Todd Petroleum Mining Company Limited
McKee Production Station and Power Plant
Monitoring Programme
Biennial Report
2012-2014

Technical Report 2014-102

ISSN: 1178-1467 (Online)
Document: 1469083 (Word)
Document: 1629209 (Pdf)

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March 2016

Executive summary

Todd Petroleum Mining Company Limited operates a petrochemical production station and adjacent power plant located on Otaraoa Road near Tikorangi, bridging the Waitara and Onaero catchments. The McKee Production Station processes oil and gas from the Company's McKee and Mangahewa groups of wellsites and includes electricity generation and LPG production facilities. Located to the south of the production station, the McKee Power Plant was completed and commissioned during the 2012-2014 period. This 100 MW electricity generating facility provides both peak and base load power for the national grid. This report for the period July 2012-June 2014 describes the monitoring programme implemented by the Taranaki Regional Council to assess the Company's environmental performance during the period under review, and the results and environmental effects of the Company's activities.

The Company's subsidiaries, Todd Energy Limited and Nova Energy Limited, hold a total of fifteen resource consents for the sites, which include a total of 144 conditions setting out the requirements that the Company must satisfy. The subsidiaries hold two consents to allow for the take and use water, five consents to discharge stormwater and wastewater, four consents to discharge emissions into the air, one consent to allow the diversion of unnamed tributaries of the Mangahewa Stream, and three consents regarding the installation and use of structures.

During the monitoring period, the Company demonstrated an overall high level of environmental performance at these sites.

The Council's monitoring programme for the period under review included 11 inspections of the facilities and two of the associated wellsites, five water and five stream sediment samples collected for physicochemical analysis, four biomonitoring surveys of receiving waters, and two ambient air quality surveys.

Stormwater system inspections and self-monitoring showed that although there were three minor exceedances of consent limits for discharges from the production station, inspections and sampling of the receiving waters did not reveal any adverse effects on the Waitara River or Mangahewa Stream.

Biomonitoring in the Mangahewa Stream showed that while the community health at the upstream site continued to improve, the downstream site did not follow a similar trend. This may be related to the historical hydrocarbon contamination present in the stream sediment. Sampling of the sediments in the period under review found no detectable hydrocarbons at the upstream biomonitoring site and a significant, but declining, concentration of hydrocarbons at the downstream site.

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

During the period under review, the Company demonstrated an overall high level of both environmental performance and administrative compliance with the resource consents. There were no unauthorised incidents recorded by the Council in relation to the Company's

activities. The McKee Production Station and Power Plant were well managed and maintained.

For reference, in the 2012-2013 year, 35% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 59% demonstrated a good level of environmental performance and compliance with their consents. In the 2013-2014 year, 60% of consent holders achieved a high level of environmental performance and compliance with their consents, while another 29% demonstrated a good level of environmental performance and compliance.

This report includes recommendation for the 2014-2015 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is the Biennial Report for the period July 2012-June 2014 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by subsidiaries of Todd Petroleum Mining Company Ltd (the Company). Todd Energy Ltd operates the McKee Production Station (including the Mangahewa production facilities) and Nova Energy Ltd operates the McKee Power Plant, both situated on Otaraoa Road at Tikorangi, bridging the Waitara and Onaero catchments.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by the Company's subsidiaries that relate to abstractions and discharges of water within the Waitara and Onaero catchments, and the air discharge permits to cover emissions to air from the site.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the 24th combined annual report by the Council for the McKee facilities.

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about compliance monitoring under the RMA and the Council's obligations and general approach to monitoring sites though annual programmes, the resource consents held by the Company in the Waitara and Onaero catchments, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted at the McKee Production Station.

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

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

Section 4 presents recommendations to be implemented in the 2014-2015 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

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

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

1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by the consent holder/s 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.

For reference, in the 2012-2013 year, 35% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 59% demonstrated a good level of environmental performance and compliance with their consents. In the 2013-2014 year, 60% of consent holders achieved a high level of environmental performance and compliance with their consents, while another 29% demonstrated a good level of environmental performance and compliance.

1.2 Process description

Photo 1 McKee Production Station

The McKee Production Station (MPS) is situated on Otaraoa Road, near Tikorangi and was commissioned in November 1984. It receives and processes oil and gas from a number of wellsites within the area. The Mangahewa Production Station is adjacent to

the MPS and processes hydrocarbons from the Mangahewa wellsites. It came on-stream in September 2001. The surrounding land is predominantly dairying.

Raw product from the wellsites is separated into gas, crude oil and condensate. These products are transported via either pipeline or road tanker to the Omata tank farm in New Plymouth. Produced water is a by-product of the process and this is deep well injected. All uncontaminated stormwater from the McKee and Mangahewa sites passes through a skimmer pit at the McKee site and discharges to the Mangahewa Stream. Treated impounded stormwater is discharged to the Waitara River.

A gas-powered electricity generation plant (EGP), comprised of three generation units, capable of producing a total of up to 9.1 MW of electricity, was commissioned early in 2009. During the monitoring period, an adjoining LPG plant was completed and commissioned in the southern corner of the site.

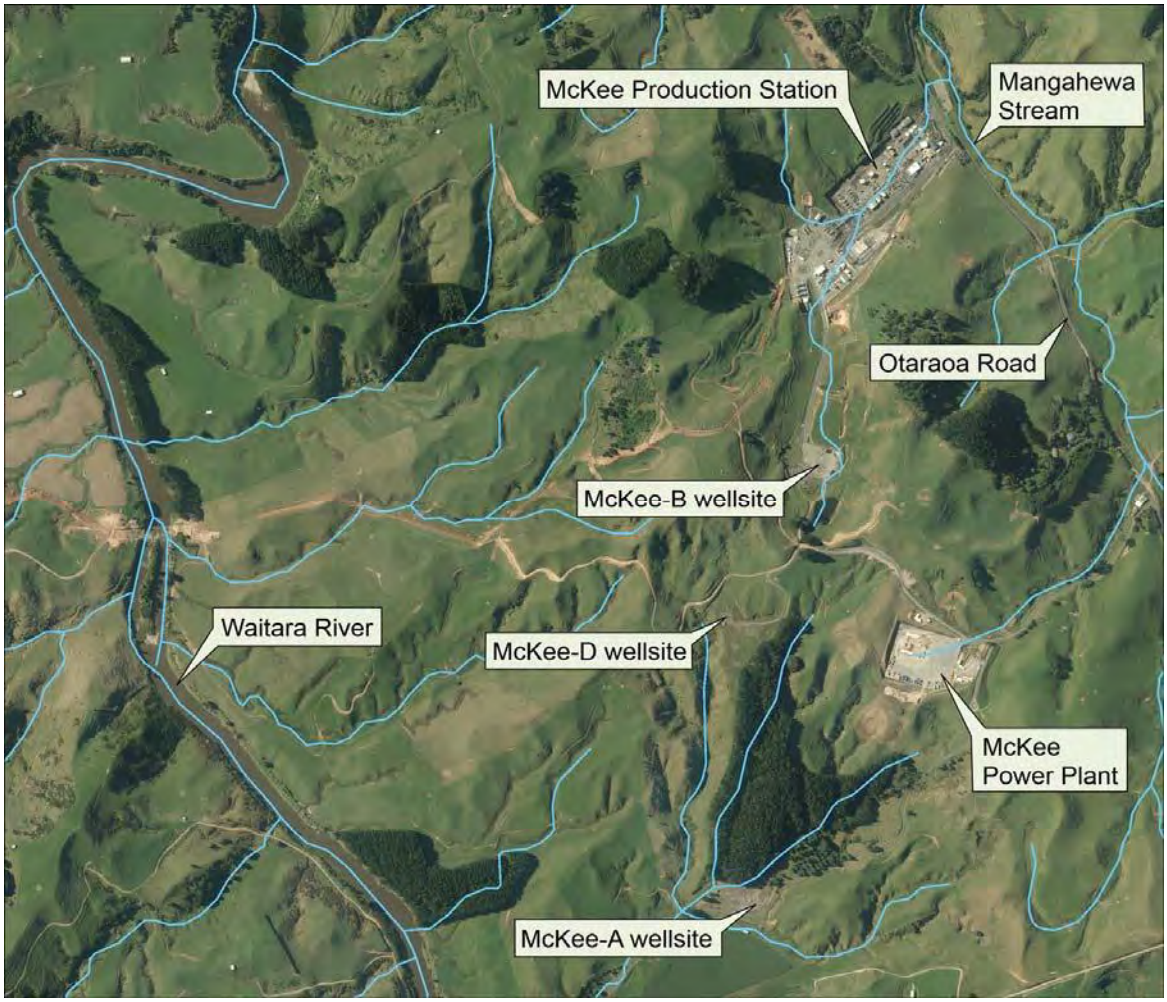


Figure 1 Location of the McKee Production Station and Power Plant

The McKee Power Plant (MPP) was also completed and commissioned during the 2012-2014 monitoring period. This electricity generating facility utilises two 50 MW gas-fired turbines to provide both peak and base load power for the national grid. Fuel gas for the MPP is supplied from the MPS via a 1 km high pressure pipeline. Stormwater and treated process water from the site is directed to a 250 m^3 retention

pond on the eastern side of the site. Overflow from this pond is discharged to an unnamed tributary of the Mangahewa Stream to the north.

1.3 Resource consents

A summary of the consents for activities at the MPS during the monitoring period is given in Table 1. Details of these consents are provided in Sections 1.3.1 to 1.3.5.

Table 1 Resource consents for activities at McKee Production Station held by Todd Energy

Consent number	Purpose of consent	Issue date	Next review	Expiry
1157-1	Discharge stormwater to Mangahewa Stream	28/9/1983	-	2023
1158-1	Discharge stormwater to Waitara River	28/9/1983	-	2023
1159-1	Divert stormwater to Mangahewa Stream	08/8/1983	-	2023
1226-1	Take and use water from Mangahewa Stream	08/8/1984	-	2023
1227-1	Mangahewa Stream intake weir	08/8/1984	-	2023
4006-2	Erect and maintain Waitara River bridge	14/7/1999	2015	2033
4050-3	Discharge emissions to air (MPS)	30/9/2009	2015	2027
7290-1	Discharge emissions to air (EGP)	24/6/2008	2015	2027
7435-1	Discharge stormwater (LPG Plant)	08/7/2009	2015	2039
7436-1	Discharge emissions to air (LPG Plant)	08/7/2009	2015	2039

A summary of the consents for activities at MPP during the monitoring period is given in Table 2. Details of these consents are provided in Sections 1.3.1 to 1.3.5.

Table 2 Resource consents for activities at McKee Power Plant held by Nova Energy

Consent number	Purpose of consent	Issue date	Next review	Expiry
2393-2	Take and use water from Mangaone Stream	22/08/1997	-	2015
4560-2	Discharge wastewater to Waitara River	07/01/2003	2015	2021
7920-1	Discharge stormwater and wastewater to unnamed tributary of Mangahewa Stream	12/10/2011	2016	2031
7921-1	Discharge emissions to air	12/10/2011	2016	2031
7922-1	Water outlet structure installation and use	12/10/2011	2016	2031

1.3.1 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.

Todd Energy holds water abstraction permit **1226-1** to take water from the Mangahewa Stream for process, fire fighting and domestic purposes associated with operation of the McKee Production Station. This permit was originally issued on 14 March 1984 under the Water and Soil Conservation Act 1967 to Petroleum Corporation of NZ Ltd. It was transferred to Shell Todd Oil Services Ltd on 10 April 2002, to Todd Taranaki Ltd on 31 May 2006 and, finally, to Todd Energy on 15 November 2013. It is due to expire on 1 June 2023.

Condition 1 requires the consent holder to maintain a minimum flow through the Mangahewa Stream.

Condition 2 requires the use of an accurate flow measuring and recording device and provides for the supply of flow data to the Council.

Condition 3 requires the intake structure to be designed and constructed so as to minimise stream disturbance and permit fish passage.

Condition 4 requires information on the location and design of the intake structure to be provided to Council prior to construction.

Condition 5 is a review provision.

Nova Energy holds water abstraction permit **2393-2** to take water from the Mangaone Stream for use in a gas fired Power Station. This permit was originally issued on 17 February 1988 under the Water and Soil Conservation Act 1967 to Petroleum Corporation of NZ Ltd then transferred to Fletcher Challenge Energy Taranaki Ltd and renewed under Section 87(d) of the RMA on 22 August 1997. It was subsequently transferred to Shell Todd Oil Services Ltd on 10 April 2002, to Todd Taranaki Ltd on 31 May 2006, to Bay of Plenty Energy on 22 June 2011 and, finally, to Nova Energy on 8 April 2013. It is due to expire on 1 June 2015.

Condition 1 limits the maximum rate of abstraction.

Conditions 2 to 6 require the installation and maintenance of a water meter and datalogger, and provide for Council access to the equipment and recorded data.

Condition 7 requires the adoption of the best practicable option to minimise adverse environmental effects.

Condition 8 requires the intake to be screened to prevent harm to fish.

These permits are attached to this report in Appendix I.

1.3.2 Water discharge permits

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.

Todd Energy holds water discharge permit **1157-1** to discharge uncontaminated stormwater from the site of the McKee Production Facility into an unnamed tributary of the Mangahewa Stream. This permit was originally issued on 28 September 1983 under the Water and Soil Conservation Act 1967 to Petroleum Corporation of NZ Ltd. It was transferred to Shell Todd Oil Services Ltd on 10 April 2002, to Todd Taranaki Ltd on 31 May 2006 and, finally, to Todd Energy on 15 November 2013. It is due to expire on 1 June 2023.

Condition 1 requires the consent holder to ensure the stream can cope with the increased volume of water.

Condition 2 requires the consent holder to ensure that works associated with the exercise of this consent be designed to minimise disturbance of the bed and banks of the stream.

Condition 3 requires mitigation or prevention of erosion resulting from the exercise of the consent.

Condition 4 requires the corrective measures applied to have the approval of the Chief Executive of the Taranaki Regional Council.

Condition 5 requires the consent holder to install a sampling chamber in the main stormwater discharge line.

Condition 6 requires the stormwater layout and discharge points to be provided to the Chief Executive of the Taranaki Regional Council prior to construction.

Condition 7 requires the consent holder to provide a contingency plan.

Condition 8 prevents adverse effects in the receiving waters.

Condition 9 addresses monitoring requirements.

Condition 10 is a review provision.

Todd Energy also holds water discharge permit **1158-1** to discharge treated impounded stormwater from the site of the McKee Production Facility into the Waitara River. This permit was originally issued on 28 September 1983 under the Water and Soil Conservation Act 1967 to Petroleum Corporation of NZ Ltd. It was transferred to Shell Todd Oil Services Ltd on 10 April 2002, to Todd Taranaki Ltd on 31 May 2006 and, finally, to Todd Energy on 15 November 2013. It is due to expire on 1 June 2023.

Condition 1 requires contaminated stormwater to be stored and treated prior to discharge.

Condition 2 requires mitigation or prevention of erosion resulting from the exercise of the consent.

Condition 3 states that any corrective measures applied are to be to the satisfaction of the Council.

Condition 4 requires a sampling chamber be installed in the treated stormwater discharge line prior to the outfall.

Condition 5 requires the stormwater layout and discharge points be provided to the Chief Executive prior to construction.

Condition 6 requires the consent holder to supply specifications of the works to the Chief Executive prior to the exercise of the consent.

Condition 7 requires the appointment of a suitable wastewater operator on the site.

Condition 8 imposes limits on significant potential contaminants in the discharge.

Conditions 9, 10 and 11 protect the receiving water from adverse effects.

Condition 12 requires a management plan be provided to the Chief Executive of the Taranaki Regional Council prior to the exercise of the consent.

Condition 13 requires a contingency plan be provided to the Chief Executive prior to the exercise of the consent.

Conditions 14, 15 and 16 address monitoring requirements.

Condition 17 is a review provision.

Todd Energy also holds water discharge permit **7435-1** to discharge stormwater into an unnamed tributary of the Mangahewa Stream in the Onaero catchment from a LPG Plant. This permit was issued to Todd Taranaki Ltd by the Taranaki Regional Council on 8 July 2009 under Section 87(e) of the Resource Management Act. It was transferred to Todd Energy on 15 November 2013 and is due to expire on 1 June 2039.

Conditions 1 and 2 concern best practicable option and the catchment area.

Conditions 3 to 6 relate to information to be provided, notification, contingency and management planning.

Conditions 7 and 8 relate to stormwater treatment and hazardous substances storage.

Conditions 9 and 10 concern discharge quality and receiving water effects.

Conditions 11 and 12 are lapse and review provisions.

Nova Energy holds water discharge permit **4560-2** to discharge wastewater from filter backwashing and tank cleaning into the Waitara River. This permit was issued by the Taranaki Regional Council on 7 January 2003 under Section 87(e) of the Resource Management Act to Shell Todd Oil Services Ltd. It was transferred to Todd Taranaki Ltd on 31 May 2006, then to Bay of Plenty Energy on 15 June 2011 and to Nova Energy on 8 April 2013. It is due to expire on 1 June 2021.

Condition 1 requires the exercise of the consent to be in accordance with the documentation submitted in support of the application.

Condition 2 describes visual effects which must not be observed below the mixing zone.

Condition 3 is a review provision.

Nova Energy also holds water discharge permit **7920-1** to discharge wastewater and stormwater from a retention pond at the McKee Power Plant, into water and onto and into land where it may enter an unnamed tributary of the Mangahewa Stream. This permit was issued to Bay of Plenty Energy Ltd by the Taranaki Regional Council on 12 October 2011 under Section 87(e) of the Resource Management Act. It was transferred to Nova Energy on 8 April 2013 and is due to expire on 1 June 2031.

Conditions 1 and 2 concern best practicable option and the catchment area.

Condition 3 requires treatment of potentially contaminated stormwater

Conditions 4 and 5 place limits on constituents in the discharge and effects below the mixing zone.

Conditions 6, 7 and 8 relate to contingency and management planning, and notification of changes that may alter the nature of the discharge.

Condition 9 requires stream fencing and riparian planting in accordance with the existing Riparian Management Plan for the property.

Conditions 10 and 11 are lapse and review provisions.

These permits are attached to this report in Appendix I.

1.3.3 Water permit

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

Todd Energy holds water permit **1159-1** to divert unnamed tributaries of the Mangahewa Stream in the vicinity of the McKee Production Facility, and to discharge surface water run-off from adjacent land into the Mangahewa Stream, to permit construction and operation of the said facility. This permit was issued on 28 September 1983 under the Water and Soil Conservation Act 1967 to Petroleum Corporation of NZ Ltd. It was transferred to Shell Todd Oil Services Ltd on 10 April 2002, then to Todd Taranaki Ltd on 31 May 2006 and, finally, to Todd Energy on 15 November 2013. It is due to expire on 1 June 2023.

Condition 1 requires that plans and locations of the diversions are forwarded to Council prior to commencement of construction.

Condition 2 requires that the natural channels of the streams below the diversion are capable of coping with the increased flow.

Condition 3 states that the consent holder shall prevent or mitigate any erosion that occurs.

Condition 4 states that any corrective action taken shall be to the satisfaction of the Council.

Condition 5 allows the Council to carry out biological monitoring on the Mangahewa Stream.

Condition 6 is a review provision.

The permit is attached to this report in Appendix I.

1.3.4 Air discharge pemits

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

Todd Energy holds air discharge permit **4050-3** to discharge emissions into the air arising from the flaring of hydrocarbons associated with production activities at the McKee-C wellsite and from hydrocarbon processing operations and miscellaneous emissions at the McKee Production Station. This permit was issued by the Taranaki Regional Council on 30 September 2009 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2027.

Condition 1 requires the adoption of the best practicable option.

Condition 2 relates to vapour recovery.

Condition 3 concerns the opacity of smoke emissions.

Conditions 4 to 8 relate to levels of contaminants at or beyond the boundary.

Conditions 9 to 12 concern record keeping and reporting.

Conditions 13 and 14 of the permit relate specifically to the McKee Production Station.

Conditions 15 to 20 of the permit relate specifically to the McKee-C wellsite.

Condition 21 is a review provision.

Todd Energy also holds air discharge permit **7290-1** to discharge emissions into the air from natural gas combustion and other related activities associated with the operation of an electricity generation plant at the McKee Production Station. This permit was issued by the Taranaki Regional Council on 24 June 2008 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2027.

Condition 1 requires the adoption of the best practicable option.

Condition 2 requires consultation with Council prior to significant alterations.

Conditions 3 to 8 relate to levels of contaminants at or beyond the boundary.

Conditions 9 and 10 are lapse and review provisions.

Todd Energy also holds air discharge permit **7436-1** to discharge emissions to air from the flaring of natural gas in emergency situations and miscellaneous emissions associated with the treatment of gas at the McKee LPG Plant and the Mangahewa Extraction Train 2. This permit was issued by the Taranaki Regional Council on 8 July 2009 under Section 87(e) of the Resource Management Act. It was altered on 24 October 2012 to include emissions from the MET2 plant and is due to expire on 1 June 2039.

Condition 1 requires the adoption of the best practicable option.

Condition 2 requires consultation with Council prior to significant alterations.

Condition 3 requires the consent holder to minimise emissions.

Condition 4 concerns the monthly provision of flaring information.

Conditions 5 to 10 relate to levels of contaminants at or beyond the boundary.

Conditions 11 and 12 are lapse and review provisions.

Nova Energy holds air discharge permit **7921-1** to discharge emissions to air from the combustion of natural gas and other miscellaneous emissions from the McKee Power Plant. This permit was issued by the Taranaki Regional Council on 12 October 2011 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2031.

Condition 1 requires the adoption of the best practicable option.

Condition 2 requires a report every six years demonstrating compliance with the first condition.

Conditions 3, 4 and 5 require the consent holder to minimise emissions.

Condition 6 sets a minimum height above ground level for the discharge point.

Condition 7 prohibits any direct significant adverse effects on Taranaki ecosystems.

