Todd Energy Limited
Waitui/Mystone Wellsite
Monitoring Programme Report
2009-2014

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Executive summary

Todd Energy Limited re-established a hydrocarbon exploration site located on Rimutauteka Road, Waitui, within the New Plymouth district, in the Waitara catchment. The site was initially called Mystone, but was changed to Waitui wellsite. This report covers the period from June 2009 to June 2013. During this period, two wells were drilled, tested, and fractured.

This report for Todd Energy Limited describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess Todd Energy Limited's environmental performance in relation to drilling operations at the Waitui wellsite during the period under review, and the results and environmental effects of Todd Energy Limited's activities.

Todd Energy Limited holds seven resource consents for the activities at the Waitui wellsite, which include a total of 110 special conditions setting out the requirements that Todd Energy Limited must satisfy. Todd Energy Limited holds consent 4388-2 to discharge treated stormwater; consent 7452-1 to discharge emissions to air associated with exploration activities; consent 7453-1 to discharge solid drilling wastes; consent 7454-1 to discharge stormwater and sediment from earthworks during construction onto and into land; consent 7455-1 to take water from the Manganui River; consent 7456-1 to take groundwater, and consent 7459-1 to discharge to air during workovers and in emergency situations.

During the monitoring period, Todd Energy Limited demonstrated an overall high level of environmental performance.

The Council's monitoring programme for the period under review included 14 inspections of the site and surrounding environment. In total one ground water sample; two drilling mud samples; one mix-bury-cover layer soil sample; and one fracturing fluid sample were collected for analysis.

The monitoring showed that, in general, good processes and procedures were implemented. A strong focus on the environment by all personnel ensured that the site was mostly clean and tidy.

Any spills on-site were quickly cleaned up to avoid the potential for a contaminant to travel to surface water. The site's stormwater system worked effectively.

Owing to the distance of the wellsite to the nearest stream being approximately 60 m, the stream was inspected by Council staff during each site visit. Chemical analysis or a biomonitoring survey was un-necessary as no evidence of effects on the stream environment were observed by the inspecting officer.

Staff on site were cooperative with requests made by officers of the Council, any required works were completed quickly and to a satisfactory standard.

Flaring was carried out onsite during the well clean up and testing phase. No complaints were received from nearby residents in relation to smoke issues.

When Todd Energy Limited took control of the wellsite they undertook a programme of site expansion and development, including hydraulic fracturing. As part of the expansion works,

sump material and drilling wastes stored on site by the previous operators was disposed of via mix-bury-cover.

During the monitoring period, Todd Energy Limited demonstrated a high level of environmental performance and administrative compliance with their resource consents. During the period under review there were no unauthorised incidents associated with wellsite activities undertaken by Todd Energy Limited.

This report includes recommendations in the case of future drilling operations at this and other sites.

The well is to be plugged and abandoned. Further exploration is not scheduled at this stage.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

This report is for the period June 2009 to June 2013 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Todd Energy Limited. During the period under review, Todd Energy Limited re-established a wellsite, drilled and tested two wells, and hydraulically fractured the target formation.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Todd Energy Limited that relate to exploration activities at Waitui wellsite located off Rimutauteka Road, Waitui in the New Plymouth District.

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

1.1.1 Structure of this report

Section 1 of this report is a background section. It sets out general information about compliance monitoring under the RMA and the Council's obligations and general approach to monitoring sites through monitoring programmes, the resource consents held by Todd Energy Limited in the Waitara 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 Waitui wellsite during exploration activities.

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 during future drilling operations.

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

1.1.2 The Resource Management Act (1991) and monitoring

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

(a) the neighbourhood or the wider community around 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 (for example 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' in as much as is appropriate for each discharge source. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with section 35 of the RMA 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, including 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, to move closer to achieving sustainable development of the region's resources.

1.1.3 Evaluation of environmental and consent performance

Besides discussing the various details of the performance and extent of compliance by the consent holder during the period under review, this report also assigns a rating as to each Company's environmental and administrative performance.

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

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

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

Environmental Performance

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

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

  For example:

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

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

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

Administrative performance

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

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

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

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

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

1.2 Process description

Site description

Todd Energy Limited held a five year Petroleum Mining Permit No. 51156 to prospect, explore, and mine for condensate, gas, LPG, oil and petroleum within an area of 90.4 km^2. The Waitui wellsite is one of many sites within this area that have been established in order to explore, evaluate and produce hydrocarbons.

The Waitui wellsite is located 150 m down a gravel track off Rimutauteka Road, more than 15 km by road from Inglewood and Lepperton, as per Figure 1. The wellsite was originally established in 1993 and involved the removal of topsoil to create a firm level platform on which to erect a drilling rig and house associated equipment. Site establishment also involved the installation of:

- Wastewater control, treatment and disposal facilities;
- A system to collect and control stormwater and contaminants;
- A gas combustion system; and
- Other on-site facilities such as accommodation, parking and storage.

There are two dwellings within 300 m of the wellsite. Bunding, earthworks and good site location helped minimise any potential for off-site effects on the neighbours.

Well development

The process of drilling a well can take a few weeks to several months, depending on the depth of the well, the geology of the area, and whether the well is vertical or horizontal.

Drilling fluids, more commonly known as 'drilling muds', are required in the drilling process for a number of reasons, including:

- As a safety measure to ensure that any pressurised liquids encountered in the rock formation are contained;
- To transport drill cuttings to the surface;
- To cool and lubricate the drilling bit;
- To provide information to the drillers about what is happening down hole and the actual geology being drilled; and

- To maintain well pressure and lubricate the borehole wall to control cave-ins and wash-outs.

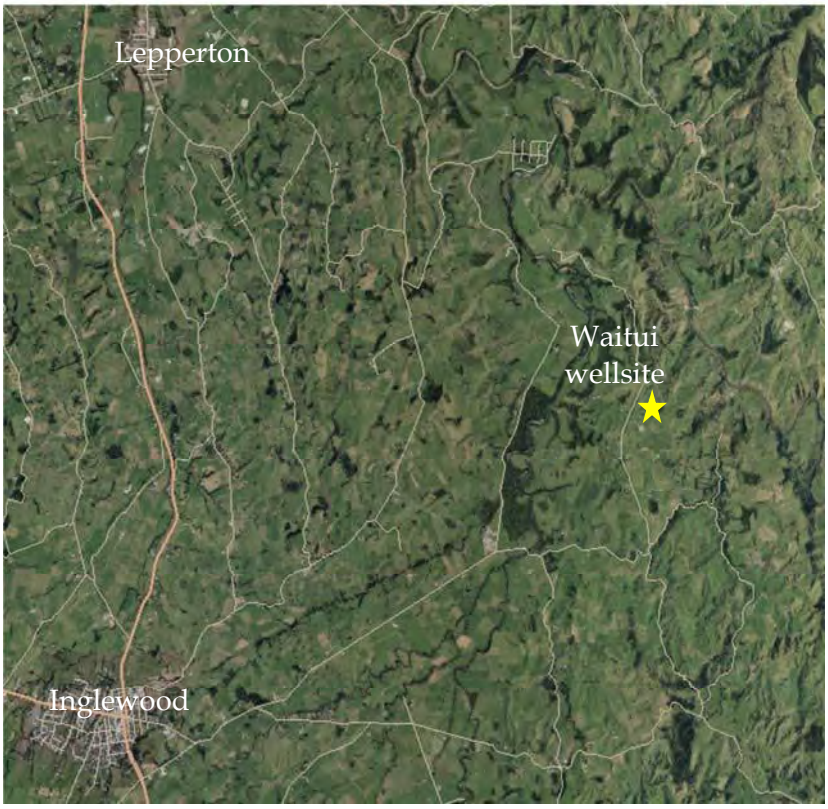

Figure 1 Approximate location of Waitui wellsite

The well is drilled progressively using different sized drill bits. The width of the well is widest at the surface as smaller drill bits are used as the well gets deeper. Once each section of the well is drilled, a steel casing is installed. Cement is then pumped down the well to fill the annulus (the space between the steel casing and the surrounding country rock). This process is repeated until the target depth is reached, with each section of steel casing interlocked with the next.

Production tubing is then fitted within the steel casing to the target depth. A packer is fitted between the production tubing and casing to stop oil/gas/produced water from entering the annulus. The packer is pressure tested to ensure it is sealed.

The construction aspects that are most important for a leak-free well include the correct composition and quality of the cement used, the installation method, and the setting time. The aim is to ensure that the cement binds tightly to the steel casing and the rock, and leaves no cavities through which liquids and gases could travel.

Once the well is sealed and tested the casing is perforated at the target depth, allowing fluids and gas to flow freely between the formation and the well.

Management of stormwater, wastewater and solid drilling waste

The Waitui wellsite is located approximately 60 m to the west of the nearest waterbody which is an unnamed tributary of the Mangaone Stream in the Waitara catchment.

Management systems were put in place to avoid any adverse effects on the surrounding environment from exploration and production activities on the wellsite. There are several sources of potential contamination from water and solid waste material which require appropriate management. These include:

- Stormwater from 'clean' areas of the site [for example parking areas] which run off during rainfall. There is potential that this runoff will pick up small amounts of hydrocarbons and silt due to the nature of the activities on-site;
- Stormwater which collects in the area surrounding the drilling platform and ancillary drilling equipment. This stormwater has a higher likelihood of contact with potential contaminants, particularly drilling mud;
- Produced water which flows from the producing formation and is separated from the gas and water phase at the surface; and
- Drill cuttings, mud and residual fluid which are separated from the liquid waste generated during drilling.

An important requirement of site establishment is to ensure that the site is contoured so that all stormwater and any runoff from 'clean' areas of the site flow into perimeter drains. The drains direct stormwater into a skimmer pit system on-site consisting of two settling ponds. Any hydrocarbons present in the stormwater float to the surface and can be removed. The ponds also provide an opportunity for suspended sediment to settle. Treated stormwater is then discharged from the wellsite onto and into land, and into an unnamed tributary in the Mangaone Stream in the Waitara catchment.

Drilling mud and cuttings brought to the surface during drilling operations are separated out using a shale shaker. The drilling mud and some of the water is then reused for the drilling process. Cuttings were collected in bins located at the base of the shaker and disposed of offsite at a consented facility; a small amount of old drilling mud was disposed of on site via mix-bury-cover.

Hydraulic fracturing

In late 2012 the Parliamentary Commissioner for the Environment released an interim report on hydraulic fracturing within New Zealand. The purpose of this report is firstly to assess the environmental risks with hydraulic fracturing, and secondly to assess whether the policies, laws, regulations and institutions in New Zealand are adequate for managing these risks. The following discussion has been based upon this report.

The first known hydraulic fracturing operation was in 1989 at Petrocorp's Kaimiro-2 gas well in Taranaki. Since then, almost all of the hydraulic fracturing that has taken place in New Zealand has been done within the Taranaki region.

By the early 2000's New Zealand started exploring options for more unconventional ways of getting access to natural gas, and especially oil. These are considered to be more expensive than conventional drilling, but as the price of oil has risen and new technologies have been developed, these unconventional methods are growing.

The most common unconventional source of oil and gas in the Taranaki region has been extracting natural gas and oil from 'tight sands'. The boundary between tight sands and conventional reservoirs is ill-defined and generally based on whether the reservoir will have an economic production flow without hydraulic fracturing.

The process of hydraulic fracturing involves using a fracturing fluid, which is primarily water (typically made up of around 95-97% treated water). This fluid also contains various chemicals, including the three main components, which are:

- An inert proppant which keeps the induced fracture open when pumping is stopped, such as medium grained sand, or small ceramic pellets;
- A gelling substance to carry the proppant into the cracks; and
- A de-gelling substance to thin the gel to allow the fracturing fluid to return to the surface while leaving the proppant in the fractures.

The chemicals associated with the fracturing fluid are trucked to the site, stored in concentrated form, and mixed immediately before the hydraulic fracturing commences.

After the casing is perforated at the desired depth, the fracturing fluid is injected under high pressure into the well and is forced through the small holes into the rocks, creating cracks. This high downhole pressure is maintained for a brief period of time (approximately 1 hour) in order to exceed the fracture strength of the reservoir rock and cause artificial fractures.

Once a fracture has been initiated, the fracturing fluid and proppant are carried into the fracture. The placement of proppant in the fractures is assisted by the use of cross-linked gels. These are solutions, which are liquid at the surface but, when mixed, form long-chain polymer bonds and become gels that transport the proppant into the formation.

Once in the formation these gels 'break' back with time and temperature to a liquid state and are flowed back to surface as back flow without disturbing the proppant wedge, trapped in the hydraulic fracture. With continued flow, formation hydrocarbon fluids should be drawn into the fracture, through the perforations into the wellbore and to the surface.

Flaring from exploration activities

It is possible that flaring may occur during the following activities:

- Well testing and clean-up;
- Production testing;
- Emergencies; and
- Maintenance and enhancement activities [well workovers].

