

Origin Energy Resources (Kupe) Limited
Kupe Production Station
Monitoring Programme
Annual Report
2009-2010
Technical Report 2010-27

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Executive summary

Origin Energy Resources Limited operates a gas production station located on Inaha Road at Manaia, in the Inaha catchment. This report for the period July 2009-June 2010 describes the monitoring programme implemented by the Taranaki Regional Council to assess the Company's environmental performance during the period under review, and the results and environmental effects of the Company's activities.

The Company holds a total of 13 resource consents, which include a total of 147 conditions setting out the requirements that the Company must satisfy. The Company holds five consents to allow it to take and use water, two consents to discharge stormwater and produced water, four consents to allow disturbance and occupation of the seabed and the erection of pipelines and two consents to discharge emissions into the air at this site.

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

Inspections of the site found the production station to be tidy and well managed throughout the monitoring period. Results of water and air monitoring were within limits prescribed by consent conditions.

During the year, the Company demonstrated a good level of environmental performance and compliance with the resource consents. During the year under review there were no unauthorised incidents at the Kupe Production Station site.

This report includes recommendations for the 2010-2011 year.

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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 the Annual Report for the period June 2009-June 2010 by the Taranaki Regional Council on the monitoring programme associated with resource consents held by Origin Energy Resources (Kupe) Limited (Origin Energy). The Company operates a gas production station situated on Inaha Road at Manaia, in the Inaha catchment, South Taranaki.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Origin Energy that relate to abstraction and discharge of water within the Inaha catchment, and the air discharge permit held by Origin Energy to cover emissions to air from the site.

One of the intents of the Resource Management Act (1991) 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 Taranaki Regional Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of Origin Energy's use of water, land, and air, and is the first combined annual report by the Taranaki Regional Council for the Company's Kupe facility in its operational phase.

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about compliance monitoring under the Resource Management Act and the Council's obligations and general approach to monitoring sites through annual programmes, the resource consents held by Origin Energy 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 Company's site.

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

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

Section 4 presents recommendations to be implemented in the 2010-2011 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 Resource Management Act 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 a discharger, and may include cultural and socio-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 (eg, recreational, cultural, or aesthetic);
- (e) risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Taranaki Regional Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each discharge source. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the Resource Management Act to assess the effects of the exercise of consents. In accordance with section 35 of the Resource Management Act 1991, the Council undertakes compliance monitoring for consents and rules in regional plans; and maintains an overview of performance of resource users against regional plans and consents. Compliance monitoring, (covering both activity and impact) monitoring, also enables the Council to continuously assess its own performance in resource management as well as that of resource users particularly consent holders. It further 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 performance

Besides discussing the various details of the performance and extent of compliance by the Company during the period under review, this report also assigns an overall rating. The categories used by the Council, and their interpretation, are as follows:

- a **high** level of environmental performance and compliance indicates that essentially there were no adverse environmental effects to be concerned about, and no, or trivial (such as data supplied after a deadline) non-compliance with conditions.
- a **good** level of environmental performance and compliance indicates that adverse environmental effects of activities during the year were negligible or minor at most, items of concern were resolved positively, co-operatively, and quickly, the Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices, there were perhaps some items noted on inspection notices for attention but these items were not urgent nor critical, and follow-up inspections showed they have been dealt with.
- **improvement desirable** indicates that the Council may have been obliged to record against the consent holder a verified unauthorised incident involving

significant environmental impacts, and/or abatement notices may have been issued; there were adverse environmental effects arising from activities and intervention by Council staff was required, and there were matters that required urgent intervention, took some time to resolve, or remained unresolved at end of the period under review.

- **poor** performance is used when there were grounds for prosecution or infringement notice.

1.2 Process description

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 30km 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.



Figure 1 Location of Kupe Gas Project

(source: <http://www.originenergy.com.au/1222/Kupe-Gas-Project>)

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.

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 and a power cable transfer chemicals, power and fibre optic 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.

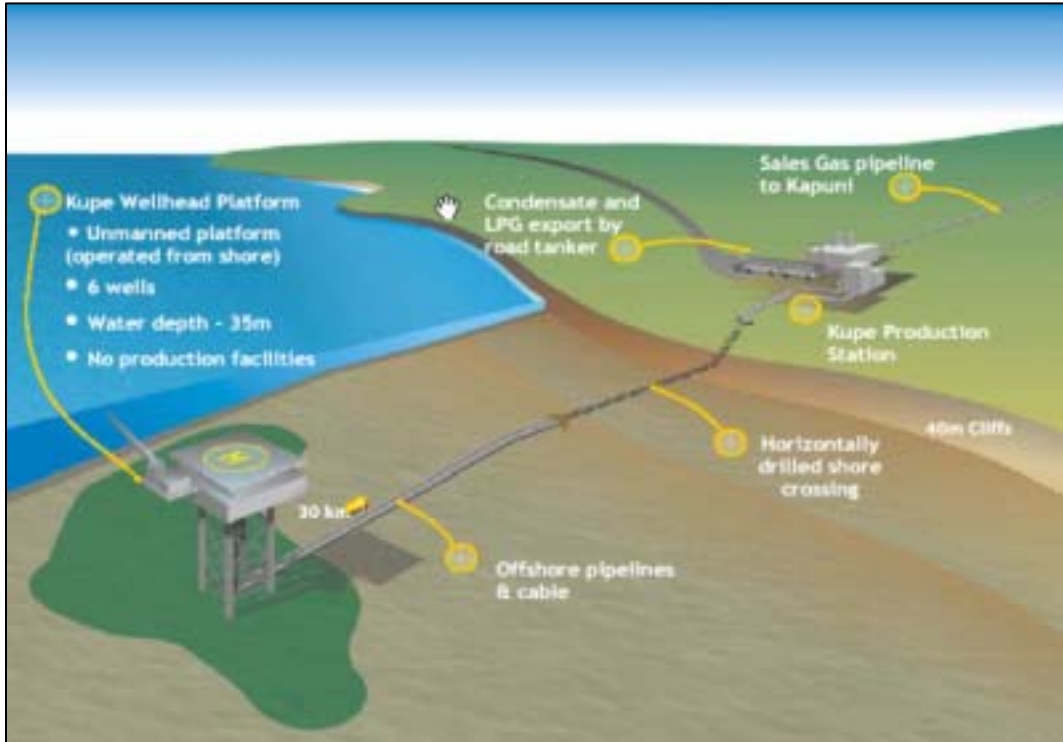


Figure 2 Components of Kupe Gas Project
 (source: <http://www.originenergy.com.au/1222/Kupe-Gas-Project>)

The production station is located at the southern end of Inaha Road, occupying roughly 19 hectares of land. It processes the raw gas and light oil from the Kupe Field to meet sale specifications. The production station contains 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.

1.3 Resource consents

1.3.1 Water abstraction permit

Section 14 of the Resource Management Act 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 **6539-1** to take and use water from the Inaha Stream for pipeline hydrotesting purposes. This permit was issued by the Taranaki Regional Council on 21 June 2005 under Section 87(d) of the Resource Management Act. It is due to expire on 1 June 2023.

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 notify Council prior to exercise of the consent.

Conditions 3 to 5 deal with the rate of abstraction and recording.

Condition 6 states that the intake structure be screened.

Conditions 7 and 8 deal with lapse and review of the consent.

Origin Energy holds water permit **6540-1** to take and use groundwater from a bore for construction and operation purposes at the horizontal directional drilling site and production station. This permit was issued by the Taranaki Regional Council on 21 June 2005 under Section 87(d) of the Resource Management Act. It is due to expire on 1 June 2039.

There are nine special conditions attached to the consent.

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

Conditions 2 and 3 require that Council is notified prior to the exercise of the consent and the results of a pump test are also supplied.

Conditions 4 and 5 put limits on the abstraction volume and rate.

Condition 6 states that the abstraction should not cause the intrusion of salt water into any freshwater aquifer.

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

Conditions 8 and 9 deal with lapse and review of consent.

Origin Energy holds water permit **6541-1** to take and use groundwater from a bore for pipeline hydrotesting purposes. This permit was issued by the Taranaki Regional Council on 21 June 2005 under Section 87(d) of the Resource Management Act. It is due to expire on 1 June 2023.

The nine special conditions attached to the consent are the same as those attached to **6540** (above).

Origin Energy holds water permit **6679-1** 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 Taranaki Regional Council on 1 November 2006 under Section 87(d) of the Resource Management Act. 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 deal with decommissioning of the bores.

Conditions 7 and 8 deal with lapse and review of consent.

Copies of these permits are attached to this report in Appendix I.

1.3.2 Water discharge permits

Section 15(1)(a) of the Resource Management Act 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 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. It is due to expire on 1 June 2039. Changes to the conditions of the consent were made on 14 December 2006.

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.

Conditions 3 and 4 requires the consent holder to notify the Council and provide site specific details relating to contingency planning prior to the exercise of the consent.

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

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

Condition 7 requires that hazardous substances are banded.

Condition 8 gives limits of various contaminants not to be exceeded in the discharge, while condition 9 deals with effects below the mixing zone.

Conditions 10 and 11 deal with lapse and review of consent.

Origin Energy holds water discharge permit **6544-1** to discharge produced water from hydrocarbon production operations by deepwell injection at the Kupe Production Station site. This permit was issued by the Taranaki Regional Council on 21 June 2005 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2039.

There are nine special conditions attached to the consent.

Condition 1 requires that the consent be exercised in accordance with the application, while condition 2 requires that the consent holder adopt the best practicable option to minimise environmental effects.

Condition 3 requires that the consent holder supply a report relating to each well used for deepwell injection.

Condition 4 states that the injection does not contaminate any freshwater aquifer.

Condition 5 requires that records be kept of the nature and amounts of all material injected.

Condition 6 states that fluids shall be injected below the pressure which would be required to fracture the injection formation.

Condition 7 requires the consent holder to provide a report in May each year on the matters required under conditions 3, 4, 5 and 6.

Condition 8 is a lapse of consent condition – this timeframe was extended in June 2010.

Condition 9 deals with expiry of the consent.

Origin Energy holds water discharge permit **7010-1** 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 horizontal directional drilling, pipeline hydro-testing and production station operation purposes. This permit was issued by the Taranaki Regional Council on 2 November 2006 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2039. Changes to the conditions of the consent were made on 25 July 2007.

There are 12 special conditions attached to the consent.

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

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 deal with 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 deal with monitoring.

Conditions 11 and 12 deal with lapse and review of consent.

Copies of the permits are attached to this report in Appendix I.

1.3.3 Coastal permits

Section 12(1)(b) of the Resource Management Act 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 four pipelines and one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring. Consent **6531** is a restricted coastal activity (RCA) 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 to the seabed is minimised, while condition 8 requires that this disturbance be contained within a 100 m wide disturbance corridor.

Condition 9 states that the disturbance 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 deal with lapse and review of the consent.

Origin Energy holds consent **6532-1** to erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area up to four 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. Consent **6532** is a restricted coastal activity (RCA) 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 work associated with the structure 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 deal with lapse and review of consent.

Origin Energy 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** is a restricted coastal activity (RCA) 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, while 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 deal with lapse and review of the consent.

Origin Energy hold consent **6629-1** to erect, place, 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 Taranaki Regional Council on 28 October 2005 under Section 87(e) of the Resource Management Act. It is due to expire in June 2039.