Conditions 8 and 9 are lapse and review provisions.

These permits are attached to this report in Appendix I.

1.3.5 Land use permits

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

Section 14 (1)(a) of the RMA stipulates that no person may take, use, dam or divert any water (other than coastal water) unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Todd Energy holds land use permit **1227-1** to construct a weir control for the McKee Production Site water intake on the Mangahewa Stream in the Onaero Catchment. This permit was originally issued on 14 March 1984 under the Water and Soil Conservation Act 1967 to Petroleum Corporation of NZ Ltd. It was transferred to Shell Todd Oil Services Ltd on 10 April 2002, to Todd Taranaki Ltd on 31 May 2006 and, finally, to Todd Energy on 15 November 2013. It is due to expire on 1 June 2023.

Condition 1 requires the consent holder to submit plans and proposed locations prior to commencement of construction.

Condition 2 requires the consent holder to minimise disturbance to the bed and banks of the river channel at both low flows and design flood levels.

Condition 3 requires the consent holder to prevent or mitigate any erosion.

Condition 4 requires the intake structure be designed and constructed to permit passage of fish.

Condition 5 requires that a minimum flow of 5 litres/second is maintained in the Mangahewa stream.

Condition 6 requires the operation of the sluice pipe through the weir, for the purposes of de-silting the impoundment.

Condition 7 is a review provision.

Todd Energy also holds land use permit **4006-2** to erect, place and maintain a bridge over the Waitara River for oil field access purposes. This permit was issued by the Taranaki Regional Council on 14 July 1999 under Section 87(e) of the Resource Management Act to Fletcher Challenge Energy Taranaki Ltd. It was transferred to Shell Todd Oil Services Ltd on 10 April 2002, to Todd Taranaki Ltd on 31 May 2006 and, finally, to Todd Energy on 15 November 2013. It is due to expire on 1 June 2023.

Condition 1 requires that the consent holder notifies the Taranaki Regional Council prior to any works being undertaken, which would involve disturbance of or deposition to the riverbed or discharges to water.

Conditions 2 and 3 require that the structure authorised by the consent be maintained to ensure the conditions of the consent are met, and that the structure is to be removed and the area reinstated if and when it is no longer required.

Condition 4 is a review provision.

Nova Energy holds land use permit **7922-1** to install and use a stormwater and wastewater outlet structure in an unnamed tributary of the Mangahewa Stream associated with the McKee Power Plant. This permit was issued by the Taranaki

Regional Council on 12 October 2011 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2031.

Conditions 1 and 2 place requirements on the design and construction of the outlet.

Condition 3 requires notification prior to commencement and upon completion of the works.

Conditions 4 and 5 require the minimisation of streambed disturbance and discharge of sediment during the works.

Condition 6 requires that the structure is removed and the area reinstated if and when it is no longer required.

Condition 7 prohibits alteration to the natural flow of the river or the restriction of fish passage.

Conditions 8 and 9 are lapse and review provisions.

These permits are attached to this report in Appendix I.

1.3.6 Wellsite consents

Todd Energy also holds consents for production activities at wellsites associated with the MPS. A summary of these consents is provided in Table 3.

Table 3 Consents for production activities at wellsites associated with McKee Production Station

Wellsite	Consent number	Purpose	Issue date	Expiry
Makara-B	4883-2	To discharge treated stormwater and treated produced water from the Makara-B wellsite into an unnamed tributary of the Mangaone Stream in the Waitara catchment	28/05/2009	2027
	4884-2	To discharge emissions into the air from hydrocarbon exploration and production testing operations and miscellaneous emissions associated with eight wells at the Makara-B wellsite	07/04/2005	2021
Mangahewa-A	4919-2	To discharge treated stormwater from hydrocarbon exploration and production operations at the Mangahewa-A wellsite onto and into land and into an unnamed tributary of the Waitara River	27/10/2000	2021
	4920-3	To discharge emissions to air during flaring from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the Mangahewa-A wellsite	25/08/2008	2021
Mangahewa-C	6967-1	To discharge treated stormwater and treated produced water from hydrocarbon exploration and production operations at the Mangahewa-3 wellsite onto and into land in the vicinity of an unnamed tributary of the Waiau Stream	19/10/2006	2021
	6974-1	To discharge emissions to air during flaring from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the Mangahewa-3 wellsite	19/10/2006	2021
	7180-1	To discharge water containing contaminants from the hydrotesting of pipelines onto and into land at the Mangahewa-3 wellsite	14/12/2007	2021
	9594-1	To take and use groundwater for water supply purposes associated with hydrocarbon exploration and production activities	18/06/2013	2027
Mangahewa-D	7404-1	To take water from the Manganui River for wellsite and well drilling activities during hydrocarbon exploration and production operations at the Mangahewa-D wellsite	19/11/2008	2021

Wellsite	Consent number	Purpose	Issue date	Expiry
Mangahewa-D	7405-1	To discharge emissions to air during flaring from well workovers and in emergency situations, and to discharge miscellaneous emissions associated with production activities at the Mangahewa-D wellsite	05/02/2009	2027
	7407-1	To discharge treated stormwater, treated produced water and surplus drill water from hydrocarbon exploration and production operations at the Mangahewa-D wellsite onto and into land in the vicinity of an unnamed tributary of the Manganui River in the Waitara catchment	28/11/2008	2027
	9903-1	To take and use groundwater from a bore for general water supply purposes at the Mangahewa-D wellsite	26/05/2014	2033
Mangahewa-E	9453-1	To discharge treated stormwater and produced water from hydrocarbon exploration and production operations at the Mangahewa-E wellsite, onto land and into an unnamed tributary of the Waiau Stream	01/02/2013	2027
	9455-1	To discharge emissions to air associated with hydrocarbon producing wells at the Mangahewa-E wellsite	31/01/2013	2027
Mangahewa-G	10021-1	To discharge emissions to air associated with hydrocarbon producing wells at the Mangahewa-G wellsite	09/12/2014	2033
	10022-1	To discharge treated stormwater from hydrocarbon exploration and production operations at the Mangahewa-G wellsite, into an unnamed tributary of the Mangahewa Stream	08/01/2015	2033
	10026-1	To take and use water from a spring fed pond on an unnamed tributary of the Mangahewa Stream for hydrocarbon exploration activities at the Mangahewa-G wellsite	24/11/2014	2020
McKee-A	3666-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production operations at the McKee-A wellsite onto and into land and into an unnamed tributary in the Waitara catchment	22/04/2003	2033
McKee-B	3667-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production activities at the McKee-B wellsite onto and into land and into an unnamed tributary of the Mangahewa Stream in the Onaero catchment	28/04/2003	2033
	7462-1	To discharge emissions into the air during flaring from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the McKee-B wellsite	21/04/2009	2027
McKee-C	3668-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production operations and electricity generation operations and associated activities at the McKee-C wellsite onto and into land and into an unnamed tributary of the Mangahewa Stream in the Onaero catchment	28/04/2003	2033
McKee-D	3669-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production operations at the McKee-D wellsite onto and into land and into an unnamed tributary in the Waitara catchment	28/04/2003	2033
McKee-E	4626-2	To discharge treated stormwater and treated produced water from the McKee-E wellsite into the Mangahewa Stream in the Onaero catchment	28/05/2009	2027
Mystone-A	4388-2	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	13/05/2009	2027

Wellsite	Consent number	Purpose	Issue date	Expiry
Mystone-A	7455-1	To take water from the Manganui River for wellsite and well drilling activities during hydrocarbon exploration and production operations at the Mystone-A wellsite.	13/03/2009	2021
	7459-1	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	31/03/2009	2027
Pouri-A	3671-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production operations at the Pouri-A wellsite onto and into land and into an unnamed tributary of the Mangahewa Stream in the Onaero catchment	16/09/2003	2033
Pukemai-A	3670-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production activities at the Pukemai-A wellsite onto and into land and into the Pukemai Stream in the Onaero catchment.	28/04/2003	2033
Toetoe-A	3676-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production operations at the Toetoe-A wellsite onto and into land and into the Mangaone Stream in the Waitara catchment	30/04/2003	2033
Toetoe-B	3677-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production activities at the Toetoe-B wellsite onto and into land and into an unnamed tributary of the Mangaone Stream in the Waitara catchment	28/04/2003	2033
Toetoe-C	4078-2	To discharge up to 50 cubic metres/day of treated stormwater from hydrocarbon exploration and production operations into the Mangaone Stream in the Waitara Catchment	22/08/1997	2015
Tuhua-A	3672-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production activities at the Tuhua-A wellsite onto and into land and into the Pouri Stream in the Onaero catchment	28/04/2003	2033
Tuhua-B	3673-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production activities at the Tuhua-B wellsite onto and into land and into the Pouri and Pukemai Streams in the Onaero catchment	28/04/2003	2033
Tuhua-C	3674-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production activities at the Tuhua-C wellsite onto and into land and into an unnamed tributary of the Pouri Stream in the Onaero catchment	28/04/2003	2033
Tuhua-D	3675-2	To discharge treated stormwater, uncontaminated treated site water and uncontaminated treated production water from hydrocarbon exploration and production operations at the Tuhua-D wellsite onto and into land and into the Pouri and Pukemai Streams in the Onaero catchment	28/04/2003	2033
Tuhua-E	4440-2	To discharge emissions into the air from the flaring of hydrocarbons and miscellaneous emissions associated with (a) hydrocarbon exploration and production testing operations and (b) emissions from production at the Tuhua-E wellsite	30/04/2003	2021

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 consents, and the effects arising, within the Taranaki region and report upon these.

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

The monitoring programme for the MPS, MPP and associated sites consisted of four primary components.

1.4.2 Programme liaison and management

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

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

1.4.3 Site inspections

The MPS and MPP sites were visited 11 times and the associated wellsites twice during the monitoring period. With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the consent holder were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.4.4 Chemical sampling

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

The MPS discharge to the Mangahewa stream was sampled on one occasion, and the sample analysed for chlorides, conductivity, hydrocarbons, pH and suspended solids. The Mangahewa Stream sites were sampled on one occasion, and the samples analysed for chlorides, conductivity, hydrocarbons, pH and turbidity. The impounded

stormwater which is discharged to the Waitara River was sampled on two occasions, and the samples analysed for chlorides, conductivity, hydrocarbons, pH and suspended solids.

Soft sediments in the Mangahewa Stream were sampled at various sites on two occasions, and analysed for hydrocarbons.

Ambient carbon monoxide and gas monitoring was undertaken on two occasions in the vicinity of the production station, and the Company supplied data on flaring causes and flare and fuel gas volumes throughout the period.

1.4.5 Biomonitoring surveys

Biological surveys were performed on four occasions in the Mangahewa Stream to determine whether or not the discharge of stormwater from the MPS has had a detrimental effect upon the communities of the stream.

2. Results

2.1 Water

2.1.1 Inspections

Eleven inspections of the MPS and MPP sites and two inspections of the associated wellsites were undertaken during the period under review. The following was found during the inspections:

12 October 2012
The site was neat and tidy. There was no evidence of any stormwater contamination, either in the ring drains on site or in the Mangahewa Stream. A localised area of contamination in a sump at the rear of the MPS was to be cleaned up under guidance from BTW Company. Minimal flaring was occurring at the time of inspection with no associated problems. The MPS site was well managed as always. Everything was satisfactory.

19 November 2012
Inspection was undertaken to assess progress on the site works, particularly around the stormwater system at the top of the plant. Transfield Worley staff demonstrated a good understanding of the stormwater system and silt control. Hay bales and silt cloth were in position to minimise any risk of run-off. No effects from any silt or other discharge were noted in the nearby Mangahewa stream. Minimal flaring was being undertaken. No odours or smoke were evident.

16 April 2013
A site inspection was undertaken from the perimeter with an Energyworks Ltd representative in regards to the Mangahewa-C to MPS pipeline tie-in. No effects to groundwater quality or run-off to the Mangahewa Stream were noted. Flaring was minimal at the time of inspection. Everything was satisfactory.

15 May 2013
The site was shut down for works at the time of inspection. Ring drains and bunds were clear of all debris after high winds during previous weekend. There was no flaring occurring and no apparent effects from any stormwater or groundwater discharge to the Mangahewa stream. The sites were all neat and tidy. Everything was satisfactory.

12 June 2013
MPS: the stormwater and drainage systems were clear of contaminants and the discharge to the Mangahewa Stream was clear. Minimal flaring was occurring at the time of inspection. The construction area was neat, tidy and well managed.
MPP: The stormwater catchment pond water was crystal clear and discharging through the wetland. Everything was satisfactory at both sites.

17 June 2013 – wellsites inspection
The associated wellsites were inspected following heavy rainfall in the preceding week. All sites had effective stormwater catchment systems i.e. ring drains directing the flow of water through skimmer pits with goose neck pipe outlets. Silt and sediment discharges were minimised by silt traps where appropriate. No contaminants or spills of drilling muds or drilling fluids were evident at any of the sites. The flare pits were all

clear of any contaminants and had not been recently utilised. Mix, bury, cover sites were all effectively revegetated and no seepage or effects from this activity were noted. All the sites were neat and tidy with effective control of pest plants.

22 July 2013
The sites were neat and tidy. Ring drains and bunds were secure. Minimal flaring was occurring at the time of inspection which did not give rise to any off site effects or smoke emissions. The construction area stormwater system and silt controls were effective with no effects of any discharge to Mangahewa stream apparent. The discharge to the tributary from the MPP was very clean. Everything was satisfactory.

12 November 2013
The sites were neat and tidy with no off site discharges occurring. There was some flaring at MPS with no visible smoke. No evidence of any effects to the environment from the ongoing operations at these sites was noted. Everything was well managed in regard to environmental performance.

24 January 2014
A comprehensive site tour was undertaken by representatives of Todd Energy and the Council. The site storm water treatment facilities were inspected and the API separator's treatment system, bunding and ducting were explained in full. Flaring was not being undertaken at the time. There were no off site odours noted during ambient monitoring. The site was neat and tidy and well managed. Everything was satisfactory.

22 April 2014
Inspection of the sites, including the stormwater discharge point into the Mangahewa Stream, did not reveal any adverse effects from this operation. Stormwater systems at the ancillary wellsites were in place and effective. Minimal flaring was being undertaken at the Production Station with no smoke or off site odours noted. As usual, all sites were neat and tidy. Previous mix, bury, cover areas did not give rise to any concerns. Everything was satisfactory.

14 May 2014
An inspection was conducted during very heavy rainfall and hail to check the capabilities of the stormwater systems and silt controls during excessive run-off. All sites inspected were coping very well with the high stormwater volumes. There was no evidence of silt discharges causing adverse effects. The MPS discharge to the Mangahewa Stream was very clean.

5 June 2014
Site inspection was undertaken during a period of fine weather. No adverse effects from stormwater discharges were noted in receiving waters. Minimal flaring was occurring at the Production Station with no odours or smoke noted off site. Bunds and storage areas were all secure. There was no evidence of any contaminants in the stormwater systems. The API separator was secure. All sites were neat and tidy.

9 June 2014 – wellsites inspection
The wellsites were inspected during a prolonged period of fine weather. No stormwater discharges were occurring from any of the sites. The skimmer pits were all clear of contaminants, and all ring drains and bunds were secure and clear. The Company was asked to check the integrity of the stormwater system near the flare pits

at Mangahewa-D. Some minor works may have been required to ensure all stormwater was being diverted through the skimmer pits for treatment prior to discharge.

2.1.2 Results of discharge monitoring

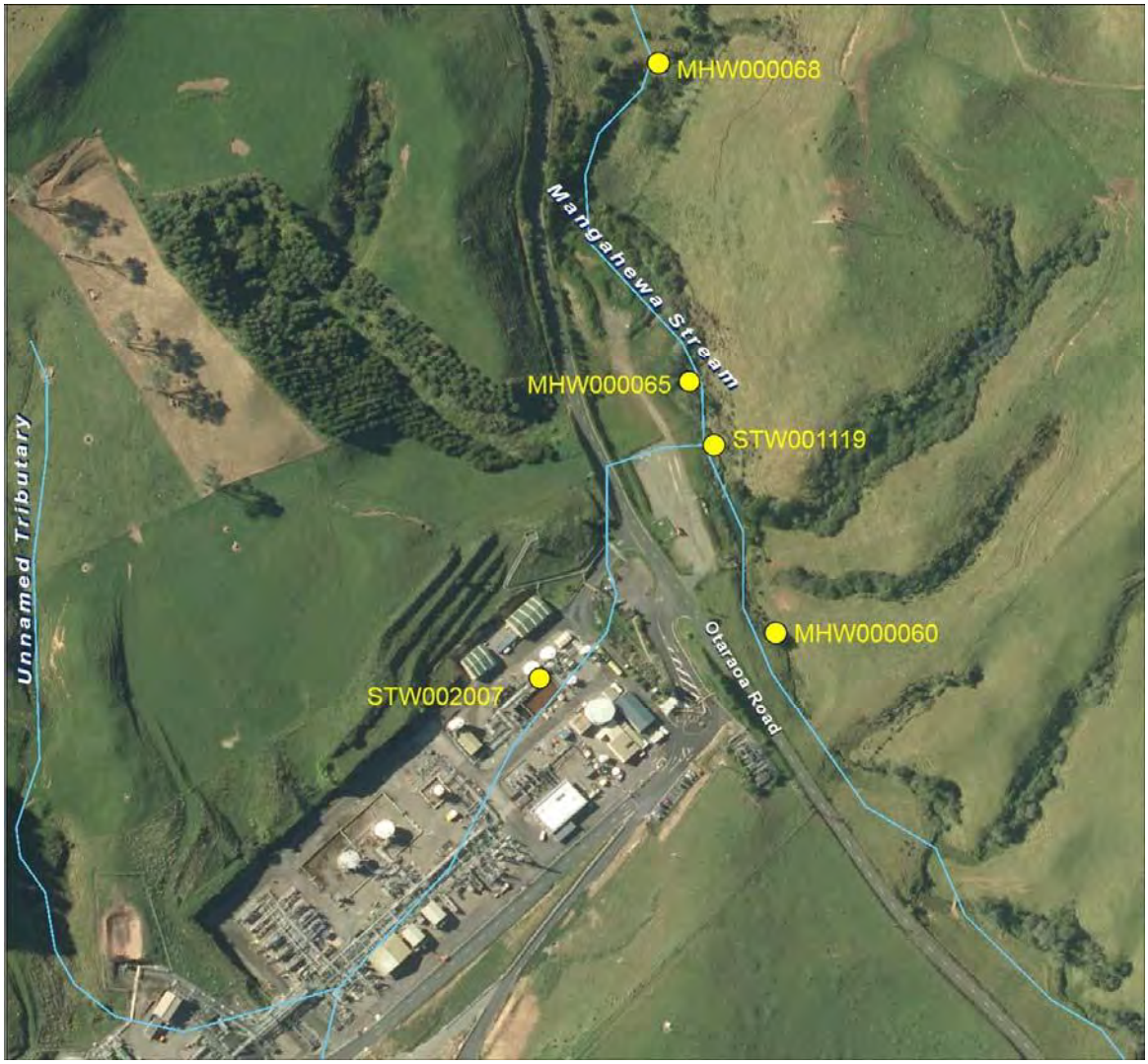


Figure 2 Sampling sites relating to McKee Production Station

General stormwater from the MPS is discharged to the Mangahewa Stream via a skimmer pit (sampled at STW001119). Impounded stormwater from within bunded areas filters through a treatment system prior to discharge to the Waitara River (sampled at STW002007). Sampling sites are shown in Figure 2.

2.1.2.1 Discharge to the Mangahewa Stream

Water quality sampling of the discharge to the Mangahewa Stream was undertaken on one occasion during the 2012-14 period. Table 4 presents the results of this sampling.

The results are indicative of clean stormwater at the time of sampling, with parameters well below the limits imposed by consent 7435-1.

Table 4 Monitoring results for stormwater discharge to Mangahewa Stream (site STW001119)

Parameter	Units	6 June 2014	Consent 7435-1 limits
Chloride	g/m^3	12.0	50
Conductivity	mS/m	18.8	-
Hydrocarbons	g/m^3	< 0.5	15
pH		7.2	6.0 – 9.0
Suspended solids	g/m^3	2	100
Temperature	Deg.C	11.9	-

Results provided by Todd Energy from their self-monitoring of the upper culvert discharge to the Mangahewa Stream during the period under review showed two minor exceedances of the suspended solids limit and one slight exceedance of the hydrocarbon limit. Concurrent sampling of the Mangahewa Stream showed that the effects of these discharges on the receiving water quality were no more than minor.

Photo 2 McKee Production Station stormwater discharge point to the Mangahewa Stream

2.1.2.2 Discharge to the Waitara River

Water quality sampling of the impounded stormwater which is discharged to the Waitara River was undertaken on two occasions during the 2012-14 period. Table 5 presents the results of this sampling.

Table 5 Monitoring results for stormwater discharge to Waitara River (site STW002007)

Parameter	Units	13 Nov 2013	6 Jun 2014	Consent 1158-1 limits
Chloride	g/m^3	11.2	39.2	-
Conductivity	mS/m	9.5	19.0	-
Hydrocarbons	g/m^3	-	< 0.5	90% <10, 10% <20
pH		7.2	7.4	6.5 – 8.5
Suspended solids	g/m^3	< 2	5	30
Temperature	Deg.C	13.2	10.5	< 20

The results are again indicative of clean stormwater at the times of sampling, with parameters well below the limits imposed by consent 1158-1.

Results provided by Todd Energy from their self-monitoring of the water quality of the stormwater discharged to the Waitara River during the period under review showed compliance with all applicable consent conditions on all occasions, except for one exceedance of the suspended solids limit. This would be very unlikely to have had an impact on the water quality of the Waitara River due to the massive dilution involved.

2.1.3 Results of receiving environment monitoring

2.1.3.1 Chemical

Water quality sampling of the Mangahewa Stream was undertaken in conjunction with stormwater discharge sampling. The results are presented in Table 6.