1.3 Resource consents

1.3.1 Background

Todd Energy Limited holds seven resource consents related to exploration activities at the Waitui wellsite, as follows:

- Discharge Permit **4388-2**; granted 13 May 2009,
- Discharge Permit **7452-1**; granted 8 April 2009
- Discharge Permit **7453-1**;granted 31 March 2009,
- Discharge Permit **7454-1**; granted 31 March 2009,
- Water Permit **7455-1**; granted 13 March 2009,
- Water Permit **7456-1**; granted 13 March 2009, and
- Discharge Permit **7459-1**; granted 31 March 2009.

Each of the consent applications were processed on a non-notified basis as Todd Energy Limited obtained the landowner approvals as an affected party, and the Council were satisfied that the environmental effects of the activity would be minor. The consents are discussed in further detail below.

Copies of the consents can be found within Appendix I of this report.

The Waitui-1 well was hydraulically fractured in April 2011, at a depth of 4341-4352 mTVD, well below the freshwater/saltwater interface. At the time a resource consent was not required for the subsurface discharge with consent required for such discharges after July 2011. To investigate any environmental effects of the discharge a hydrogeological risk assessment was undertaken. The report concluded that there was little risk to freshwater aquifers from properly conducted hydraulic fracturing operations (TRC, Hydrogeological Risk Assessment of Hydraulic Fracturing for Gas Recovery in the Taranaki Region, 28 May, 2012).

1.3.2 Water abstraction permits

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

The Council determined that the application to take groundwater fell within Rule 49 of the Regional Freshwater Plan for Taranaki (RFWP) as the rate and daily volume of the groundwater abstraction might exceed that of the permitted activity (Rule 48). Rule 49 provides for groundwater abstraction as a controlled activity, subject to two conditions:

- The abstraction shall cause not more than a 10% lowering of static water-level by interference with any adjacent bore;
- The abstraction shall not cause the intrusion of saltwater into any fresh water aquifer.

Todd Energy Limited holds water permit **7456-1** to take groundwater that may be encountered as produced water during exploration and production operations at the Waitui wellsite.

This permit was issued by the Council on 13 March 2009 under Section 87(d) of the RMA. It is due to expire on 1 June 2021.

Consent conditions were imposed on Todd Energy Limited to ensure that adverse effects were avoided in the first instance. Consent conditions of this consent are as follows:

Condition 1 and 2 restricts the lowering of static water level and intrusion of salt water to adjacent bores and aquifers.

Condition 3 and 4 requires the consent holder to maintain records and submit these to the Council.

Condition 5 and 6 are lapse and review provisions of the consent.

Any produced water will be from reserves far below that which is used for domestic or farm purposes. In addition, there is only one known shallow groundwater well within 500 m of the wellsite. Shallow groundwater (which does not have any saltwater content) was protected by casing within the bore hole. Given these factors, the abstraction would not cause the effects referred to in Rule 49.

The Council was satisfied that the proposed activity would meet all the standards for a controlled activity. It was therefore obliged to grant the consent but imposed conditions in respect of those matters over which it reserved control. Those matters over which the Council reserved its control were:

- Volume and rate of abstraction;
- Daily timing of abstraction;
- Effects on adjacent bores, the aquifer, river levels, wetlands and sea water intrusion;
- Fitting of equipment to regulate flows and to monitor water volumes, levels, flows and pressures;
- Payment of administrative charges;
- Monitoring and report requirements;
- Duration of consent; and
- Review of the conditions of consent and the timing and purpose of the review.

In granting the consent it was considered that the taking of groundwater was unlikely to have any adverse effect on the environment.

Todd Energy Limited holds water permit **7455-1** to take water from the Manganui River for wellsite and well drilling activities during hydrocarbon exploration and production operations at the Waitui wellsite for hydrocarbon exploration purposes.

This permit was issued by the Council on 13 March 2009 under Section 87(d) of the RMA. It is due to expire on 1 June 2021.

Consent conditions were imposed on Todd Energy Limited to ensure that adverse effects were avoided in the first instance. Consent conditions of this consent are as follows:

Condition 1 requires the volume of water taken to not exceed 100 m^3 per day at below 25 l/s

Condition 2, 3 and 4 requires the consent holder to install a water meter, record abstraction data and submit records to council on request.

Condition 5 requires the consent holder to avoid, remedy or mitigate adverse effects.

Condition 6 requires the screening of the intake structure.

Condition 7 and 8 refer to lapse and review provisions of the consent.

1.3.3 Water discharge permit (treated stormwater and treated produced water)

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

The Council determined that the application to discharge treated stormwater, treated produced water and surplus drill water fell within Rule 44 of the RFWP, which provides for a discharge as a discretionary activity.

The discharge of stormwater may result in contaminants (for example sediment, oil) entering surface water. These contaminants have the potential to smother or detrimentally affect in-stream flora and fauna. On-site management of stormwater, as discussed in 1.2 above, is necessary to avoid/remedy any adverse effects on water quality.

Todd Energy Limited holds water discharge permit **4388-2** to discharge treated stormwater and produced water from hydrocarbon exploration and production operations at the Waitui wellsite onto and into land.

This permit was issued by the Council on 13 May 2009 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Consent conditions were imposed on Todd Energy Limited to ensure that adverse effects were avoided in the first instance.

Condition requirements of this consent are as follows:

Condition 1 requires the consent holder to adopt best practice.

Condition 2 limits the stormwater collection area.

Condition 3 and 16 requires the consent holder to notify council prior to the works commencing and prior to reinstatement.

Condition 4 requires a contingency plan to be in place.

Condition 5, 6 and 7 specify requirements of the stormwater systems and bunding around hazardous substance storage.

Condition 8, 9, 10 and 11 requires constituents of the discharge and, conductivity and sodium absorption of the soil layer containing the discharge to be within the required limits, including at the expiry of the consent.

Condition 12 requires no direct discharge of contaminants to surface water.

Condition 13 requires soil samples to be collected and analysed prior to the consent being exercised.

Condition 14 requires data records to be maintained.

Condition 15 require a management plan to be provided to Council prior to discharging produced water.

Condition 17 and 18 refer to lapse and review of the consent.

1.3.4 Water discharge permit (stormwater and sediment – earthworks)

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

Council considered that the application fell under Rule 27 of the RFWP as a controlled activity (which may be non-notified without written approval), subject to one standard/term/condition to be met:

- A site erosion and sediment control management plan shall be submitted to the Taranaki Regional Council.

Todd Energy Limited supplied a site erosion and sediment control management plan in support of the application.

The Council was satisfied that the activity would meet all the standards for a controlled activity. It was therefore obliged to grant the consent but imposed conditions in respect of those matters over which it reserved control. Those matters over which the Council reserved its control were:

- Approval of a site erosion and sediment control management plan and the matters contained therein;
- Setting of conditions relating to adverse effects on water quality and the values of the waterbody;
- Timing of works;
- Any measures necessary to reinstate the land following the completion of the activity;
- Monitoring and information requirements;
- Duration of consent;
- Review of conditions of consent and the timing and purpose of the review; and
- Payment of administrative charges and financial contributions.

Todd Energy Limited holds water discharge permit **7454-1** to discharge stormwater and sediment from earthworks during construction of the Waitui wellsite onto and into land.

This permit was issued by the Council on 31 March 2009 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Consent conditions were imposed on Todd Energy Limited to ensure that adverse effects are avoided in the first instance.

Conditions 1 and 2 require a site drainage system to be in accordance with provided information and Council requirements.

Condition 3 requires notice to be provided to Council prior to works commencing.

Condition 4 requires earthworks to be stabilised with vegetation.

Condition 5 requires no direct discharge of contaminates to surface water.

Condition 6 and 7 refer to lapse and review provisions of the consent.

1.3.5 Air discharge permit (exploration activities)

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

The Council determined that the application to discharge emissions to air associated with the exploration activities at the Waitui wellsite fell within Rule 9 of the Regional Air Quality Plan (RAQP).

The standard/term/conditions associated with Rule 9 are as follows:

- Flare or incinerator point is at least 300 m from any dwelling house;
- The discharge to air from the flare must not last longer than 15 days cumulatively, including of testing, clean-up, and completion stages of well development or work-over, per zone to be appraised; and
- No material to be flared or incinerated, other than those derived from or entrained in the well steam.

Provided the activities were conducted in accordance with the applications and in compliance with the recommended special conditions, then no significant effects were anticipated.

Todd Energy Limited holds air discharge permit **7452-1** to discharge emissions into the air from flaring of hydrocarbons and miscellaneous emissions associated with well clean-up, well testing and production testing associated with exploration activities.

This permit was issued by the Council on 8 April 2009 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Consent conditions were imposed on Todd Energy Limited to ensure that adverse effects are avoided in the first instance.

Conditions requirements of the consent re as follows:

Condition 1 limits duration of flaring activities.

Condition 2 requires the consent holder to maintain a log of flaring.

Condition 3 and 4 requires the Council and residents to be informed of flaring.

Condition 5 stipulates no alterations to be made to the plant or equipment.

Condition 6 requires the consent holder to have regard to wind conditions during flaring.

Condition 7 requires treatment by liquid and solid separation to ensure that smoke emission during flaring is minimised while Condition 8 provides for this not occurring and requires the council to be notified and situation remedied.

Condition 9, 10 and 12 restricts what can be combusted through the gas flare system.

Condition 11 requires adoption of the best practicable option.

Condition 13 through 18 requires the consent holder to control emissions.

Conditions 19 through 21 requires the consent holder to collect and provide data to the Council.

Condition 22 and 23 refer to lapse and review provisions of the consent.

1.3.6 Air discharge permit (production activities)

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

The Council determined that the application to discharge emissions to air associated with the production activities at the Waitui wellsite fell within Rule 11 of the RAQP.

The standard/term/condition of Rule 11 states that the:

- Flare or incinerator point is a distance equal to or greater than 300 m from any dwelling house.

Todd Energy Limited holds air discharge permit **7459-1** to discharge emissions to air during flaring from well workovers and in emergency situations and miscellaneous emissions associated with production activities.

This permit was issued by the Council on 31 March 2009 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Consent conditions were imposed on Todd Energy Limited to ensure that adverse effects are avoided in the first instance.

Condition requirements of this consent are as follows:

Condition 1 and 2 requires notice to be given to Council and neighbouring residents.

Condition 3 stipulates no alterations to the plant or equipment.

Condition 4 requires regard to wind conditions prior to flaring.

Condition 5 requires separation of liquids and solids prior to flaring, while Condition 6 provides for this not occurring and requires the Council to be notified and the situation remedied.

Condition 7 and 9 restricts what can be combusted through the gas flare system.

Condition 8 requires the consent holder to adopt best practicable option.

Condition 10 through 16 controls emissions.

Conditions 17 to 20 requires the consent holder to record data and provide this to the Council.

Condition 21 and 22 refer to lapse and review provisions of the consent.

1.3.7 Mix-bury-cover (discharge of wastes to land)

Sections 15(1)(b) and (d) of the Act stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

The discharge of drilling muds, drilling cuttings and drilling wastes onto or into land from hydrocarbon exploration is a controlled activity under Rule 42 of the RFWP.

Rule 42 of the RFWP has four standards/terms/conditions to be met:

- The discharge shall not result or be liable to result in any contaminant entering surface water;
- The discharger must at all times adopt the best practicable option to prevent or minimise any adverse effects of the discharge or discharges to any water body or soil;
- The discharge shall contain less than 15 mg/kg oil and grease; and
- There shall be no adverse chemical effects on groundwater beyond the site.

Provided the activity was conducted in a manner consistent with good industry practice, and in accordance with the recommended special conditions, then no significant effects were anticipated.

Todd Energy Limited holds discharge permit **7453-1** to discharge solid drilling wastes (drilling cuttings and residual drilling fluids) from hydrocarbon exploration activities onto and into land via the mix-bury-cover process.

This permit was issued by the Council on 31 March 2009 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Consent conditions were imposed on Todd Energy Limited to ensure that adverse effects are avoided in the first instance.

Condition requirements of this consent are as follows:

Condition 1 requires the consent holder to adopt best practicable options.

Condition 2 requires the council to be notified prior to and after discharge.

Condition 3 requires records of discharge to be kept.

Condition 4 to 7 sets criteria for discharge.

Conditions 8 to 11 stipulates how drilling waste is to be managed.

Condition 12 to 15 stipulates mix-bury site requirements.

Condition 16 to 19 and 21 to 24 requires concentrations of hydrocarbons, salts and various parameters to be within the required limits of the consent.

Condition 20 required sampling of an adjacent waterway.

Condition 25 and 26 refer to the lapse and review provisions of the consent.

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets out obligations upon the Council to gather information, monitor, and conduct research on the exercise of resource consent and the effects arising, within the Taranaki region.