The conditions of **6629** are the same as those attached to **6532** (above).

Copies of the permits are attached to this report in Appendix I.

1.3.4 Air discharge permits

Section 15(1)(c) of the Resource Management Act 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 Taranaki Regional Council on 21 June 2005 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2039. Changes to the consent conditions were granted in April 2007.

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 minimise environmental effects, while 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 deal with 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 deal with lapse and review of the consent.

Origin Energy 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 Taranaki Regional Council on 21 June 2005 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2039.

There are 17 special conditions attached to the consent. These are similar to consent **6545** above.

Copies of the permits are attached to this report in Appendix I.

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the Resource Management Act sets out obligation/s upon the Taranaki Regional Council to gather information, monitor, and conduct research on the exercise of resource consents, and the effects arising, within the Taranaki region and report upon these.

The Taranaki Regional 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 six primary components.

1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Taranaki Regional 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, or new consents, advice on the Council's environmental management strategies and the content of regional plans, and consultation on associated matters.

1.4.3 Site inspections

The Kupe Production Station site 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 consent holder 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

1.4.4.1 Water

Discharge from the site was sampled on one occasion, and the sample was analysed for hydrocarbons, pH, suspended solids, chloride, BOD and conductivity.

1.4.4.2 Air

The Council undertook sampling of the emissions of ammonia, carbon monoxide, combustible gases, PM₁₀, nitrogen and sulphur oxides from the site on two occasions – during commissioning and once production was underway.

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 treated stormwater from the site has had significant adverse effects on aquatic life.

1.4.6 Subtidal ecology

The consent holder was required to undertake post-lay monitoring surveys of the pipeline corridor, immediately after laying the offshore pipelines and approximately one year later, with results to be provided to the Council. A pre-lay survey was undertaken in June 2004. The pipeline was laid in January/February 2008, an initial post-lay remotely operated vehicle (ROV) survey was undertaken in March 2008, then an as-built post-lay ROV survey was done in January 2009.

In addition to the ROV surveys post-lay surveys, Cawthron have been engaged to undertake a post-lay ecological survey. However, this survey was not able to be completed in 2009-10 due to boat availability, weather issues etc. It is scheduled to occur in April 2011, when an appropriate weather window is available. A final report will then be provided to Council.

1.4.7 Data review

Origin are required to provide various data to the Council as part of consent conditions. This includes: contingency plans, records of water abstraction, an air discharge report, and a deepwell injection report (if the consent is exercised).

The Council may also request various forms of data from Origin, such as an analysis of the gas/condensate stream, and management plans.

2. Results

2.1 Water

2.1.1 Inspections

The site was visited on six occasions during the monitoring period. These visits are described in more detail below.

27 November 2009

The construction phase was basically complete and commissioning had started. Discharge pumps from the pond system had been tested. Sampling points for the discharge were discussed with Origin Energy staff, and grab sampling from the pond was considered to be the best option. There were no issues with dust observed during the inspection, and the new area being set up west of the production station for temporary site offices was being managed well. The emergency flare pilot was in operation.

10 December 2009

The new area to the west of the production station was inspected from offsite. There were no visible dust emissions observed. Gravel areas appeared very dry and machinery was working at the time of inspection. The consent holder was asked to ensure that dust suppression was used as required.

9 February 2010

The ring drains, skimmer pits, and bunded areas were all in good order. The flare was satisfactory. There was slight discolouration in the stormwater system, however the ponds were not discharging.

22 April 2010

The site was neat and tidy and there were no objectionable odours from the processing areas, or from flaring operations.

21 June 2010

The site was inspected during and following a period of sustained rainfall over the previous few weeks. The ring drains were clear and all water was being conveyed to the separation system by the wetland. There was no evidence of any contamination in water. A sample of the discharge was collected from the fire water discharge point. As notified by Origin Energy, additional flaring was being undertaken at the time of inspection - this was not resulting in off site odours or smoke. The site was neat and tidy - all bunds were secure and there was no evidence of any contaminants within these bunds.

29 June 2010

Significant and prolonged rainfall had occurred over the weeks prior to the inspection, however there were no adverse effects observed in the receiving water. Flaring was minimal – there were no odours or smoke and no off site effects were evident. The site was neat and tidy, and all bunds and storage areas were secure.

2.1.2 Results of discharge monitoring

The discharge from the site (fire water) was collected and analysed on one occasion during the period under review. The results are presented in Table 1 below.

Table 1 Results of sample from fire water discharge

Parameter	Units	21 June 2010	Consent limits (6543)
BOD	g/m ³	1.2	-
Chloride	g/m ³	8.0	50
Conductivity	mS/m	6.2	-
Hydrocarbons	g/m ³	<0.5	15
Suspended solids	g/m ³	<2	100
pH		7.4	6.0 – 9.0

Levels of chloride, hydrocarbons, and suspended solids were below those prescribed by condition 8 of consent 6543. pH was within the required range.

2.1.3 Results of receiving environment monitoring

The Council's standard 'kick-sampling' technique was used at three newly established sites on two occasions (late spring and later summer) 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.

Both macroinvertebrate surveys indicated that a previous discharge of treated stormwater from the Kupe Production Station had not had any recent detrimental effect on the macroinvertebrate communities of the Kapuni Stream. No significant changes in the macroinvertebrate communities were recorded in either survey between the upstream 'control' site and the two sites downstream of the discharge.

The macroinvertebrate communities of the stream contained significant proportions of 'sensitive' taxa and these communities were numerically dominated by 'sensitive' taxa resulting in relatively high SQMCI_s values for the lower reaches of a ringplain stream near the coast.

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

2.2 Air

Air quality monitoring was carried out initially prior to and during commissioning to obtain baseline data, and on a second occasion during production. Monitoring consisted of video analysis, continual measurements of gas concentration for ammonia, carbon monoxide and combustible gases (QRae device), PM₁₀ (DustTrak device) and nitrogen and sulphur oxides (NO_x and SO_x absorption discs). Further explanation of all air quality monitoring can be found in Appendix III.



Figure 3 Air quality monitoring sites at the Kupe Production Station

2.2.1 Visible emissions

During commissioning in December 2009, a video camera and time-lapse digital video recorder were set up to monitor any visible emissions, to record the movement and dispersion of smoke plumes and to record the duration of such events. The video equipment was placed in "Kupe House" owned by Origin Energy, approximately 250m to the east of Kupe flaring stack.

On several occasions a conspicuous plume of black smoke was observed. From analysis of the video record, it appears that the plume would have passed beyond the boundary of the site as a visible plume, before dispersion by wind (see Photograph 1 for a representative view). Condition 11 of consent 6546 requires that the plume should not be offensive, obnoxious, or objectionable beyond the boundary. Being essentially subjective conditions, the fact that the plume was visible does not necessarily constitute a breach of the condition. The Council did not receive any complaint, and taking into account the strong offshore wind during the monitoring period, any potential for a direct impingement of the plume to have an environmental impact would have been minimal.



Photograph 1 Flaring and smoke emission at Kupe Production Station during production testing

2.2.2 Carbon monoxide (CO)

Special condition 13 of consent 6546 sets a limit on the carbon monoxide concentration at or beyond the production station’s boundary of 10 mg/m³ for an eight hour average, or 30 mg/m³ for a 1 hour average exposure.

Table 2 Summary of carbon monoxide monitoring results at Kupe production station

Date	unit	Max	Mean	Min
June 2009	ppm	0.3	0.0	0.0
May 2010		9.2	0.1	0.0

Note: the instrument records in units of ppm. At 15°C
 1ppm CO = 0.85 mg/m³

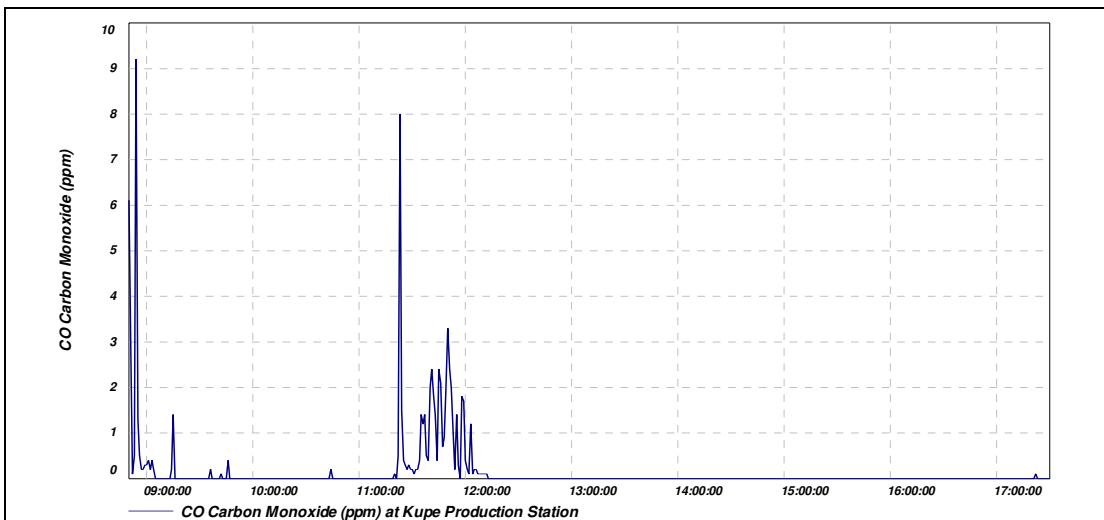


Figure 4 Carbon monoxide levels in the vicinity of the Kupe Production Station (May 2010)

The maximum concentration of carbon monoxide found during the monitoring run undertaken prior to start-up was less than 1.0 mg/m³. The maximum concentration of carbon monoxide found during production was 9.2 mg/m³ (Figure 4, Table 2), which complies with the consent condition. This short term spike may be caused by traffic movement as the monitor was located adjacent to the site entrance.

2.2.3 Lower Explosive Limit (LEL)

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 a dangerous level 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 (Table 3).

Table 3 Summary of Lower Explosive Limit monitoring results at Kupe production station

	unit	Max	Mean	Min
June 2009	%	0.1	0.0	0.0
May 2010		0.1	0.0	0.0

2.2.4 PM₁₀ monitoring

In September 2004 the Ministry for the Environment promulgated the National Environmental Standards (NES) relating to certain air pollutants. The (NES) for PM₁₀ is 50 µg/m³ (24-hour average).

During the reporting period, a "DustTrak" PM₁₀ monitor was deployed on two occasions in the vicinity of the plant. The deployments lasted approximately forty hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM₁₀ concentrations as shown in Figures 5 and 6.

