a trivial level.

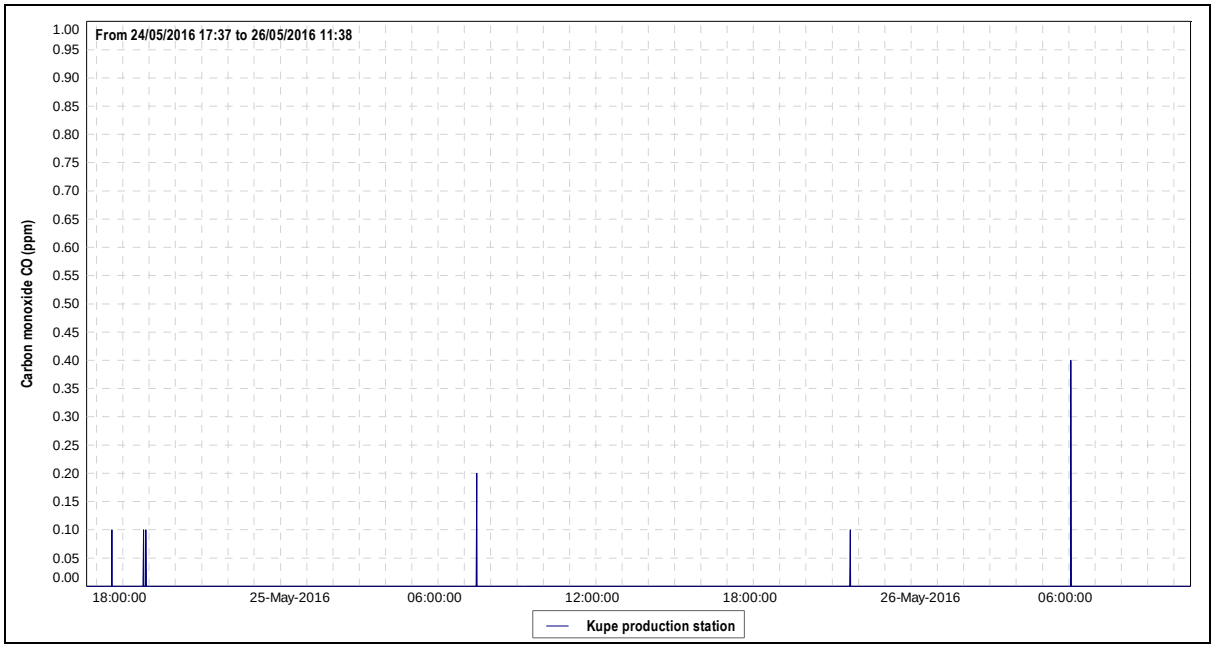

Figure 2 Graph of ambient CO levels in the vicinity of the Kupe Production Station

PM10

In September 2004 the Ministry for the Environment made public National Environmental Standards (NESs) relating to certain air pollutants. The NES for PM10 is 50 µg/m^3 (24-hour average).

Particulates can be derived from many sources, including motor vehicles (particularly diesel), solid and oil-burning processes for industry and power generation, incineration and waste burning, photochemical processes, and natural sources such as pollen, abrasion, and sea spray.

PM10 particles are linked to adverse health effects that arise primarily from the ability of particles of this size to penetrate the defences of the human body and enter deep into the lungs significantly reducing the exchange of gases across the lung walls. Health effects from inhaling PM10 include increased mortality and the aggravation of existing respiratory and cardiovascular conditions such as asthma and chronic pulmonary diseases.

During the reporting period, a "DustTrak" PM10 monitor was deployed on one occasion in the vicinity of the Kupe production station. The deployment lasted approximately 42 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM10 concentrations. The location of the "DustTrak" monitor during the sampling run is shown in Figure 1.

The details of the sample run are presented in Figure 3 and Table 2.