Table 6 Receiving environment results for Mangahewa Stream in relation to MPS

		6 June 2014	
Parameter	Units	Upstream [site MHW000060]	Downstream [site MHW000065]
Chloride	g/m^3	9.0	9.4
Conductivity	mS/m	7.9	8.5
Hydrocarbons	g/m^3	< 0.5	< 0.5
pH		7.1	7.1
Temperature	Deg.C	9.6	10.1
Turbidity	NTU	2.2	1.1

The results show minimal impact of discharges from MPS on the water quality of the Mangahewa Stream at the time of sampling. This indicates compliance with the conditions of consents 1157-1 and 7435-1.

Due to historical contamination, the sediments on the bed of the Mangahewa Stream in the vicinity of MPS have been found to contain hydrocarbons. Monitoring of the levels of these hydrocarbons has been undertaken in previous years in conjunction with biomonitoring surveys to determine their impact on the health of the stream

communities and whether the concentrations are decreasing over time due to degradation and/or downstream transport.

Table 7 shows the results of soft sediment sampling for the period 2011 to 2014. The sampling locations are shown in Figure 2.

Table 7 Soft sediment sampling of the Mangahewa Stream for hydrocarbons 2011 - 2014

	Hydrocarbons in sediment - mg/kg dry weight		
Date	100m u/s of discharge [site MHW000060]	50m d/s of discharge [site MHW000065]	250m d/s of discharge [site MHW000068]
3 June 2011	49	130	190
12 April 2013	< 10	170	56
6 June 2014	< 0.5	94	(no sample)

Although a significant amount of variability can be expected at a given site due to changes in the stream bed over time, recent sampling shows a declining trend at the three sites with no hydrocarbons detected in samples taken 100 metres upstream of the MPS stormwater discharge in the period under review.

2.1.3.2 Biomonitoring

The Council's standard 'kick-sampling' technique was used at two established sites (MHW000060 and MHW000065, Figure 2) to collect streambed macroinvertebrates from the Mangahewa Stream on four occasions during the period under review. Samples were sorted and identified to provide the number of taxa (richness), MCI score and $SQMCI_S$ score for each site.

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

29 November 2012
This macroinvertebrate survey indicates that recovery recorded in the previous survey had remained. The April 2011 results indicated a discharge containing hydrocarbons had entered the Mangahewa Stream prior, and this was also noted during sample collection and processing at that time. At the time of sampling and processing of the current survey, no hydrocarbon odour was noted from the downstream sample.

The site upstream of the production station recorded a macroinvertebrate community in above average health, with the third highest MCI score and the equal-highest $SQMCI_S$ score recorded to date, although the taxa richness at this site was within the range of that previously recorded. In contrast, the site downstream recorded a taxa richness of 27, significantly higher than the median taxa richness, and the second highest richness recorded at this site. The MCI and $SQMCI_S$ scores were also above average, significantly for the MCI score. Apart from the different taxa richnesses

recorded at the sites, there were few differences in either index score, or in individual taxon abundances. There were also few differences from that recorded in the previous survey, which recorded a significant improvement with regard to the number of individuals present at the downstream site. This was well illustrated by the taxa that dominated the communities, as in the April 2011 previous survey, only one taxon was abundant, being the 'tolerant' snail *Potamopyrgus*, and only one 'moderately sensitive' taxon was represented by five or more individuals, being the dobson fly larvae *Archichauliodes*. In the current survey, four 'tolerant' taxa were recorded in abundance (oligochaete worms, *Potamopyrgus* snails, orthoclad midge larvae and *Austrosimulium* sandfly larvae), as were two 'moderately sensitive' taxa (*Austroclima* mayfly larvae and *Hydrobiosis* caddisfly larvae). This is very similar to that recorded in the previous survey, consolidating the recovery observed since the 2011 survey.

Although there were some differences in community composition between sites (only 15 of the 27 taxa recorded were common to both sites), there was only a three unit increase in MCI score and 0.3 unit reduction in $SQMCI_S$ score at site 3 downstream. The MCI score showed an eight unit increase from that recorded in the previous survey, and was a significant 14 units higher than the median score for this site. This is equal to the highest MCI score recorded at this site to date, and reflects improved preceding water quality.

12 April 2013
This April 2013 macroinvertebrate survey was undertaken during very low flows, and these low flows appeared to be the overriding influence on the macroinvertebrate community. While the recovery recorded in the previous two surveys remained, there was a slight deterioration in community health from the last survey. However, this deterioration was not to the degree recorded in April 2011, when results indicated a discharge containing hydrocarbons had entered the Mangahewa Stream prior. At the time of sampling and processing of the current survey, no hydrocarbon odour was noted from the downstream sample.

The site upstream of the production station recorded a macroinvertebrate community in above average health, with an MCI score ten units higher than the median, and community richness and an $SQMCI_S$ score equal to their respective medians. The site downstream recorded a taxa richness of 20, similar to the median taxa richness. The MCI and $SQMCI_S$ scores were also not significantly different to their respective medians. Both sites however recorded reductions in taxa richness and index scores from that recorded in the previous survey, with this reduction being slightly more marked at site 2 than site 1. In addition, the number of taxa recorded as abundant reduced markedly at both sites, again more so at site 2, with only two taxa being recorded as abundant, both 'tolerant'. Although this will be related to the very low flows experienced at the time of sampling, sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate. Although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

18 December 2013
This macroinvertebrate survey was undertaken during moderate flows. The increase in flow from the previous survey resulted in a slight improvement in taxa richness. While the recovery recorded in the previous three surveys remained, there remained a slight

deterioration in community health from the last survey. However, this deterioration was not to the degree recorded in April 2011, when results indicated a discharge containing hydrocarbons had entered the Mangahewa Stream prior. At the time of sampling and processing of the current survey, no hydrocarbon odour was noted from the downstream sample.

The site upstream of the production station recorded a macroinvertebrate community in above average health, with an MCI score seventeen units higher than the median, and community richness and an $SQMCI_S$ score higher than their respective medians. The site downstream recorded a taxa richness of 23, six taxa higher than the median taxa richness. The MCI and $SQMCI_S$ scores were also not significantly different to their respective medians. However, unlike that recorded at site 1, there was no improvement in MCI score, and the $SQMCI_S$ score reduced, being significantly less than that recorded in the previous survey. This is contrary to what would be expected with the increased flows, and sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate. Although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

14 March 2014
This macroinvertebrate survey was undertaken during very low flows. The reduction in flow from the previous survey did not result in a reduced taxa richness at either site, with site 1 recording a new maximum taxa richness, from 64 previous surveys. While the recovery recorded in the previous four surveys remained, there remained a slight deterioration in community health from the last survey at site 2. However, this deterioration was not to the degree recorded in April 2011, when results indicated a discharge containing hydrocarbons had entered the Mangahewa Stream prior. At the time of sampling and processing of the current survey, no hydrocarbon odour was noted from the downstream sample.

The site upstream of the production station recorded a macroinvertebrate community in above average health, with an MCI score fifteen units higher than the median, and community richness and an $SQMCI_S$ score much higher than their respective medians. The site downstream recorded a taxa richness of 23, six taxa higher than the median taxa richness. The MCI and $SQMCI_S$ scores were also not significantly different to their respective medians. However, unlike that recorded at site 1, there was no improvement in MCI or $SQMCI_S$ score, with both being significantly less than that recorded at site 1. This is contrary to what would be expected, considering the improved results at site 1. Sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate and although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

It is recommended that sediment samples continue to be collected and analysed for hydrocarbons.

The full biomonitoring reports are attached to this report in Appendix II.

2.2 Air

2.2.1 Inspections

Air inspections were carried out in conjunction with site inspections as discussed in section 2.1.1 above. Air discharges were all found to be satisfactory and no offensive or objectionable odours were noted during the inspections.

2.2.2 Results of receiving environment monitoring

During the period under review, Todd Energy kept the Council informed of all non-routine flaring at MPS. The majority of this flaring related to planned maintenance, compressor trips, plant and wellsite configuration changes and commissioning of the MET-2 plant. No visible smoke events were recorded.

2.2.2.1 Ambient air quality monitoring

During the period under review, a multi-gas meter was deployed on two occasions in the vicinity of the plant, on 1 August 2012 and 2 July 2013. The instrument was placed in a downwind position at the start of each deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases).

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

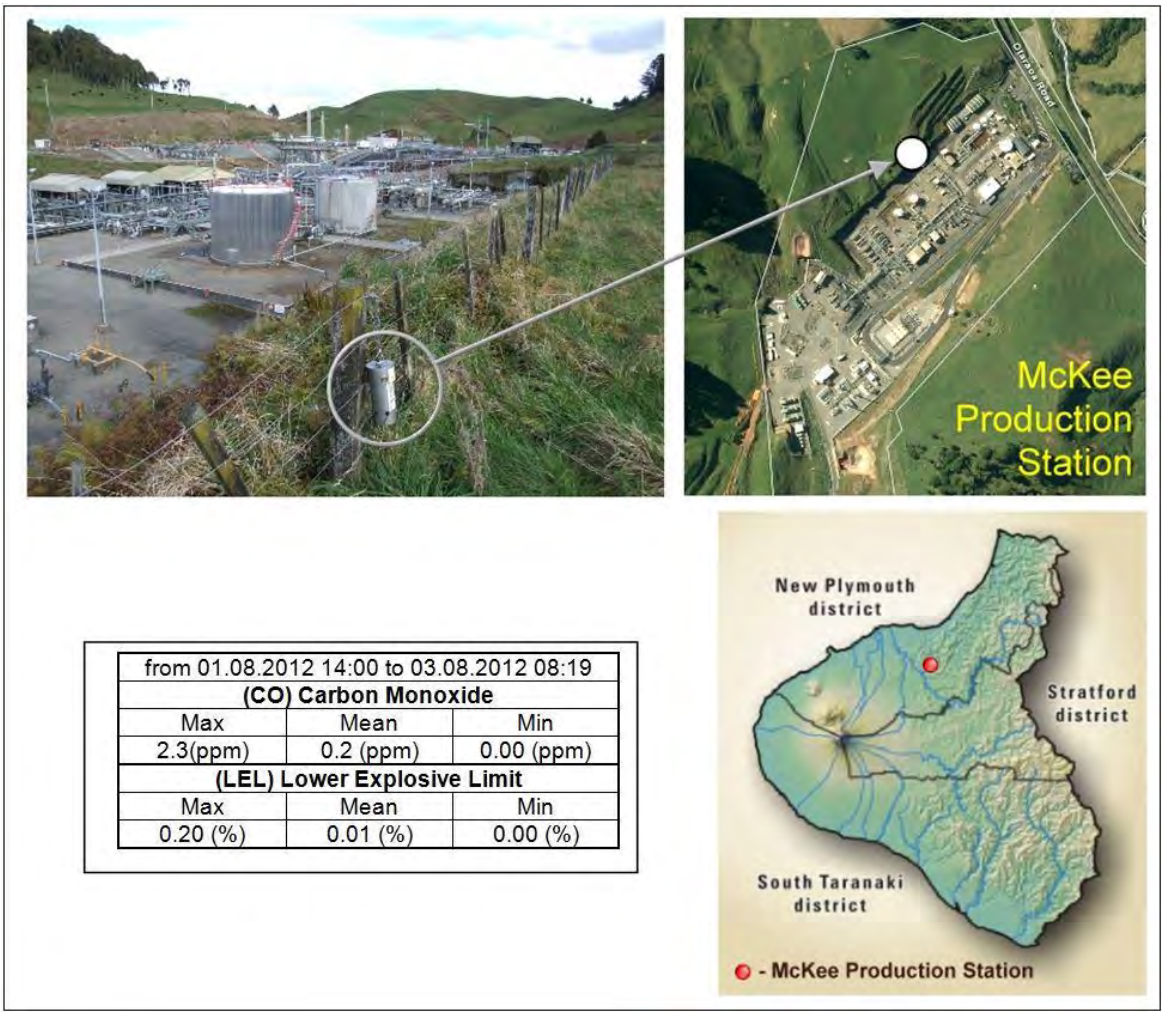
The consents covering air discharges from the MPS facilities have specific limits relating to particular gases. Special condition 5 of consent 4050-3 sets a limit on the carbon monoxide concentration at or beyond the production station's boundary:

"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/m3] [eight-hour average exposure], or 30 mg/m3 one-hour average exposure at or beyond the boundary of the property where the production station and wellsite are located."

The sensors on the instrument also react to gases and vapours such as acetone, benzene, butane, methane, propane, carbon monoxide, ethanol, and higher alkanes and alkenes, with varying degrees of sensitivity. LEL% gives the percentage of the lower explosive limit, expressed as methane, which is detected in the air sampled. The Council's Regional Air Quality Plan has a typical requirement that no discharge shall result in a dangerous level of airborne contaminants, including any risk of explosion.

1 August 2012
The deployment lasted approximately 48 hours. The location of the multi-gas meter for the sampling run and summarised details of the sample are shown in Figure 3. The maximum concentration of carbon monoxide found during the monitoring run was

2.0 mg/m³ (2.3 ppm) and the average concentration was only 0.17 mg/m³, which complies with the consent condition. At no time did the level of explosive gases downwind of MPS reach any more than a trivial level.

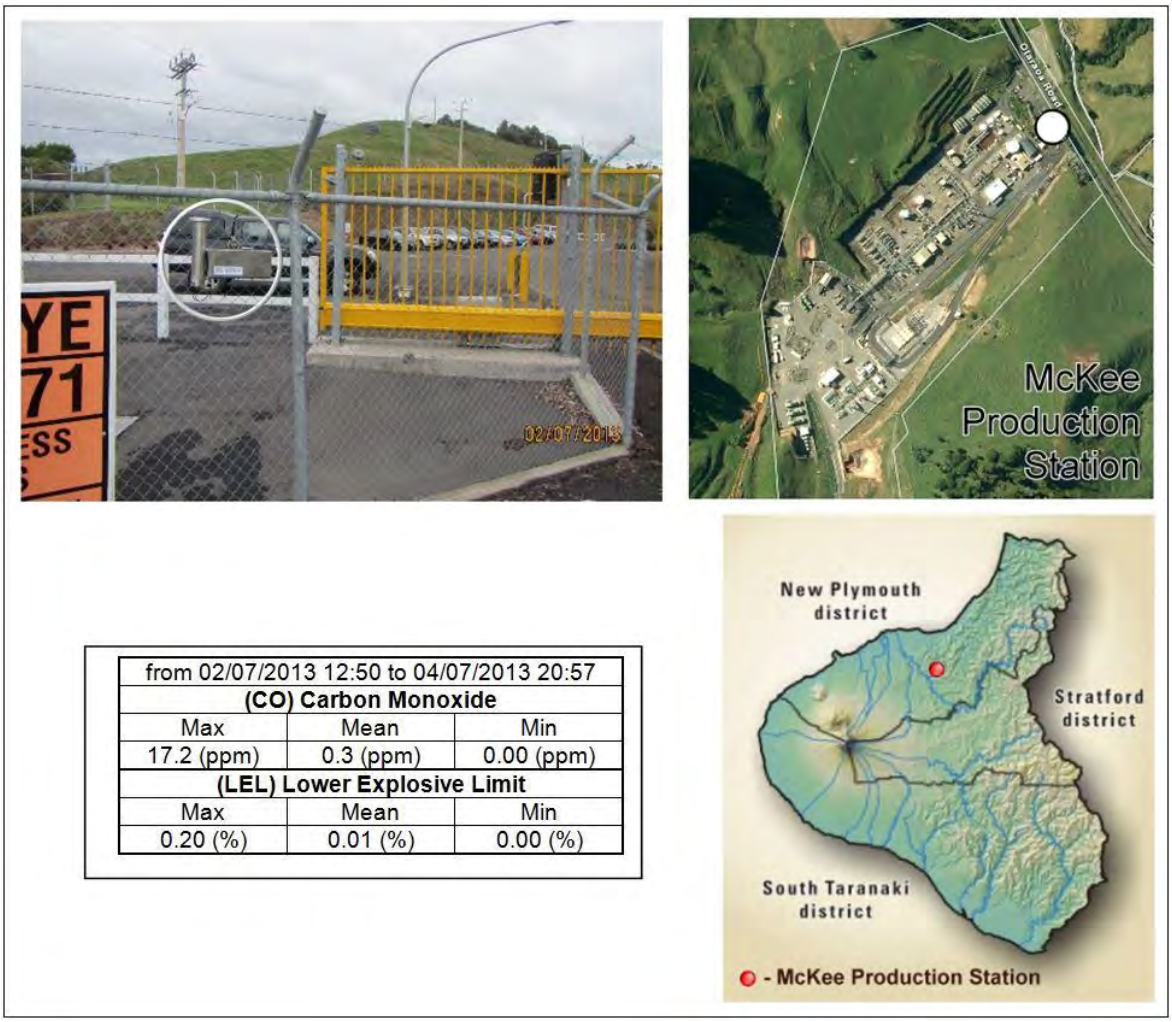


from 01.08.2012 14:00 to 03.08.2012 08:19		
(CO) Carbon Monoxide		
Max	Mean	Min
2.3(ppm)	0.2 (ppm)	0.00 (ppm)
(LEL) Lower Explosive Limit		
Max	Mean	Min
0.20 (%)	0.01 (%)	0.00 (%)

Figure 3 August 2012 air monitoring site and sample details for McKee Production Station

2 July 2013

The deployment lasted approximately 56 hours. The location of the multi-gas meter for the sampling run and summarised details of the sample are shown in Figure 4. The maximum concentration of carbon monoxide found during the monitoring run was 14.6 mg/m³ (17.2 ppm) and the average concentration was only 0.26 mg/m³, which complies with the consent condition. At no time did the level of explosive gases downwind of MPS reach any more than a trivial level.



from 02/07/2013 12:50 to 04/07/2013 20:57		
(CO) Carbon Monoxide		
Max	Mean	Min
17.2 (ppm)	0.3 (ppm)	0.00 (ppm)
(LEL) Lower Explosive Limit		
Max	Mean	Min
0.20 (%)	0.01 (%)	0.00 (%)

Figure 4 July 2013 air monitoring site and sample details for McKee Production Station

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

2.2.3 Summary of flaring and fuel use reported by Todd Energy

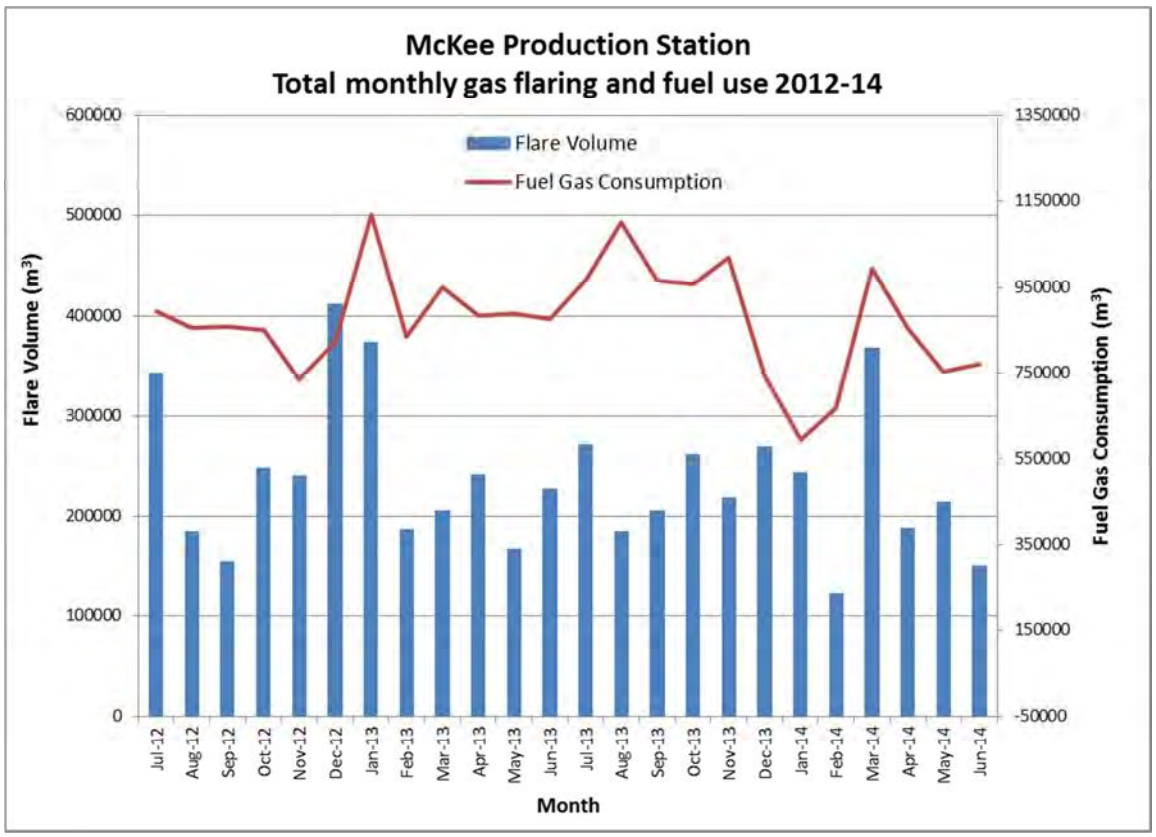


Figure 5 Monthly gas flaring and fuel use for McKee Production Station under consent 4050-3

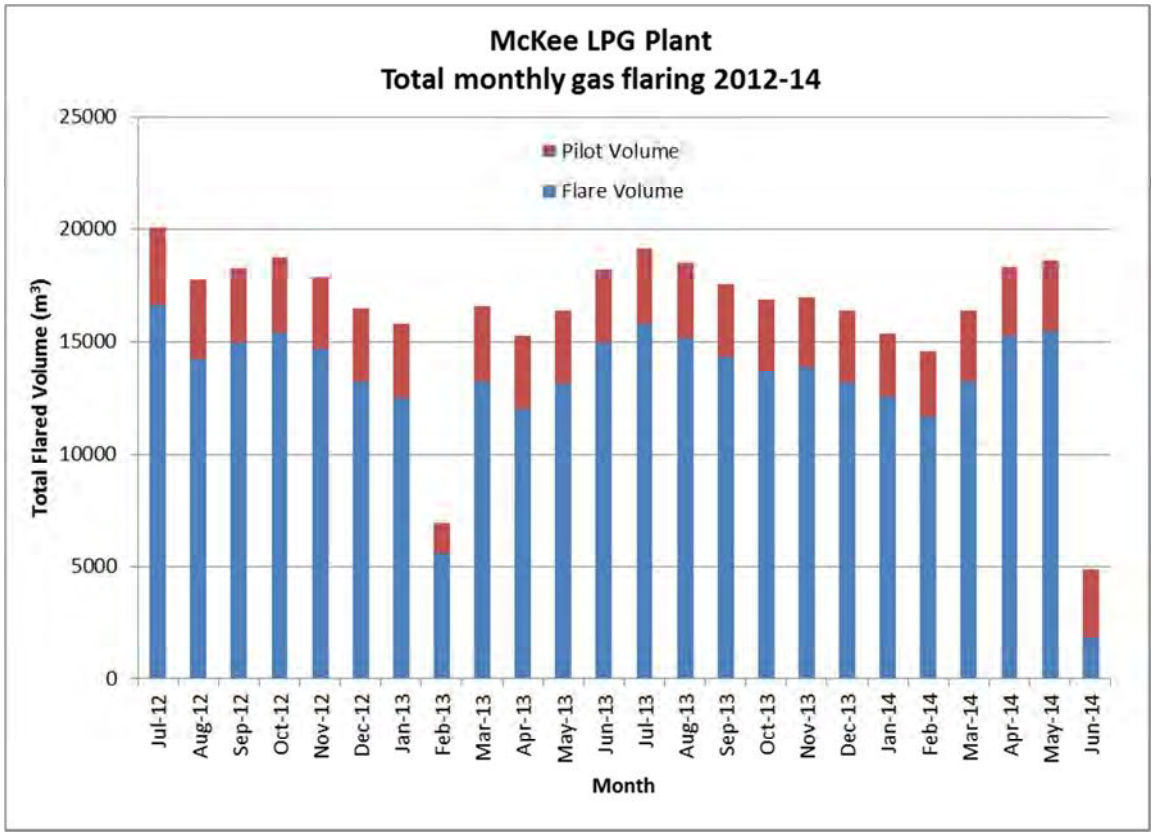


Figure 6 Monthly flaring volumes for McKee LPG Plant under consent 7436-1

There was no flaring associated with the exercise of the air discharge consents for the McKee EGP (7290-1) or the Nova Energy MPP (7921-1).