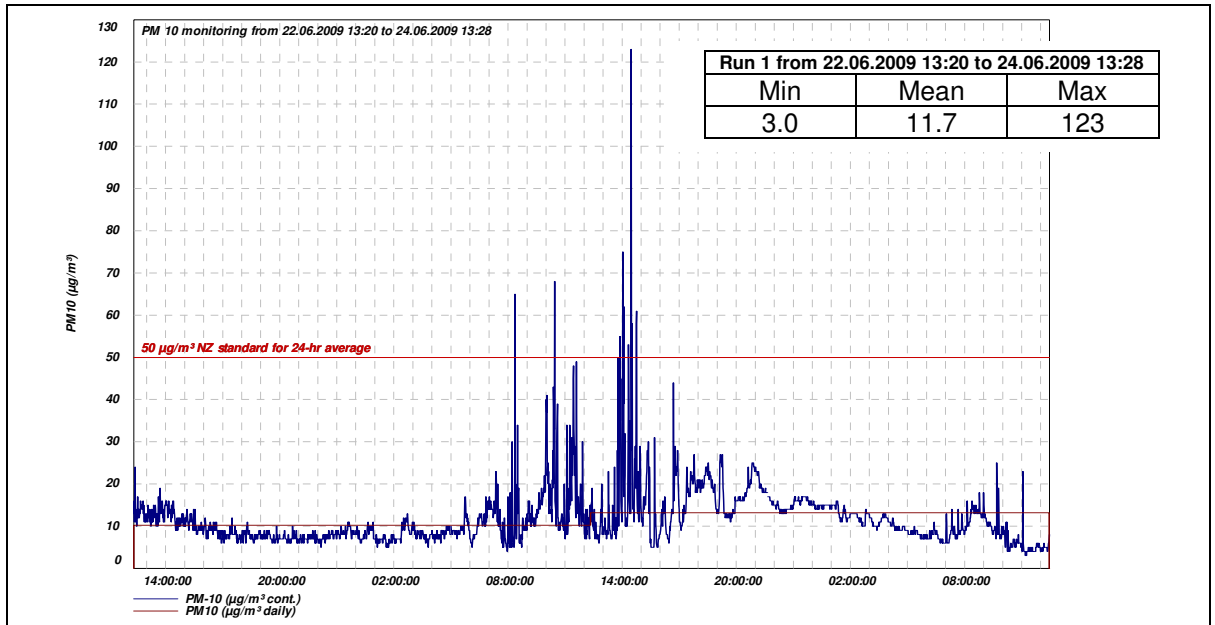


Figure 5 PM₁₀ concentration ($\mu\text{g}/\text{m}^3$) at the Kupe Production Station

The average recorded PM₁₀ concentration prior to start up was $11.7 \mu\text{g}/\text{m}^3$ ($10.3 \mu\text{g}/\text{m}^3$ and $13.2 \mu\text{g}/\text{m}^3$ daily concentrations respectively). This equates to 23% of the National Environmental Standard for a 24-hour period of $50 \mu\text{g}/\text{m}^3$. The maximum recorded PM₁₀ concentration over the entire monitoring period was $123 \mu\text{g}/\text{m}^3$.

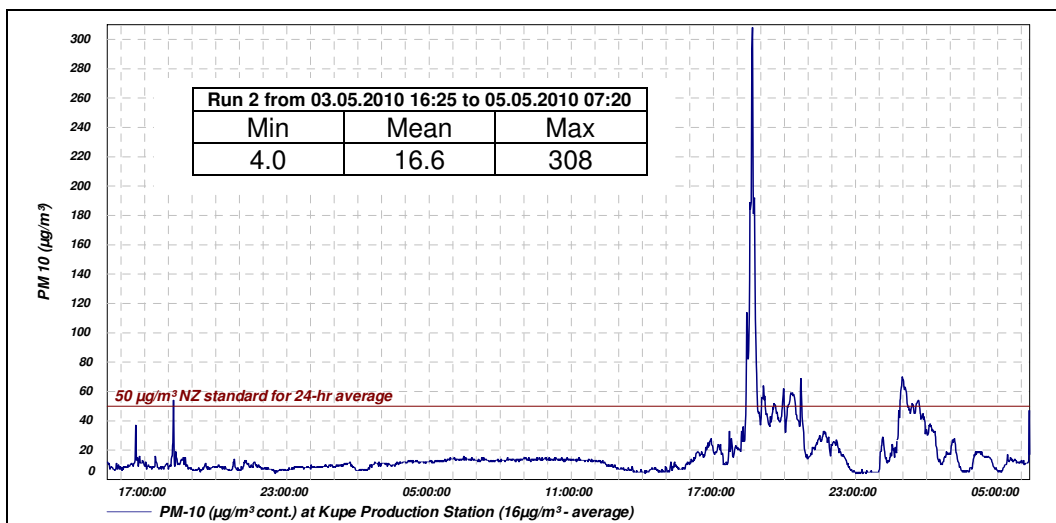


Figure 6 PM₁₀ concentration ($\mu\text{g}/\text{m}^3$) at the Kupe Production Station

The second survey, carried out in May 2010 during production, found an average recorded PM₁₀ concentration was $16.6 \mu\text{g}/\text{m}^3$. This equates to 33% of the National Environmental Standard for a 24-hour period of $50 \mu\text{g}/\text{m}^3$. The maximum recorded PM₁₀ concentration recorded was $308 \mu\text{g}/\text{m}^3$. This short term spike may be caused by traffic movement as the monitor was located adjacent to the site entrance.

Background levels of PM₁₀ in the region have been found to be around $11 \mu\text{g}/\text{m}^3$.

2.2.5 Nitrogen (NO_x) and sulphur (SO_x) oxides monitoring

Special conditions 14 of consent 6546 set limits for NO_x at or beyond the boundary of the site of 100 µg/m³ of air as a 24-hour average exposure.

There are no specific limits related to SO_x discharges. The National Environmental Standards (NES) for SO_x is 350µg/m³ averaged over a 1 hour exposure. The Ministry for the Environment's air quality guideline for sulphur dioxide (based on health protection) are also 350µg/m³ averaged over a 1 hour exposure and 120µg/m³ averaged over a 24 hour exposure period.

Table 4 presents the actual levels found and theoretical maximum daily concentration of SO_x and NO_x.

The calculated 24-hour average concentrations during the initial survey (prior to start-up) ranged from 0.74 µg/m³ to 1.36 µg/m³ for sulphur dioxide and 7.31 µg/m³ to 10.3 µg/m³ for oxides of nitrogen dioxide. 24-hour average concentrations measured during production ranged from 0.69 µg/m³ to 1.51 µg/m³ for SO_x, and 7.00 µg/m³ to 10.2 µg/m³ for NO_x. These values were all within the New Zealand Ambient Air Quality Guidelines and below the consent limit of 120 and 100 µg/m³ respectively. Essentially there were no differences in ambient nitrogen and sulphur oxides following start- up of the plant.

Table 4 Ambient SO_x and NO_x results from around the Kupe Production Station

Site	SO _x µg/m ³		SO _x - 24 hour average µg/m ³ *		NO _x µg/m ³		NO _x - 24 hour average µg/m ³ *	
	1	2	1	2	1	2	1	2
Run								
AIR007827	0.48	0.35	0.91	0.69	5.44	5.18	10.3	10.2
AIR007828	0.72	0.77	1.36	1.51	3.96	3.57	7.48	7.00
AIR007829	0.39	0.69	0.74	1.35	3.87	4.44	7.31	8.70
AIR007830	0.69	0.65	1.30	1.27	4.77	4.13	9.01	8.09
Limits			120 (MfE guideline)				100 (Consent)	

* theoretical maximum

Run 1 = 22 June to 16 July 2009 (pre-start up), Run 2 = 3 May to 1 July 2010

2.3 Data review

Water abstraction data was received from the Company.

The annual flaring report required by consents 6545 and 6546 was received.

Up-to-date contingency plans, as required by consents 6531, 6532, 6537, 6543 and 6629, were received from the Company in August 2010 and approved.

A deepwell injection report was not required as the consent was not exercised.

2.4 Register of incidents

The Taranaki Regional 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 Unauthorised Incident Register (UIR) includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

Incidents may be alleged to be associated with a particular site. If there is 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 2009-2010 monitoring period, there were no incidents recorded by the Council that were associated with Origin Energy at the Kupe Production Station.

3. Discussion

3.1 Discussion of site performance

The site was found to be tidy and well managed during inspections. No dust, smoke or odours were observed beyond the site boundary.

Contingency plans for the site were up-to-date.

3.2 Environmental effects of exercise of consents

Results of discharges from the site were within the levels prescribed by consent conditions.

Monitoring of the Kapuni Stream did not indicate any adverse effects from the activities carried out at the production station.

Levels of air emissions of interest were all measured at levels well below MfE guideline or Council consent levels.

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 5-17.

Table 5 Summary of performance for Consent 6531-1 to disturb the foreshore and seabed to lay pipelines

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application		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		Yes
5. Contingency plan to be provided	Received and accepted August 2010	Yes
6. BPO to prevent or minimise adverse effects		Yes
7. Seabed disturbance to be minimised		Yes
8. Disturbance to be within a 100 m corridor		Yes
9. Disturbance to comply with noise standards		Yes
10. Work to cease on discovery of archaeological remains		N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
11. Consent holder to undertake pre and post lay monitoring surveys	Pre-lay survey complete, post-lay survey scheduled during April 2011	Yes
12. Lapse of consent		N/A
13. Optional review provision re environmental effects	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good

N/A = not applicable

Table 6 Summary of performance for Consent 6532-1 to erect up to four pipelines

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application		Yes
2. Pipe laying management plan to be provided	Provided February 2007	Yes
3. Programme of installation to be provided		Yes
4. Notification prior to maintenance work		Yes
5. Contingency plan to be provided	Received and accepted August 2010	Yes
6. BPO to prevent or minimise adverse effects		Yes
7. Disturbance to comply with noise standards		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	Pre-lay survey complete, post-lay survey scheduled during April 2011	Yes
10. Structures to be removed and area reinstated if and when no longer required		N/A
11. Lapse of consent		N/A
12. Optional review provision re environmental effects	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good

N/A = not applicable

Table 7 Summary of performance for Consent 6533-1 to occupy the coastal marine area

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application		Yes
2. Public access to be maintained		Yes
3. Notification prior to works involving restriction of public access		Yes
4. Consent holder to survey and map position of the structure	Provided by consent holder	Yes
5. Lapse of consent		N/A
6. Optional review provision re environmental effects	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

N/A = not applicable

Table 8 Summary of performance for Consent 6539-1 to take water from the Inaha Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Consent not exercised	N/A
2. Notification prior to exercise of consent	Consent not exercised	N/A
3. Volume not to exceed 2500m ³ , at a rate of 40 l/s	Consent not exercised	N/A
4. Abstraction to cease when flow is equal to or less than 240 l/s	Consent not exercised	N/A
5. Consent holder to maintain a record of abstraction	Consent not exercised	N/A
6. Intake structure to be properly screened	Consent not exercised	N/A
7. Lapse of consent		N/A
8. Optional review provision re environmental effects	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A

N/A = not applicable

Table 9 Summary of performance for Consent 6540-1 to take groundwater from a bore for construction and operational purposes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Consent not exercised	N/A
2. Notification prior to exercise of consent	Consent not exercised	N/A
3. Results of pump test to be provided prior to exercise of consent	Consent not exercised	N/A
4. Volume extracted not to exceed 200m ³ /day or 5 l/s	Consent not exercised	N/A
5. Abstraction not to cause more than 10% lowering of static water level	Consent not exercised	N/A
6. Abstraction not to cause intrusion of saltwater	Consent not exercised	N/A
7. Consent holder to maintain records of abstraction	Consent not exercised	N/A
8. Lapse of consent		N/A
9. Optional review provision re environmental effects	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A