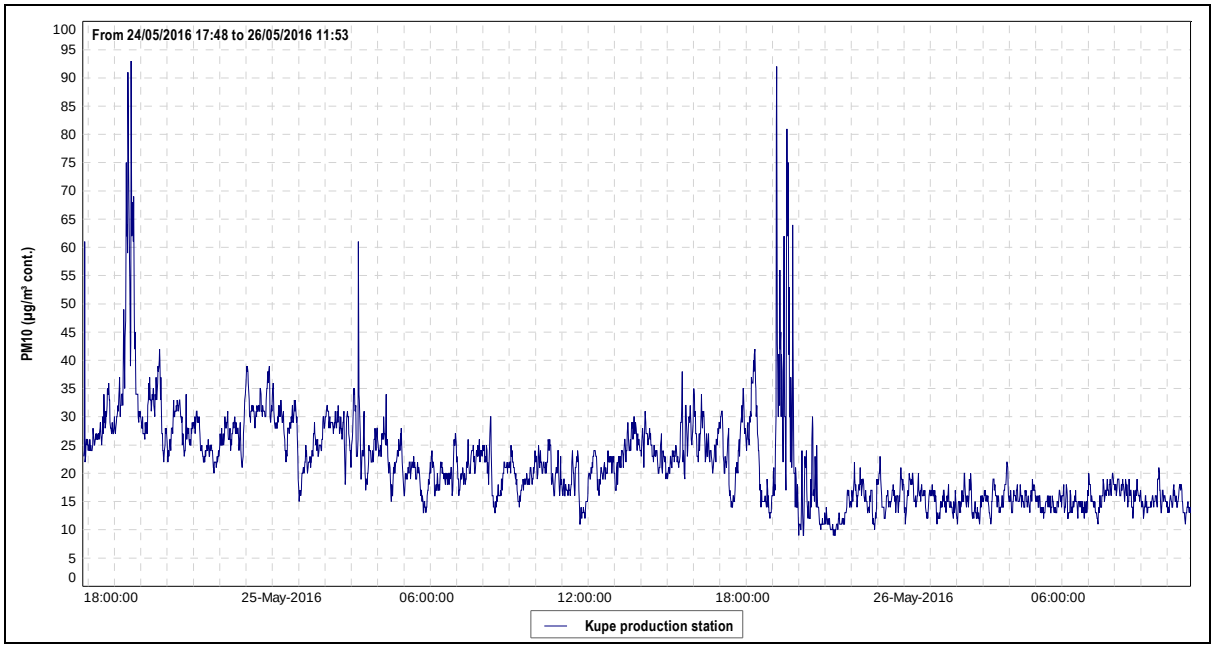

Figure 2 PM10 concentrations (µg/m³) at the Kupe production station (2015-16)

	(42 hours) (24-26/05/2016)	
24 hr. set	Day 1	Day 2
Daily average	25.1 µg/m³	18.3 µg/m³
NES	50µg/m³	

Table 1 Daily mean of PM10 results at Kupe production station

During the 42-hour run, from 24th to 26th of May 2016, the average recorded PM_{10} concentration for the 24 hour period was 25.1µg/m³ and 18.3µg/m³ for the second 24 hour period. These daily means equate to 50.2% and 36.6%, respectively, of the 50 µg/m³ value that is set by the National Environmental Standard.

Background levels of PM_{10} in the region have been found to be typically around 11 µg/m³.

Nitrogen oxides (NOx)

From 2014 onwards, the Council has implemented a coordinated region-wide compliance monitoring programme to measure NOx. The programme involves deploying all measuring devices at 24 NOx monitoring sites (including two sites in the vicinity of the Kupe production station) on the same day, with retrieval three weeks later. This approach assists the Council in further evaluating the effects of local and regional emission sources and ambient air quality in the region.

The complete report covering region-wide NOx monitoring is attached in the Appendix to this memorandum.

The consents covering air discharges from the Kupe production station have specific limits related to particular gases. Special condition 18 of consent 6545-1 set a limit on the nitrogen dioxide concentration at or beyond the production station's boundary. The limit is expressed as 100 µg/m³ for a 24 hour average or 200 µg/m³ for a one hour average exposure.

NOx passive adsorption discs were place at two locations in the vicinity of the Kupe production station on one occasion during the year under review. The discs were left in place for a period of 21 days.

The calculated 1-hour and 24-hour theoretical maximum NOx concentrations found at the Kupe production station during the year under review equates to 6.02µg/m³ and 3.19µg/m³ respectively. The results show that the ambient ground level concentration of NO_x is well below the limits set out by consent 6545-1.