2.3 Investigations, interventions, and incidents

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

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

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

In the 2012-2014 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the conditions in resource consents or provisions in Regional Plans relating to the McKee Production Station and Power Plant.

3. Discussion

3.1 Discussion of site performance

Inspections of the McKee Production Station and Power Plant during the 2012-2014 period found that the sites were well managed and the stormwater systems were maintained to a satisfactory standard. Emissions to air were well controlled.

The construction and commissioning of the LPG plant at MPS and the adjacent McKee Power Plant during the period were accomplished with no significant effects on the surrounding environment.

3.2 Environmental effects of exercise of consents

Stormwater system inspections and self-monitoring showed that although there were three minor exceedances of consent limits for discharges from the production station, inspections and sampling of the receiving waters did not reveal any adverse effects on the Waitara River or Mangahewa Stream.

Biomonitoring in the Mangahewa Stream showed that while the community health at the upstream site continued to improve, the downstream site did not follow a similar trend. This may be related to the historical hydrocarbon contamination present in the stream sediment. Sampling of the sediments in the period under review found no detectable hydrocarbons at the upstream biomonitoring site and a significant, but declining, concentration of hydrocarbons at the downstream site.

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

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Tables 8-22.

Table 8 Summary of performance for Consent 1157-1 to discharge uncontaminated stormwater from the site of the McKee Production Station to an unnamed tributary of the Mangahewa Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Ensure the stream can cope with increased volume of water	Inspection	Yes
2. Minimise disturbance of the stream	Inspection	Yes
3. Prevent or mitigate erosion	Inspection	Yes
4. Corrective measures applied are to be to the satisfaction of the Council	Inspection	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Install a sampling chamber in the main stormwater line	Inspection	Yes
6. Stormwater design and discharge points to be forwarded to Council	Information received	Yes
7. Provide contingency plan	Latest version approved 6 August 2014	Yes
8. Discharge not to affect receiving water	Sampling	Yes
9. Council may carry out biological monitoring	Biomonitoring undertaken	Yes
10. Review provision	Provision for review every five years	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 1158-1 to discharge treated impounded stormwater from the site of the McKee Production Facility into the Waitara River

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Stormwater to be directed for treatment prior to discharge	Inspection	Yes
2. Prevent or mitigate erosion	Inspection	Yes
3. Corrective measures applied are to be to satisfaction of Council	Inspection	Yes
4. Install a sampling chamber in the main stormwater line	Inspection	Yes
5. Stormwater layout design and discharge points are to be forwarded to the Council	Information received	Yes
6. Supply specifications of works to Council	Information received	Yes
7. Trained operator onsite capable of operation of all aspects of the treatment works	Inspection	Yes
8. Limits on contaminants in the discharge	Sampling and self-monitoring	One minor exceedance in reported results
9. Discharge shall have no other effect on the receiving water	Sampling and inspection	Yes
10. Discharge not to cause adverse effects on the biological community of the Waitara River	Not monitored during the period under review	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
11. Discharge not to alter colour or clarity of the water	Inspection	Yes
12. Management plan	Management Plan received	Yes
13. Spill plan	Latest version approved 6 August 2014	Yes
14. Council may undertake ecological monitoring of the receiving water	Not monitored during the period under review	N/A
15. Toxicological monitoring of discharge	Not undertaken during the period under review	N/A
16. Monitoring of discharge shall be undertaken as required	Records received	Yes
17. Review provision	Provision for review every five years	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

Table 10 Summary of performance for Consent 1159-1 to divert unnamed tributaries of the Mangahewa Stream in the vicinity of the McKee Production Facility, and to discharge surface water run-off from adjacent land into the Mangahewa Stream, to permit construction and operation of the said facility

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Plans and location of diversions to be forwarded to Council	Received	Yes
2. Ensure natural channels of stream can cope with increased flow	Inspection	Yes
3. Prevent or mitigate erosion	Inspection	Yes
4. Any corrective measures are to be to the satisfaction of Council	Inspection	Yes
5. Council may carry out biological monitoring	Biomonitoring undertaken	Yes
6. Review provision	Provision for review every five years	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 1226-1 to take water from the Mangahewa Stream for process, fire fighting and domestic purposes associated with operation of the McKee Production Station

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Minimum flow of at least 5 litres/sec to be maintained in tributary	Not assessed	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
2. Install metering system and forward records to Council	Records provided to Council	Yes
3. Intake structure to be designed to minimise disturbance	Inspection	Yes
4. Submit plans of intake structure	Provided	Yes
5. Review provision	Provision for review every five years	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 1227-1 to construct a weir control for the McKee Production Site water intake on the Mangahewa Stream in the Onaero Catchment

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Submit plans and location of all works	Received	Yes
2. Works to minimise disturbance to beds and banks of river channel flows	Inspection	Yes
3. Prevent or mitigate any erosion	Inspection	Yes
4. Intake structure to be designed and constructed to permit passage of fish upstream	Triennial fish survey - not undertaken during this monitoring period	N/A
5. Minimum flow of no less than 5 litres/sec in the Mangahewa Stream	Not assessed	N/A
6. Operation of sluice pipe for desilting only with written approval of Council	No requests to undertake desilting	N/A
7. Review provision	Provision for review every five years	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 13 Summary of performance for Consent 2393-2 to take water from the Mangaone Stream in the Waitara catchment for use in a gas fired Power Station

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Abstraction rate not to exceed 46 l/sec	Abstraction records received	Yes
2. Install and maintain a water meter and data logger at the take point	Meter installed and verified	Yes
3. Provide certification of the measuring and recording equipment	Certification received	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
4. Notify the Council of any malfunctions and repairs	None undertaken	N/A
5. The equipment shall be accessible to the Council at all reasonable times	Inspection	Yes
6. Provide records in a suitable format	Abstraction records received	Yes
7. Adoption of best practicable option	Inspection	Yes
8. Design and screen the intake to avoid entrapment of fish	Inspection	Yes
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 14 Summary of performance for Consent 4006-2 to erect, place and maintain a bridge over the Waitara River for oil field access purposes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Notify Council prior to maintenance works which may disturb the river bed	No works undertaken	N/A
2. Structure shall be maintained to ensure conditions of consent are met	Inspection	Yes
3. Structure shall be removed and area reinstated when no longer required	Structure still in use	N/A
4. Review provision	Next option for review in 2015	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 15 Summary of performance for Consent 4050-3 to discharge emissions into the air arising from the flaring of hydrocarbons associated with production activities at the McKee-C wellsite and from hydrocarbon processing operations and miscellaneous emissions at the McKee Production Station

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder shall adopt the best practicable option	Inspection	Yes
2. Hydrocarbon storage vessels are to be fitted with vapour recovery systems	Inspection	Yes
3. Opacity of smoke emissions shall not exceed 1 on the Ringlemann Scale	Not assessed	N/A
4. There shall be no offensive odour or smoke beyond the boundary	Inspection	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. CO concentration at or beyond boundary shall not exceed 10 mg/m^3/8hrs or 30 mg/m^3/hr	Ambient air sampling	Yes
6. NO concentration at or beyond boundary shall not exceed 100 µg/m^3/12hrs or 200 µg /m^3/hr	Not assessed	N/A
7. No hazardous/toxic/noxious emissions at or beyond boundary	Inspection and ambient air sampling	Yes
8. Limit on increase of contaminant concentrations at or beyond boundary	Not assessed	N/A
9. Gas and condensate analysis to be made available	Not requested	N/A
10. Consent holder to record occasions of visible smoke	Inspection	Yes
11. Consent holder to maintain flaring log	Inspection and log received by Council	Yes
12. Provision of flaring and emissions report each May	Report received by Council	Yes
13. No alterations to be made without consulting Council prior	Inspection	Yes
14. No liquid or solid hydrocarbons to be combusted except in emergency	Inspection and consent holders records	Yes
15. Council to be notified of flaring	Notifications received	Yes
16. Consent holder to notify residents within 1 km prior to flaring	No complaints received	Yes
17. Wind speed and direction to be taken into consideration for flaring	No complaints received	Yes
18. Gas flared to be treated by effective separation and recovery	Inspection	Yes
19. Council to be notified if separation fails	No incidents during period	N/A
20. Only well stream substances to be combusted in flare pit.	Inspection and records	Yes
21. Review provision	Next option for review in 2015	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 16 Summary of performance for Consent 4560-2 to discharge wastewater from filter backwashing and tank cleaning into the Waitara River

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent to be in accordance with information submitted in support of application	Inspection	Yes
2. Discharge not to cause effects beyond mixing zone	Inspection	Yes
3. Review provision	Next option for review in 2015	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 17 Summary of performance for Consent 7290-1 to discharge emissions into the air from natural gas combustion and other related activities associated with the operation of an electricity generation plant at the McKee Production Station

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of the best practicable option	Inspection	Yes
2. Consult with Council prior to alterations	Inspection	Yes
3. Dangerous levels of airborne contaminants at or beyond the boundary not allowed	Air quality monitoring	Yes
4. Odour, dust or smoke that is offensive or obnoxious or objectionable at or beyond the boundary not allowed	Inspection	Yes
5. Hazardous, toxic or noxious contaminants at or beyond the boundary not allowed	Inspection and air quality monitoring	Yes
6. Maximum ground level concentration of carbon monoxide at or beyond the boundary	Air quality monitoring	Yes
7. Maximum ground level concentration of nitrogen dioxide at or beyond the boundary	Not assessed	N/A
8. Specified maximum ground level concentrations for contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides	Not assessed	N/A
9. Lapse condition	Not applicable – consent exercised	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
10. Review provision	Next option for review in 2015	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		High High

Table 18 Summary of performance for Consent 7435-1 to discharge stormwater into an unnamed tributary of the Mangahewa Stream in the Onaero catchment from a LPG Plant

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder shall adopt the best practicable option	Inspection and liaison with consent holder	Yes
2. Maximum catchment area 7,800m^2	Site plans	Yes
3. Provide site plans	Plans received	Yes
4. Notify Council prior to exercise of consent	Notifications received	Yes
5. Maintain contingency plan	Latest version approved 6 August 2014	Yes
6. Maintain stormwater management plan	Plan received	Yes
7. Stormwater directed to treatment system	Inspection	Yes
8. Hazardous substance storage to be bunded	Inspection	Yes
9. Limits contaminants in the discharge	Sampling and self-monitoring	Three minor exceedances in reported results
10. Discharge not to cause certain effects in receiving waters	Inspection and sampling	Yes
11. Lapse provision	Not applicable - consent exercised	N/A
12. Review provision	Next option for review in 2015	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		Good High

Table 19 Summary of performance for Consent 7436-1 to discharge emissions to air from the flaring of natural gas in emergency situations and miscellaneous emissions associated with the treatment of gas at the McKee LPG Plant and the Mangahewa Extraction Train 2

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder shall adopt the best practicable option	Inspection	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
2. No alterations to be made without consulting Council prior	Inspection	Yes
3. Consent holder to minimise emissions	Inspection	Yes
4. Monthly flaring information to be provided to Council	Information received	Yes
5. No dangerous levels of contaminants at or beyond the boundary	Inspection and ambient air sampling	Yes
6. There shall be no offensive//obnoxious/objectionable odour/dust/smoke at or beyond the boundary	Inspection	Yes
7. No hazardous/toxic/noxious emissions at or beyond boundary	Inspection and ambient air sampling	Yes
8. CO concentration at or beyond boundary shall not exceed 10 mg/m^3/8hrs or 30 mg/m^3/hr	Ambient air sampling	Yes
9. NO concentration at or beyond boundary shall not exceed 100 $\mu g/m^3$/12hrs or 200 $\mu g /m^3$/hr	Not assessed	N/A
10. Limit on increase of contaminant concentrations at or beyond boundary	Not assessed	N/A
11. Lapse provision	Not applicable - consent exercised	N/A
12. Review provision	Next option for review in 2015	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 20 Summary of performance for Consent 7920-1 to discharge wastewater and stormwater from a retention pond at the McKee Power Plant, into water and onto and into land where it may enter an unnamed tributary of the Mangahewa Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder shall adopt the best practicable option	Inspection	Yes
2. Maximum catchment area 4.2 hectares	Inspection	Yes
3. Ensure all potentially contaminated stormwater is directed for treatment prior to discharge	Inspection	Yes
4. Limits on contaminants in discharge	Sampling	Yes
5. Effects on receiving water below the mixing zone	Inspection and sampling	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
6. Prepare and maintain contingency plan	Plan approved	Yes
7. Prepare and maintain stormwater management plan	Plan approved	Yes
8. No alterations to be made that may alter the discharge without consulting the Council	No changes proposed	Yes
9. Undertake and maintain fencing and riparian planting	Inspection	Yes
10. Lapse provision	Not applicable – consent exercised	N/A
11. Review provision	Next option for review in 2015	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 21 Summary of performance for Consent 7921-1 to discharge emissions to air from the combustion of natural gas and other miscellaneous emissions from the McKee Power Plant

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder shall adopt the best practicable option	Inspection	Yes
2. Provision of report demonstrating compliance with SC1 every six years	Not required during monitoring period under review	N/A
3. Maximum ground level concentration of carbon monoxide, nitrogen dioxide, PM10 and sulphur dioxide at or beyond the boundary	Air quality monitoring	Yes
4. Hazardous, toxic or noxious contaminants at or beyond the boundary not allowed	Air quality monitoring	Yes
5. Maximum discharge rate for nitrogen oxides	Self-monitoring	Yes
6. Minimum discharge stack height	Construction complete	Yes
7. Discharges shall not give rise to significant adverse environmental effects	Inspection, sampling and results of self-monitoring	Yes
8. Lapse provision	Not applicable – consent exercised	N/A
9. Review provision	Next option for review in 2016	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 22 Summary of performance for Consent 7922-1 to install and use a stormwater and wastewater outlet structure in an unnamed tributary of the Mangahewa Stream associated with the McKee Power Plant

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Constructed in accordance with application	Construction complete	Yes
2. Minimum pipe diameter of 525mm	Construction complete	Yes
3. Notification of installation	Notification received	Yes
4. Minimisation of streambed disturbance	Inspection	Yes
5. Undertake works in accordance with Council guidelines	Inspection	Yes
6. Removal and reinstatement when no longer required	Structure still in use	N/A
7. Shall not alter flow or restrict passage of fish	Inspection	Yes
8. Lapse provision	Not applicable – consent exercised	N/A
9. Review provision	Next option for review in 2016	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 period under review, the Company demonstrated an overall high level of both environmental performance and administrative compliance with the resource consents as defined in Section 1.1.4. There were no unauthorised incidents recorded by the Council in relation to the Company's activities. The McKee Production Station and Power Plant were well managed and maintained.

3.4 Recommendations from the 2011-2012 Annual Report

In the 2011-2012 Annual Report, it was recommended:

1. THAT the monitoring programme for consents associated with the McKee Production Station for the 2012-2013 period remained unchanged from that of the 2011-2012 period (including supplementary sediment sampling in the Mangahewa Stream).

2. THAT the option for a review of resource consent 1157 in 2013, as set out in condition 10 of the consent not be exercised, on the grounds that the current conditions are adequate to mitigate any effects arising from the exercise of the consent.

3. THAT the option for a review of resource consent 1158 in 2013, as set out in condition 17 of the consent not be exercised, on the grounds that the current conditions are adequate to mitigate any effects arising from the exercise of the consent.

4. THAT the option for a review of resource consent 1159 in 2013, as set out in condition 6 of the consent not be exercised, on the grounds that the current conditions are adequate to mitigate any effects arising from the exercise of the consent.

These recommendations were implemented.

3.5 Alterations to monitoring programmes for 2014-2015

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community. The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

It is proposed that for 2014-2015 the monitoring programme is amended to reflect the Council's changes to the structure of all monitoring programme estimates, primarily to provide for amended health and safety requirements. It is also proposed that the monitoring programme is updated as part of the standardisation of monitoring at petrochemical production stations. For the McKee Production Station and Power Plant programme, this includes expanded discharge sampling and inspection regimes and the integration of the associated wellsite monitoring work.

3.6 Exercise of optional review of consents

Resource consents 4006-2, 4560-2, 7290-1, 7435-1 and 7436-1 provide for an optional review of the consents in June 2015. Conditions 4, 3, 10, 12 and 12 respectively, allow the Council to review the consents for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of these resource consents which were either not foreseen at the time the applications were considered or which it was not appropriate to deal with at the time.

Resource consent 4050-3 also provides for optional review of the consent in June 2015. Condition 21 allows the Council to review the consent 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.

Based on the results of monitoring in the period under review, and in previous years as set out in earlier annual compliance monitoring reports, it is considered that there are no grounds that require a review to be pursued or grounds to exercise the review option for consents 4006-2, 4050-3, 4560-2, 7290-1, 7435-1 or 7436-1.

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

4. Recommendations

1. THAT monitoring of consented activities at the McKee Production Station and Power Plant in the 2014-2015 year be amended from that undertaken in 2012-2014 to reflect the Council's changes to the structure of all monitoring programme estimates, primarily to provide for amended health and safety requirements.

2. THAT monitoring of consented activities at the McKee Production Station and Power Plant in the 2014-2015 year be amended from that undertaken in 2012-2014 to include expanded discharge sampling and inspection regimes and the integration of the associated wellsite monitoring work.

3. THAT the option for review of resource consents 4006-2, 4050-3, 4560-2, 7290-1, 7435-1 and 7436-1 in June 2015, as set out in their respective conditions, not be exercised on the grounds that the current conditions are considered adequate to deal with any adverse effects on the environment arising from the exercise of these resource consents.

Glossary of common terms and abbreviations

The following abbreviations and terms may be 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.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m^3s^{-1}).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
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.
$g/m^2/day$	grams/$metre^2$/day
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.
m^2	Metres$^{2.}$
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.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
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 consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act* 1991 and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
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.