N/A = not applicable

Table 10 Summary of performance for Consent 6541-1 to take groundwater from a bore for hydrotesting purposes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Consent not exercised	N/A
2. Notification prior to exercise of consent	Consent not exercised	N/A
3. Results of pump test to be provided prior to exercise of consent	Consent not exercised	N/A
4. Volume extracted not to exceed 200m ³ /day or 5 l/s	Consent not exercised	N/A
5. Abstraction not to cause more than 10% lowering of static water level	Consent not exercised	N/A
6. Abstraction not to cause intrusion of saltwater	Consent not exercised	N/A
7. Consent holder to maintain records of abstraction	Consent not exercised	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
8. Lapse of consent		N/A
9. Optional review provision re environmental effects	Next scheduled in June 2011 recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A

N/A = not applicable

Table 11 Summary of performance for Consent 6543-1 to discharge pipeline hydrotesting water and treated stormwater

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application		Yes
2. Plans of stormwater catchment and drainage pathways to be provided on completion of site	Received	Yes
3. Notification prior to exercise of consent	Received	Yes
4. Consent holder to provide site specific details relating to contingency planning	Received and accepted August 2010	Yes
5. Consent holder to adopt BPO	Site inspections	Yes
6. All discharges to be treated through stormwater treatment system	Site inspections	Yes
7. All hazardous substance storage areas to be bunded	Site inspections	Yes
8. Limits on contaminants in discharge	Sample collected	Yes
9. Effects in receiving water	Site inspections, samples and biomonitoring	Yes
10. Lapse of consent		N/A
11. Optional review provision re environmental effects	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

N/A = not applicable

Table 12 Summary of performance for Consent 6544-1 to discharge produced water via deepwell injection

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Consent not exercised	N/A
2. Consent holder to adopt BPO	Consent not exercised	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. Consent holder to supply well data prior to exercise	Consent not exercised	N/A
4. No contamination of any freshwater aquifers	Consent not exercised	N/A
5. Consent holder to keep records of the nature and amounts injected	Consent not exercised	N/A
6. Injection of fluids to be below the pressure required to fracture the injection formation	Consent not exercised	N/A
7. Consent holder to supply Council with written report in May each year on matters required under conditions 3,4,5 and 6	Consent not exercised	N/A
8. Lapse of consent		N/A
9. Review of consent	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A

Table 13 Summary of performance for Consent 6545-1 to discharge emissions to air

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Site inspections	Yes
2. Consent holder to adopt BPO	Site inspections	Yes
3. Most appropriate process equipment to minimise emissions	Site inspections	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 2010	Yes
6. Consent holder to consult with Council prior to significantly altering equipment or processes		N/A
7. Consent holder to provide a final site layout prior to commencement of production	Received	Yes
8. Notification to neighbours prior to commissioning	Letter sent by Origin Energy in October 2009	Yes
9. Notification of incidents	No incidents reported	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
10. Consent holder to supply record of all smoke emitting incidents upon request	Not requested during period under review	N/A
11. Consent holder to maintain a log of all continuous flaring incidents	Report provided	Yes
12. All practicable steps undertaken to minimise flaring	Site inspections	Yes
13. Prevention of dense black smoke from being discharged from flare	Site inspections	Yes
14. Consent holder to notify Council of continuous flaring	Received	Yes
15. Discharge not to give rise to odour, dust or smoke beyond the boundary	Site inspections	Yes
16. Discharge not to give rise to hazardous, toxic or noxious contaminant beyond the boundary	Site inspections	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		N/A
21. Optional review of consent	Next scheduled in June 2011 recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good

Table 14 Summary of performance for Consent 6546-1 to discharge emissions to air

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Site inspections	Yes
2. Consent holder to adopt BPO	Site inspections	Yes
3. Most appropriate process equipment to minimise emissions	Site inspections	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 2010	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
6. Consent holder to consult with Council prior to significantly altering equipment or processes		Yes
7. Consent holder to provide a final site layout prior to commencement of production		Yes
8. Notification of incidents	No incidents reported	Yes
9. Consent holder to supply record of all smoke emitting incidents upon request	Not requested during period under review	N/A
10. Discharge not to give rise to dangerous levels of contaminants at or beyond boundary	Air quality monitoring	Yes
11. Discharge not to give rise to odour, dust or smoke beyond the boundary	Air quality monitoring and inspections	Some smoke observed beyond boundary
12. Discharge not to give rise to hazardous, toxic or noxious contaminant beyond the boundary	Air quality monitoring	Yes
13. Limits on carbon monoxide in the discharge	Air quality monitoring	Yes
14. Limits on nitrogen dioxide in discharge	Air quality monitoring	Yes
15. Limits on other contaminants	Air quality monitoring	Yes
16. Lapse of consent		N/A
17. Optional review of consent	Next scheduled in June 2011, if required	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good

Table 15 Summary of performance for Consent 6629-1 to place a cable on the seabed

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application		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	No maintenance work during period under review	N/A
5. Contingency plan to be provided	Received and accepted August 2010	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
6. BPO to prevent or minimise adverse effects		Yes
7. Works to comply with noise standards		Yes
8. Consent holder to survey and map position of structures	Provided by consent holder	Yes
9. Pre-lay and post-lay monitoring surveys of pipeline corridor	Pre-lay survey complete, post-lay survey scheduled during April 2011	Yes
10. Structures removed and area reinstated when no longer required		N/A
11. Lapse of consent		N/A
12. Review of consent	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good

Table 16 Summary of performance for Consent 6979-1 to install seven water bores

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application		Yes
2. Consent holder to supply bore completion log	Provided in 2007	Yes
3. Bores to be cased and sealed	Site inspections	Yes
4. Consent holder to mitigate any adverse environmental effects		Yes
5. Consent holder to decommission bores when no longer required		N/A
6. Written notification of decommission	Provided in 2007	Yes
7. Lapse of consent		N/A
8. Review of consent	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

Table 17 Summary of performance for Consent 7010-1 to take and use groundwater

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application		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	Maximum daily volume possible with current pump is 1,383 m ³	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	Not monitored during period under review	N/A
7. Consent holder to maintain daily records of abstraction	Provided by consent holder	Yes
8. Consent holder to install groundwater monitoring piezometers		Yes
9. Consent holder to install a water meter	Installed in 2007	Yes
10. Consent subject to monitoring by Council	Not monitored during period under review	N/A
11. Lapse of consent		N/A
12. Review of consent	Next scheduled in June 2011, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

During the year, the Company demonstrated a good level of environmental performance and compliance with the resource consents.

There were no unauthorised incidents at the Kupe Production Station site during the year under review.

3.4 Alterations to monitoring programmes for 2010-2011

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, 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 2010-2011, the monitoring programme remains unchanged from that of 2009-2010. A recommendation to this effect is attached to this report.

3.5 Exercise of optional review of consent

Resource consents **6531, 6532, 6533, 6539, 6540, 6541, 6543, 6544, 6545, 6546, 6629, 6679** and **7010** provide for an optional review of the consent in June 2011. Conditions of these consents allow the Council to review them, to ensure that the conditions are adequate to deal with any adverse effects on the environment from the exercise of the consent.

Based on the results of monitoring in the year under review it is considered that there are no grounds that require a review to be pursued.

A recommendation to this effect is presented in Section 4 of this report.

4. Recommendations

1. THAT monitoring of consented activities at the Kupe Production Station in the 2010-2011 year continue at the same level as in 2009-2010.
2. THAT the option for a review of resource consents **6531, 6532, 6533, 6539, 6540, 6541, 6543, 6544, 6545, 6546, 6629, 6679** and **7010** in June 2011, not be exercised, on the grounds that the current conditions are adequate to deal with any adverse effects on the environment.

Glossary of common terms and abbreviations

The following abbreviations and terms are used within this report:

Biomonitoring	assessing the health of the environment using aquatic organisms
BOD	biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate
bund	a wall around a tank to contain its contents in the case of a leak
Condy	conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m
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
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
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
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
SS	suspended solids
SQMCI	semi quantitative macroinvertebrate community index;
Temp	temperature, measured in °C (degrees Celsius)
UI	Unauthorised Incident
UIR	Unauthorised 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

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

Bibliography and references

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

Appendix I

Resource consents held by Origin Energy



03-01-011/01

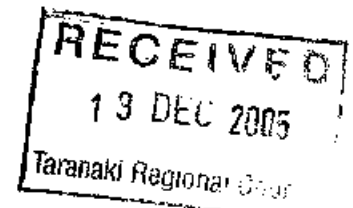
Office of Hon Chris Carter
MP for Te Atatu
Minister of Conservation
Minister of Housing
Minister for Ethnic Affairs

126741

6531-1

- 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.

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

Application 3501 [consent 6531]: disturb [restricted coastal activity]

1. That application 3501, 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 four pipelines and one power/fibre optic cable connecting an offshore wellhead/platform to the foreshore at mean high water spring, be submitted to the Minister of Conservation for approval 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 3501, and special condition 2. In the case of any contradiction between the documentation submitted in support of application 3501 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 chooses 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 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.
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 consents 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.

**Application 3502 [consent 6532]: structure – pipelines
[restricted coastal activity]**

2. That application 3502, to erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area up to four 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, be submitted to the Minister of Conservation for approval for a period to 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:



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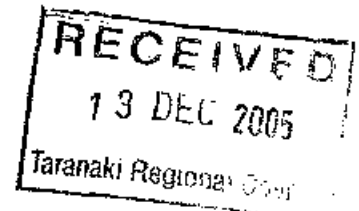
Office of Hon Chris Carter
MP for Te Atatu
Minister of Conservation
Minister of Housing
Minister for Ethnic Affairs

12674

6532-1

- 9 DEC 2005

Peter Carvin
Consents Manager
Taranaki Regional Council
Private Bag 713
Stratford



Dear Mr Carvin

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.

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. 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.
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 126 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 3502 [consent 6532]: structure – pipelines [restricted coastal activity]

2. That application 3502, to erect, place, use, reconstruct, alter, extend and maintain within the coastal marine area up to four 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, be submitted to the Minister of Conservation for approval 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 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 chooses 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 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.

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.



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

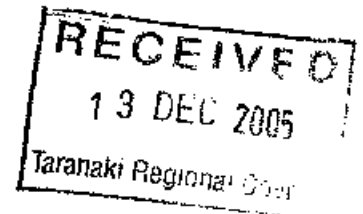
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6533-1

- 9 DEC 2005

Peter Canvin
Consents Manager
Taranaki Regional Council
Private Bag 713
Stratford



Dear Mr Canvin

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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.

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.



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

CHIEF EXECUTIVE
PRIVATE BAG 713
47 CLOIEN ROAD
STRATFORD
NEW ZEALAND
PHONE: 06-765 7127
FAX: 06-765 5097
www.trc.govt.nz

Please quote our file number
on all correspondence

Name of Consent Holder: Origin Energy Resources (Kupe) Limited
12 Waione Street
Petone WELLINGTON New Address:
Private Mail Bag 2022
New Plymouth 4342

Consent Granted Date: 21 June 2005

Conditions of Consent

Consent Granted: To take and use water from the Inaha Stream for pipeline hydrotesting purposes at or about GR: Q21:104-797

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 Sec 17 Blk VIII Waimate SD

Catchment: Inaha

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 carried out in general accordance with the information submitted in support of application 3509. In the case of any contradiction between the documentation submitted in support of application 3509 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. The volume of water abstracted shall not exceed 2500 cubic metres in total, at a rate not exceeding 40 litres per second.
4. The abstraction authorised by this consent shall cease when the flow in the Inaha Stream immediately downstream of the abstraction is equal to or less than 240 litres per second.
5. The consent holder shall maintain a record of the abstraction including date, pumping hours and daily volume abstracted and make these records available to the Chief Executive, Taranaki Regional Council, upon request.
6. The consent holder shall ensure that the intake structure is appropriately screened to avoid the entrainment of freshwater fauna.
7. 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.