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

The monitoring programme for exploration well sites consists of seven primary components. They are:

- Programme liaison and management;
- Site inspections;
- Chemical sampling;
- Solid wastes monitoring;
- Air quality monitoring;

- Discharges to land (hydraulic fracturing, deep well injection and MBC);
- Biomonitoring surveys.

The monitoring programme for the Waitui wellsite focused primarily on programme liaison and management, site inspections, and discharges to land. However, all seven components are discussed below.

1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Council in ongoing liaison with resource consent holders over consent conditions and their interpretation and application, in discussion over monitoring requirements, preparation for any reviews, renewals, 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

Inspection and examination of well sites is a fundamental and effective means of monitoring and are undertaken to ensure that good environmental practices are adhered to and resource consent special conditions complied with.

The inspections are based on internationally recognised and endorsed wellsite monitoring best practice checklists developed by the Alberta Energy Resources Conservation Board and the USEPA, adapted for local application.

The inspections also provide an opportunity for monitoring officers to liaise with staff about on-site operations, monitoring and supervision; discuss matters of concern; and resolve any issues in a quick and informal manner.

Inspections pay special attention to the ring drains, mud sumps, treatment by skimmer pits and the final discharge point from the skimmer pit on to land and then any potential receiving waters.

During each inspection the following are checked or noted:

- Weather;
- Flow rate of surface waters in the general vicinity;
- Flow rate of water take;
- Whether pumping of water was occurring;
- General tidiness of site;
- Site layout;
- Ring drains;
- Hazardous substance bunds;
- Treatment by skimmer pits/sedimentation pits;
- Drilling mud;
- Drill cuttings;
- Mud pit capacity and quantity contained in pit;
- Sewage treatment and disposal;
- Cementing waste disposal;

- Surface works;
- Gas combustion systems, whether flaring was in progress, and if there was a likelihood of flaring, whether the Council had been advised;
- Discharges;
- Surface waters in the vicinity for effects on colour and clarity, aquatic life and odour;
- Site records;
- General observations; and
- Odour (a marker for any hydrocarbon and hazardous chemical contamination).

1.4.4 Chemical sampling

The Council may undertake sampling of discharges from site and from sites upstream and downstream of the discharge point to ensure that resource consent special conditions are complied with and to determine whether site activities were causing any adverse effects within the receiving environment.

1.4.5 Solid wastes

The Council monitors any disposal of drill cuttings on site via mix-bury cover to ensure compliance with resource consent conditions and to determine whether site activities were causing any adverse effects within the receiving environment.

In recent times consent holders have opted to remove drilling waste from the site by contractor and dispose of it at licensed disposal areas (land farming), which are monitored separately.

1.4.6 Air quality monitoring

Air quality monitoring is carried out in association with the well testing and clean-up phase, where flaring can occur.

Assessments are made by inspecting officers of the Council during site inspections to ensure that operators undertake all practicable steps to mitigate any effects from flaring gas.

Inspecting officers check that plant equipment is working effectively, that there is the provision for liquid and solid separation and that on site staff have regard to wind direction and speed at the time of flaring.

It is also a requirement that the Council and immediate land owners are notified prior to any gas being flared when practicable. This requirement was checked to ensure compliance with consent conditions and to determine whether site activities were causing any adverse effects within the receiving environment.

1.4.7 Discharges to land (hydraulic fracturing & mix-bury-cover)

Sampling and analysis of the hydraulic fracturing return flow fluids and a nearby groundwater sump were carried out during the period under review. Samples of sump material and drilling wastes stored on site were taken prior to discharge. Following reinstatement of the mix-bury-cover site a sample of the soil cover material was also collected to ensure consent compliance. In addition, inspections of

the site and surrounding land and water were carried out to ensure that no observable effects had occurred as a result of the discharge to land.

1.4.8 Biomonitoring surveys

Biomonitoring surveys in nearby streams may be carried out pre and post occupation of the wellsite to assess whether the activities carried out on site, and associated discharges have had any effect on ecosystems. No biomonitoring was carried out during the period under review due to separation distances to surface water.

2. Results

2.1 Water

2.1.1 Inspections

The Waitui wellsite, adjacent land and streams were inspected fourteen times during the monitoring period. Below is a copy of the comments that were noted on the day of each inspection.

9 June 2009
Inspection was undertaken during showery and windy weather. Site maintenance was being undertaken including upgrading of drains, sumps and restructuring of bunds.

30 December 2009
Inspection was undertaken during fine weather. The rig had been set up and drilling had commenced. Inspection and site assessment were undertaken with Todd Energy Limited staff. The site layout was generally good but the placement and bunding of the synthetic drilling mud tank needed to be addressed. The shut off valve on the skimmer pit was not sighted but this was to be checked, as discussed with Todd Energy Limited staff . Notification of production testing received, testing to begin early January.

13 January 2010
Inspection was undertaken during fine weather. Drilling ahead at the time of inspection. There was a shut off valve fitted to the skimmer pit. The ring drains and skimmer pits were clear of obstructions and contaminants. There was no discharge off site. There were no flaring or other effects of emissions off site. The site was neat and tidy.

21 January 2010
Inspection was undertaken during fine weather. The site was neat and tidy. There was no discharge from the skimmer pits. The ring drains were clear. There was no flaring or effects of emissions off site.

3 February 2010
Inspection was undertaken during overcast weather. No drilling was occurring. The site was neat and tidy. All ring drains and bunds were secure. The skimmer pits were clear and not discharging, there were frogs in residence. No discharge of

stormwater was occurring. There was no flaring being undertaken. The septic tank area was secure and frequently pumped out to prevent any discharge.

12 February 2010
Inspection was undertaken during overcast weather. The casing was being reset at the time of inspection. The site was neat and tidy. The ring drains and skimmer pits were clear; there was no discharge off site. There was no flaring being undertaken.

18 February 2010
Inspection was undertaken after significant rain overnight. The ring drains and bunds were secure. At the site entrance way stormwater was running off down the access track, this needed to be directed to ring drains and then to the skimmer pits. There was no discharge off site via skimmer pits. No flaring was being undertaken. The site was neat and tidy.

2 March 2010
Inspection was undertaken during fine weather. Target depth had been reached. Drilling had finished and the casing was being set at the time of inspection. Production testing was to be undertaken in due course. The ring drains and bunds were secure despite exceptional rain preceding the inspection. The storage areas were secure. Some drilling mud (small amount) was to be cleaned up and stormwater run off from the north end of the site including access track was to be recontoured through the skimmer pits.

17 June 2010
Inspection was undertaken during fine weather. The mix-bury-cover area on the eastern side of the wellsite was inspected. The area had been reinstated and was in well established pasture. A surface soil sample from the mix-bury cover layer was collected for analysis.

16 September 2011
Inspection was undertaken during overcast and windy weather. The site was neat and tidy. There were no effects noted as a result of the stormwater discharge to the nearby stream; there was no evidence of any silt deposition to the stream. No smoke or odours were evident from flaring or operational procedures.

27 September 2011
Inspection was undertaken during fine weather. The site was being prepared for drilling of a new well. There was a contractor on site setting the casing. No stormwater discharge was occurring off site at the time of inspection. The storm water system was still operational.

21 March 2012
Inspection was undertaken during fine weather. The site was neat and tidy. There was no discharge of stormwater from the site. The ring drains and bunds were secure. There was no effect or odours from any flaring evident.

30 August 2012
The site was inspected during fine weather, following a prolonged period of rain. Flaring was being carried out as per normal, there were no issues arising out of this. The stormwater discharge into the nearby stream was clear. There were no effects

from any previous discharge noted. The API separators and skimmer pits were functioning well. There was some plastic material in the ring drain (NW corner) to be removed.

17 June 2013
The site was inspected following heavy rainfall in the preceding week.
Ring drains directed the flow of water through skimmer pits with a goose neck pipe outlet. Silt and sediment discharges off site were minimised by silt traps. No contaminants, drilling muds, or drilling fluids were evident. The flare pit was all clear of contaminants and had not been recently utilised. Mix-bury-cover site was effectively revegetated and no seepage or effects of this practise were noted. The site was neat and tidy and plant pests had been effectively controlled.

2.1.2 Results of abstraction and discharge monitoring

During the period under review, stormwater was observed discharging from the site on several occasions. No skimmer pit or stormwater samples were collected during the monitoring period.

Discharges observed during compliance monitoring inspections were clear and appeared to be having no visual effect on the receiving waterbody.

All sewage was directed for treatment through a septic tank system and removed by contractor to a licensed disposal facility.

2.1.3 Results of receiving environment monitoring

The receiving surface water body was inspected regularly in conjunction with site inspections. No effects were observed and the stream appeared clear with no visual change in colour or clarity. In addition, no odour, oil, grease films, scum, foam or suspended solids were observed in the stream as a result of activities at the Waitui wellsite during the monitoring period.

2.2 Air

2.2.1 Inspections

Air quality monitoring inspections were carried out in conjunction with general compliance monitoring inspections. See Section 2.1.1 above for comments concerning site inspections.

2.2.2 Results of discharge monitoring

Todd Energy notified the Council of its intention to test the Waitui well and flare gas intermittently between April 2011 and May 2011. During inspections of the site the Investigating Officer found there were no offensive or objectionable odours, smoke or dust associated with activities at Waitui wellsite. The Council received no complaints in relation to smoke from flaring at the Waitui wellsite.

It appeared that Todd Energy Limited took all practicable steps to mitigate any effects of smoke, which included, ensuring that plant equipment was working effectively and having regard to wind direction and speed.

The flare pit was inspected to ensure that solid and liquid hydrocarbons were not combusted within the flare pit. There was no evidence to suggest that solid and liquid hydrocarbons were being combusted through the gas flare system.

From observations during site inspections, including the inspection of the flare log maintained by Todd Energy Limited, it appeared that special conditions relating to the control of emissions to air from the flaring of hydrocarbons were complied with.

2.2.3 Results of receiving environment monitoring

No monitoring of the receiving environment was carried out as inspections found no offensive or objectionable odours, smoke or dust that was associated with activities at the site.

No chemical monitoring of air quality was undertaken during the testing phase of the Waitui wellsite as the controls implemented by Todd Energy Limited did not give rise to any concerns with regard to air quality.

As mentioned in Section 2.2.2, visual inspections of the flare, the flare pit and surrounding area were carried out and no effects were observed. During monitoring inspections of the site the inspecting officers found there were no offensive or objectionable odours, smoke or dust associated with activities at the Waitui wellsite.

2.2.4 Other ambient monitoring

No other ambient air sampling was undertaken, as the controls implemented by Todd Energy Limited did not give rise to any concerns with regard to air quality.

2.3 Land

2.3.1 Inspections (hydraulic fracturing and mix-bury-cover)

Land monitoring inspections were carried out in conjunction with general compliance monitoring inspections. See Section 2.1.1 above for comments concerning site inspections.

2.3.2 Results of receiving environment monitoring

Todd Energy Limited took over ownership of the Waitui wellsite and undertook site expansion and well development, including hydraulic fracturing. As part of the wellsite expansion works, sump material and solid drilling wastes stored at the site by previous operators was disposed of on site via mix-bury-cover. The mix-bury-cover was permitted under resource consent 7453-1.

In 2009, approximately 475m^3 of waste material was disposed of by mix-bury-cover in a paddock adjacent to the eastern boundary of the wellsite. The Council was provided with an analysis of the waste prior to the mix-bury-cover. The results along with contaminant loadings are shown in Table 1.

Table 1 Waitui wellsite pre-mbc results and loadings

Parameter	Unit	Sump A (mg/kg)	Sump B (mg/kg)	Average loading (kg)	Loading Limit (kg)
Dry matter	g/100g	44	43	-	-
Total Nitrogen	g/100g	0.17	0.24	857	900
Chloride	mg/kg	140	26	34.7	1600
Arsenic	mg/kg	3.9	2.3	1.3	-
Boron	mg/kg	-	-	-	10
Cadmium	mg/kg	0.11	<0.1	0.03	3
Chromium	mg/kg	20	6.2	5.5	200
Copper	mg/kg	-	-	-	400
Lead	mg/kg	50	11	12.7	200
Mercury	mg/kg	<0.1	0.11	0.03	-
Nickel	mg/kg	17	3	4.2	50
Vanadium	mg/kg	-	-	-	200
Zinc	mg/kg	150	49	41.6	600
Conductivity	ms/cm	0.46	<0.2	-	-
Soluble salts	g/100g	0.16	<0.05	-	-
Barium	mg/kg	4600	35	-	-
Total sodium	mg/kg	860	320	-	-
C7-C9	mg/kg	<16	<15	-	-
C10-C14	mg/kg	<22	<21	-	-
C15-C36	mg/kg	83	<30	-	-
TPH	mg/kg	95	<60	-	-

The pre-disposal sampling results were found to be compliant with all relevant limits specified in the consent.