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Appendix I

Resource consents held by Todd Energy Limited and Nova Energy Limited

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

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
Decision Date (Change):	8 August 1984
Commencement Date (Change):	8 August 1984 [Granted: 28 September 1983]

Conditions of Consent

Consent Granted:	To discharge up to 325 litres/second of uncontaminated stormwater from the site of McKee Production Facility into an unnamed tributary of the Mangahewa Stream at or about GR: Q19:255-343
Expiry Date:	1 June 2023
Site Location:	Grantee's property, near unnamed tributary of Mangahewa Stream
Legal Description:	Pt Otaraoa No 3 DP 2961 Blk X Waitara SD
Catchment:	Onaero
Tributary:	Mangahewa

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

General conditions

a) This right is subject to all the relevant provisions of the Water and Soil Conservation Act 1967, and any regulations made thereunder. It is the obligation of the grantee of this right to comply with all statutory requirements relating to the exercise thereof.

b) The Taranaki Regional Council may prescribe the method of management of this right, including the limitation of periods during which the right may be fully exercised, if a water shortage or other abnormal circumstance occurs in the locality.

c) The grantee shall keep such records relating to the exercise of this right as may reasonably be required by the Taranaki Regional Council and shall, if so requested, supply this information to the Taranaki Regional Council. Further, the grantee shall, at his own expense, if the Taranaki Regional Council so requests, install such measuring devices as are considered reasonably necessary by the Taranaki Regional Council for the acquisition of such records.

d) This right is granted subject to the Taranaki Regional Council or its servants or agents being permitted such access as is reasonably required for the purposes of carrying out inspections and measurements in connection with this right.

e) The standards, techniques and methods of monitoring of this right shall be to the specific approval of the Chief Executive, Taranaki Regional Council.

f) The design, construction and maintenance of any works relating to the right shall be to a standard adequate to meet the conditions of this right, so that the exercise of this does not cause damage to any property or injury to any person.

g) This right may be cancelled in writing to the grantee by the Taranaki Regional Council if the right is not exercised within twelve months of the date or grant or such longer time as the Chief Executive, Taranaki Regional Council, may approve.

h) This right may be terminated by the Taranaki Regional Council upon not less that 12 months notice in writing to the grantee if, in the opinion of the Taranaki Regional Council, the public interest so requires, but without prejudice to the grantee to apply for a further right in respect of the same matter.

i) The actual and reasonable cost of supervision of this right, including certification, approval, monitoring, water sampling and analyses, be met by the grantee.

j) The Grantee shall provide to the Chief Executive, Taranaki Regional Council, on his request (and, at his discretion, for his approval) plans, specifications and maintenance programmes of works associated with the exercise of this right, showing that the conditions of this right are able to be met.

k) Before the Taranaki Regional Council or its Chief Executive:

   i) imposes any requirement or makes any request under General Condition (c); or
   ii) grants or withholds any approval under the provisions of this right; or

iii) makes any determination as to any programme or supervision or monitoring or as to the actual and reasonable cost to be met by the Grantee; or

iv) makes any determination as to adequacy under General Conditions (f) and/or (j);

the Taranaki Regional Council shall confer with the Grantee to enable agreement to be reached between the Taranaki Regional Council and the Grantee on the subject matter and costs thereof, provided that if any dispute arises concerning the matters dealt with in (i)-(iv) above, the dispute shall be referred to an independent arbitrator to be mutually agreed upon, the arbitration to be conducted in accordance with the Arbitration Act 1908, or in such a manner as the parties affecting may agree upon.

Special conditions

1. That the Grantee shall be responsible for ensuring that the natural channels of the streams below the discharge point, for a distance to be decided upon by agreement between the Chief Executive, Taranaki Regional Council and the Grantee, are capable of coping with the increased volumes of water.

2. That the works associated with the exercise of this right shall be designed to minimise disturbance to the bed and banks of the stream channels both at low flows and design flood levels, subject to Condition 1 above.

3. That the Grantee shall, where possible, prevent or mitigate any erosion which may occur as a result of works associated with the exercise of this right.

4. That any corrective measures applied as a result of (2) and (3) above shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

5. That the Grantee shall install a sampling chamber in the main stormwater discharge lines, to the satisfaction of the Chief Executive, Taranaki Regional Council.

6. That plans for stormwater design layout and discharge points shall be forwarded to the Chief Executive, Taranaki Regional Council, for his approval prior to the commencement of construction.

7. That the Grantee shall provide, for the approval of the Chief Executive, Taranaki Regional Council, a contingency plan for actions to be taken in the event of a spillage or accumulation of off-specification effluent, at least three months or such shorter time as the Chief Executive, Taranaki Regional Council may allow, prior to the exercise of this right.

8. That the discharge shall not alter the level or concentration of suspended solids, oils and hydrocarbons, pH, temperature or any other parameter in the receiving water, without prior written approval of the Chief Executive, Taranaki Regional Council.

9. That the Taranaki Regional Council may carry out a programme of biological monitoring of the Mangahewa Stream environment, subject to Section 24K of the Water and Soil Conservation Act 1967.

10. That there shall be a review by the Grantee and Taranaki Regional Council of all conditions, restrictions and prohibitions every five years, and if as a result of this review the Grantee or the Taranaki Regional Council require a variation, then the variation procedures shall be pursuant to Section 24B of the Water and Soil Conservation Act 1967.

Transferred 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
Decision Date (Change):	8 August 1984
Commencement Date (Change):	8 August 1984 [Granted: 28 September 1983]

Conditions of Consent

Consent Granted:	To discharge up to 10 litres/second of treated impounded stormwater from the site of the McKee Production Facility into the Waitara River at or about GR: Q19:241-337
Expiry Date:	1 June 2023
Site Location:	East Bank Of Waitara River
Legal Description:	Pt Otaraoa No 3 DP 2961 Blk X Waitara SD
Catchment:	Waitara

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

General conditions

a) This right is subject to all the relevant provisions of the Water and Soil Conservation Act 1967, and any regulations made thereunder. It is the obligation of the grantee of this right to comply with all statutory requirements relating to the exercise thereof.

b) The Taranaki Regional Council may prescribe the method of management of this right, including the limitation of periods during which the right may be fully exercised, if a water shortage or other abnormal circumstance occurs in the locality.

c) The grantee shall keep such records relating to the exercise of this right as may reasonably be required by the Taranaki Regional Council and shall, if so requested, supply this information to the Taranaki Regional Council. Further, the grantee shall, at his own expense, if the Taranaki Regional Council so requests, install such measuring devices as are considered reasonably necessary by the Taranaki Regional Council for the acquisition of such records.

d) This right is granted subject to the Taranaki Regional Council or its servants or agents being permitted such access as is reasonably required for the purposes of carrying out inspections and measurements in connection with this right.

e) The standards, techniques and methods of monitoring of this right shall be to the specific approval of the Chief Executive, Taranaki Regional Council.

f) The design, construction and maintenance of any works relating to the right shall be to a standard adequate to meet the conditions of this right, so that the exercise of this does not cause damage to any property or injury to any person.

g) This right may be cancelled in writing to the grantee by the Taranaki Regional Council if the right is not exercised within twelve months of the date or grant or such longer time as the Chief Executive, Taranaki Regional Council, may approve.

h) This right may be terminated by the Taranaki Regional Council upon not less that 12 months notice in writing to the grantee if, in the opinion of the Taranaki Regional Council, the public interest so requires, but without prejudice to the grantee to apply for a further right in respect of the same matter.

i) The actual and reasonable cost of supervision of this right, including certification, approval, monitoring, water sampling and analyses, be met by the grantee.

j) The Grantee shall provide to the Chief Executive, Taranaki Regional Council, on his request (and, at his discretion, for his approval) plans, specifications and maintenance programmes of works associated with the exercise of this right, showing that the conditions of this right are able to be met.

k) Before the Taranaki Regional Council or its Chief Executive:

   i) imposes any requirement or makes any request under General Condition (c); or
   ii) grants or withholds any approval under the provisions of this right; or

iii) makes any determination as to any programme or supervision or monitoring or as to the actual and reasonable cost to be met by the Grantee; or

iv) makes any determination as to adequacy under General Conditions (f) and/or (j);

the Taranaki Regional Council shall confer with the Grantee to enable agreement to be reached between the Taranaki Regional Council and the Grantee on the subject matter and costs thereof, provided that if any dispute arises concerning the matters dealt with in (i)-(iv) above, the dispute shall be referred to an independent arbitrator to be mutually agreed upon, the arbitration to be conducted in accordance with the Arbitration Act 1908, or in such a manner as the parties affecting may agree upon.

Special conditions

1. That any stormwater originating from process or tankage areas, or areas where the level of contamination or likely contamination is significant, or is contaminated in the opinion of the Chief Executive, Taranaki Regional Council, shall be retained in the stormwater holding pond for treatment and discharged via the treatment system as treated stormwater.

2. That the Grantee shall, where possible, prevent or mitigate any erosion which occurs as a result of works associated with the exercise of this right.

3. That any corrective measures applied as a result of (2) above shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

4. That the Grantee shall install a sampling chamber in the treated stormwater discharge line to the outfall, to the satisfaction of the Chief Executive, Taranaki Regional Council

5. That plans for stormwater design layout, discharge point and works shall be forwarded to the Chief Executive, Taranaki Regional Council, for the written approval, prior to the commencement of construction.

6. The Grantee shall supply specifications of all works associated with the exercise of this right showing that the special conditions of the right particularly (8) and (9) can be met, at least three months prior to the exercise of this right for the written approval of the Chief Executive, Taranaki Regional Council.

7. That at all times of plant operation a suitably trained operator be available on site capable of operation of all aspects of the treatment works, to the satisfaction of the Chief Executive, Taranaki Regional Council.

8. That on the basis of 24 hour flow-proportioned composite samples, components of the effluent stream shall conform to the following:

Temperature	$<20^{o}C$
pH	6.5 – 8.5
Total recoverable hydrocarbons	90% of samples $<10\ g/m^3$
	the balance of samples $<20\ g/m^3$
Suspended solids	$<30\ g/m^3$

9. That other than specified in Condition 8 above, the discharge shall not alter the level of concentration of any other parameter in the receiving water, without prior written approval of the Chief Executive, Taranaki Regional Council

10. The discharge shall cause no adverse effects to the biological communities of the Waitara River.

11. That the discharge shall not alter to a conspicuous extent the natural colour and clarity of the receiving water.

12. That the grantee shall provide an Effluent Disposal Management Plan for the plant, including commissioning phases, at least three months (or such shorter time as the Chief Executive, Taranaki Regional Council, may allow) prior to the exercise of this right for the approval of the Chief Executive, Taranaki Regional Council.

13. That the Grantee shall provide a Contingency Plan for actions to be taken in the event of a spillage or accumulation of off-specification effluent, at least three months (or such shorter time as the Chief Executive, Taranaki Regional Council may allow) prior to the exercise of this right, for the approval of the Chief Executive, Taranaki Regional Council

14. That ecological monitoring of the receiving water may be carried out by the Taranaki Regional Council to determine the effects of the discharge on in-stream ecology, subject to Section 24K of the Water and Soil Conservation Act 1967.

15. The Commission may undertake such toxicological testing of the final discharge from time to time, as may be required by the Chief Executive, Taranaki Regional Council, subject to Section 24K of the Water and Soil Conservation Act 1967.

16. The Grantee shall undertake such monitoring of the final discharge as may be required by the Chief Executive, Taranaki Regional Council (Section 24K of the Water and Soil Conservation Act 1967).

17. That there shall be a review by the Grantee and Taranaki Regional Council of all conditions, restrictions and prohibitions every five years, and if as a result of this review the Grantee or the Taranaki Regional Council require a variation, then the variation procedures shall be pursuant to Section 24B of the Water and Soil Conservation Act 1967.

Transferred 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
Decision Date (Change)	8 August 1984
Commencement Date (Change)	8 August 1984 (Granted: 28 September 1983)

Conditions of Consent

Consent Granted:	To divert unnamed tributaries of the Mangahewa Stream in the vicinity of the McKee Production Facility, and to discharge surface water run-off from adjacent land into the Mangahewa Stream, to permit construction and operation of the said facility at or about GR: Q19:255-343
Expiry Date:	1 June 2023
Site Location:	Grantee's property, near unnamed tributary of Mangahewa Stream
Legal Description:	N/A
Catchment:	Onaero
Tributary:	Mangahewa

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

General conditions

a) This right is subject to all the relevant provisions of the Water and Soil Conservation Act 1967, and any regulations made thereunder. It is the obligation of the grantee of this right to comply with all statutory requirements relating to the exercise thereof.

b) The Taranaki Regional Council may prescribe the method of management of this right, including the limitation of periods during which the right may be fully exercised, if a water shortage or other abnormal circumstance occurs in the locality.

c) The grantee shall keep such records relating to the exercise of this right as may reasonably be required by the Taranaki Regional Council and shall, if so requested, supply this information to the Taranaki Regional Council. Further, the grantee shall, at his own expense, if the Taranaki Regional Council so requests, install such measuring devices as are considered reasonably necessary by the Taranaki Regional Council for the acquisition of such records.

d) This right is granted subject to the Taranaki Regional Council or its servants or agents being permitted such access as is reasonably required for the purposes of carrying out inspections and measurements in connection with this right.

e) The standards, techniques and methods of monitoring of this right shall be to the specific approval of the Chief Executive, Taranaki Regional Council.

f) The design, construction and maintenance of any works relating to the right shall be to a standard adequate to meet the conditions of this right, so that the exercise of this does not cause damage to any property or injury to any person.

g) This right may be cancelled in writing to the grantee by the Taranaki Regional Council if the right is not exercised within twelve months of the date or grant or such longer time as the Chief Executive, Taranaki Regional Council, may approve.

h) This right may be terminated by the Taranaki Regional Council upon not less that 12 months notice in writing to the grantee if, in the opinion of the Taranaki Regional Council, the public interest so requires, but without prejudice to the grantee to apply for a further right in respect of the same matter.

i) The actual and reasonable cost of supervision of this right, including certification, approval, monitoring, water sampling and analyses, be met by the grantee.

j) The Grantee shall provide to the Chief Executive, Taranaki Regional Council, on his request (and, at his discretion, for his approval) plans, specifications and maintenance programmes of works associated with the exercise of this right, showing that the conditions of this right are able to be met.

k) Before the Taranaki Regional Council or its Chief Executive:

   i) imposes any requirement or makes any request under General Condition (c); or
   ii) grants or withholds any approval under the provisions of this right; or

iii) makes any determination as to any programme or supervision or monitoring or as to the actual and reasonable cost to be met by the Grantee; or

iv) makes any determination as to adequacy under General Conditions (f) and/or (j);

the Taranaki Regional Council shall confer with the Grantee to enable agreement to be reached between the Taranaki Regional Council and the Grantee on the subject matter and costs thereof, provided that if any dispute arises concerning the matters dealt with in (i)-(iv) above, the dispute shall be referred to an independent arbitrator to be mutually agreed upon, the arbitration to be conducted in accordance with the Arbitration Act 1908, or in such a manner as the parties affecting may agree upon.

Special conditions

1. That plans and locations for the proposed diversions shall be forwarded to the Chief Executive, Taranaki Regional Council, for his written approval prior to commencement of construction.

2. That the Grantee shall be responsible for ensuring that the natural channels of the streams below the diversion, for a distance to be decided upon by agreement between the Chief Executive, Taranaki Regional Council and the Grantee, are capable of coping with the increased volumes of water.

3. That the Grantee shall, where possible, prevent or mitigate any erosion which occurs as a result of works associated with the exercise of this right.

4. That any corrective measures applied as a result of (2) and (3) above shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

5. That the Taranaki Regional Council may carry out a programme of biological monitoring of the Mangahewa Stream environment, subject to Condition (1) above.

6. That there shall be a review by the Grantee and Taranaki Regional Council of all conditions, restrictions and prohibitions every five years, and if as a result of this review the Grantee or the Taranaki Regional Council require a variation, then the variation procedures shall be pursuant to Section 24B of the Water and Soil Conservation Act 1967.

Transferred 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
Decision Date (Change):	8 August 1984
Commencement Date (Change):	8 August 1984 (Granted: 14 March 1984)

Conditions of Consent

Consent Granted:	To take up to 172,800 litres/day of water at a maximum rate of 2 litres/second from the Mangahewa Stream for process and domestic purposes associated with operation of the Mckee Production Station at or about GR: Q19:256-344
Expiry Date:	1 June 2023
Site Location:	Mangahewa Stream, Otaraoa Road, Waitara
Legal Description:	Pt Otaraoa No 3 DP 2961 Blk X Waitara SD
Catchment:	Onaero
Tributary:	Mangahewa

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

General conditions

a) This right is subject to all the relevant provisions of the Water and Soil Conservation Act 1967, and any regulations made thereunder. It is the obligation of the grantee of this right to comply with all statutory requirements relating to the exercise thereof.

b) The Taranaki Regional Council may prescribe the method of management of this right, including the limitation of periods during which the right may be fully exercised, if a water shortage or other abnormal circumstance occurs in the locality.

c) The grantee shall keep such records relating to the exercise of this right as may reasonably be required by the Taranaki Regional Council and shall, if so requested, supply this information to the Taranaki Regional Council. Further, the grantee shall, at his own expense, if the Taranaki Regional Council so requests, install such measuring devices as are considered reasonably necessary by the Taranaki Regional Council for the acquisition of such records.

d) This right is granted subject to the Taranaki Regional Council or its servants or agents being permitted such access as is reasonably required for the purposes of carrying out inspections and measurements in connection with this right.

e) The standards, techniques and methods of monitoring of this right shall be to the specific approval of the Chief Executive, Taranaki Regional Council.

f) The design, construction and maintenance of any works relating to the right shall be to a standard adequate to meet the conditions of this right, so that the exercise of this does not cause damage to any property or injury to any person.

g) This right may be cancelled in writing to the grantee by the Taranaki Regional Council if the right is not exercised within twelve months of the date or grant or such longer time as the Chief Executive, Taranaki Regional Council, may approve.

h) This right may be terminated by the Taranaki Regional Council upon not less that 12 months notice in writing to the grantee if, in the opinion of the Taranaki Regional Council, the public interest so requires, but without prejudice to the grantee to apply for a further right in respect of the same matter.

i) The actual and reasonable cost of supervision of this right, including certification, approval, monitoring, water sampling and analyses, be met by the grantee.

j) The Grantee shall provide to the Chief Executive, Taranaki Regional Council, on his request (and, at his discretion, for his approval) plans, specifications and maintenance programmes of works associated with the exercise of this right, showing that the conditions of this right are able to be met.

k) Before the Taranaki Regional Council or its Chief Executive:

   i) imposes any requirement or makes any request under General Condition (c); or
   ii) grants or withholds any approval under the provisions of this right; or

iii) makes any determination as to any programme or supervision or monitoring or as to the actual and reasonable cost to be met by the Grantee; or

iv) makes any determination as to adequacy under General Conditions (f) and/or (j);

the Taranaki Regional Council shall confer with the Grantee to enable agreement to be reached between the Taranaki Regional Council and the Grantee on the subject matter and costs thereof, provided that if any dispute arises concerning the matters dealt with in (i)-(iv) above, the dispute shall be referred to an independent arbitrator to be mutually agreed upon, the arbitration to be conducted in accordance with the Arbitration Act 1908, or in such a manner as the parties affecting may agree upon.

Special conditions

1. That a minimum flow of not less than 5 litres/second should be maintained in the tributary at all times except when due to natural conditions.

2. That the Grantee shall install a metering system to continuously record the abstraction rate with an error of less than 10%, and shall supply this record or parts of this records to the Taranaki Regional Council at the Taranaki Regional Council's request.

3. That the intake structure shall be designed to minimise disturbance to the stability of the bed and banks of the streams/river's channels both at low flows and flood levels. The intakes shall be so designed, constructed, maintained and modified so as to permit upstream passage of fish.

4. That the Grantee shall submit plans of the intake structure, its location, and the metering system to the Taranaki Regional Council for written approval by the Chief Executive, prior to commencement of construction.

5. That there shall be a review by the Grantee and Taranaki Regional Council of all conditions, restrictions and prohibitions every five years, and if as a result of this review the Grantee or the Taranaki Regional Council require a variation, then the variation procedures shall be pursuant to Section 24B of the Water and Soil Conservation Act 1967.

Transferred 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:	Bay of Plenty Energy C/- Todd Corporation P O Box 3141 WELLINGTON
Decision Date:	22 June 2011
Change To Conditions Date:	22 June 2011 [Granted: 22 August 1997]

Conditions of Consent

Consent Granted:	To take water from the Mangaone Stream in the Waitara catchment for use in a gas fired Power Station at or about (NZTM) 1714710E-5670423N
Expiry Date:	1 June 2015
Site Location:	McKee Oil Field, Bristol Road, Inglewood [site of take] Otaraoa Road, Waitara [site of use]
Legal Description:	Pt Rimutauteka 12 Blk XIV Waitara SD [site of take] Pt Lot 6 DP 658 XIW Waitara SD [site of use]
Catchment:	Waitara
Tributary:	Mangaone

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

General condition

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

Special conditions

1. The volume of water taken shall not exceed 46 litres per second.

2. Before exercising this consent the consent holder shall install, and thereafter maintain a water meter and a datalogger at the site of taking. The water meter and datalogger shall be tamper-proof and shall measure and record the rate and volume of water taken to an accuracy of ± 5%. Records of the date, the time and the rate and volume of water taken at intervals not exceeding 15 minutes, shall be made available to the Chief Executive, Taranaki Regional Council at all reasonable times.

   Note: Water meters and dataloggers must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters and dataloggers have a limited lifespan.

3. The consent holder shall provide the Chief Executive, Taranaki Regional Council with a document from a suitably qualified person certifying that water measuring and recording equipment required by the conditions of this consent ['the equipment']:

   (a) has been installed and/or maintained in accordance with the manufacturer's specifications; and/or

   (b) has been tested and shown to be operating to an accuracy of ± 5%.

   The documentation shall be provided:

   (i) within 30 days of the installation of a water meter or datalogger;

   (ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the equipment may not be functioning as required by this consent; and

   (iii) no less frequently than once every five years.

4. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.

5. The water meter and datalogger shall be accessible to Taranaki Regional Council officers at all reasonable times for inspection and/or data retrieval.

6. The records of water taken shall:

   (a) be in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing; and

   (b) specifically record the water taken as 'zero' when no water is taken.

7. At all times the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the abstraction of water, including, but not limited to, the efficient and conservative use of water.

8. The consent holder shall ensure that the intake is screened and designed to avoid fish entering the intake or being trapped against the screen.

Signed and transferred at Stratford on 22 June 2011

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Land Use Consent

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH
Decision Date:	14 July 1999
Commencement Date:	14 July 1999

Conditions of Consent

Consent Granted:	To erect, place and maintain a bridge over the Waitara River for oil field access purposes at or about GR: Q19:248-322
Expiry Date:	1 June 2033
Review Date(s):	June 2003, June 2009, June 2015, June 2021, June 2027
Site Location:	Waitara River, Bristol/McKee Road, Waitui
Legal Description:	Road Reserve Blk XIV Waitara SD
Catchment:	Waitara

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 (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) 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. That the consent holder shall notify the Taranaki Regional Council, at least 48 hours prior to the commencement and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the riverbed or discharges to water.