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, 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 21 June 2005

For and on behalf of
Taranaki Regional Council



Director Resource Management



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

CHIEF EXECUTIVE
PRIVATE BAG 713
47 CLOTEN ROAD
STRATFORD
NEW ZEALAND
PHONE: 06-765 7127
FAX: 06-765 5097
www.trc.govt.nz

Please quote our file number
on all correspondence

Name of Consent Holder: Origin Energy Resources (Kupe) Limited
12 Waione Street
Petone WELLINGTON New Address:
Private Mail Bag 2022
New Plymouth 4342

Consent Granted Date: 21 June 2005

Conditions of Consent

Consent Granted: To take and use groundwater from a bore for construction and operation purposes at the horizontal directional drilling site and production station at or about GR: P21:099-800

Expiry Date: 1 June 2039

Review Date(s): 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 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

Catchment: Inaha

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 3510. In the case of any contradiction between the documentation submitted in support of application 3510 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 to the satisfaction of the Chief Executive, Taranaki Regional Council, results and interpretation of a pump test [24 hour constant discharge and recovery tests] on the bore[s] to be used for the water supply.
4. The volume of groundwater abstracted shall not exceed 200 cubic metres per day at a rate not exceeding 5 litres per second.
5. The abstraction shall not cause more than a 10% lowering of the static water level by interference with any adjacent bore.
6. The abstraction shall not cause the intrusion of salt water into any freshwater aquifer.
7. The consent holder shall maintain records of the abstraction including date, pumping hours and volume pumped, and make these records available to the Chief Executive, Taranaki Regional Council, no later than 31 July of each year, or upon request.
8. 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.

9. 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 21 June 2005

For and on behalf of
Taranaki Regional Council



Director-Resource Management



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

CHIEF EXECUTIVE
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Please quote our file number
on all correspondence

Name of
Consent Holder: Origin Energy Resources (Kupe) Limited
12 Waione Street
Petone
WELLINGTON

New Address:

Private Mail Bag 2022
New Plymouth 4342

Consent Granted
Date: 21 June 2005

Conditions of Consent

Consent Granted: To take and use groundwater from a bore for pipeline hydrotesting purposes at or about GR: P21:099-800

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 Sec 17 Blk VIII Waimate SD

Catchment: Inaha

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 3511. In the case of any contradiction between the documentation submitted in support of application 3511 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 to the satisfaction of the Chief Executive, Taranaki Regional Council, results and interpretation of a pump test [24 hour constant discharge and recovery tests] on the bore[s] to be used for the water supply.
4. The volume of groundwater abstracted shall not exceed 2500 cubic metres in total at a rate not exceeding 5.0 litres per second.
5. The abstraction shall not cause more than a 10% lowering of the static water level by interference with any adjacent bore.
6. The abstraction shall not cause the intrusion of salt water into any freshwater aquifer.
7. The consent holder shall maintain records of the abstraction including date, pumping hours and volume pumped, and make these records available to the Chief Executive, Taranaki Regional Council, upon request.
8. 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.

9. 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 21 June 2005

For and on behalf of
Taranaki Regional Council



Director Resource Management



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

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Please quote our file number

Name of Consent Holder: Origin Energy Resources [Kupe] Limited **New Address:**
 P O Box 38721
 Petone
 WELLINGTON
 Private Mail Bag 2022
 New Plymouth 4342



Change To Conditions Date: 14 December 2006 [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 into the Kapuni Stream at or about GR: P21:092-804

Expiry Date: 1 June 2039

Review Date(s): 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

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 3513, 4468, and special condition 2.
2. In the case of any contradiction between the documentation submitted in support of application 3513, 4468, and the conditions of this consent, the conditions of this consent shall prevail.

Conditions 2 to 11 – unchanged

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. Prior to the exercise of this consent, the consent holder shall provide for the written approval of the Chief Executive, Taranaki Regional Council, 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 in accordance with the special conditions of this consent.

- Consent 0545
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:

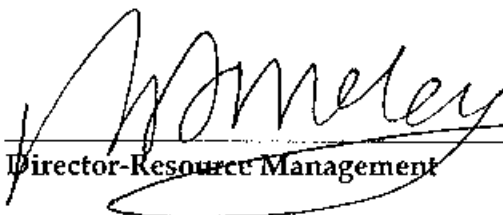
Component	Concentration
pH (range)	6.0-9.0
suspended solids	100 gm ⁻³
total recoverable hydrocarbons [infrared spectroscopic technique]	15 gm ⁻³
chloride	50 gm ⁻³

This condition shall apply prior to the entry of the treated stormwater into the Kapuni Stream at a designated sampling point 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 14 December 2006

For and on behalf of
Taranaki Regional Council


Director-Resource Management



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

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Please quote our file number
on all correspondence

Name of Consent Holder: Origin Energy Resources (Kupe) Limited
12 Waione Street
Petone
WELLINGTON
New Address:
Private Mail Bag 2022
New Plymouth 4342

Consent Granted Date: 21 June 2005

Conditions of Consent

Consent Granted: To discharge produced water from hydrocarbon production operations by deepwell injection at the Kupe Production Station site at or about GR: P21:098-802

Expiry Date: 1 June 2039

Review Date(s): 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

Catchment: Kapuni

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 3514. In the case of any contradiction between the documentation submitted in support of application 3514 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 adverse effects on the environment from the exercise of this consent.
3. Prior to the exercise of this consent for each individual well to be used for deepwell injection, the consent holder shall submit, to the written satisfaction of the Chief Executive, Taranaki Regional Council, a log of the injection well, and an injection well operation management plan, to demonstrate that special condition 4 of this consent can be met. The report shall:
 - a) identify the injection zone, including a validated bore log and geophysical log;
 - b) detail the results of fluid sampled from the injection zone, and the proposed wastes to be injected for maximum and mean concentrations for pH, suspended solids, total dissolved solids, salinity, chlorides, and total hydrocarbons;
 - c) demonstrate the integrity of well casing; and
 - d) outline design and operational procedure to isolate the zone.
4. The consent holder shall ensure that injection will not contaminate or endanger any actual or potential useable freshwater aquifer.
5. The consent holder shall keep daily records of the nature and amounts of all material injected, including injection pressure and rate, and mean concentrations of pH, suspended solids, total dissolved solids, salinity, chlorides, and total hydrocarbons. The consent holder shall make the records available to the Taranaki Regional Council on a 3 monthly basis, and when there has been a significant pressure change event.

6. The consent holder shall inject fluids at pressures below the pressure that would be required to fracture the injection formation.
7. The consent holder shall provide to the Taranaki Regional Council during the month of May of each year, for the duration of the consent, a written report on all matters required under special conditions 3, 4, 5, and 6 above.
8. 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.
9. 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 21 June 2005

For and on behalf of
Taranaki Regional Council



Director Resource Management



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

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Please quote our file number
on all correspondence

Name of Consent Holder: Origin Energy Resources (Kupe) Limited
P O Box 38721
Petone
WELLINGTON
New Address:
Private Mail Bag 2022
New Plymouth 4342



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

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



Director Resource Management



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

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Please quote our file number
on all correspondence

Name of Consent Holder: Origin Energy Resources (Kupe) Limited
12 Waione Street
Petone
WELLINGTON
New Address:
Private Mail Bag 2022
New Plymouth 4342

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

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



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 28 October 2005
Date:

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 chooses 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.

Consent 6629-1

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.

Consent 6629-1

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

Director-Resource Management



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

CHIEF EXECUTIVE
PRIVATE BAG 713
47 CLOTEN ROAD
STRATFORD
NEW ZEALAND
PHONE: 06-765 7127
FAX: 06-765 5097
www.trc.govt.nz

Please quote our file number
on all correspondence

Name of Consent Holder: Origin Energy Resources (Kupe) Limited
P O Box 38721
Petone
WELLINGTON
New Address:
Private Mail Bag 2022
New Plymouth 4342

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.

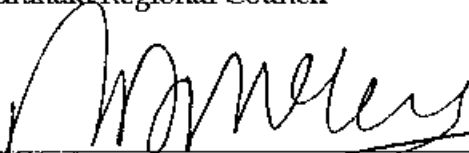
Special conditions

- 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



~~Director-Resource Management~~



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

CHIEF EXECUTIVE
PRIVATE BAG 713
47 CLOTEN ROAD
STRATFORD
NEW ZEALAND
PHONE: 06-765 7127
FAX: 06-765 5097
www.trc.govt.nz

New Address:

Name of Consent Holder: Origin Energy Resources (Kupe) Limited
Private Bag 2202
NEW PLYMOUTH 4342

Private Mail Bag 2022
New Plymouth 4342



Change To Conditions Date:

25 July 2007 [Granted: 2 November 2006]

Conditions of Consent

Consent Granted: 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 horizontal directional drilling, pipeline hydro-testing, and production station operation purposes at or about 2609985E-6180205N

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 Survey District

Catchment: Inaha

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 4430 and 4585 and shall ensure the efficient and effective use of water. In the case of any contradiction between the documentation submitted in support of application 4430, 4585, and the conditions of this consent, the conditions of this consent shall prevail.

Conditions 2 to 7 – unchanged

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.

Condition 8 – changed

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.

Conditions 9 to 12 – unchanged

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 25 July 2007

For and on behalf of
Taranaki Regional Council



Director-Resource Management

Appendix II

Biomonitoring reports

To Job Manager, K Brodie
From Scientific Officer, C R Fowles
Doc No 755336
Report No CF508
Date May 2010

Biomonitoring of the Kapuni Stream in relation to stormwater discharges from the Kupe Production Station of Origin Energy Resources Ltd, surveyed in March 2010

Introduction

This was the second of two scheduled biomonitoring surveys relating to the newly commissioned Kupe Production Station, for the 2009-2010 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'.

The most recent stormwater discharge had occurred in mid December 2009 following the Production Station construction phase. This second (late summer) survey provides further baseline and monitoring data in relation to the lower reaches of the Kapuni Stream. 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, 2009)].

This late summer survey was performed in mid March 2010 after a lengthy low flow summer period.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from riffle habitats at three newly established sites (sites 1,2 and 3) in the Kapuni Stream (Table 1, Figure 1) on 16 March 2010. 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	Location
1	KPN000488	BK29:992187	Upstream of Production Station stormwater discharge
2	KPN000490	BK29:992186	50 m downstream of Production Station stormwater discharge
3	KPN000492	BK29:992185	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 very 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 300 litres/sec which represented a flow slightly higher than the minimum monthly mean March flow (253 l/sec) but well below the average monthly mean March flow (735 l/sec) recorded for the period 1999-2009. The survey was performed 49 days after a fresh in excess of 3x median river flow and 118 days after a fresh in excess of 7 x median flow conditions. Water temperatures at these three sites ranged from 18.4°C to 18.9°C at the time of this early afternoon survey.