An inspection of the MBC site carried out on 17 June 2010 found that the area had been reinstated and was in well established pasture. A soil sample was collected from the MBC cover layer. The results of the soil analysis are shown below (Table 2).

Table 2 Waitui wellsite mbc site – soil cover layer analysis

	Chloride (g/m^3)	Conductivity (mS/m)	Hydrocarbons (mg/kg)	Na (g/m^3)	pH	Total soluble salts g/m^3
Consent limit	700	290	4178*	460		2500
17 June 2010	28.9	28.7	14	13.1	6.2	225

*most stringent limit for TPH from MFE guidelines

The results of the sampling comply with all relevant consent condition limits. During initial hydraulic fracturing, a sample of the hydraulic fracturing fluids used and fluids returning to the well head was obtained and analysed.

Table 3 Composite of return hydraulic fracturing fluid from Waitui wellsite

Parameter	Unit	4 May 2011
pH	pH	7.8
Electrical Conductivity (EC)	mS/m	3,650
Total Boron	g/m³	24
Total Potassium	g/m³	2,100
Total Sodium	g/m³	6,600
Chloride	g/m³	11,000
Total Ammoniacal-N	g/m³	17.5
Dissolved reactive phosphorus	g/m³	0.054
Ethylene Glycol	g/m³	30
Methanol	g/m³	18
Benzene	g/m³	4.6
Toulene	g/m³	7.5
Ethylbenzene	g/m³	0.66
m&p-Xylene	g/m³	4.4
o-Xylene	g/m³	1.68
Acenaphthene	g/m³	0.009
Acenaphthylene	g/m³	0.005
Anthracene	g/m³	<0.004
Benzo[a]anthracene	g/m³	<0.004
Benzo[a]pyrene (BAP)	g/m³	<0.004
Benzo[b]Fluoranthene + Benzo[j]fluoranthene	g/m³	<0.004
Benzo[g,h,i]perylene	g/m³	<0.004
Benzo[k]fluoranthene	g/m³	<0.004
Chrysene	g/m³	<0.004
Dibenzo[a,h]anthracene	g/m³	<0.004
Fluoranthene	g/m³	<0.004
Fluorene	g/m³	0.096
Indeno(1,2,3-c,d)pyrene	g/m³	<0.004
Naphthalene	g/m³	1.74
Phenanthrene	g/m³	0.109
Pyrene	g/m³	<0.004
C7-C9	g/m³	24
C10-C14	g/m³	87
C15-C36	g/m³	132
Total Hydrocarbons (C7-C36)	g/m³	240

Waitui wellsite was hydraulically fractured on 28 April 2011. At completion of fracturing operations, the fluid returning from the well (return fluids) were stored on site in a clay lined pit. Return fluids are comprised of a mixture of fluids injected during fracturing operations and naturally occurring reservoir fluids. A sample of return fluids was obtained from the wellhead on 4 May 2011 (Table 3 above). The fluids were removed from the site to the BTW Brown Road disposal site. The pit in which the fluid was stored was subsequently reinstated and the land re-contoured in early October 2011.

A groundwater monitoring site was established (Table 4) to ensure the storage of return fracture fluids in a clay lined pit on the site had not caused any contamination or put at risk usable freshwater.

Table 4 Groundwater sampling site details

Site No.	Depth (m)	Easting (m)	Northing (m)
GND2297	unknown depth to aquifer	1713158	5669896

In order to assess whether the storage of fracturing fluids in a clay lined pit on site had contaminated or put at risk usable freshwater aquifers, a groundwater sample was taken (Table 5) from a concrete sump located in the area where pit reinstatement had occurred.

Figure 2 Aerial view showing the approximate location of Waitui wellsite and one groundwater sampling location

Table 5 Groundwater monitoring results for site GND2297

Parameter	Unit	29 September 2012
Sum of Anions	meq/L	1.56
Sum of Cations	meq/L	1.54
pH	pH	6.6
Total Alkalinity	g/m³ as $CaCO_3$	27
Bicabonate	g/m³ at 25ºC	33
Total hardness	g/m³ as $CaCO_3$	38
Electrical Conductivity (EC)	mS/m	18.1
Total dissolved solids (TDS)	g/m³	96

Parameter	Unit	29 September 2012
Dissolved Barium	g/m³	0.129
Dissolved Calcium	g/m³	11.2
Dissolved Iron	g/m³	1.55
Dissolved Magnesium	g/m³	2.4
Dissolved Nickel	g/m³	<0.0005
Dissolved Potassium	g/m³	14.0
Dissolved Sodium	g/m³	8.1
Dissolved Zinc	g/m³	0.0074
Bromide	g/m³	0.18
Chloride	g/m³	26
Nitrite-N	g/m³	0.006
Nitrate-N	g/m³	1.75
Nitrate-N + Nitrite-N	g/m³	1.75
Sulphate	g/m³	7.9
Ethylene Glycol	g/m³	<4
Propylene Glycol	g/m³	<4
Methanol	g/m³	<2
Benzene	g/m³	<0.0010
Toulene	g/m³	<0.0010
Ethylbenzene	g/m³	<0.0010
m&p-Xylene	g/m³	<0.002
o-Xylene	g/m³	<0.0010
Formaldehyde	g/m³	<0.02
Ethane	g/m³	<0.003
Ethylene	g/m³	<0.004
Methane	g/m³	0.126
C7-C9	g/m³	<0.10
C10-C14	g/m³	<0.2
C15-C36	g/m³	<0.4
Total hydrocarbons (C7-C36)	g/m³	<0.7

The results in Table 5 the show that there is no indication of groundwater contamination related to the storage of hydraulic fracturing fluids within the clay lined pit or MBC activities at the site. The results do indicate a low concentration of dissolved methane in the groundwater, common across the Taranaki Region, including areas where no exploration activities have been carried out.

It is considered that the slight variations seen in Table 5 by comparison with data from other sites (not shown) are not a result of hydraulic fracturing operations, but are natural variances in groundwater between sites and as seasons change. No levels are of any environmental significance.

2.3.3 Land status

The well site was constructed on a flat rural area. There were relatively minor earthworks undertaken to construct the site. The land had not been reinstated at the time of the last inspection.

2.4 Contingency plan

Todd Energy Limited has provided a general contingency plan, as required by Condition 4 of resource consent 4388-2 with site specific maps. The contingency plan was reviewed and approved by officers of the Council in May 2011.

2.5 Investigations, interventions and incidents

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The 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).

During the monitoring period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, associated with Todd Energy Limited's activities at the Waitui wellsite.

3. Discussion

3.1 Discussion of exercise of consents

Of the seven resource consents relating to the Waitui wellsite, consent **7455-1** (take surface water) **7456-1** (take groundwater), **7452-1** (air discharge associated with exploration), **4388-2** (to discharge treated stormwater and produced water), **7454-1** (to discharge stormwater and sediment from earthworks during construction), and **7453-1** (discharge to land – mix-bury-cover) were exercised and actively monitored.

Flaring in association with production activities was not exercised during the monitoring period as permitted by resource consent **7459-1** (air discharge associated with production).

Some drilling waste was disposed of via mix-bury-cover on site and some (including all fracturing wastes) was transported off site to a consented facility. It is considered that all remaining resource consent conditions were complied with during the monitoring period, including the provision of various pieces of information (contingency plan, notifications etc).

3.2 Environmental effects of exercise of consents

Stormwater

The discharge of stormwater from earthworks has the potential for sediment and other contaminants to enter surface water where it may detrimentally affect in-stream flora and fauna. To mitigate these effects, Todd Energy Limited established perimeter drains during the construction of the wellsite, and care was taken to ensure runoff from disturbed areas was directed into the drains or directed through adequate silt control structures.

Once the well was constructed, attention was given to controlling stormwater that ran off the wellsite and the associated plant and equipment.

Adverse effects on surface water quality can occur if contaminated water escapes through the stormwater system. Interceptor pits are designed to trap sediment and hydrocarbons through gravity separation. Any water that is unsuitable for release via the interceptor pits was directed to the drilling sumps, or removed for off-site disposal.

Todd Energy Limited also undertook the following mitigation measures in order to minimise off-site adverse effects:

- All stormwater was directed via perimeter drains to the skimmer pits for treatment prior to discharge;
- Additional bunding was constructed around the bulk fuel tank, chemical storage area, and other areas where runoff from areas containing contaminants could occur;
- Regular inspections of the interceptor pits occurred; and
- Maintenance and repairs were carried out if required.

Interceptor pits do not discharge directly to surface water, instead they discharge onto and into land where the discharge usually soaks into the soil before reaching any surface water. However, if high rainfall had resulted in the discharge reaching the surface water, significant dilution would have occurred.

There are numerous on-site procedures included in drilling and health and safety documentation that are aimed at preventing spills on-site, and further procedures that address clean-up to remedy a spill situation before adverse environmental effects have the opportunity to occur (for example bunding of chemicals and bulk fuel).

Groundwater

Small amounts of groundwater may have been encountered as produced water during operations at the wellsite. It was anticipated that the abstraction of groundwater would not impact on any groundwater resource and that the groundwater would not be affected as it would be protected by the well casing.

Flaring

The environmental effects from flaring have been evaluated in monitoring reports prepared by the Council in relation to the flaring emissions from specific wells in the region.

The Council has previously undertaken field studies at two wells (one gas, and the other producing oil and heavier condensates); together with dispersion modelling at a third site[1]. More recently two studies have focused on field investigations and modelling of emissions from flares involving fracturing fluids.[2]

In brief, the previous studies found that measurements of carbon monoxide, carbon dioxide, and methane concentrations to be safe at all points downwind, including within 50 m of the flare pit. Measurements of suspended particulate matter found concentrations typical of background levels, and measurements of PM_{10} found compliance with national standards even in close proximity to the flare. Beyond 120 m from the flare pit, concentrations of polyaromatic hydrocarbons (PAH) approached background levels, as did levels of dioxins beyond 250 m from the flare.

In summary, the studies established that under combustion conditions of high volume flaring of gases with some light entrained liquids etc., atmospheric concentrations of all contaminants had reduced by a distance of 250 m downwind to become essentially typical of or less than elsewhere in the Taranaki environment (for example urban areas). These levels are well below any concentrations at which there is any basis for concern over potential health effects.

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[1] Taranaki Regional Council, *Fletcher Challenge Energy Taranaki Ltd, Mangahewa 2 Gas Well Air Quality Monitoring Programme Report 1997 – 98,* August 1998.
[2]Taranaki Regional Council: *Atmospheric Dispersion Modelling of Discharges to Air from the Flaring of Fracturing Fluid*, Backshall, March 2013; and *Investigation of air quality arising from flaring of fracturing fluids -emissions and ambient air quality, Technical Report 2012– 03,* Taranaki Regional Council May 2012.

The measures to be undertaken by Todd Energy Limited to avoid or mitigate actual or potential adverse environmental impacts on air quality included:

- The use of a test separator to separate solids and fluids from the gas during all well clean-ups, and workover activities where necessary, thus reducing emissions to air. In particular, this would reduce the potential for heavy smoke incidents associated with elevated PAH and dioxin emissions;
- Records of flaring events are kept by Todd Energy Limited and provided to the Council;
- Every endeavor was made by Todd Energy Limited to minimise the total volume of gas flared while ensuring that adequate flow and pressure data was gathered to inform their investment decision; and
- Every endeavor was made by Todd Energy Limited to minimise smoke emissions from the flare.

Odour and dust

Suppression of dust with water was to be implemented if it was apparent that dust may be travelling in such a direction to adversely affect off-site parties. Odour may stem from the product, flare, or some of the chemicals used on-site. Care was taken to minimise the potential for odour emissions (for example by keeping containers sealed, and ensuring the flare burnt cleanly).

Hazardous substances

The use and storage of hazardous substances on-site has the potential to contaminate surface water and soils in the event of a spill. In the unlikely event of a serious spill or fire, the storage of flammable materials could have resulted in air, soil and water contamination.

Todd Energy Limited was required to implement the following mitigation measures:

- All potentially hazardous material were used and stored in accordance with the relevant Hazardous Substances and New Organisms regulations;
- All areas containing hazardous chemicals were bunded;
- Sufficient separation of chemicals from the flare pit were maintained for safety reasons;
- In the unlikely event of a spill escaping from bunded areas, the site perimeter drain and interceptor pit system was implemented to provide secondary containment on-site; and
- A spill contingency plan was prepared that sets out emergency response procedures to be followed in the event of a spill.