2. That the structure[s] authorised by this consent shall be maintained to ensure the conditions of this consent are met.

3. That the structure[s] authorised by this consent shall be removed and the area reinstated, if and when the structure[s] are no longer required. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to structure[s] removal and reinstatement.

4. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2003 and/or June 2008 and/or June 2015 and/or June 2021 and/or June 2027, for the purpose of ensuring that the conditions adequately deal with the environmental effects arising from the exercise of this 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.

Transferred 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:	30 September 2009
Commencement Date:	30 September 2009

Conditions of Consent

Consent Granted:	To discharge emissions into the air arising from the flaring of hydrocarbons associated with production activities at the McKee-C wellsite and from hydrocarbon processing operations and miscellaneous emissions at the McKee Production Station at or about (NZTM) 1715282E-5672495N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	McKee Production Station, Otaraoa Road, Tikorangi, Waitara
Legal Description:	Lot 1 DP 14374 Blk X Waitara SD

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

General conditions

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

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

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

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

Special conditions

All operations

1. 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 McKee Production Station or McKee-C wellsite [including use of a separator during well clean-up].

2. All liquid hydrocarbon storage vessels shall be fitted with vapour recovery systems.

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

4. 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 production station and wellsite is located.

5. 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 production station and wellsite are located.

6. 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 production station and wellsite are located.

7. The consent holder shall control emissions to the atmosphere, from the production station, 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.

8. The consent holder shall control emissions to the atmosphere from the production station, 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].

9. 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.

10. 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.

11. 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 12.

12. 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 smoke emissions as required under condition 11;
   ii) detailing any measures undertaken or proposed to reduce smoke emissions;
   iii) detailing any measures undertaken or proposed to reduce flaring;
   iv) addressing any other issue relevant to the minimisation or mitigation of emissions from the flare.

McKee Production Station

13. 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.

14. No liquid or solid hydrocarbons from the McKee Production Station shall be combusted through the gas flare system, other than in an emergency.

McKee-C wellsite

15. The consent holder shall notify the Chief Executive, Taranaki Regional Council, whenever the continuous flaring of hydrocarbons [other than purge gas] from the McKee-C wellsite 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.

16. At least 24 hours before any flaring from the McKee-C wellsite, 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.

17. 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 from the McKee-C wellsite so as to minimise offsite effects.

18. All gas that is flared from the McKee-C wellsite must first be treated by effective liquid and solid separation and recovery to ensure that smoke emission during flaring is minimised.

19. If separation required by special condition 18 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.

20. Only substances originating from the well stream and treated as outlined by conditions 18 and 19 shall be combusted within the flare pit.

Review

21. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent 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.

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:	Nova Energy Limited P O Box 10141 WELLINGTON 6143
Decision Date:	7 January 2003
Commencement Date:	7 January 2003

Conditions of Consent

Consent Granted:	To discharge wastewater from filter backwashing and tank cleaning into the Waitara River
Expiry Date:	1 June 2021
Review Date(s):	June 2009, June 2015
Site Location:	McKee Oilfield, Bristol Road, Waitui, Inglewood
Legal Description:	Pt Rimutauteka 12 DP 658 Blk XIV Waitara SD
Grid Reference (NZTM)	1714714E-5670564N
Catchment:	Waitara

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 (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

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

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

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

Special conditions

1. The exercise of this consent shall be conducted in accordance with the information submitted in support of the application and to ensure that the conditions of this consent are met at all times.

2. That after allowing for reasonable mixing in a zone of 100 metres downstream of the discharge point, the discharge shall not give rise to all or any of the following effects in the receiving water:

   i) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
   ii) any conspicuous change in the colour or visual clarity:
   iii) any emission of an objectionable odour;
   iv) any significant adverse effects on aquatic life, habitats, or ecology;
   v) any undesirable biological growths.

3. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2009 and/or 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.

Transferred at Stratford on 8 April 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 July 2009
Commencement Date:	8 July 2009

Conditions of Consent

Consent Granted:	To discharge stormwater into an unnamed tributary of the Mangahewa Stream in the Onaero catchment from a LPG Plant at or about (NZTM) 1715355E-5672389N
Expiry Date:	1 June 2039
Review Date(s):	June 2015, June 2021, June 2027, June 2033
Site Location:	McKee Production Station, Otaraoa Road, Waitara
Legal Description:	Lot 1 DP 14374 Blk X Waitara SD
Catchment:	Onaero
Tributary:	Mangahewa

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 adverse effects of the discharge on any water body.

2. The stormwater discharged shall be from a catchment area not exceeding 7,800 m^2.

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

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent. 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 only if the consent holder does not have access to email.

5. The consent holder shall maintain a contingency plan. The contingency plan shall be adhered to in the event of a spill or emergency and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, detail measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not authorised by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.

6. The consent holder shall maintain a stormwater management plan. This plan shall be adhered to at all times and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council document how the site is to be managed in order to minimise the contaminants that become entrained in the stormwater. The plan shall include but not necessarily be limited to:

   a. management of the interceptor system.
   b. the loading and unloading of materials;
   c. maintenance of conveyance systems; and
   d. general housekeeping.

7. All stormwater discharged under this permit shall be directed for treatment through the stormwater treatment system for discharge in accordance with the special conditions of this permit.

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

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

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

   This condition shall apply prior to the entry of the treated stormwater into the unnamed tributary of the Mangahewa Stream at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

10. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge point, the discharge shall not give rise to any of the following effects in the receiving waters of the unnamed tributary of the Mangahewa Stream:

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

11. This consent shall lapse on 30 September 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.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021 and/or June 2027 and/or June 2033, 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 (Change):	24 October 2012
Commencement Date (Change):	24 October 2012 (Granted: 8 July 2009)

Conditions of Consent

Consent Granted:	To discharge emissions to air from the flaring of natural gas in emergency situations and miscellaneous emissions associated with the treatment of gas at the McKee LPG Plant and the Mangahewa Extraction Train 2 at or about (NZTM) 1715363E-5672126N
Expiry Date:	1 June 2039
Review Date(s):	June 2015, June 2021, June 2027, June 2033
Site Location:	McKee Production Station, Otaraoa Road, Waitara
Legal Description:	Lot 1 DP 14374 Blk X Waitara SD (Discharge source & site)

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 effects on the environment associated with the discharge of contaminants into the environment arising from the emissions to air from the site.

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

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

4. The consent holder shall supply to the Taranaki Regional Council each month a copy of flaring information comprising: the type and amount of material flared (including any gas used to maintain a pilot flame), the date this was flared, the reason why flaring was undertaken, and an indication of whether smoke was produced from such flaring events.

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

6. The discharges authorised by this consent shall not, whether alone or in conjunction with any other emissions from the McKee Production Station arising through the exercise of any other consent held by the consent holder, give rise to any odour or dust or smoke that is offensive or obnoxious or objectionable at or beyond the boundary of the property on which the production station is located.

7. The consent holder shall not discharge any contaminant to air from the site at a rate or a quantity such that the contaminant, whether alone or in conjunction with any other emissions from the McKee Production Station arising through the exercise of any other consent held by the consent holder, is or is liable to be hazardous or toxic or noxious at or beyond the boundary of the property where the LPG plant is located.

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

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

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

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

11. This consent shall lapse on 30 September 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.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021 and/or June 2027 and/or June 2033, 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:	Nova Energy Limited P O Box 10141 WELLINGTON 6143
Decision Date:	12 October 2011
Commencement Date:	12 October 2011

Conditions of Consent

Consent Granted:	To discharge emissions to air from the combustion of natural gas and other miscellaneous emissions from the McKee Power Plant
Expiry Date:	1 June 2031
Review Date(s):	June 2016, June 2021, June 2026
Site Location:	McKee Production Station, Otaraoa Road, Tikorangi
Legal Description:	Pt Lot 6 DP 658 [Discharge source & site]
Grid Reference (NZTM)	1715521E-5671616N and 1715507E-5671577N

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

General condition

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

Special conditions

1. The consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants into the environment from the property.

   Note: With respect to this consent, the consent holder's property is defined as the area shown in the map attached.

2. By 31 October 2013 and every six years thereafter, the consent holder shall provide to the Council a written report that demonstrates compliance with condition 1 above. The report shall include but not necessarily be limited to:

   a) A review of any of technological advances in the reduction or mitigation of emissions, how these might be applicable and/or implemented at the power station, and the costs and benefits of these advances; and

   b) An inventory of emissions from the site of such contaminants as the Chief Executive, Taranaki Regional Council, may from time to time specify following consultation with the consent holder; and

   c) Documentation showing that emissions of contaminants is the minimum that can be reasonably achieved; and

   d) Details of any measures that have been taken by the consent holder to improve the energy efficiency of the power station.

3. The consent holder shall control all emissions of carbon monoxide, nitrogen dioxide, fine particles [PM_{10}] and sulphur dioxide to the atmosphere from the site, in order that the maximum ground level concentration of any of these contaminants arising from the exercise of this consent measured under ambient conditions does not exceed the relevant ambient air quality standard as set out in the Resource Management [National Environmental Standards for Air Quality Regulations, 2004] at or beyond the boundary of the property.

4. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than those expressly provided for under special condition 3, in order that they do not individually or in combination with other contaminants cause a hazardous, noxious, dangerous, offensive or objectionable effect at or beyond the boundary of the property.

5. With the exception of any period of 15 minutes following the initiation of start-up of a turbine or in any period of 5 minutes prior to the cessation of the generation of electricity from a turbine, the consent holder shall take all practicable steps to control emissions of nitrogen oxides to the atmosphere to ensure that the following rates of discharge are not exceeded:

   a) a combined total mass emission rate from the two gas turbine stacks of 44.6 kg/hour; and
   b) a mass emission rate per gas turbine stack of 5.7g s^{-1}.

6. The minimum height of discharge of the products of combustion from the turbines shall be 14.5 metres above ground level.

7. The discharges authorised by this consent shall not give rise to any direct significant adverse ecological effect on any ecosystems in the Taranaki region, including but not limited to habitats, plants, animals, microflora and microfauna.

8. This consent shall lapse on 31 December 2016, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

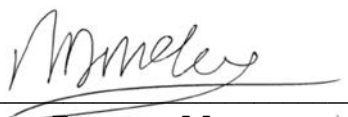
9. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2021, and/or June 2026 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; and/or

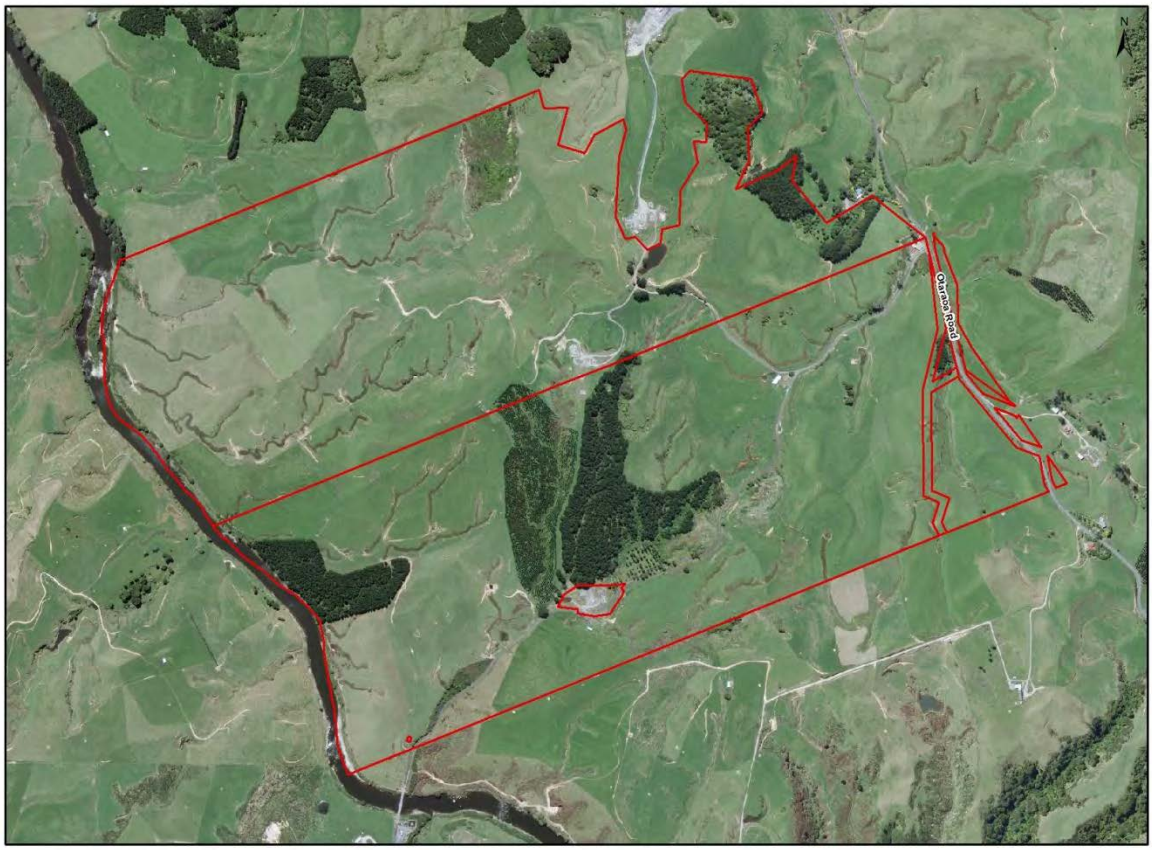
   b) requiring the consent holder to adopt specific practices in order to achieve the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge.

Transferred at Stratford on 8 April 2013

For and on behalf of
Taranaki Regional Council



Director-Resource Management



Map Showing the property boundary

Land Use Consent

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

Name of Consent Holder:	Nova Energy Limited P O Box 10141 WELLINGTON 6143
Decision Date:	12 October 2011
Commencement Date:	12 October 2011

Conditions of Consent

Consent Granted:	To install and use a stormwater and wastewater outlet structure in an unnamed tributary of the Mangahewa Stream associated with the McKee Power Plant
Expiry Date:	1 June 2031
Review Date(s):	June 2016, June 2021, June 2026
Site Location:	McKee Production Station, Otaraoa Road, Tikorangi
Legal Description:	Pt Lot 6 DP 658 [Site of structure]
Grid Reference (NZTM)	1715548E-5671506N
Catchment:	Onaero
Tributary:	Mangahewa

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

General condition

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

Special conditions

1. The structure shall be constructed in accordance with drawing 5/2665/1/7424 sheet 2 dated 3/08/2011 and a plan view drawing dated 29/09/2011-01, and provided to the Taranaki Regional Council on 29/08/2011 and 29/09/2011 respectively. In the case of any contradiction between the drawing[s] and the conditions of this consent, the conditions of this consent shall prevail.

2. The outlet pipe shall have a diameter no less than 525 mm.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the commencement and upon completion of the initial installation. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

4. The consent holder shall ensure that the area and volume of streambed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.

5. The consent holder shall take all reasonable steps to:

   a. minimise the amount of sediment discharged to the stream;
   b. minimise the amount of sediment that becomes suspended in the stream; and
   c. mitigate the effects of any sediment in the stream.

   Undertaking work in accordance with *Guidelines for Earthworks in the Taranaki region,* by the Taranaki Regional Council, will achieve compliance with this condition.

6. Except with the written agreement of the Chief Executive, Taranaki Regional Council, the structure[s] authorised by this consent shall be removed and the area reinstated, if and when the structure is no longer required. A further resource consent may be required to authorise the removal of the structure, and the consent holder is advised to seek advice from the Council on this matter.

7. The exercise of this consent shall not alter the natural flow of the river or restrict the passage of fish.

8. This consent shall lapse on 31 December 2016, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

9. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2021 and /or June 2026, 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.

Transferred at Stratford on 8 April 2013

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Appendix II

Biomonitoring reports

To Job Manager, S Cowperthwaite
From Scientific Officer, B Jansma
Doc No 1235681
Report No BJ198
Date 13 August 2013

Biomonitoring of the Mangahewa Stream in relation to stormwater discharges from the McKee Production Station of Todd Taranaki Ltd, November 2012.

Introduction

This was the first of two biomonitoring surveys relating to the McKee Production Station undertaken in 2012-13 monitoring year. While sites 1, 2 and 4 were monitored by some previous surveys in the Mangahewa Stream, in order to determine recovery over this reach of the stream subsequent to a small pipeline leakage of hydrocarbon products referenced in previous surveys, documented recovery required that only sites 1 and 2 were monitored by the more recent surveys. The results from surveys performed since the 2000-2001 monitoring year are discussed in the reports referenced in this report. Previously the McKee Production Station was under Fletcher Challenge Energy ownership. It was owned for a period by Shell Todd Oil Services Ltd and recently was transferred to Todd Taranaki Ltd.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from all substrate types at two sites (sites 1 and 2) in the Mangahewa Stream (Table 1, Figure 1) on 29 November 2012. This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

Table 1 Biomonitoring sites in the Mangahewa Stream, sampled in relation to the McKee Production Station

Site No.	Site code	Map reference	Location
1	MHW000060	Q19:257344	Upstream of stormwater discharge and intake pond
2	MHW000065	Q19:256347	150 m downstream of McKee Production Station

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

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

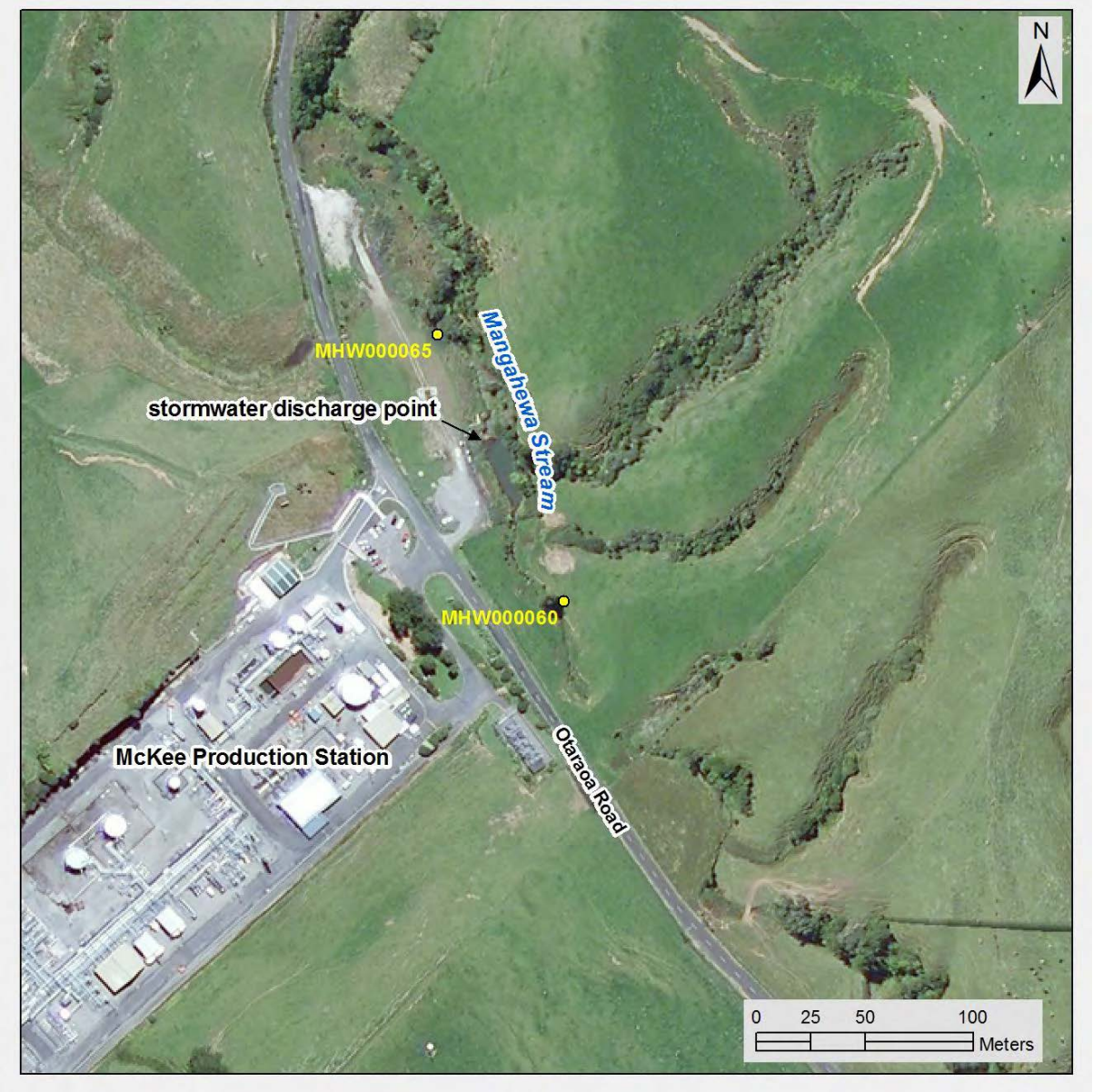


Figure 1 Biomonitoring sites in the Mangahewa Stream related to the McKee Production Station.

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

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

Results and discussion

At the time of this afternoon survey there was a moderate to low, uncoloured flow at both sites in the Mangahewa Stream. The flow at both sites was clear, with the cloudiness noted at site 2 in the previous survey not apparent. It was also noted that there seemed to be a lot of silt tied up in the substrate and periphyton at site 2, although site 1 also exhibited some siltation also.

The current survey followed 11 days after a stream fresh in excess of 7 times median flow. At site 1, upstream of the McKee Production Station, the substrate was predominantly fine and coarse gravel, with fine gravel, a minor amount of sand, silt and cobble. Downstream of the production station at site 2 the substrate was had a slightly coarser composition, with more cobble and some boulder noted. Both sites had similar periphyton communities, with algal mats and filaments present in patches, while site 2 also supported patchy growths of moss. The downstream site was partially shaded by riparian vegetation whereas the upstream site was partially shaded due to it being located between slumped pasture banks (due to localised seepages and inadequate riparian protection). Unlike in the April 2011 survey, hydrocarbon odours were not noticeable at site 2 during sampling, nor were they apparent during processing of the sample.