Periphyton mats were thin to patchy with patchy filamentous algae on the predominantly gravel-cobble-boulder substrates of all three unshaded sites. No moss was recorded at any site. There was no stormwater discharge from the rock rip-rap outfall at the time of the survey although there had been a discharge of treated stormwater on one occasion over the three month period prior to the survey.

Macroinvertebrate communities

One previous macroinvertebrate survey had been performed at these three sites. The results of that survey 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 2009) 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	22	15	10-26	98	81-136
KPN000488	1	19	-	99	-
KPN000490	1	14	-	106	-
KPN000492	1	16	-	91	-

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

Table 3 Macroinvertebrate fauna of the Kapuni Stream in relation to the Kupe Production Station stormwater discharge sampled on 16 March 2010

Taxa List	Site Number	MCI score	1	2	3
	Site Code		KPN000488	KPN000490	KPN000492
	Sample Number		FWB10170	FWB10171	FWB10172
PLATYHELMINTHES (FLATWORMS)	<i>Cura</i>	3	R	-	-
NEMERTEA	Nemertea	3	A	A	A
ANNELIDA (WORMS)	Oligochaeta	1	C	C	A
	Lumbricidae	5	R	R	C
MOLLUSCA	<i>Physa</i>	3	-	R	-
	<i>Potamopyrgus</i>	4	A	A	VA
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	C	A	A
	<i>Coloburiscus</i>	7	C	C	C
	<i>Deleatidium</i>	8	XA	XA	XA
	<i>Nesameletus</i>	9	R	-	-
	<i>Zephlebia group</i>	7	C	-	-
PLECOPTERA (STONEFLIES)	<i>Stenoperla</i>	10	-	R	-
	<i>Zelandobius</i>	5	-	-	R
HEMIPTERA (BUGS)	<i>Saldula</i>	5	-	-	R
COLEOPTERA (BEETLES)	Elmidae	6	XA	XA	XA
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	A	C	C
TRICHOPTERA (CADDISFLIES)	<i>Aoteapsyche</i>	4	VA	VA	VA
	<i>Costachorema</i>	7	C	C	C
	<i>Hydrobiosis</i>	5	A	A	C
	<i>Beraeoptera</i>	8	A	C	C
	<i>Pycnocentria</i>	7	R	-	-
	<i>Pycnocentroides</i>	5	XA	VA	A
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	-	C	C
	Eriopterini	5	R	R	R
	<i>Maoridiamesa</i>	3	R	A	VA
	Orthoclaadiinae	2	R	A	A
	Tanytarsini	3	R	A	A
	Empididae	3	-	-	R
	Muscidae	3	R	-	R
	Tanyderidae	4	R	R	R
No of taxa			24	22	24
MCI			103	102	96
SQMCI			6.1	6.3	6.0
EPT (taxa)			11	9	9
%EPT (taxa)			46	41	38
'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 outfall)

A good richness (24 taxa) was found at site 1 which was nine taxa more than the median number of taxa from previous surveys at the nearest upstream site (Table 2). The community was characterised by two 'highly sensitive' taxa (extremely abundant mayfly (*Deleatidium*) and flare-cased caddisfly (*Beraeoptera*)); four moderately sensitive taxa (extremely abundant stony-cased caddisfly (*Pycnocentroides*) and elmid beetles; dobsonfly (*Archichauliodes*), and free-living caddisfly (*Hydrobiosis*)); and three 'tolerant' taxa (nemertean worms, snail (*Potamopyrgus*), and net-building caddisfly (*Aoteapsyche*). The numerical dominance by three of the 'sensitive' taxa resulted in a relatively high SQMCI_s value (6.1 units) for the lower reaches of a ringplain stream and indicative of good preceding physicochemical water quality and physical habitat.

The MCI score (103 units) was indicative of the relative balance between 'sensitive' (58% of taxa richness) and 'tolerant' taxa. This score was 5 units above the median score recorded at the site 8 km upstream (Table 2). It was also a significant 18 units (Stark, 1998) higher than predicted for a site at this altitude (10 m a.s.l.) and a significant 11 units higher than predicted for this site 35.3 km downstream from the National Park in ringplain streams (Stark and Fowles, 2009). This score (103 units) categorised the site as having 'good' stream health (TRC, 2009) at the time of this late summer survey.

Site 2 (50 m downstream of Production Station discharges)

A good richness of 22 taxa was found at site 2, only two taxa fewer than the richness at the upstream site. The community was characterised by seven of the nine taxa that were dominant at site 1 with the addition of one 'moderately sensitive' taxon (mayfly (*Austroclima*) and three 'tolerant' taxa (midges (orthoclads, tanytarsids, and *Maoridiamesa*)). Again, the numerical dominance by several 'sensitive' taxa resulted in the relatively high SQMCI_s value, 0.2 unit higher than the value at the upstream site 1, indicative of good physical habitat and preceding physicochemical water quality.

The MCI score (102 units) was an insignificant 1 unit lower than the score at site 1, reflecting the high proportion (59% of richness) of 'sensitive' taxa in the community. This score was indicative of no impacts of any preceding stormwater discharge on the macroinvertebrate community at this site. It was a very significant 17 units above the predicted score for a site 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' stream health (TRC, 2009) at the time of this late summer survey.

Site 3 (200 m downstream of Production Station discharge)

A good richness (24 taxa) was also found at this site, two more than at site 2 and the same number of taxa as found at the upstream 'control' site. The community was characterised by the same taxa as dominant at site 2 with the exception of one fewer 'sensitive' taxon (free-living caddisfly (*Hydrobiosis*)) and one additional 'tolerant' taxon (oligochaete worms). This numerical dominance by several 'sensitive' taxa resulted in the relatively high SQMCI_s value (6.0 units) which was only 0.1 unit below that recorded at the upstream 'control' site 1, but higher than typically found in the lower reaches of ringplain streams and rivers near the coast (TRC, 1999 (updated 2009)).

The MCI score (96 units) reflected the relative balance between 'sensitive' (58% of the richness) and 'tolerant' taxa in the community and was an insignificant 7 units lower than

the score recorded at the upstream 'control' site mainly as a result of the absence of one 'highly sensitive' taxon at site 3, which was present only as a rarity at the 'control' site i.e. insignificant differences in community diversities between the two sites. The MCI score (96 units) was a significant 11 units above that predicted for a ringplain site at this altitude and similar (4 units higher) to that predicted for a site 35.6 km downstream from the National Park in ringplain streams (Stark and Fowles, 2009). This score categorised this site as having 'fair' stream health (TRC, 2009) at the time of this late summer survey.

Conclusions

This late summer 2010, second macroinvertebrate survey of the Kapuni Stream indicated that a previous stormwater discharge from the Kupe Production Station had not had any recent impacts upon the macroinvertebrate communities downstream of the stormwater outfall. Community richnesses were good with a relatively high proportion of 'sensitive' taxa constituting and numerically dominating each community resulting in higher SQMCI_s values than typical for 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 (0.3 unit) of SQMCI_s values found over this reach of the stream although there was a marked increase in 'tolerant' midge numbers in a downstream direction coincident with an increase in periphyton mats on the streambed.

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

The range of MCI scores (96 to 103) categorised this reach of the stream as having 'fair' to 'good' biological health consistent with good physical habitat and preceding physicochemical water quality. 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 the majority of other ringplain rivers and streams.

Summary

The Council's standard 'kick-sampling' technique was used at three recently 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 late summer and second macroinvertebrate survey indicated that a previous discharge of treated stormwater from the Kupe Production Station had not had any recent detrimental effects on the macroinvertebrate communities of the Kapuni Stream. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and the two sites downstream of the discharge.

The macroinvertebrate communities of the stream contained significant proportions of 'sensitive' taxa and these communities were numerically dominated by 'sensitive' taxa resulting in relatively high SQMCI_s values for the lower reaches of a ringplain stream near the coast.

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

References

- Fowles CR, 2009: Biomonitoring of the Kapuni Stream in relation to stormwater discharges from the Kupe Production Station of Origin Energy Resources Ltd, December 2009. TRC Internal report CF497.
- Stark JD, 1985: A macroinvertebrate community index of water quality for stony streams. *Water and Soil* Miscellaneous Publication No. 87.
- Stark JD, 1998: SQMCI: a biotic index for freshwater macroinvertebrate coded abundance data. *New Zealand Journal of Marine and Freshwater Research* 32(1): 55-66.
- Stark JD, 1999: An evaluation of Taranaki Regional Council's SQMCI biomonitoring index. Cawthron Institute, Nelson. Cawthron Report No. 472.
- Stark JD, Boothroyd IKG, Harding JS, Maxted JR, Scarsbrook MR, 2001: Protocols for sampling macroinvertebrates in wadeable streams. New Zealand Macroinvertebrate Working Group Report No. 1. Prepared for the Ministry for the Environment. Sustainable Management Fund Project No. 5103. 57p.
- Stark JD, Fowles CR, 2009: Relationships between MCI, site altitude, and distance from source for Taranaki ring plain streams. Stark Environmental Report 2009-01. 47p.
- Stark JD, 2009: Kapuni macroinvertebrate biomonitoring (13 November 2009). Stark Environmental Report 2009-13. 23p.
- TRC, 1999: Some statistics from the Taranaki Regional Council database (FWB) of freshwater macroinvertebrate surveys performed during the period from January 1980 to 31 December 1998 (SEM reference report). Technical Report 99-17.
- TRC, 2009: Freshwater biological monitoring programme Annual State of the Environment Monitoring Report 2008-2009. TRC Technical Report 2009-14.

To Job Manager, K Brodie
From Scientific Officer, C R Fowles
Doc No 703037
Report No CF497
Date December 2009

Biomonitoring of the Kapuni Stream in relation to stormwater discharges from the Kupe Production Station of Origin Energy Resources Ltd, December 2009

Introduction

This was the first of two scheduled biomonitoring surveys relating to the newly commissioned Kupe Production Station, for the 2009-2010 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'.

Only one recent brief period of stormwater discharge had occurred (for pump commissioning purposes in mid August, 2009) prior to this survey following the Production Station construction phase. This inaugural (spring) survey was performed on the day preceeding the commissioning of the site and provides baseline and monitoring data in relation to the lower reaches of the Kapuni Stream. This section of the stream (approximately 700m from the coast) has no previous macroinvertebrate monitoring history. [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) monitored in association with industrial usage in mid-catchment (Stark, 2009)].

This inaugural survey was performed in early December 2009, after a wet early-mid spring delayed biomonitoring.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from riffle habitats at three newly established sites (sites 1,2 and 3) in the Kapuni Stream (Table 1, Figure 1) on 3 December 2009. 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 Jupe Production Station

Site No.	Site code	Map reference	Location
1	KPN000488	BK29:992187	Upstream of Production Station stormwater discharge
2	KPN000490	BK29:992186	50 m downstream of Production Station stormwater discharge
3	KPN000492	BK29:992185	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 late-morning survey there was a 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 520 litres/sec which represented a flow slightly less than the minimum monthly mean December flow (538 l/sec) and therefore well below the average monthly mean December flow (1.60 m³/sec) recorded for the period 1999-2009. The survey was performed 15 days after freshes in excess of 3x and 7x median river flow conditions. Water temperatures at all three sites were 15.1°C at the time of this late morning survey.

Periphyton mats were thin to patchy with no filamentous algae on the predominantly gravel-cobble-boulder substrates of all three unshaded sites. Patchy moss was recorded only at site 3. There was no stormwater discharge from the rock rip-rap outfall at the time of the survey although there had been a controlled release of treated stormwater on one occasion prior to the survey.