Hydraulic fracturing

The process of hydraulic fracturing results in some chemicals (for example clay stabilisers) being absorbed into the rock, where some may be residually trapped near the fracture face. The chemicals used in the fracturing process are classified as hazardous substances. However, these additives used in the process make up less than 5% of the total volume of fluid, the remaining being water and proppant. In a

concentrated form some of the chemicals used in the fluid are toxic, but prior to the activity they are highly diluted as part of the process. The majority of the fluid returns to the surface for controlled disposal at a consented facility.
Hence, there is a discharge of contaminants (energy, chemicals, water and inert sand/ small ceramic pellets) to land at considerable depth that has minor and temporary changes to the physical and chemical condition of the land (reservoir) in a way that does not affect other foreseeable users of the land and water resources.

The interval fractured is generally over 3 km below the surface. It is isolated by a considerable thickness of impermeable rock. The reservoir sands are known to contain hydrocarbons at pressures that exceed hydrostatic pressure, proving that the cap rock is relatively impermeable to the flow of water and hydrocarbons over very long time scales and high pressures.

The potential for the hydraulic fracturing activities to trigger seismic activity, particularly if located near faults within the formation has also been raised as a concern by some individuals. However, hydraulic fracturing is designed to create certain fractures in the rock and on a geological scale these are insignificant. The fissures created by the fracturing discharge are generally less than 400 m long, several mm wide and roughly 20 m thick into reservoir rock. These are very small features on a geological scale, and are not envisaged to create any increased risk of significant seismic activity.

The risk of the reservoir being fractured with a failure of the geological seal causing fracture fluids to migrate upwards and contaminate groundwater resources is considered extremely low. This is a result of numerous geological seals acting as natural barriers that stop any fracture fluids migrating upward.

Concern has also been raised that shallow groundwater may become contaminated from chemicals used in the hydraulic fracturing process. It is alleged that fluids may return to the surface via poorly sealed well casing or via cracks created through the fracturing process, rendering groundwater unsafe for human consumption. These hydro-geological risks of hydraulic fracturing affecting potable groundwater arise from two potential sources. The integrity of the well being used for the hydraulic fracturing, including the well casing and cement programme; and the geologic integrity of the reservoir seal and seals above this.

As a result of fracture design and modelling, coupled with extensive monitoring, the potential for groundwater to be impacted by hydraulic fracturing of a properly constructed well is extremely low and highly unlikely.

Summary

There were no significant adverse environmental effects observed to water, land or air as a result of the wellsite activities during the monitoring period.

3.3 Evaluation of performance

A tabular summary of Todd Energy Limited's compliance record for the period under review is set out in Tables 6-12.

Table 6 Summary of performance for Consent **7456-1** to take groundwater that may be encountered during exploration and production operations

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. The abstraction must not cause more than a 10% lowering of static water level by interference with any adjacent bore	Complaints	Yes (no complaints were received)
2. The abstraction does not cause the intrusion of salt water into any freshwater aquifer	No produced water	Yes
3. A well log to 1,000 m must be submitted to the Council	Well log to 1,000 m submitted	Yes
4. Maintain records of abstraction	No produced water	Yes
5. Consent shall lapse if not implemented by date specified	Notification received and confirmed by inspection	N/A
6. Notice of Council to review consent	Notice of intention /not served	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 7 Summary of performance for Consent **7459-1** to discharge emissions to air associated with production activities including flaring associated with emergencies, maintenance and minor emissions

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. 24hrs notice of flaring to the Council when flaring is longer than 5 minutes in duration	Notification received 24hrs prior to flaring	N/A (consent not exercised)
2. 24hrs notice of flaring to residents within 1000metres of the site	Residents notified	N/A
3. No alteration to plant or equipment without prior consultation	No alteration noted	N/A
4. Regard for predicted and prevailing wind conditions at time of flaring	Visually inspecting site, procedures & processes	N/A
5. Liquid and solid separation to occur before flaring to minimise smoke emissions	Inspection of flare pit and flare	N/A
6. Separation failure	Visually inspecting site, procedures & processes	N/A
7. No liquid or solid hydrocarbons to be combusted through gas flare system	Inspection of flare pit	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
8. Adopt best practicable option	Inspection of site, procedures & processes	N/A
9. Only substances originating from well stream to be combusted in flare pit	Visual inspection of site	N/A
10. No offensive odour or smoke beyond boundary	Assessment by investigating officer	N/A
11. All storage tanks to have vapour recovery systems fitted.	Visual inspection of site	N/A
12. Opacity of smoke emissions	Visual inspection of site	N/A
13. Control of carbon monoxide	Inspection of Company records	N/A
14. Control of nitrogen oxide	Inspection of Company records	N/A
15. Control of other emissions	Inspection of Company records	N/A
16. Control of other emissions to levels outlined in workplace exposure standards	Inspection of Company records	N/A
17. Analysis of typical gas and condensate stream from field to be made available to the Council	Available upon request	N/A
18. Record time, duration and cause of any smoke event	Inspection of Company records	N/A
19. Log all flaring events longer than 5 minutes or 10 minute aggregate or longer in any 120 minute period)	Inspection of Company records	N/A
20. Provide Council with a report detailing: smoke emissions, measures to reduce emissions.	Report was to be provided if exercised	N/A
21. Consent shall lapse if not implemented by date specified	N/A	N/A
22. Notice of Council to review consent	No provision for review during period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A
Overall assessment of administrative performance in respect of this consent		N/A

Table 8 Summary of performance for Consent **7452-1** to discharge emissions to air from flaring of hydrocarbons and miscellaneous emissions

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Flaring shall not occur for more than 15 days per zone, for up to four zones per well, for up to 6 wells	Inspection of records	Yes
2. Provide logs of all flaring to Council prior to undertaking flaring in excess of 45 days	Inspections of records	Yes
3. 24hrs notice of flaring to the Council for initial flare of each zone	Notification received 24hrs prior to flaring	Yes
4. 24hrs notice of flaring to residents within 1000m of site	Notifications undertaken	Yes
5. No alteration to plant or equipment without prior consultation	No alterations undertaken	Yes
6. Regard for predicted and prevailing wind conditions during flaring	Visually inspecting site, procedures & processes	Yes
7. Liquid and solid separation	Visually inspecting site, procedures & processes	Yes
8. Separation failure	Inspection of Company records	Yes
9. No liquid or solid hydrocarbons combusted through the flare system	Inspection of Company records	Yes
10. Gas shall be combusted so emissions of smoke minimised	Inspections of Company records	Yes
11. Adopt best practicable option	Inspection of site, procedures & processes	Yes
12. Only substances originating from the well to be combusted within the flare pit	Inspection of Company records	Yes
13. No offensive odour or smoke at or beyond the boundary	Inspection of Company records	Yes
14. Opacity of smoke emissions	Inspection of Company records	Yes
15. Control emissions of carbon monoxide	Inspection of Company records	Yes
16. Control emissions of nitrogen oxides	Inspection of Company records	Yes
17. Control of other emissions	Inspection of Company records	Yes
18. Control of other emissions to levels outlined in workplace exposure standards	Inspections of Company records	Yes
19. Analysis of typical gas and condensate stream from field to be made available to the Council	Available upon request	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
20. Record time, duration and cause of any smoke event	Inspection of Company records	Yes
21. Make log of all flaring available to Council	Available upon request	Yes
22. Consent lapse	N/A	N/A
23. Notice of Council to review consent	No provision for review during period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 9 Summary of performance for Consent **7453-1** to discharge sump material and solid drilling wastes [drilling cuttings and residual drilling fluids]

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspection of site, procedures & processes	Yes
2. The Council to be notified 48hrs prior to and after each mix-bury-cover discharge	Notification received	Yes
3. Records of composition, volumes and quantities of material to be discharged shall be kept	Inspection of Company records	Yes
4. Discharge of existing sump material to be as indicated in consent application	Inspection of Company records and site	Yes
5. The volume of waste discharged shall not exceed 1,500 m^3 per well	Inspection of Company records and site	Yes
6. Discharge areas for wastes to be kept separate and distinct	Visually inspecting site, procedures & processes	Yes
7. Mix-bury-cover discharge shall not occur within 12 months of any previous mix-bury-cover discharge	Inspection of Company records	Yes
8. As far as practicable, all fluids shall be removed from the drilling wastes	Visually inspecting site, procedures & processes	Yes
9. All sumps are to be permeable	Visually inspecting sumps	Yes
10. Drilling waste to be mixed with uncontaminated soil	Sampling soil prior to mixing	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
11. Solid drilling wastes and uncontaminated soil shall be covered by at least one metre of uncontaminated soil	Visually inspecting site, procedures & processes	Yes
12. Each mix-bury-cover discharge shall be re-vegetated and maintained with pasture cover	Visual inspection of site	Yes
13. Compact and contour cover material so stormwater is directed away from the mix-bury-cover site.	Visual inspection of site	Yes
14. Mix-bury-cover site to be above the groundwater table as far as practicable	Visual inspection of site	Yes
15. The mix-bury-cover must be 30m from any water body, spring or bore	Visual inspection of site	Yes
16. The total loading of trace elements in waste is not to exceed Alberta Energy and Utilities Board, 1996, G-50 guidelines	Inspection of Company records	Yes
17. Chloride levels in each mix-bury-cover shall not exceed 1,600kg	Sample mix-bury-cover to ensure compliance	Yes
18. Nitrogen levels in each mix-bury-cover shall not exceed 400kg	Sample mix-bury-cover to ensure compliance	Yes
19. The hydrocarbon content of solid drilling waste shall not exceed 15mg/kg & 100mg/kg for sump material	Sample mix-bury-cover to ensure compliance	Yes
20. Monthly samples from unnamed trib adjacent to sump material discharge area for 12 months	Results provided to Council	Yes
21. Various parameters in the soil covering the mix-bury-cover to be below agreed limits	Sample mix-bury-cover to ensure compliance	Yes
22. Various metals in the soil covering the mix-bury-cover to be below agreed limits	Sample mix-bury-cover to ensure compliance	Yes
23. Hydrocarbon concentrations in the soil covering the mix-bury-cover shall comply with agreed guideline values	Sample mix-bury-cover to ensure compliance	Yes
24. Level of salts in surface & ground water not to exceed 2,500g/m^3	Sample mix-bury-cover to ensure compliance	Yes
25. Consent shall lapse if not implemented by date specified	N/A	N/A
26. Notice of Council to review consent	N/A	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 10 Summary of performance for Consent **4388-2** to discharge treated stormwater, and produced water

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder to adopt best practicable option at all times	Visually inspecting site, procedures & processes	Yes
2. Stormwater catchment area	Visual inspection of site	Yes
3. Notify Council 7 days prior to site works commencing	Visual inspection of site	Yes
4. Maintain a contingency plan	Contingency plan received and approved	Yes
5. Design, construction, management and maintenance of stormwater system to be in accordance with information submitted	Comparing submitted and approved plans with as built site	Yes
6. Stormwater and produced water to be directed for treatment through the stormwater system	Visually inspecting site, procedures & processes	Yes
7. Hazardous substance storage areas shall be bunded with drainage to sumps or other appropriate system	Visually inspecting site, procedures & processes	Yes
8. Constituents in the discharge to be within specified limits	Sampling	Yes
9. Conductivity limit	Sampling	Yes
10. Sodium absorption ratio limit	Sampling	Yes
11. Constituent limits at time of surrender, expiry or cancellation of consent	Sampling	Yes
12. No direct discharge of contaminants to surface water	Visually inspecting site, procedures & processes	Yes
13. Representative composite soil samples collected from land where discharge is to occur	Sample results received	Yes
14. Records of produced water discharges to land	Visually inspecting site, procedures & processes	Yes
15. Management plan to Council prior to discharging produced water	Visually inspecting site, procedures & processes	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
16. Notify 48 hours prior to site reinstatement	Site not yet reinstated	Yes
17. Consent lapse	N/A	N/A
18. Notice of Council to review consent	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 11 Summary of performance for Consent **7454-1** to discharge stormwater and sediment from earthworks during construction

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Construction of site drainage system to be in accordance with submitted information	Visually inspecting site, procedures & processes	Yes
2. All runoff shall pass through settlement ponds or traps with a minimum capacity of 100 m3	Site erosion and sediment control plan submitted	Yes
3. 7 days written notice prior to commencement of works	Notification received	Yes
4. Earthworks areas to be stabilised vegetatively	Visual inspection	Yes
5. No direct discharge of contaminants to surface water	Visual inspection	Yes
6. Consent lapse	N/A	N/A
7. Notice of Council to review consent	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 12 Summary of performance for Consent **7455-1** to take water from the Manganui River for wellsite and well drilling activities

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Volume of water taken not to exceed 100 m^3 per day, at rate not exceeding 25 l/s	Inspection of company records and site	Yes
2. Install and maintain a water meter	Visual inspection of site, procedures and processes	Yes
3. Electronic records of water taken available to Council	Records received	Yes
4. Maintain record of abstraction including date, volume, hours,	Available upon request	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
available to council		
5. All reasonable steps to avoid, remedy or mitigate any adverse effects	Visual inspection of site, procedures, and processes	Yes
6. Ensure the intake structure is properly screened	Visual inspection of site, procedures and processes	Yes
7. Consent lapse	N/A	N/A
8. Notice of Council to review consent	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the monitoring period, Todd Energy Limited demonstrated a high level of environmental and administrative performance and compliance with the resource consents. The site was generally neat, tidy, and well maintained.