Macroinvertebrate communities

This small hill country stream usually supports macroinvertebrate communities with low to moderate numbers of taxa and moderate to low proportions of 'sensitive' taxa. The results of previous surveys are summarised in Table 2, together with the current results which are also presented in Table 3 and illustrated in Figures 2 and 3.

Table 2 Numbers of macroinvertebrate taxa and MCI values recorded in previous surveys of the Mangahewa Stream in relation to the McKee Production Station from March 1983, together with current results

Site		Numbers of taxa			MCI values			$SQMCI_S$ values			
	N	Median	Range	Current	Median	Range	Current	N	Median	Range	Current
1	61	14	4-24	17	74	48-98	93	24	3.1	1.3-4.4	4.4
2	56	16	3-31	27	82	27-96	96	24	3.4	1.9-3.9	4.1

Table 3 Macroinvertebrate fauna of the Mangahewa Stream in relation to McKee Production Station discharges sampled on 29 November 2012

Taxa List	Site Number	MCI score	1	2
	Site Code		MHW000060	MHW000065
	Sample Number		FWB12481	FWB12482
NEMERTEA	Nemertea	3	-	R
ANNELIDA (WORMS)	Oligochaeta	1	A	A
	Lumbricidae	5	R	R
MOLLUSCA	*Potamopyrgus*	4	VA	A
CRUSTACEA	*Paracalliope*	5	-	R
	Paraleptamphopidae	5	-	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	A	A
	Coloburiscus	7	-	R
	Deleatidium	8	A	C
	Zephlebia group	7	R	C
PLECOPTERA (STONEFLIES)	*Acroperla*	5	R	R
	Zelandobius	5	C	R
COLEOPTERA (BEETLES)	Elmidae	6	A	R
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	R	R
TRICHOPTERA (CADDISFLIES)	*Aoteapsyche*	4	-	C
	Costachorema	7	-	R
	Hydrobiosis	5	A	A
	Neurochorema	6	-	R
	Psilochorema	6	-	R
	Oxyethira	2	-	C
DIPTERA (TRUE FLIES)	*Aphrophila*	5	C	A
	Maoridiamesa	3	C	R
	Orthocladiinae	2	A	A
	Polypedilum	3	-	C
	Ceratopogonidae	3	R	-
	Empididae	3	R	-
	Muscidae	3	-	R
	Austrosimulium	3	C	A
ACARINA (MITES)	Acarina	5	-	R
		No of taxa	17	27
		MCI	93	96
		SQMCIs	4.4	4.1
		EPT (taxa)	6	11
		%EPT (taxa)	35	41

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

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

Site 1 (upstream of production station)

Results to date for this site are illustrated in Figure 2.

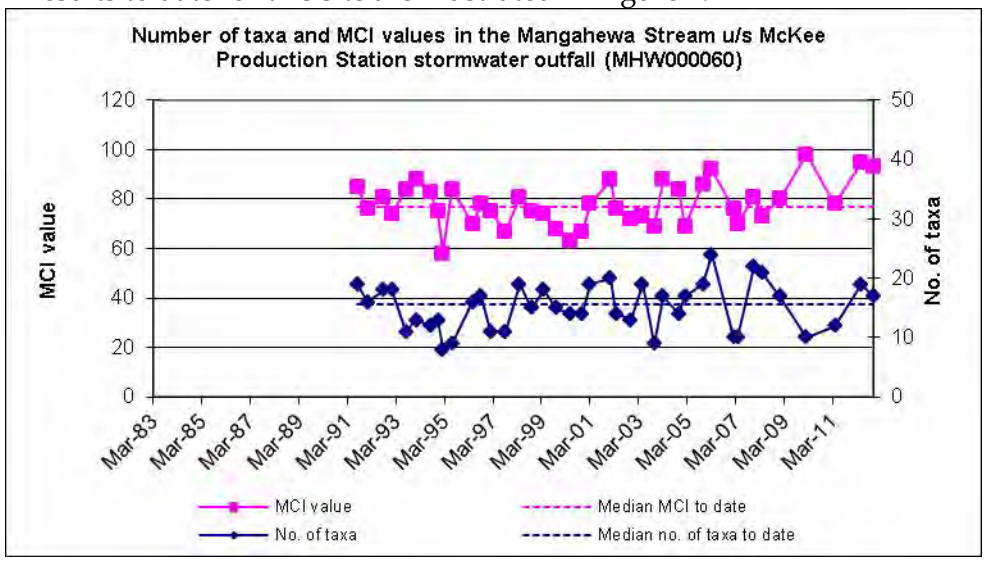


Figure 2 Number of taxa and MCI scores at site 1 in the Mangahewa Stream

A moderate richness (17 taxa) was found at site 1, three taxa more than the median number of taxa from previous surveys at this site (Table 2). The community was characterised by one 'highly sensitive' taxon (*Deleatidium* mayfly), three 'moderately sensitive' taxa (*Austroclima* mayflies, elmid beetles and *Hydrobiosis* caddisfly larvae), and three 'tolerant' taxa (oligochaete worms, snail (*Potamopyrgus*) and orthoclad midge larvae). The numerical dominance of this 'tolerant' snail was reflected in the $SQMCI_s$ value of 4.4 units, which on a general scale is relatively low. However, in comparison to previous surveys, it is the highest $SQMCI_S$ score recorded at this site to date, and relates to improved abundances of 'sensitive' taxa. This is the second consecutive survey to record such an $SQMCI_S$ score. Overall, this result is a reflection of an enriched habitat dominated by a softer, finer substrate but with an improved periphyton cover. The reduced proportion of 'tolerant' taxa present in the community (41% of taxa number) resulted in the MCI score of 93 units. This was significantly higher than the median of previous scores (Table 2), but similar to that recorded in the previous survey (Stark, 1998), and was the third highest MCI score recorded of 62 surveys (Figure 2, Table 2). The above median result recorded in the current survey is primarily related to certain taxa that are typically recorded at this site being absent, namely *Chironomus* worms and Ostracod seed shrimps, and the appearance of a number of 'sensitive' taxa, such a certain mayflies.

Site 2 (150 m downstream of production station discharges)

Results to date at this site are illustrated in Figure 3.

A significantly improved taxa richness of 27 taxa was recorded at site 2, eleven taxa more than the median of numbers recorded from all previous surveys at this site, and the second highest richness recorded at this site. It also exceeded the richness recorded at site 1 above the discharge by ten taxa (Table 2). This result also represents a continuation of the significant recovery recorded in the previous survey. That survey had been preceded by two poor results, with the February 2010 and April 2011 surveys recording 13 and 14 taxa respectively. In 2011 survey, during sample collection and processing a strong hydrocarbon odour was noted indicating that a discharge of hydrocarbons had occurred recently, which had had a toxic affect on the macroinvertebrate communities. This is further supported by the observations made during processing of that sample, that there were very few individuals recorded (10 of 14 taxa recorded less than five individuals, most only 1 or 2 specimens), and that those

individuals present were very small. There were no such observations made during sampling and processing of the current sample, and coupled with the high taxa richness, this indicates that no such discharge had preceded the current survey, similar to that concluded in the previous survey.

Another reflection of this improved preceding water quality is the number of taxa that dominate the community. In the 2011 survey, only one taxon was abundant, being the 'tolerant' snail *Potamopyrgus*, and only one 'moderately sensitive' taxon was represented by five or more individuals, being the dobson fly larvae *Archichauliodes*. In the current survey, four 'tolerant' taxa were recorded in abundance (oligochaete worms, *Potamopyrgus* snails, orthoclad midge larvae and *Austrosimulium* sandfly larvae), as were two 'moderately sensitive' taxa (*Austroclima* mayfly larvae and *Hydrobiosis* caddisfly larvae). This is very similar to that recorded in the previous survey, consolidating the recovery observed since the 2011 survey.

Although there were some differences in community composition between sites (only 15 of the 27 taxa recorded were common to both sites), there was only a three unit increase in MCI score and 0.3 unit reduction in $SQMCI_S$ score at site 3 downstream. The MCI score showed a eight unit increase from that recorded in the previous survey, and was a significant 14 units higher than the median score for this site (Table 2 and Figure 3). This is equal to the highest MCI score recorded at this site to date, and reflects improved preceding water quality.

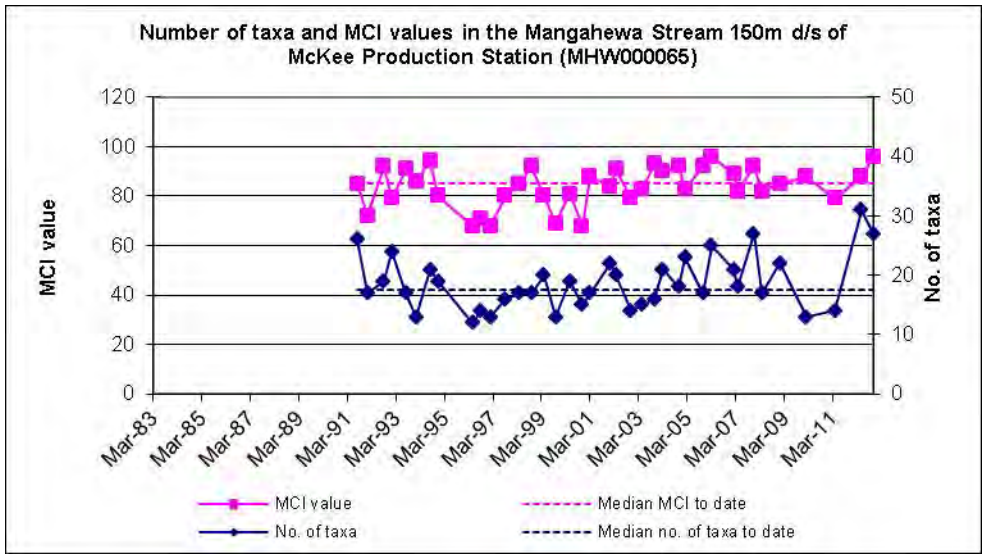


Figure 3 Number of taxa and MCI scores at site 2 in the Mangahewa Stream

Summary

The Council's standard 'kick-sampling' technique was used at two established sites to collect streambed macroinvertebrates from the Mangahewa Stream on 29 November 2012. Samples were sorted and identified to provide the number of taxa (richness), MCI score and $SQMCI_S$ score for each site.

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

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

This November 2012 macroinvertebrate survey indicates that recovery recorded in the previous survey had remained. The April 2011 results indicated a discharge containing hydrocarbons had entered the Mangahewa Stream prior, and this was also noted during sample collection and processing at that time. At the time of sampling and processing of the current survey, no hydrocarbon odour was noted from the downstream sample.

The site upstream of the production station recorded a macroinvertebrate community in above average health, with the third highest MCI score and the equal-highest $SQMCI_S$ score recorded to date, although the taxa richness at this site was within the range of that previously recorded. In contrast, the site downstream recorded a taxa richness of 27, significantly higher than the median taxa richness, and the second highest richness recorded at this site. The MCI and $SQMCI_S$ scores were also above average, significantly for the MCI score. Apart from the different taxa richnesses recorded at the sites, there were few differences in either index score, or in individual taxon abundances. There were also few differences from that recorded in the previous survey, which recorded a significant improvement with regard to the number of individuals present at the downstream site. This was well illustrated by the taxa that dominated the communities, as in the April 2011 previous survey, only one taxon was abundant, being the 'tolerant' snail *Potamopyrgus*, and only one 'moderately sensitive' taxon was represented by five or more individuals, being the dobson fly larvae *Archichauliodes*. In the current survey, four 'tolerant' taxa were recorded in abundance (oligochaete worms, *Potamopyrgus* snails, orthoclad midge larvae and *Austrosimulium* sandfly larvae), as were two 'moderately sensitive' taxa (*Austroclima* mayfly larvae and *Hydrobiosis* caddisfly larvae). This is very similar to that recorded in the previous survey, consolidating the recovery observed since the 2011 survey.

Although there were some differences in community composition between sites (only 15 of the 27 taxa recorded were common to both sites), there was only a three unit increase in MCI score and 0.3 unit reduction in $SQMCI_S$ score at site 3 downstream. The MCI score showed a eight unit increase from that recorded in the previous survey, and was a significant 14 units higher than the median score for this site (Table 2 and Figure 3). This is equal to the highest MCI score recorded at this site to date, and reflects improved preceding water quality.

It is recommended that sediment samples continue to be collected and analysed for hydrocarbons. It is also recommended that the current macroinvertebrate results be compared with the results of sediment sampling undertaken to date.

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To Job Manager, S Cowperthwaite
From Scientific Officer, B Jansma
Doc No 1235888
Report No BJ199
Date 13 August 2013

Biomonitoring of the Mangahewa Stream in relation to stormwater discharges from the McKee Production Station of Todd Taranaki Ltd, April 2013.

Introduction

This was the second of two biomonitoring surveys relating to the McKee Production Station undertaken in 2012-13 monitoring year. While sites 1, 2 and 4 were monitored by some previous surveys in the Mangahewa Stream, in order to determine recovery over this reach of the stream subsequent to a small pipeline leakage of hydrocarbon products referenced in previous surveys, documented recovery required that only sites 1 and 2 were monitored by the more recent surveys. The results from surveys performed since the 2000-2001 monitoring year are discussed in the reports referenced in this report. Previously the McKee Production Station was under Fletcher Challenge Energy ownership. It was owned for a period by Shell Todd Oil Services Ltd and recently was transferred to Todd Taranaki Ltd.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from all substrate types at two sites (sites 1 and 2) in the Mangahewa Stream (Table 1, Figure 1) on 12 April 2013. This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

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VA (very abundant) = estimated 100-499 individuals;
XA (extremely abundant) = estimated 500 individuals or more.

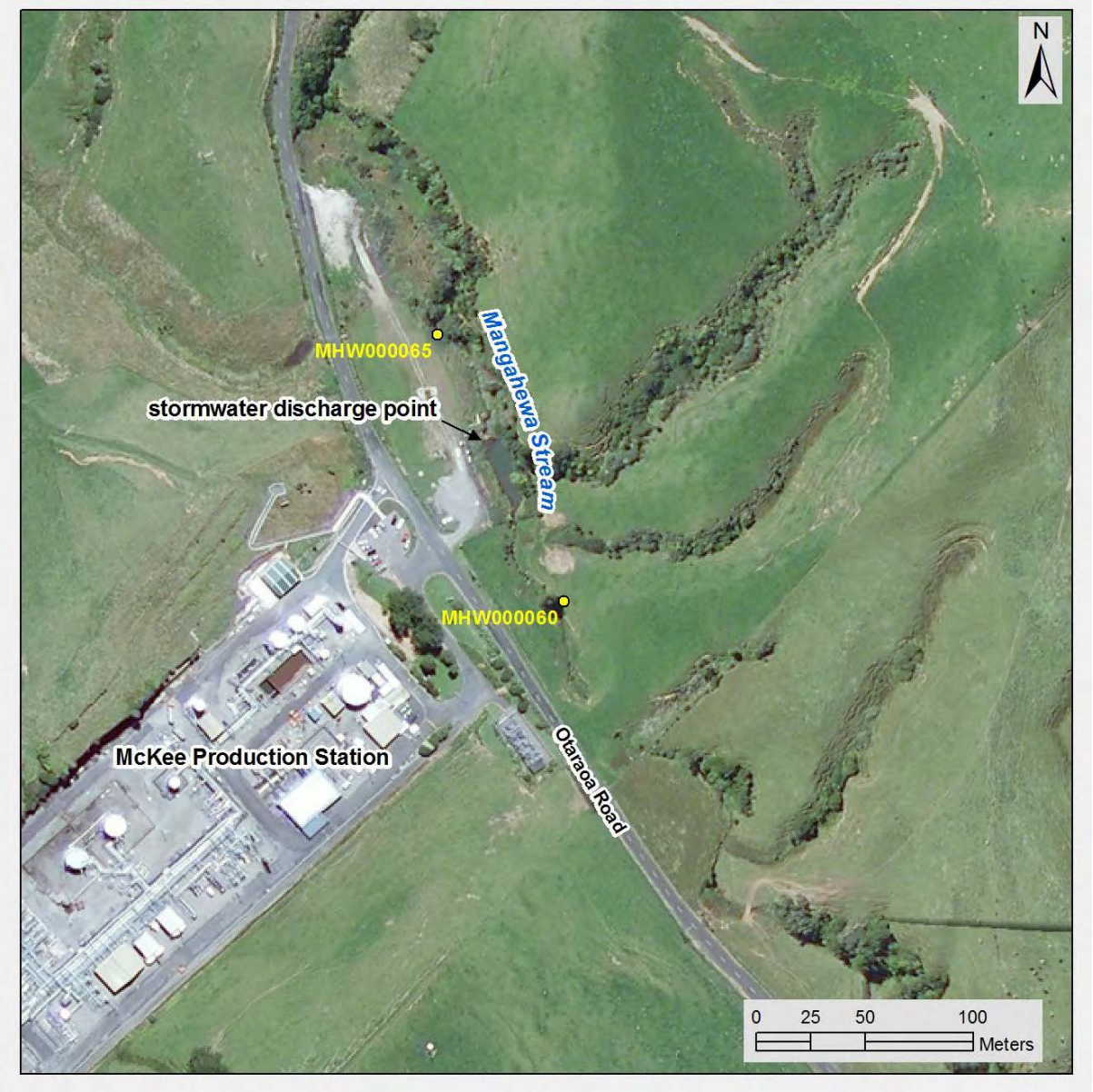

Figure 1 Biomonitoring sites in the Mangahewa Stream related to the McKee Production Station.

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

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

Results and discussion

At the time of this afternoon survey there was very low, uncoloured flow at both sites in the Mangahewa Stream. The flow at site 1 was clear, with cloudiness noted at site , most likely from the unnamed tributary that joins that Mangahewa Stream between sites 1 and 2. It was noted that there seemed to be less silt tied up in the substrate and periphyton at site 2 than what was observed in the previous few surveys.

The current survey followed 48 days after a stream fresh in excess of 7 times median flow. At site 1, upstream of the McKee Production Station, the substrate was predominantly fine and coarse gravel, with fine gravel, a moderate amount of sand and silt, and some cobble. Downstream of the production station at site 2 the substrate was had a slightly coarser composition, with more cobble and some boulder noted. Site 1 supported only a slippery film of algae, while site 2 had patchy growths of algal mats and also patchy growths of moss. The downstream site was completely shaded by riparian vegetation whereas the upstream site was unshaded, with the site located between slumped pasture banks (due to localised seepages and inadequate riparian protection). Hydrocarbon odours were last noted while sampling in the April 2011 survey, with the last three surveys (including the current one) being clear of this odour, nor was it apparent during processing of the sample.

Macroinvertebrate communities

This small hill country stream usually supports macroinvertebrate communities with low to moderate numbers of taxa and moderate to low proportions of 'sensitive' taxa. The results of previous surveys are summarised in Table 2, together with the current results which are also presented in Table 3 and illustrated in Figures 2 and 3.

Table 2 Numbers of macroinvertebrate taxa and MCI values recorded in previous surveys of the Mangahewa Stream in relation to the McKee Production Station from March 1983, together with current results

Site		Numbers of taxa			MCI values			$SQMCI_S$ values			
	N	Median	Range	Current	Median	Range	Current	N	Median	Range	Current
1	62	14	4-24	17	74	48-98	84	25	3.1	1.3-4.4	3.1
2	57	16	3-31	20	82	27-96	85	25	3.4	1.9-4.1	3.8

Table 3 Macroinvertebrate fauna of the Mangahewa Stream in relation to McKee Production Station discharges sampled on 12 April 2013

Taxa List	Site Number	MCI score	1	2
	Site Code		MHW000060	MHW000065
	Sample Number		FWB12481	FWB12482
PLATYHELMINTHES (FLATWORMS)	*Cura*	3	R	-
NEMERTEA	Nemertea	3	R	A
ANNELIDA (WORMS)	Oligochaeta	1	VA	C
	Physa	3	-	C
MOLLUSCA	*Potamopyrgus*	4	VA	VA
CRUSTACEA	Ostracoda	1	-	R
	Paraleptamphopidae	5	R	-
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	A	-
	Coloburiscus	7	-	R
	Deleatidium	8	C	-
ODONATA (DRAGONFLIES)	*Procordulia*	5	-	R
COLEOPTERA (BEETLES)	Elmidae	6	R	R
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	-	C
TRICHOPTERA (CADDISFLIES)	*Aoteapsyche*	4	-	C
	Hydrobiosis	5	C	R
	Plectrocnemia	8	-	R
	Psilochorema	6	R	-
	Oxyethira	2	-	C
	Triplectides	5	R	-
DIPTERA (TRUE FLIES)	*Aphrophila*	5	-	C
	Limonia	6	-	R
	Orthocladiinae	2	R	C
	Empididae	3	-	R
	Psychodidae	1	R	-
	Austrosimulium	3	R	C
	Stratiomyidae	5	-	R
ACARINA (MITES)	Acarina	5	-	R
		No of taxa	14	20
		MCI	84	85
		SQMCIs	3.1	3.8
		EPT (taxa)	5	4
		%EPT (taxa)	36	20

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

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

Site 1 (upstream of production station)

Results to date for this site are illustrated in Figure 2.