Macroinvertebrate communities

No previous macroinvertebrate surveys had been performed at these three sites. For comparative background purposes, Table 2 provides historical data for the nearest monitored site in the stream at Normanby Road [Site: KPN000400] some 8 km upstream.



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 from 1982 to 2007

Site	Number of previous surveys	Numbers of taxa		MCI values	
		Median	Range	Median	Range
KPN000400	20	15	10-26	97	83-132

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

Table 3 Macroinvertebrate fauna of the Kapuni Stream in relation to the Kupe Production Station stormwater discharge sampled on 3 December, 2009

Taxa List	Site Number	MCI score	1	2	3
	Site Code		KPN000488	KPN000490	KPN000492
	Sample Number		FWB09388	FWB09389	FWB09390
ANNELIDA (WORMS)	Oligochaeta	1	A	A	A
	Lumbricidae	5	R	R	-
MOLLUSCA	<i>Potamopyrgus</i>	4	R	R	R
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	R	R	R
	<i>Coloburiscus</i>	7	R	R	-
	<i>Deleatidium</i>	8	XA	XA	XA
PLECOPTERA (STONEFLIES)	<i>Acroperla</i>	5	R	-	-
	<i>Zelandobius</i>	5	R	-	-
COLEOPTERA (BEETLES)	Elmidae	6	XA	VA	VA
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	R	R	R
TRICHOPTERA (CADDISFLIES)	<i>Aoteapsyche</i>	4	A	A	C
	<i>Costachorema</i>	7	C	A	A
	<i>Hydrobiosis</i>	5	C	C	R
	<i>Pycnocentroides</i>	5	VA	VA	A
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	-	-	C
	Eriopterini	5	R	C	R
	<i>Chironomus</i>	1	-	-	C
	<i>Maoridiamesa</i>	3	R	-	C
	Orthoclaadiinae	2	-	-	R
	<i>Polypedilum</i>	3	R	-	-
	Tanytarsini	3	R	-	R
	<i>Austrosimulium</i>	3	-	R	-
Tanyderidae	4	R	-	-	
No of taxa			19	14	16
MCI			99	106	91
SQMCIs			6.6	7.0	7.2
EPT (taxa)			9	7	6
%EPT (taxa)			47	50	38
'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 outfall)

A moderate richness (19 taxa) was found at site 1 which was four taxa more than the median number of taxa from previous surveys at the nearest upstream site (Table 2). The community was characterised by one 'highly sensitive' taxon (ubiquitous and extremely abundant mayfly (*Deleatidium*)); two moderately sensitive taxa (stony-cased caddisfly

(*Pycnocentroides*) and extremely abundant elmids beetles); and two 'tolerant' taxa (oligochaete worms and net-building caddisfly (*Aoteapsyche*)). The numerical dominance by the three 'sensitive' taxa resulted in a relatively high SQMCI_s value (6.6 units) for the lower reaches of a ringplain stream and indicative of good preceding physicochemical water quality and physical habitat.

The MCI score (99 units) was indicative of the relative balance between 'sensitive' (63% of taxa richness) and 'tolerant' taxa. This score was very similar to the median score recorded at the site 8 km upstream (Table 2) and a significant 14 units (Stark, 1998) higher than predicted for a site at this altitude (10 m a.s.l.) and an insignificant 7 units higher than predicted for this site 35.3 km downstream from the National Park in ringplain streams (Stark and Fowles, 2009). This score (99 units) categorized the site as having 'fair' (on the border of 'good') stream health (TRC, 2009a) at the time of this spring survey.

Site 2 (50 m downstream of Production Station discharges)

A slightly poorer richness of 14 taxa was found at site 2, but due to the absence of five taxa present only as rarities (less than 5 individuals per taxon) at the upstream site. The community was characterized by all five taxa that were dominant at site 1 with the addition of one 'moderately sensitive' taxon (free-living caddisfly (*Costachorema*)). Again, the numerical dominance by several 'sensitive' taxa resulted in the relatively high SQMCI_s value, 0.4 unit higher than the value at the upstream site 1, indicative of good physical habitat and preceding physicochemical water quality.

The MCI score (106 units) was an insignificant 7 units higher than the score at site 1, reflecting the high proportion (71% of richness) of 'sensitive' taxa in the community. This score was indicative of no impacts of any preceding stormwater discharge on the macroinvertebrate community at this site. It was a very significant 21 units above the predicted score for a site 10 m a.s.l. and a significant 14 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 (106 units) categorized the site as having 'good' stream health (TRC, 2009a) at the time of this spring survey.

Site 3 (200 m downstream of Production Station discharge)

A moderate richness (16 taxa) was found at this site, two more than at site 2 and three taxa fewer than found at the upstream 'control' site. The community was characterized by the same taxa as dominant at site 2 with the exception of one fewer 'tolerant' taxon (net-building caddisfly (*Aoteapsyche*)). This numerical dominance by several 'sensitive' taxa resulted in the relatively high SQMCI_s value (7.2 units) which was 0.6 unit above that recorded at the upstream 'control' site 1, and higher than typically found in the lower reaches of ringplain Streams and rivers near the coast.

The MCI score (91 units) reflected the relative balance between 'sensitive' (56% of the richness) and 'tolerant' taxa in the community and was an insignificant 8 units lower than the score recorded at the upstream 'control' site mainly as a result of the variability in presence/absence of (low abundances of) four 'tolerant' taxa between sites and absence of four 'sensitive' taxa at site 3, which were present only as rarities at the 'control' site i.e. insignificant differences in community diversities between the two sites. The MCI score (91 units) was an insignificant 6 units above that predicted for a ringplain site at this altitude and very similar (1 unit lower) to that predicted for a site 35.6 km downstream from the National Park in ringplain streams (Stark and Fowles, 2009). This score categorized this site as having 'fair' stream health (TRC, 2009a) at the time of this spring survey.

Conclusions

This spring 2009 inaugural macroinvertebrate survey of the Kapuni Stream indicated that previous stormwater discharge from the Kupe Production Station had not had any recent impact upon the macroinvertebrate communities downstream of the stormwater outfall. Richnesses were generally moderate with a relatively high proportion of 'sensitive' taxa constituting and numerically dominating each community resulting in higher SQMCI_s values than 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 narrow range (0.6 unit) of SQMCI_s values found over this stream reach.

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

The range of MCI scores (91 to 106) categorized this reach of the stream as having 'fair' to 'good' biological health consistent with good physical habitat and preceding physicochemical water quality. These scores were also higher than predicted scores for ringplain sites at equivalent altitudes and distances downstream of the National Park.

Summary

The Council's standard 'kick-sampling' technique was used at three newly 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 late spring, inaugural macroinvertebrate survey indicated that a previous discharge of treated stormwater from the Kupe Production Station had not had any recent detrimental effect on the macroinvertebrate communities of the Kapuni Stream. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and the two sites downstream of the discharge.

The macroinvertebrate communities of the stream contained significant proportions of 'sensitive' taxa and these communities were numerically dominated by 'sensitive' taxa resulting in relatively high SQMCI_s values for the lower reaches of a ringplain stream near the coast.

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

References

- Stark JD, 1985: A macroinvertebrate community index of water quality for stony streams. *Water and Soil Miscellaneous Publication No. 87.*
- Stark JD, 1998: SQMCI: a biotic index for freshwater macroinvertebrate coded abundance data. *New Zealand Journal of Marine and Freshwater Research* 32(1): 55-66.
- Stark JD, 1999: An evaluation of Taranaki Regional Council's SQMCI biomonitoring index. Cawthron Institute, Nelson. Cawthron Report No. 472.
- Stark JD, Boothroyd IKG, Harding JS, Maxted JR, Scarsbrook MR, 2001: Protocols for sampling macroinvertebrates in wadeable streams. New Zealand Macroinvertebrate Working Group Report No. 1. Prepared for the Ministry for the Environment. Sustainable Management Fund Project No. 5103. 57p.
- Stark JD, Fowles CR, 2009: Relationships between MCI, site altitude, and distance from source for Taranaki ring plain streams. Stark Environmental Report 2009-01. 47p.
- Stark JD, 2009: Kapuni macroinvertebrate biomonitoring (13 November 2009). Stark Environmental Report 2009-13. 23p.
- TRC, 1999: Some statistics from the Taranaki Regional Council database (FWB) of freshwater macroinvertebrate surveys performed during the period from January 1980 to 31 December 1998 (SEM reference report). Technical Report 99-17.
- TRC, 2009a: Freshwater biological monitoring programme Annual State of the Environment Monitoring Report 2008-2009. TRC Technical Report 2009-14.

Appendix III

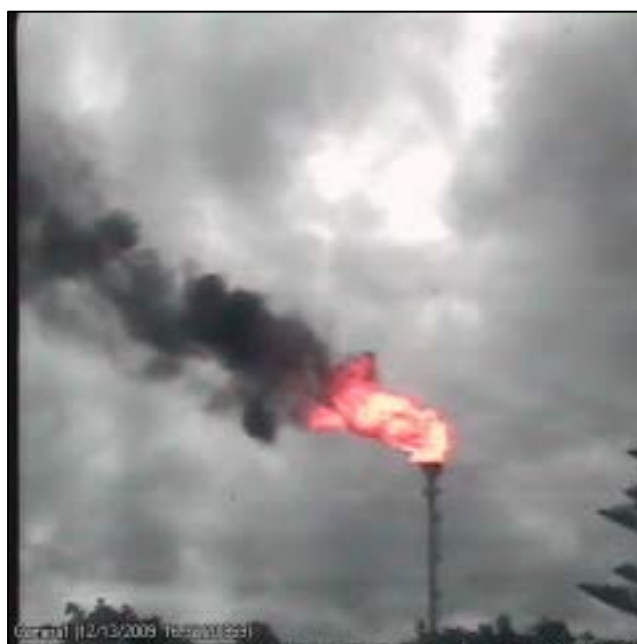
Air report

Memorandum

To Job Manager, Keith Brodie, Bruce Pope
From Air Quality Officer, Brian Cheyne
File FRODO# 701496
Date December 20, 2009

Ambient air quality monitoring and video survey at Kupe Production Station before and during production testing period

During the period from June 2009 to December 2009 the Taranaki Regional Council carried out an ambient air quality monitoring and a video survey of the Kupe production station at Lower Inaha Road to quantify background conditions prior to start up, gauge potential affects during start up and initial production, and assist with emission inventories. A video camera and time-lapse digital video recorder were set up to monitor any visible emissions, to record the movement and dispersion of smoke plumes and to record the duration of such events. The video equipment was placed in "Kupe House" owned by Origin Energy Limited (GPS 1700245E 5618458N), approximately 250m to the east of Kupe flaring stack. Locations of the air monitoring sites and prevailing wind direction during the video monitoring period are presented in Figure 2.



Photograph 1 Flaring and smoke emission at Kupe Production Station during production testing

Equipment used and the parameters measured for this compliance monitoring programme are summarised in Table 1.