3.4 Exercise of optional review of consents

Each resource consent includes a condition which allows the Council to review the consent, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of the resource consent, which were not foreseen at the time the application was considered or which it was not appropriate to deal with at the time. The next provision for review of all seven consents is in June 2015.

Based on the results of monitoring during the period 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.

3.5 Alterations to monitoring programmes

In designing and implementing the monitoring programmes for air and water discharges and water abstractions at well sites in the region, the Council takes into account the extent of information made available by previous and other authorities, its relevance under the RMA, the obligations of the RMA in terms of monitoring emissions/discharges and effects, and of 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 wellsite processes within Taranaki.

The Council has routinely monitored wellsite activities for more than 20 years in the region. This work has included in the order of hundreds of water samples and biomonitoring surveys in the vicinity of well sites, and has demonstrated robustly that a monitoring regime based on frequent and comprehensive inspections is rigorous and thorough, in terms of identifying any adverse effects from wellsite and associated activities. Furthermore, with regard to hydraulic fracturing activities, baseline groundwater monitoring samples have demonstrated that hydraulic

fracturing discharges have not given rise to any significant adverse effects on groundwater aquifers within the region. However, the Council had for a time not routinely required the additional targeted physicochemical and biological monitoring unless a site-specific precautionary approach indicated this would be warranted for certainty and clarity around site effects.

In addition, the Council has also noted a desire by some community areas or individuals for a heightened level of information feedback and certainty around the results and outcomes of monitoring at wellsites. The Council has therefore moved to extend the previous regime, to make the sampling and extensive analysis of groundwater and surface waters in the general vicinity of a wellsite where hydraulic fracturing occurs, and biomonitoring of surface water ecosystems, an integral part of the basic monitoring programme for such activities.

Therefore, it is proposed that for any further work at the Waitui wellsite, the new standard programme will continue to be repeated, notwithstanding the lack of any effects or concerns previously found. A recommendation to this effect is attached to this report.

4. Recommendations

1. THAT this report be forwarded to the Company, and to any interested parties upon request;

2. THAT the monitoring of future consented activities at Waitui wellsite be extended to include the sampling and extensive analysis of both groundwater and surface waters in the general vicinity of a wellsite where hydraulic fracturing occurs;

3. THAT the monitoring of future consented activities at Waitui wellsite be extended to include a biomonitoring survey;

4. THAT, subject to the findings of monitoring of any further activities at the Waitui wellsite consents shall not be reviewed in June 2015.

Glossary of common terms and abbreviations

The following abbreviations and terms may have been used within this report:

Al*	Aluminium.
As*	Arsenic.
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.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate .
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Condy	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Cu*	Copper.
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
F	Fluoride.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
l/s	Litres per second.
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.
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties(e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM_{10}	Relatively fine airborne particles (less than 10 micrometre diameter).
Resource consent	Refer Section 87 of the RMA. Resource consent 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 subsequent amendments.
SS	Suspended solids.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
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.
Zn*	Zinc.

*an abbreviation for a metal or other analyte may be followed by the letters 'As', to denote the amount of metal recoverable in acidic conditions. This is taken as indicating the total amount of metal that might be solubilised under extreme environmental conditions. The abbreviation may alternatively be followed by the letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

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

Appendix I

Resource consents

Discharge Permit

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH 4340
Decision Date:	13 May 2009
Commencement Date:	13 May 2009

Conditions of Consent

Consent Granted:	To discharge treated stormwater and treated produced water from hydrocarbon exploration and production operations at the Mystone-A wellsite onto and into land within the vicinity of an unnamed tributary of the Mangaone Stream in the Waitara catchment at or about (NZTM) 1713506E-5669875N
Expiry Date:	1 June 2027
Review Date(s):	June 2010, June 2011, June 2012, June 2015, June 2021
Site Location:	Mystone-A wellsite, Rimutauteka Road, Inglewood [Property owner: NB & HR Dunlop]
Legal Description:	Lot 2 DP 364575
Catchment:	Waitara
Tributary:	Mangaone

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 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 effect on the environment associated with the discharge of contaminants from the site.

2. Stormwater discharged shall be collected from a catchment area of no more than 12,000 m^2.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 7 days prior to any site works commencing, and again in writing at least 7 days prior to any well drilling operation commencing. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable if the consent holder does not have access to email.

4. The consent holder shall prepare and maintain a contingency plan that details measures and procedures to be undertaken that will, to the satisfaction of the Chief Executive, Taranaki Regional Council, prevent spillage or accidental discharge of contaminants not authorised by this consent and avoid, remedy or mitigate the environmental effects of such a spillage or discharge.

5. The design, construction, management and maintenance of the stormwater system shall be undertaken in accordance with Drawing No. 08238-02 supplied in support of applications 6207-6211.

6. All stormwater and produced water shall be directed for treatment through the stormwater treatment system before being discharged.

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

8. Constituents in the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm^{-3}
total recoverable hydrocarbons	Concentration not greater than 15 gm^{-3}
chloride	Concentration not greater than 50 gm^{-3}

This condition shall apply at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

9. The conductivity of the soil layer containing the discharge shall not exceed 400 mSm^{-1} or 100 mSm^{-1} above the background concentrations established prior to the exercise of this consent whichever is greater.

10. The sodium absorption ratio [SAR] of the soil layer containing the discharge shall be maintained at less than 18.0, or alternatively if the background soil SAR exceeds 18.0, the exercise of this consent shall not increase the SAR by more than 1.0 over the background concentrations established prior to the exercise of this consent.

11. Prior to the expiry, cancellation, or surrender of this consent soil parameters shall not exceed the following limits: conductivity, 290 mSm^{-1}; total dissolved salts, 2500 gm^{-3}; sodium, 460 gm^{-3}; and chloride, 700 gm^{-3}.

12. The exercise of this consent shall not lead, or be liable to lead to a direct discharge of contaminants to a surface water body.

13. Prior to the exercise of this consent the consent holder shall undertake an analysis of representative composite soil samples collected from the area of land where the discharge is to occur. Analyses shall be undertaken of conductivity, pH, total soluble salts, sodicity and chloride and the results shall be forwarded to the Chief Executive, Taranaki Regional Council.

14. Whenever produced water is discharged to land the consent holder shall keep records of the following:

    a) the results of analysis of a monthly representative sample of the composition of the treated produced water, which is being or will be discharged on the site [including pH level, electro-conductivity, Salinity, and concentration of total hydrocarbons];
    b) volumes of treated produced water discharged directly to land; and
    c) sampling, analysis and results of monitoring undertaken by the consent holder.

    and shall forward these records to the Chief Executive, Taranaki Regional Council, on a quarterly basis, or as requested by the Council.

15. Before discharging any produced water onto land, the consent holder shall prepare a management plan that, to the satisfaction of the Chief Executive, Taranaki Regional Council, demonstrates how the activity will be undertaken to comply with all of the conditions of this consent. The management plan shall be reviewed prior to the commencement of every new drilling programme or as requested by the Chief Executive, Taranaki Regional Council, and shall include as a minimum:

    a) sampling regime
    b) contingency procedures; and
    c) site reinstatement and monitoring.

16. The consent holder shall advise the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the reinstatement of the site and the reinstatement shall be carried out so as to minimise effects on stormwater quality. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable if the consent holder does not have access to email.

17. This consent shall lapse on 30 June 2014, 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.

18. 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 2010 and/or June 2011 and/or June 2012 and/or June 2015 and/or June 2021, 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 15 November 2013

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH 4340
Decision Date:	8 April 2009
Commencement Date:	8 April 2009

Conditions of Consent

Consent Granted:	To discharge emissions into the air from flaring of hydrocarbons and miscellaneous emissions associated with well clean-up, well testing and production testing associated with exploration activities of up to four new wells at the Mystone-A wellsite at or about (NZTM) 1713506E-5669875N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Mystone-A wellsite, Rimutauteka Road, Inglewood
Legal Description:	Lot 2 DP 364575

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

Exercise of consent

1. Flaring shall not occur on more than 15 days per zone, for up to 6 zones per well.

Information and notification

2. Before undertaking any flaring in excess of 45 days for any well the consent holder shall provide to the Taranaki Regional Council logs of all flaring, including time, duration, zone, and volumes of substances flared relating to that well and shall provide up-to-date copies of this information before the commencement of flaring relating to any subsequent zones of that same well.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, at least 24 hours before the initial flaring of each zone being commenced. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable if the consent holder does not have access to email.

4. At least 24 hours before any flaring, the consent holder shall provide notification to all residents within 1000 metres of the wellsite of the commencement of flaring. The consent holder shall include in the notification a 24-hour contact telephone number for a representative of the consent holder, and shall keep and make available to the Chief Executive, Taranaki Regional Council, a record of all queries and complaints received in respect of any flaring activity.

5. No alteration shall be made to plant equipment or processes which may substantially alter the nature or quantity of flare emissions or other wellsite emissions, including but not limited to the recovery of produced gas, other than as authorised by this consent , without prior consultation with the Chief Executive, Taranaki Regional Council.

Flaring

6. Other than for the maintenance of a pilot flare flame, the consent holder shall have regard to the prevailing and predicted wind speed and direction at the time of initiation of, and throughout, any episode of flaring so as to minimise offsite effects.

7. All gas that is flared during well clean-up, drill stem testing, initial testing, well workovers, or production testing, or at any other time, must first be treated by effective liquid and solid separation and recovery, to ensure that smoke emission during flaring is minimised.

8. If separation required by condition 7 cannot be implemented or maintained at any time while there is a flow from the well, whether natural or induced, then the consent holder shall immediately advise the Compliance Manager, Taranaki Regional Council, and shall in any case re-establish liquid separation and recovery within three hours.

9. Subject to special condition 8, no liquid or solid hydrocarbons shall be combusted through the gas flare system.

10. The gas shall be combusted so that emissions of smoke are minimised.

11. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any emission to air from the flare or any other emissions to air from the Mystone-A wellsite [including use of a separator during well clean-up].

12. Only substances originating from the well stream and treated as outlined by conditions 7, 8, 9, 10 and 11 shall be combusted within the flare pit.

13. There shall not be any offensive odour or smoke, as determined by an enforcement officer of the Taranaki Regional Council, at or beyond the boundary of the property where the wellsite is located.

14. The opacity of any smoke emissions shall not exceed a level of 1 as measured on the Ringelmann Scale.

15. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the flare so that, whether alone or in conjunction with any other emissions from the wellsite, 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 [mg/m^3] [eight-hour average exposure], or 30 mg/m^3 one-hour average exposure] at or beyond the boundary of the property where the wellsite is located.

16. The consent holder shall control all emissions of nitrogen oxides to the atmosphere from the flare, so that whether alone or in conjunction with any other emissions from the wellsite, the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 100 micrograms per cubic metre [$\mu g/m^3$] [24-hour average exposure], or 200 $\mu g/m^3$ [1-hour average exposure] at or beyond the boundary of the property where the wellsite is located.

17. The consent holder shall control emissions to the atmosphere, from the wellsite and flare, of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides so that, whether alone or in conjunction with any other emissions from the production station, is not hazardous or toxic or noxious at or beyond the boundary of the property.

18. The consent holder shall control emissions to the atmosphere from the wellsite and flare of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, so that whether alone or in conjunction with any emissions from the flare, 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 where the wellsite is located, is not increased above background levels:

    a) by more than $1/30^{th}$ of the relevant Occupational Threshold Value-Time Weighted Average, or by more than the Short Term Exposure Limit at any 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 three times the Time Weighted Average at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

Recording and reporting information

19. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request, an analysis of a typical gas and condensate stream from the field, covering sulphur compound content and the content of carbon compounds of structure C_6 or higher number of compounds.

20. Each time there is visible smoke as a result of the exercise of this consent, the consent holder shall record the time, duration and cause. The consent holder shall make the record available to the Chief Executive, Taranaki Regional Council, upon request.

21. The consent holder shall record and make available to the Chief Executive, Taranaki Regional Council, logs of all flaring, including time, duration, zone, and volumes of substances flared.

Lapse and Review

22. This consent shall lapse on 30 June 2014, 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.

23. 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 2015 and/or June 2021, for any of the following purposes:

    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;
    b) to alter, add or delete limits on mass discharge quantities or discharge or ambient concentrations of any contaminant;
    c) taking into account any Act of Parliament, regulation, national policy statement or national environmental standard which relates to limiting, recording, or mitigating emissions of gases which are products of combustion, and which is relevant to the air discharge from the Mystone-A wellsite.

Signed at Stratford on 15 November 2013

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH 4340
Decision Date (Change):	12 May 2009
Commencement Date (Change):	12 May 2009 [Granted: 31 March 2009]

Conditions of Consent

Consent Granted:	To discharge 1,000 m^3 of existing sump material and up to 6000 m^3 of solid drilling wastes [drilling cuttings and residual drilling fluids] from hydrocarbon exploration activities onto and into land via mix-bury-cover at the Mystone-A wellsite at or about (NZTM) 1713506E-5669875N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021 and/or the month during mix-bury-cover discharge
Site Location:	Mystone-A wellsite, Rimutauteka Road, Inglewood [Property owner: NB & HR Dunlop]
Legal Description:	Lot 2 DP 364575
Catchment:	Waitara
Tributary:	Mangaone

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

Conditions 1 - 2 unchanged

1. 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 effect on the environment associated with the discharge of contaminants from the site, including but not limited to effects on any water body or soil.

Notification and reporting requirements prior to discharge

2. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to commencement, and upon completion of each mix-bury-cover discharge. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable if the consent holder does not have access to email.

Condition 3 changed

3. For each mix-bury-cover discharge, the consent holder shall provide a record of the volume, composition [including concentrations of nitrogen, chloride, hydrocarbons, and trace elements to show that the discharge complies with conditions 16 to 19], types of drilling fluids used, and the location of the discharge area, to the Chief Executive, Taranaki Regional Council, prior to the discharge.

Discharge methods and limits

Condition 4 – new

4. The discharge of the existing sump material shall be located as indicated in the drawing titled "MBC Location Diagram – Mystone A Wellsite" supplied in support of application 6267.

Conditions 5 - 17 [previously 4 – 16] unchanged

5. The volume of solid drilling wastes discharged shall not exceed 1500 m^3 per well from up to 4 wells and up to 1000 m^3 of material from the existing sump.

6. Mix-bury-cover discharge areas for wastes from individual wells shall be kept separate and distinct.

7. No mix-bury-cover discharge shall occur within 12 months of any previous mix-bury-cover discharge at the site, except for the discharge of the existing sump material.

8. As far as practicable, all fluids shall be removed from the drilling wastes prior to discharge.

9. If sumps are used as drilling waste holding receptacles on the site, and the sump is to be used for a disposal area, the impermeable liner shall be perforated, and where possible removed, so that it no longer encloses the solid drilling wastes.

10. The solid drilling wastes shall be mixed with uncontaminated soil in a mixing ratio of 1 part solid drilling wastes to a minimum of 3 parts uncontaminated soil.

11. The mixture of solid drilling wastes and uncontaminated soil shall be covered by at least one metre of uncontaminated soil.

12. Each mix-bury-cover discharge area shall be revegetated, and thereafter maintained with pasture cover:

    a) within 6 months of the completion of the discharge, or
    b) if the discharge area is part of the active wellsite area, upon reinstatement of the site.

13. The consent holder shall compact, contour, and maintain the soil overlying the mix-bury-cover discharge to ensure that at all times all surface stormwater is directed away from the mix-bury-cover discharge area.

14. The mix-bury-cover discharge shall, as far as practicable, occur above the groundwater table.

15. The edges of the mix-bury-cover discharge area shall be at least 30 metres from any surface water body, spring, or any pre-existing groundwater supply bore.

16. The total loading of trace elements in the solid drilling wastes for each distinct mix-bury-cover discharge area shall not exceed the limits shown below:

Trace element	**Total loading limit**
boron	10 kg
cadmium	3 kg
chromium	200 kg
copper	400 kg
lead	200 kg
nickel	50 kg
vanadium	200 kg
zinc	600 kg

17. The loading of chloride shall not exceed 1,600 kg for each distinct mix-bury-cover discharge area.

Conditions 18 - 19 [previously 17 – 18] changed

18. The loading of nitrogen shall not exceed 400 kg for each distinct mix-bury-cover discharge area, or 900 kg for the existing sump material discharge area.

19. The hydrocarbon content of the solid drilling waste shall not exceed 0.0015% [15 mg/kg] on a dry weight basis, or 0.0100% [100 mg/kg] on a dry weight basis for the existing sump material.

Condition 20 – new

20. For the first twelve months after the discharge of the existing sump material the consent holder shall take a monthly sample from the adjacent unnamed tributary of the Mangaone Stream at or about Grid Reference [NZTM] 1713171E-5669900N and provide a record of the concentrations of ammonia and nitrate to the Chief Executive, Taranaki Regional Council.

Receiving environment limits

Conditions 21 - 26 [previously conditions 19 - 24] unchanged

21. At all times, parameters in the soil overlying the mix-bury-cover discharge area [less than 0.5 metre depth] shall not exceed the limits shown below:

Parameter	**Limit**
Conductivity	290 mSm^{-1}
Total dissolved salts	2500 gm^{-3}
Sodium	460 gm^{-3}
Chloride	700 gm^{-3}

22. At all times the levels of metals in the soil overlying the mix-bury-cover discharge area [less than 0.5 metre depth] shall comply with the limits shown below:

Metal	**Limit**
arsenic	20 mg kg^{-1}
cadmium	1 mg kg^{-1}
chromium	600 mg kg^{-1}
copper	100 mg kg^{-1}
lead	300 mg kg^{-1}
mercury	1 mg kg^{-1}
nickel	60 mg kg^{-1}
zinc	300 mg kg^{-1}

23. At all times the levels of hydrocarbons in the soil covering the mix-bury-cover discharge area [less than 0.5 metre depth] shall comply with the guideline values for the designated soil type in the surface layer set out in Tables 4.12 and 4.15 of the Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand [Ministry for the Environment, 1999], appended to this consent.

24. The exercise of this consent shall not cause the level of total dissolved salts within any surface water or ground water to exceed more than 2500 gm^{-3}.

Lapse and review

Conditions 25 - 26 [previously conditions 23 – 24] unchanged

25. This consent shall lapse on 31 March 2014, 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.

26. 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 following each mix-bury-cover discharge, and/or during the month of June 2015 and/or June 2021, 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 15 November 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Appendix 1

Tables 4.12 and 4.15 of the Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand [Ministry for the Environment, 1999].

Table 4.12 Tier 1 soil acceptance criteria *Agricultural use* [1,3,6] ALL PATHWAYS (all values mg/kg)

Soil Type/ Contaminant	Depth of contamination		
	Surface (<1m)	1m - 4m	> 4m
SAND			
MAHs			
Benzene	1.1 [v]	1.9 [7,v]	2.4 [7,v]
Toluene	(68) [4,v]	(94) [4,m]	(230) [4,v]
Ethylbenzene	(53) [4,v]	(92) [4,7,v]	(120) [4,v]
Xylenes	(48) [4,v]	(130) [4,7,v]	(180) [4,v]
PAHs			
Naphthalene	7.2 [p]	70 [v]	80 [v]
Non-carc. (Pyrene)	(160) [4,p]	NA [2]	NA [2]
Benzo(a)pyrene eq. [5]	0.027 [p]	(25) [4,m]	NA [2]
SANDY SILT			
MAHs			
Benzene	1.1 [v]	1.9 [v]	2.4 [v]
Toluene	(82) [4,v]	(170) [4,v]	(240) [4,v]
Ethylbenzene	(59) [4,v]	(92) [4,v]	(140) [4,v]
Xylenes	(59) [4,v]	(130) [4,v]	(180) [4,v]
PAHs			
Naphthalene	7.2 [p]	83 [v]	(130) [4,v]
Non-carc. (Pyrene)	(160) [4,p]	NA [2]	NA [2]
Benzo(a)pyrene eq. [5]	0.027 [p]	(25) [4,m]	NA [2]
SILTY CLAY			
MAHs			
Benzene	1.7 [v]	4.6 [v]	12 [v]
Toluene	(210) [4,v]	(950) [4,v]	(3,000) [4,v]
Ethylbenzene	(110) [4,v]	(800) [4,v]	(2,800) [4,v]
Xylenes	(160) [4,v]	(710) [4,v]	(2,200) [4,v]
PAHs			
Naphthalene	7.2 [p]	(330) [4,v]	(1,100) [4,v]
Non-carc. (Pyrene)	(160) [4,p]	NA [2]	NA [2]
Benzo(a)pyrene eq. [5]	0.027 [p]	(25) [4,m]	NA [2]

NOTES:

1. Based on protection of human health. Refer to Table 4.20 for protection of groundwater. Site-specific consideration of aesthetic and ecological impacts is required.
2. NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.
3. Surface soil acceptance criteria are based on the lower value of volatilisation criteria (Table 4.16), other pathway criteria (Table 4.18) and criteria for the protection of maintenance workers (Table 4.19). Criteria for soils at 1 m are based on the lower value of those arising from volatilisation and maintenance criteria. Criteria for soils at 4 m are based on volatilisation only.
4. Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons. For further explanation refer to Appendix 4M.
5. Risk associated with mixture of carcinogenic PAHs assessed by comparison with criteria based on benzo(a)pyrene equivalent concentration. Refer to Section 4.4.3 for details of the calculation of Benzo(a)pyrene equivalent concentrations.
6. The following notes indicate the limiting pathway for each criterion: v - Volatilisation, s - Soil Ingestion, d - Dermal, p - Produce, m - Maintenance/Excavation
7. Due to the nature of boundary conditions in volatilisation model, calculated criteria for sandy soils are higher than that for silt soil type. Therefore, the criteria for sand are set equal to the criteria for silt. Refer Appendix 4D for details.

Table 4.12 (CONTINUED)
Tier 1 soil acceptance criteria *Agricultural use* [1,3,6] ALL PATHWAYS
(all values mg/kg)

Soil Type/ Contaminant	Depth of contamination		
	Surface (<1m)	1m - 4m	> 4m
CLAY			
MAHs			
Benzene	2.7 [v]	8.8 [v]	(26) [4,v]
Toluene	(320) [4,v]	(2,400) [4,v]	(8,500) [4,v]
Ethylbenzene	(160) [4,v]	NA [2]	NA [2]
Xylenes	(250) [4,v]	(1,800) [4,v]	(6,500) [4,v]
PAHs			
Naphthalene	7.2 [p]	(360) [4,v]	(1,200) [4,v]
Non-carc. (Pyrene)	(160) [4,p]	NA [2]	NA [2]
Benzo(a)pyrene eq. [5]	0.027 [p]	(25) [4,m]	NA [2]
PUMICE			
MAHs			
Benzene	1.2 [v]	2.4 [v]	3.1 [v]
Toluene	(73) [4,v]	(240) [4,v]	(350) [4,v]
Ethylbenzene	(48) [4,v]	(140) [4,v]	(220) [4,v]
Xylenes	(53) [4,v]	(180) [4,v]	(260) [4,v]
PAHs			
Naphthalene	7.2 [p]	140 [v]	(220) [4,v]
Non-carc. (Pyrene)	(160) [4,p]	NA [2]	NA [2]
Benzo(a)pyrene eq. [5]	0.027 [p]	(25) [4,m]	NA [2]
PEATS AND HIGHLY ORGANIC SOILS			
MAHs			
Benzene	5.7 [v]	10 [v]	13 [v]
Toluene	(2,500) [4,v]	(2,900) [4,v]	(3,800) [4,v]
Ethylbenzene	(2,200) [4,v]	(2,500) [4,v]	(3,200) [4,v]
Xylenes	(1,700) [4,v]	(2,000) [4,v]	(2,600) [4,v]
PAHs			
Naphthalene	7.2 [p]	(2,700) [4,v]	(3,500) [4,v]
Non-carc. (Pyrene)	(160) [4,p]	NA [2]	NA [2]
Benzo(a)pyrene eq. [5]	0.027 [p]	(25) [4,m]	NA [2]

NOTES:

1. Based on protection of human health. Refer to Table 4.20 for protection of groundwater. Site-specific consideration of aesthetic and ecological impacts is required.
2. NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.
3. Surface soil acceptance criteria are based on the lower value of volatilisation criteria (Table 4.16), other pathway criteria (Table 4.18) and criteria for the protection of maintenance workers (Table 4.19). Criteria for soils at 1 m are based on the lower value of those arising from volatilisation and maintenance criteria. Criteria for soils at 4 m are based on volatilisation only.
4. Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons. For further explanation refer to Appendix 4M.
5. Risk associated with mixture of carcinogenic PAHs assessed by comparison with criteria based on benzo(a)pyrene equivalent concentration. Refer to Section 4.4.3 for details of the calculation of Benzo(a)pyrene equivalent concentrations.
6. The following notes indicate the limiting pathway for each criterion: v - Volatilisation, s - Soil Ingestion, d - Dermal, p - Produce, m - Maintenance/Excavation

Table 4.15 Tier 1 soil acceptance criteria for TPH[1,3,5,6] *Agricultural use* ALL PATHWAYS
(all values in mg/kg)