Table 1

Equipment used	Parameters measured
"DVR5" Digital Video Recorder	Digital time-lapse video recording
"DustTrak" Aerosol Monitor	PM10 Airborne particles with a diameter of 10 µm or less
"MultiRae" Multiple-Gas Monitor	NH3 Ammonia, VOC Volatile Organic Compounds CO Carbon Monoxide LEL Lower Explosive Limit
NOx Passive sampler	Nitrogen dioxide
SOx Passive sampler	Sulphur dioxide

The video recorder was set to capture one frame of film every second. On each frame the time (NZST) and date of the recording were displayed. The timer of the video recorder was set up to record continuously over a period of sixteen days, from third of December to fifteenth of December 2009. All flaring events which occurred during this monitoring period were captured. Some examples of the still images extracted from the video file are presented in Appendix 1.

Findings

On several occasions a conspicuous plume of black smoke was observed. From analysis of the video record, it appears that the plume would have passed beyond the boundary of the site as a visible plume, before dispersion by wind (see Photograph 1 for a representative view). Condition 11 of consent 6546 requires that the plume should not be offensive, obnoxious, or objectionable beyond the boundary. Being essentially subjective conditions, the fact that the plume was visible does not necessarily constitute a breach of the condition. The Council did not receive any complaint. It is recommended that the Company be contacted to ascertain whether it received any complaint or other notification re the smoke. Taking into account the strong offshore wind during the monitoring period, any potential for a direct impingement of the plume to have an environmental impact would have been minimal.



Figure 2 Air quality monitoring sites

PM-10 monitoring

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

Particulates can be derived from many sources, including motor vehicles (particularly diesels), 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, and prior to start up a "DustTrak" PM10 monitor was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately forty-eight hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM 10 concentrations. The location of the multi-gas and PM10 monitors during the sampling run is shown in Figure 2 and 3.



Figure3 Air monitoring site AIR007827

The details of the sample run are graphically presented in Figure 4.

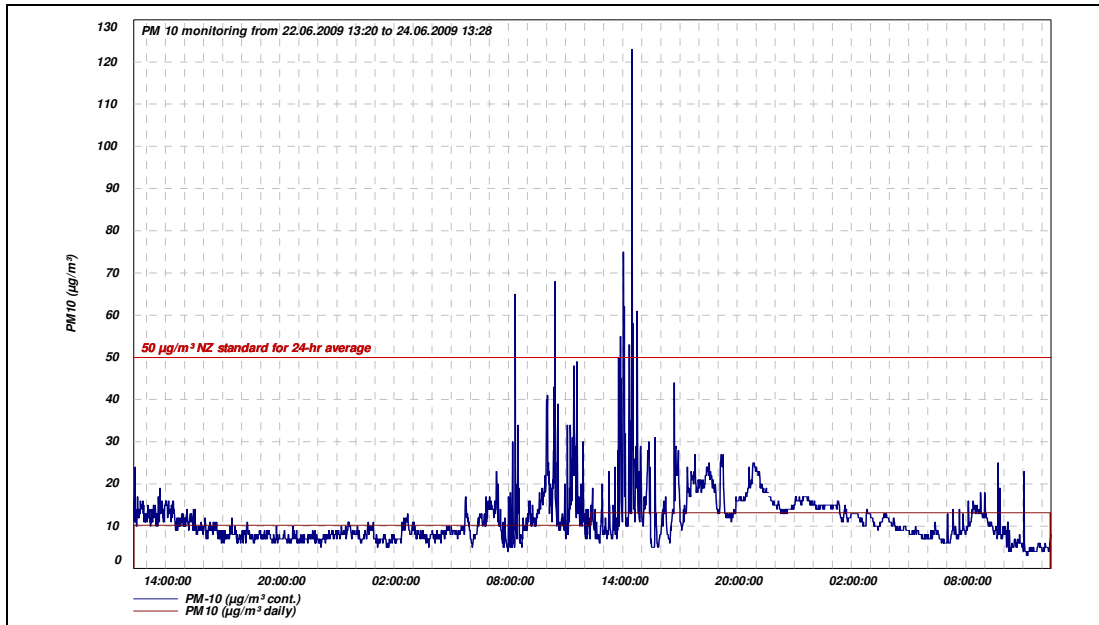


Figure 4 PM10 concentration ($\mu\text{g}/\text{m}^3$) at the Kupe Production Station

Findings

The average recorded PM_{10} concentration for the entire 48 hours dataset was $11.72 \mu\text{g}/\text{m}^3$ ($10.25 \mu\text{g}/\text{m}^3$ and $13.18 \mu\text{g}/\text{m}^3$ daily concentrations respectively). This equates to 23% of the National Environmental Standard for a 24-hour period of $50 \mu\text{g}/\text{m}^3$. The maximum recorded PM_{10} concentration over the entire monitoring period was $123 \mu\text{g}/\text{m}^3$.

Background levels of PM_{10} in the region have been found to be around $11 \mu\text{g}/\text{m}^3$.

Ambient gas monitoring

During the monitoring period and prior to start up, a multi-gas meter was deployed on one occasion in the vicinity of the Kupe production station. The deployment lasted approximately forty hours, with the instrument placed in a down-wind position. Monitoring consisted of continual measurements of gas concentration for ammonia, carbon monoxide, combustible gases, and volatile organic compounds. The results of monitoring undertaken are summarized in Table 2 and the data presented graphically in Figure 5.

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.

Table 2 Summary of ambient gas monitoring results at Kupe production station

From 22.06.2009 13:20 to 24.06.2009 04:38		
(CO) Carbon Monoxide (ppm)		
Max	Mean	Min
0.3	0.0	0.0
(VOC) Volatile Organic Compounds (ppm)		
Max	Mean	Min
1.0	0.0	0.0
(LEL) Lower Explosive Limit (%)		
Max	Mean	Min
0.1	0.0	0.0

- Note: (1) the instrument records in units of ppm. At 15°C
1ppm CO = 0.85 mg/m³
1ppm VOC = 0.4 mg/m³ (expressed as isobutylene)
- (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 % LEL by 20.

Carbon Monoxide (CO)

The consents covering air discharges from the Kupe Production Station have specific limits related to particular gases. Special condition 13 of consent 6546 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 1 hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was less than 1.0 mg/m³ which complies with the consent condition.

Volatile Organic Compounds (VOC)

The volatile organic compound sensor on the instrument used reacts to a range of organic chemicals (both aromatics, and linear chain carbon compounds), together with some inorganic compounds. It is intended for use as a screening device, to assist in determining whether further, more specific investigations are justified. The levels detected are well below levels of concern for the likely compounds that could be emitted from the site, and based on these results no additional investigations are warranted.

Lower Explosive Limit (LEL)

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 a dangerous level 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 minor level.

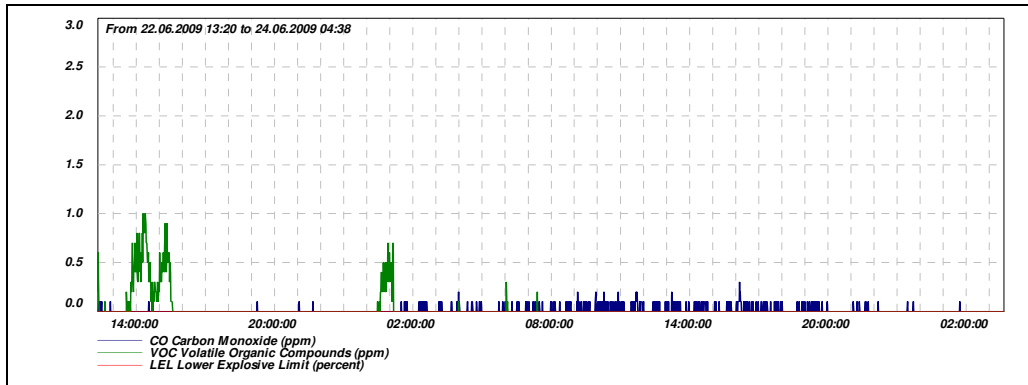


Figure 5 Graphs of ambient gas levels in the vicinity of the Kupe production station

Nitrogen (NO_x) and Sulphur (SO_x) oxides monitoring

Sulphur dioxide is primarily generated from the burning of fossil fuels containing sulphur, but also occurs naturally from volcanic and geothermal activity. Sulphur dioxide can cause eye and throat irritation and trigger asthma attacks and bronchitis.

In the case of Kupe production station, the main source of the sulphur oxides would be diesel fuelled motor vehicles which are servicing the plant.

Nitrogen oxides are also products of fossil fuel combustion. In humans they can reduce the body's resistance to infections and affect breathing. Nitrogen oxides are also toxic to plants and can contribute to brown haze and petrochemical smog.

Special conditions 14 of air consent 6546 set limits for nitrogen dioxide at or beyond the boundary of the site of 100 micrograms per cubic metre of air as a 24-hour average exposure.

The consent covering air discharges from the Kupe Production Station does not have specific limits related to the sulphur dioxide discharges. The National Environmental Standards (NES) for sulphur dioxide is 350µg/m³ averaged over a 1 hour exposure. The Ministry for the Environment's air quality guideline for sulphur dioxide (which are based on health protection) are also 350µg/m³ averaged over a 1 hour exposure and 120µg/m³ averaged over a 24 hour exposure period.

The Taranaki Regional Council has been monitoring sulphur dioxide and nitrogen oxides (SO_x and NO_x) in the Taranaki region since 1993 using passive absorption discs. These discs are placed at the nominated sites, in the vicinity of the industry concerned. The gases diffuse into the discs and any target gases (sulphur dioxide and nitrogen dioxide) are captured. Passive absorption discs were placed at four sites, staked about two metres off the ground for a period 24 days. The location of the monitoring sites is shown in Figure 2.

From the average concentration measured, it is possible to calculate a theoretical maximum daily concentration that may have occurred during the exposure period. Council data on SO_x and NO_x is gathered over a time period other than exactly 24 hours. 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' 24-hour exposure levels.

Table 3 presents the actual levels found and theoretical maximum daily concentration of SO_x and NO_x.

Table 3 Ambient SO_x and NO_x results from around the Kupe production station (22 June to 16 July 2009)

Site	SO _x µg/m ³	SO _x - 24 hour average µg/m ³ (Theoretical maximum)	NO _x µg/m ³	NO _x - 24 hour average µg/m ³ (Theoretical maximum)
<i>Limits</i>		<i>120 (MfE guideline)</i>		<i>100 (Consent)</i>
AIR007827	0.48	0.91	5.44	10.3
AIR007828	0.72	1.36	3.96	7.48
AIR007829	0.39	0.74	3.87	7.31
AIR007830	0.69	1.30	4.77	9.01

Discussions

The calculated 24-hour average concentrations (using a power law exponent of 0.2) ranged from 0.74 µg/m³ to 1.36 µg/m³ for sulphur dioxide and 7.31 µg/m³ to 10.3 µg/m³ for oxides of nitrogen dioxide. These values were all within the New Zealand Ambient Air Quality Guidelines and the consent limit of 120 and 100 µg/m³ respectively.

Conclusions

The monitoring undertaken from 22 - 24 June 2009 occurred some six months prior to plant start up to provide data on background ambient air quality. Levels of the emission of interest were all measured at levels well below MfE guideline or Taranaki Regional Council consent levels and provide a reference benchmark in an area where several other petrochemical processes plants discharge to air.

The video surveillance conducted as the plant went live recorded flare discharges that had the potential to cause nuisance effects beyond the sites boundaries, but due to dispersant winds and the complete absence of complaints from potentially affected neighbours no breach of conditions occurred.

Appendix 1