Soil Type/ Contaminant	Depth of contamination		
	Surface (<1m)	1m - 4m	> 4m
SAND			
C_7-C_9 [4]	120 [m]	120 [m]	(3,800) [7,8,v]
C_{10}-C_{14}	58 [x]	(560) [7,x]	(650) [7,x]
C_{15}-C_{36}	(4,000) [7,x]	NA [2]	NA [2]
SANDY SILT			
C_7-C_9 [4]	(500) [7,m]	(500) [7,m]	(3,800) [7,v]
C_{10}-C_{14}	58 [x]	(670) [7,x]	(4,900) [7,v]
C_{15}-C_{36}	(4,000) [7,x]	NA [2]	NA [2]
SILTY CLAY			
C_7-C_9 [4]	(2,700) [7,v]	(7,300) [7,v]	(19,000) [7,v]
C_{10}-C_{14}	58 [x]	(2,700) [7,x]	(8,900) [7,x]
C_{15}-C_{36}	(4,000) [7,x]	NA [2]	NA [2]
CLAY			
C_7-C_9 [4]	(15,000) [7,v]	NA [2]	NA [2]
C_{10}-C_{14}	58 [x]	(2,900) [7,x]	(9,700) [7,x]
C_{15}-C_{36}	(4,000) [7,x]	NA [2]	NA [2]
PUMICE			
C_7-C_9 [4]	(810) [7,m]	(810) [7,m]	(4,800) [7,v]
C_{10}-C_{14}	58 [x]	(1,100) [7,x]	(1,800) [7,x]
C_{15}-C_{36}	(4,000) [7,x]	NA [2]	NA [2]
PEATS AND HIGHLY ORGANIC SOILS			
C_7-C_9 [4]	(6,700) [7,m]	(6,700) [7,m]	NA [2]
C_{10}-C_{14}	58 [x]	NA [2]	NA [2]
C_{15}-C_{36}	(4,000) [7,x]	NA [2]	NA [2]

NOTES:

1. Criteria for C10 - C14 and C15 - C36 are based on consideration of aliphatic component of TPH measurement and consideration of TPH as a surrogate measure for PAH, consideration of PAHs completed by extrapolation of PAH content of diesel and PAH criteria (refer Table 4.10)
2. NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
3. Based on protection of human health only. Site specific consideration of aesthetic and ecological impact is required.
4. Based on health effects associated with aliphatic component only. Separate consideration of the health effects associated with the aromatic component (i.e. BTEX) is required.
5. Soil acceptance criteria are based on the lower value of criteria based on volatilisation (Table 4.16), other pathways (Table 4.18), criteria for the protection of maintenance workers (Table 4.19) and TPH criteria developed as surrogates for PAHs (Table 4.22). Surface soils criteria are based on all three pathways, criteria for soils at 1 m are based on volatilisation and maintenance workers, and criteria for soils at 4 m are based on volatilisation only. PAH surrogate considerations apply at all depths.
6. The following notes indicate the limiting pathway for each criterion: v - Volatilisation, s - Soil Ingestion d - Dermal, p - Produce, m - Maintenance/Excavation, x - PAH surrogate
7. Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons. For further explanation refer to Appendix 4M.
8. Due to the nature of boundary conditions in volatilisation model, calculated criteria for sandy soils are higher than that for silt soil type. Therefore, the criteria for sand are set equal to the criteria for silt. Refer Appendix 4D for details.

Discharge Permit

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH 4340
Decision Date:	31 March 2009
Commencement Date:	31 March 2009

Conditions of Consent

Consent Granted:	To discharge stormwater and sediment from earthworks during construction of the Mystone-A wellsite onto and into land at or about (NZTM) 1713506E-5669875N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Mystone-A wellsite, Rimutauteka Road, Inglewood [Property owner: NB & HR Dunlop]
Legal Description:	Lot 2 DP 364575
Catchment:	Waitara
Tributary:	Mangaone

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 construction of the site drainage system shall be undertaken in accordance with Drawing No. 08238-02 submitted in support of application 6209.

2. If any area of soil is exposed, all run off from that area shall pass through settlement ponds or sediment traps with a minimum total capacity of ;

a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and

b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;

unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.

3. At least 7 working days prior to the commencement of works the consent holder shall notify the Taranaki Regional Council of the proposed start date for the work. Notification shall include the consent number and a brief description of the activity consented and shall be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

4. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities.

5. The exercise of this consent shall not lead, or be liable to lead to a direct discharge of contaminants to a surface water body.

6. This consent shall lapse on 31 March 2014, 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.

7. 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 2015 and/or June 2021, 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 15 November 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Water Permit

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH 4340
Decision Date (Change):	17 December 2009
Commencement Date (Change):	17 December 2009 (Granted: 13 March 2009)

Conditions of Consent

Consent Granted:	To take water from the Manganui River for wellsite and well drilling activities during hydrocarbon exploration and production operations at the Mystone-A wellsite at or about (NZTM) 1711892E-5670883N [site of take] and 1713055E-5669860N [site of use]
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	Mystone-A wellsite, Rimutauteka Road, Inglewood [Property owner: NB & HR Dunlop]
Legal Description:	Pt Rimutauteka 7 Blk XIV Waitara SD [Site of take] Lot 2 DP 364575 [Site of use]
Catchment:	Waitara
Tributary:	Manganui

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 volume of water taken shall not exceed 100 cubic metres per day, at a rate not exceeding 25 litres per second.

2. Before exercising this consent the consent holder shall install, and thereafter maintain, a water meter. The water meter shall be tamper-proof and shall measure and record the rate and volume of water taken to an accuracy of ± 5%.

3. The consent holder shall make available electronic records of water taken to the Council at a frequency and in a format to be advised by the Chief Executive Taranaki Regional Council.

4. 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, no later than 31 July of each year, or earlier upon request.

5. Notwithstanding the terms and conditions of this consent the consent holder shall take all reasonable steps to avoid, remedy or mitigate any adverse effect on the environment arising from the exercise of this consent, including, but not limited to, the efficient and conservative use of water.

6. The consent holder shall ensure that the intake structure is appropriately screened to avoid the entrainment of fish.

7. This consent shall lapse on 31 March 2014, 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 2015, 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 15 November 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Water Permit

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH 4340
Decision Date:	13 March 2009
Commencement Date:	13 March 2009

Conditions of Consent

Consent Granted:	To take groundwater that may be encountered as produced water during hydrocarbon exploration and production operations at the Mystone-A wellsite at or about (NZTM) 1713055E-5669860N
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	Mystone-A wellsite, Rimutauteka Road, Inglewood [Property owner: NB & HR Dunlop]
Legal Description:	Lot 2 DP 364575
Catchment:	Waitara
Tributary:	Manganui

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 consent holder shall ensure the abstraction does not cause more than a 10% lowering of static water-level by interference with any adjacent bore.

2. The consent holder shall ensure the abstraction does not cause the intrusion of, or cross-contamination with salt water into any freshwater aquifer.

3. The consent holder shall submit, to the written satisfaction of the Chief Executive, Taranaki Regional Council, a summary well log to a depth of 1000 metres. The report shall:

   a) provide a log to show the true vertical depth to all geological formation tops intersected within the freshwater zone;
   b) identify the true vertical depth to, and thickness of, any freshwater aquifers intersected by the well;
   c) identify the true vertical depth to the freshwater- saline water interface in the well.

4. The consent holder shall maintain records of abstraction including date, volume of groundwater abstracted per day, water quality reports and shall make these records available to the Chief Executive, Taranaki Regional Council, upon request.

5. This consent shall lapse on 31 March 2014, 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 2015, 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 15 November 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH 4340
Decision Date:	31 March 2009
Commencement Date:	31 March 2009

Conditions of Consent

Consent Granted:	To discharge emissions to air during flaring from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the Mystone-A wellsite at or about (NZTM) 1713506E-5669875N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021 and/or within 6 months of receiving notification under special condition 20
Site Location:	Mystone-A wellsite, Rimutauteka Road, Inglewood [Property owner: NB & HR Dunlop]
Legal Description:	Lot 2 DP 364575

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 consent holder shall notify the Chief Executive, Taranaki Regional Council, whenever the continuous flaring of hydrocarbons [other than purge gas] is expected to occur for more than five minutes in duration. Notification shall be no less than 24 hours before the flaring commences. Notification shall include the consent number and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable if the consent holder does not have access to email.

2. At least 24 hours before any flaring, other than in emergencies, the consent holder shall provide notification to all residents within 1000 metres of the site of the commencement of flaring. The consent holder shall include in the notification a 24-hour contact telephone number for a representative of the consent holder, and shall keep and make available to the Chief Executive, Taranaki Regional Council, a record of all queries and complaints received in respect of any flaring activity.

3. No alteration shall be made to plant equipment or processes which may substantially alter the nature or quantity of flare emissions or other site emissions, including but not limited to the recovery of produced gas, other than as authorised by this consent , without prior consultation with the Chief Executive, Taranaki Regional Council.

Emissions from the site

4. Other than for the maintenance of a pilot flare flame, the consent holder shall have regard to the prevailing and predicted wind speed and direction at the time of initiation of, and throughout, any episode of flaring so as to minimise offsite effects.

5. All gas that is flared must first be treated by effective liquid and solid separation and recovery to ensure that smoke emission during flaring is minimised.

6. If separation required by special condition 5 cannot be implemented or maintained at any time while there is a flow from the well, whether natural or induced, then the consent holder shall immediately advise the Compliance Manager, Taranaki Regional Council, and shall in any case re-establish liquid and solid separation and recovery within three hours.

7. Subject to special condition 6, no liquid or solid hydrocarbons shall be combusted through the gas flare system, other than in an emergency.

8. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any emission to air from the flare or any other emissions to air from the Mystone-A wellsite [including use of a separator during well clean-up].

9. Only substances originating from the well stream and treated as outlined by conditions 5, 6, 7, and 8 shall be combusted within the flare pit.

10. There shall not be any offensive odour or smoke at or beyond the boundary of the property where the wellsite is located.

11. All permanent hydrocarbon storage vessels shall be fitted with vapour recovery systems.

12. The opacity of any smoke emissions shall not exceed a level of 1 as measured on the Ringelmann Scale.

13. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the flare so that, whether alone or in conjunction with any other emissions from the wellsite, 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 [mg/m^3] [eight-hour average exposure], or 30 mg/m^3 one-hour average exposure] at or beyond the boundary of the property where the wellsite is located.

14. The consent holder shall control all emissions of nitrogen oxides to the atmosphere from the flare so that, whether alone or in conjunction with any other emissions from the wellsite, the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 100 micrograms per cubic metre [$\mu g/m^3$] [24-hour average exposure], or 200 $\mu g/m^3$ [1-hour average exposure] at or beyond the boundary of the of the property where the wellsite is located.

15. The consent holder shall control emissions to the atmosphere, from the production station and flare, of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides so that, whether alone or in conjunction with any other emissions from the production station, is not hazardous or toxic or noxious at or beyond the boundary of the property.

16. The consent holder shall control emissions to the atmosphere from the wellsite and flare of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides so that, whether alone or in conjunction with any emissions from the flare, 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 where the wellsite is located, is not increased above background levels:

    a) by more than 1/30th of the relevant Occupational Threshold Value-Time Weighted Average, or by more than the Short Term Exposure Limit at any 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 three times the Time Weighted Average at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

Recording and reporting information

17. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request, an analysis of a typical gas and condensate stream from the field, covering sulphur compound content and the content of carbon compounds of structure C_6 or higher number of compounds.

18. Each time there is visible smoke as a result of the exercise of this consent, the consent holder shall record the time, duration and cause. The consent holder shall make the record available to the Chief Executive, Taranaki Regional Council, upon request.

19. The consent holder shall record and maintain a log of all continuous flaring events longer than five minutes duration, and any intermittent flaring lasting for an aggregate of ten minutes or longer in any 120-minute period. The log shall contain the date, the start and finish times of the flaring event, the quantity and type of material flared, and the reason for flaring. The log shall be made available to the Chief Executive, Taranaki Regional Council, upon request, and summarised annually in the report required under condition 20.

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

    i) detailing any energy efficiency measures implemented on the site;
    ii) detailing smoke emissions as required under condition 18;
    iii) detailing any measures undertaken or proposed to reduce smoke emissions;
    iv) detailing any measures undertaken or proposed to reduce flaring;
    v) addressing any other issue relevant to the minimisation or mitigation of emissions from the flare;
    vi) detailing any complaints received and any measures undertaken to address complaints; and

Lapse and Review

21. This consent shall lapse on 31 March 2014, 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.

22. 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 20 of this consent, and/or by giving notice of review during the month of June 2015 and/or June 2021, for any of the following purposes:

    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;
    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;
    c) to alter, add or delete limits on mass discharge quantities or discharge or ambient concentrations of any contaminant;
    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 gases which are products of combustion, and which is relevant to the air discharge from the Mystone-A.

Signed at Stratford on 15 November 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management