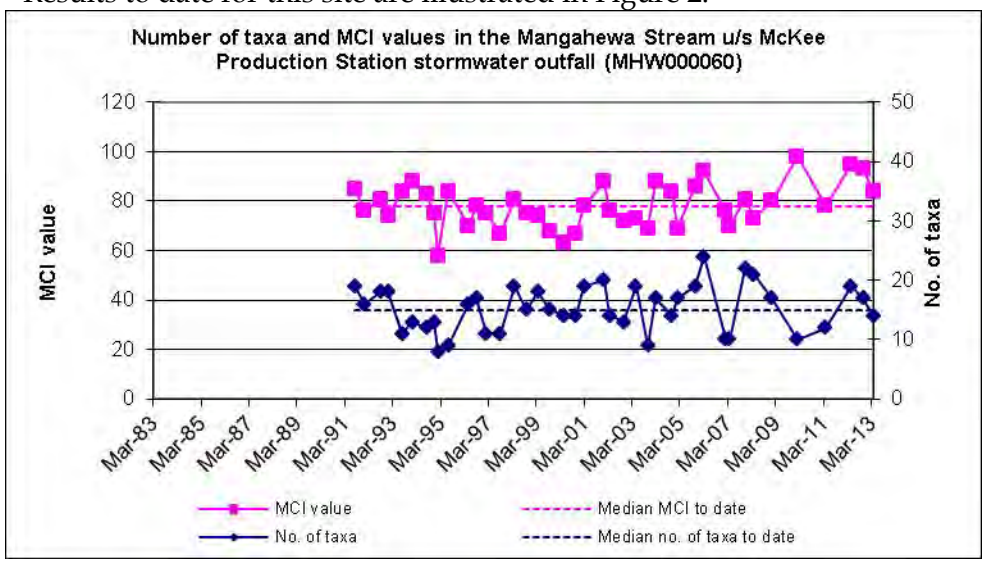

Figure 2 Number of taxa and MCI scores at site 1 in the Mangahewa Stream

A moderate richness (14 taxa) was found at site 1, equal to the median number of taxa from previous surveys at this site (Table 2). The community was characterised by one 'moderately sensitive' taxon (*Austroclima* mayfly), and two 'tolerant' taxa (oligochaete worms and snail (*Potamopyrgus*). This constitutes a significant reduction in the number of abundant taxa from that recorded in the previous survey, a direct reflection of the very low flows, and restriction of habitat that resulted. The numerical dominance of the 'tolerant' snail was reflected in the $SQMCI_s$ value of 3.1 units, which on a general scale is relatively low. However, in comparison to previous surveys, it is equal to the long term median for this site, and significantly higher than the lowest $SQMCI_S$ score recorded at this site to date (Stark, 1998). It is however a significant reduction from that recorded in the previous survey (Stark, 1998). Overall, this result is a reflection of an enriched habitat dominated by a softer, finer substrate but with an improved periphyton cover. The proportion of 'tolerant' taxa present in the community (50% of taxa number) resulted in the MCI score of 84 units. This was ten units higher than the median of previous scores (Table 2), but eight units less than that recorded in the previous survey (Figure 2, Table 2).

Site 2 (150 m downstream of production station discharges)

Results to date at this site are illustrated in Figure 3.

A reduced taxa richness of 20 taxa was recorded at site 2, four taxa more than the median of numbers recorded from all previous surveys at this site, but seven taxa less than that recorded in the previous survey, again reflecting the very low flows observed at the time. This richness exceeded the richness recorded at site 1 (above the discharge) by six taxa (Table 2). Although this result is less than that recorded in the previous two surveys, it is still considered a continuation of the significant recovery recorded since the February 2010 and April 2011 surveys, which recorded 13 and 14 taxa respectively. In 2011 survey, during sample collection and processing a strong hydrocarbon odour was noted indicating that a discharge of hydrocarbons had occurred recently, which had had a toxic affect on the macroinvertebrate communities. This is further supported by the observations made during processing of that sample, that there were very few individuals recorded (10 of 14 taxa recorded less than five individuals, most only 1 or 2 specimens), and that those individuals present were very small. There were no such observations made during sampling and processing of the current sample,

and coupled with the relatively improved taxa richness, this indicates that no such discharge had preceded the current survey, similar to that concluded in the previous two surveys.

As with site 1, site 2 also experienced a significant reduction in the number of tolerant taxa from the previous survey. In the November 2012 survey, four 'tolerant' taxa and two 'moderately sensitive' taxa were recorded in abundance. In the current survey, only two tolerant taxa were recorded as abundant (nemertean worms and snail (*Potamopyrgus*). Although this will be related to the very low flows experienced at the time of sampling, sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate. Although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

Although there were some differences in community composition between sites (only 7 of the 27 taxa recorded were common to both sites), there was only a one unit increase in MCI score and 0.7 unit increase in $SQMCI_S$ score at site 3 downstream. The MCI score showed an eleven unit decrease from that recorded in the previous survey, and was not significant different to the median score for this site (Table 2 and Figure 3). While this is also attributable to the very low flows, the hydrocarbons present in the substrate may have also influenced this result.

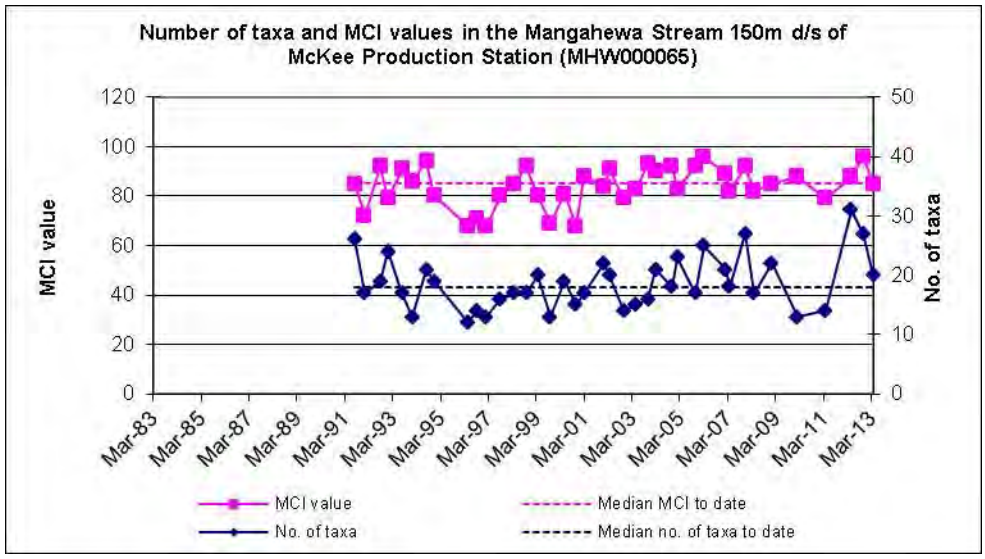

Figure 3 Number of taxa and MCI scores at site 2 in the Mangahewa Stream

Summary

The Council's standard 'kick-sampling' technique was used at two established sites to collect streambed macroinvertebrates from the Mangahewa Stream on 12 April 2013. Samples were sorted and identified to provide the number of taxa (richness), MCI score and $SQMCI_S$ score for each site.

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

This April 2013 macroinvertebrate survey was undertaken during very low flows, and these low flows appeared to be the overriding influence on the macroinvertebrate community. While the recovery recorded in the previous two surveys remained, there was a slight deterioration in community health from the last survey. However, this deterioration was not to the degree recorded in April 2011, when results indicated a discharge containing hydrocarbons had entered the Mangahewa Stream prior. At the time of sampling and processing of the current survey, no hydrocarbon odour was noted from the downstream sample.

The site upstream of the production station recorded a macroinvertebrate community in above average health, with an MCI score ten units higher than the median, and community richness and an $SQMCI_S$ score equal to their respective medians. The site downstream recorded a taxa richness of 20, similar to the median taxa richness. The MCI and $SQMCI_S$ scores were also not significantly different to their respective medians. Both sites however recorded reductions in taxa richness and index scores from that recorded in the previous survey, with this reduction being slightly more marked at site 2 than site 1. In addition, the number of taxa recorded as abundant reduced markedly at both sites, again more so at site 2, with only two taxa being recorded as abundant, both 'tolerant'. Although this will be related to the very low flows experienced at the time of sampling, sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate. Although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

It is recommended that sediment samples continue to be collected and analysed for hydrocarbons.

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To Job Manager, C McKenzie
From Scientific Officer, B Jansma
Doc No 1479498
Report No BJ249
Date 5 March 2015

Biomonitoring of the Mangahewa Stream in relation to stormwater discharges from the McKee Production Station of Todd Taranaki Ltd, December 2013.

Introduction

This was the first of two biomonitoring surveys relating to the McKee Production Station undertaken in 2013-14 monitoring year. While sites 1, 2 and 4 were monitored by some previous surveys in the Mangahewa Stream, in order to determine recovery over this reach of the stream subsequent to a small pipeline leakage of hydrocarbon products referenced in previous surveys, documented recovery required that only sites 1 and 2 were monitored by the more recent surveys. The results from surveys performed since the 2000-2001 monitoring year are discussed in the reports referenced in this report. Previously the McKee Production Station was under Fletcher Challenge Energy ownership. It was owned for a period by Shell Todd Oil Services Ltd and was then transferred to Todd Taranaki Ltd.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from all substrate types at two sites (sites 1 and 2) in the Mangahewa Stream (Table 1, Figure 1) on 18 December 2013. This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

Table 1 Biomonitoring sites in the Mangahewa Stream, sampled in relation to the McKee Production Station

Site No.	Site code	Map reference	Location
1	MHW000060	Q19:257344	Upstream of stormwater discharge and intake pond
2	MHW000065	Q19:256347	150 m downstream of McKee Production Station

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

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

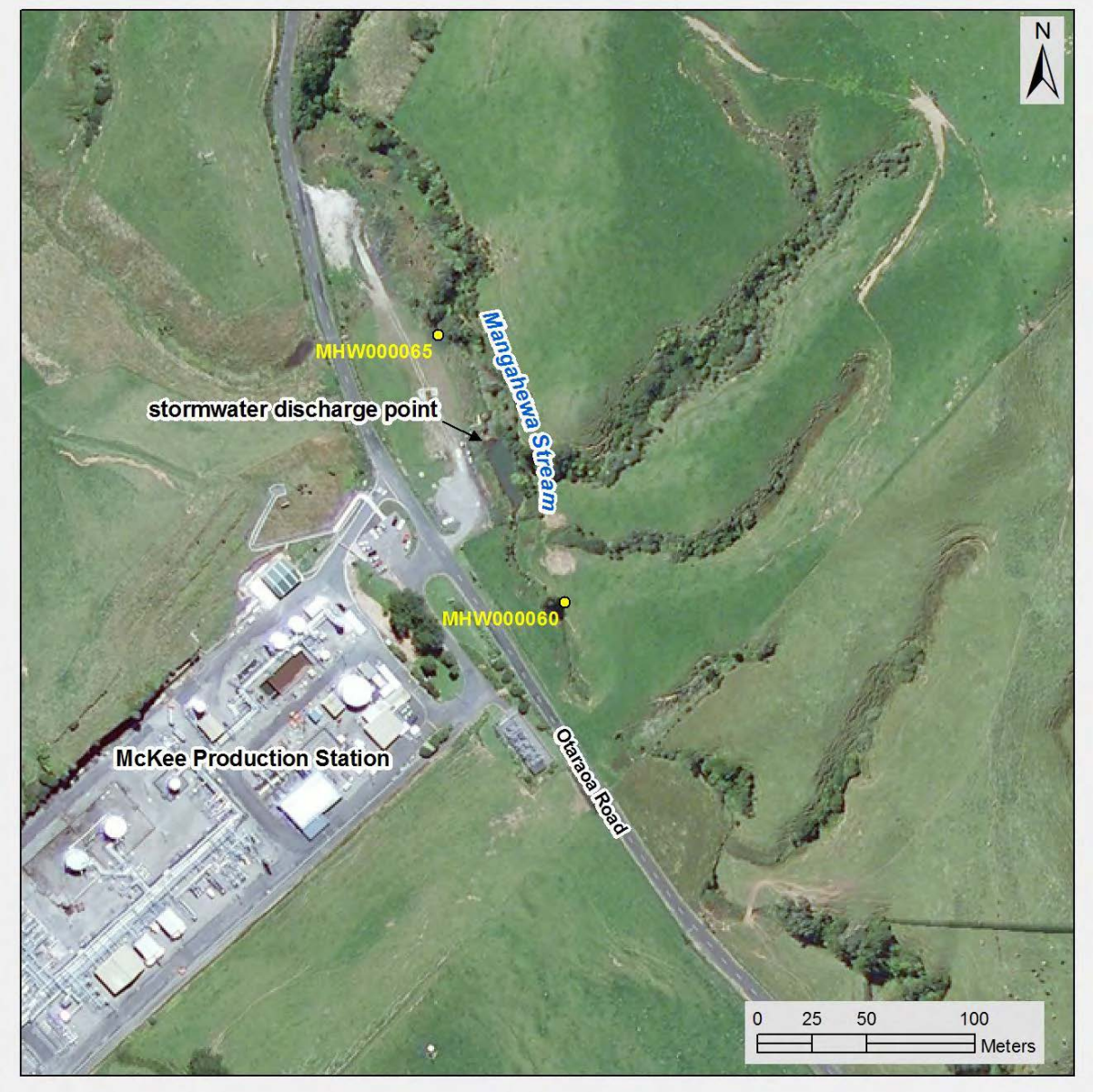

Figure 1 Biomonitoring sites in the Mangahewa Stream related to the McKee Production Station.

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

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

Results and discussion

At the time of this early afternoon survey there was moderate, uncoloured flow at both sites in the Mangahewa Stream. The flow at site 1 was clear, with cloudiness noted at site 2, most likely from the unnamed tributary that joins that Mangahewa Stream between sites 1 and 2. It was noted that there seemed to be a lot of silt tied up in the substrate and periphyton at site 2, worse that than what was observed in the previous few surveys.

The current survey followed 10 days after a stream fresh in excess of 7 times median flow. At site 1, upstream of the McKee Production Station, the substrate was predominantly fine and coarse gravel, with a moderate amount of sand and silt, and some cobble. Downstream of the production station at site 2 the substrate had a slightly coarser composition, with more cobble and some boulder noted. Site 1 supported a slippery film of algae, with some patchy filaments, while site 2 had patchy growths of both algal mats and filaments and also patchy growths of moss. The downstream site was partially shaded by riparian vegetation whereas the upstream site was unshaded, with the site located between slumped pasture banks (due to localised seepages and inadequate riparian protection). Hydrocarbon odours were last noted while sampling in the April 2011 survey, with the last four surveys (including the current one) being free of this odour. It was also not apparent during processing of the sample.

Macroinvertebrate communities

This small hill country stream usually supports macroinvertebrate communities with low to moderate numbers of taxa and moderate to low proportions of 'sensitive' taxa. The results of previous surveys are summarised in Table 2, together with the current results which are also presented in Table 3 and illustrated in Figures 2 and 3.

Table 2 Numbers of macroinvertebrate taxa and MCI values recorded in previous surveys of the Mangahewa Stream in relation to the McKee Production Station from March 1983, together with current results

Site		Numbers of taxa			MCI values			SQMCI$_S$ values			
	N	Median	Range	Current	Median	Range	Current	N	Median	Range	Current
1	63	14	4-24	20	74	48-98	91	26	3.1	1.3-4.4	4.0
2	58	17	3-31	23	82	27-96	84	26	3.4	1.9-4.1	2.8

Table 3 Macroinvertebrate fauna of the Mangahewa Stream in relation to McKee Production Station discharges sampled on 18 December 2013

Taxa List	Site Number	MCI score	1	2
	Site Code		MHW000060	MHW000065
	Sample Number		FWB13385	FWB13386
NEMERTEA	Nemertea	3	-	C
ANNELIDA (WORMS)	Oligochaeta	1	A	VA
	Lumbricidae	5	R	-
MOLLUSCA	*Potamopyrgus*	4	XA	VA
	Sphaeriidae	3	-	R
CRUSTACEA	*Paracalliope*	5	R	-
	Paraleptamphopidae	5	-	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	A	C
	Deleatidium	8	C	-
	Zephlebia group	7	-	C
PLECOPTERA (STONEFLIES)	*Zelandobius*	5	R	R
COLEOPTERA (BEETLES)	Elmidae	6	C	R
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	-	R
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	-	C
	Costachorema	7	R	-
	Hydrobiosis	5	A	C
	Neurochorema	6	-	R
	Psilochorema	6	R	-
	Oxyethira	2	-	C
	Triplectides	5	R	R
DIPTERA (TRUE FLIES)	*Aphrophila*	5	-	C
	Maoridiamesa	3	R	R
	Orthocladiinae	2	A	A
	Polypedilum	3	-	C
	Tanypodinae	5	R	-
	Ceratopogonidae	3	R	-
	Paradixa	4	R	-
	Empididae	3	R	R
	Muscidae	3	-	R
	Austrosimulium	3	C	C
	Tanyderidae	4	R	-
ACARINA (MITES)	Acarina	5	-	R
		No of taxa	20	23
		MCI	91	84
		SQMCIs	4.0	2.8
		EPT (taxa)	7	7
		%EPT (taxa)	35	30

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

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

Site 1 (upstream of production station)

Results to date for this site are illustrated in Figure 2.

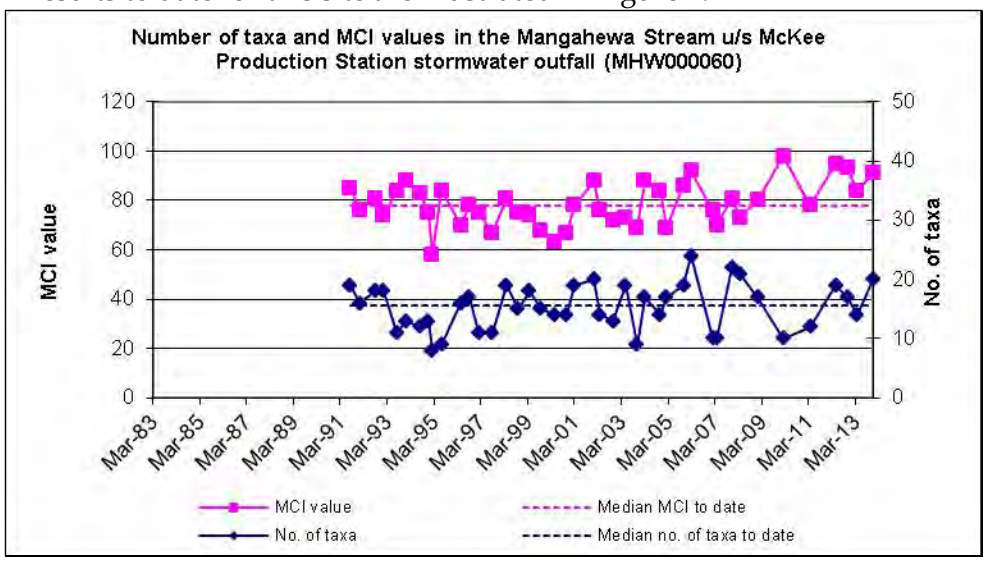

Figure 2 Number of taxa and MCI scores at site 1 in the Mangahewa Stream

A moderate richness (20 taxa) was found at site 1, equal to the median number of taxa from previous surveys at this site (Table 2). The community was characterised by two 'moderately sensitive' taxa (*Austroclima* mayfly and *Hydrobiosis* caddisfly), and three 'tolerant' taxa (oligochaete worms, *Potamopyrgus* snails and orthoclad midge larvae). This represents a slight increase in the number of abundant taxa from that recorded in the previous survey, a direct reflection of the improved flows, as the previous survey was undertaken in very low flows. The numerical dominance of the 'tolerant' snail was reflected in the $SQMCI_s$ value of 4.0 units, which on a general scale is relatively low. However, in comparison to previous surveys, it is significantly higher than the long term median for this site (Stark, 1998). It is also a significant improvement from that recorded in the previous survey (Stark, 1998). Overall, this result is a reflection of an enriched habitat dominated by a softer, finer substrate but with an improved periphyton cover. The proportion of 'tolerant' taxa present in the community (45% of taxa number) resulted in the MCI score of 91 units. This was seventeen units higher than the median of previous scores (Table 2), and seven units higher than that recorded in the previous survey (Figure 2, Table 2), both statistically significant improvements (Stark, 1998).

Site 2 (150 m downstream of production station discharges)

Results to date at this site are illustrated in Figure 3.

An increased taxa richness of 23 taxa was recorded at site 2, six taxa more than the median of numbers recorded from all previous surveys at this site, and three taxa higher than that recorded in the previous survey, again reflecting the improved low flows observed at the time. This richness exceeded the richness recorded at site 1 (above the discharge) by six taxa (Table 2). This is considered a continuation of the significant recovery recorded since the February 2010 and April 2011 surveys, which recorded 13 and 14 taxa respectively. In the 2011 survey, during sample collection and processing a strong hydrocarbon odour was noted indicating that a discharge of hydrocarbons had occurred recently, which had had a toxic affect on the macroinvertebrate communities. This is further supported by the observations made during processing of that sample, that there were very few individuals recorded (10 of 14 taxa recorded less than five individuals, most only 1 or 2 specimens), and that those individuals present were very small. There were no such observations made during sampling and processing of the current sample, and coupled with the relatively improved taxa richness, this

indicates that no such discharge had preceded the current survey, similar to that concluded in the previous three surveys.

In the April 2013survey, only two tolerant taxa were recorded as abundant. In the current survey, only three tolerant taxa were recorded as abundant (oligochaete worms, snail (*Potamopyrgus*) and orthoclad midge larvae). This indicates little change from the previous survey, despite the improved flows. Sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate. Although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

There were some differences in community composition between sites (only 11 of the 32 taxa recorded were common to both sites), and this resulted in a seven unit reduction in MCI score and 1.2 unit decrease in $SQMCI_S$ score at site 3 downstream. The MCI score showed little change from that recorded in the previous survey, and was not significantly different to the median score for this site (Table 2 and Figure 3). This does not reflect the improved flow conditions observed at the time of sampling, and may suggest that the hydrocarbons present in the substrate may have influenced this result.

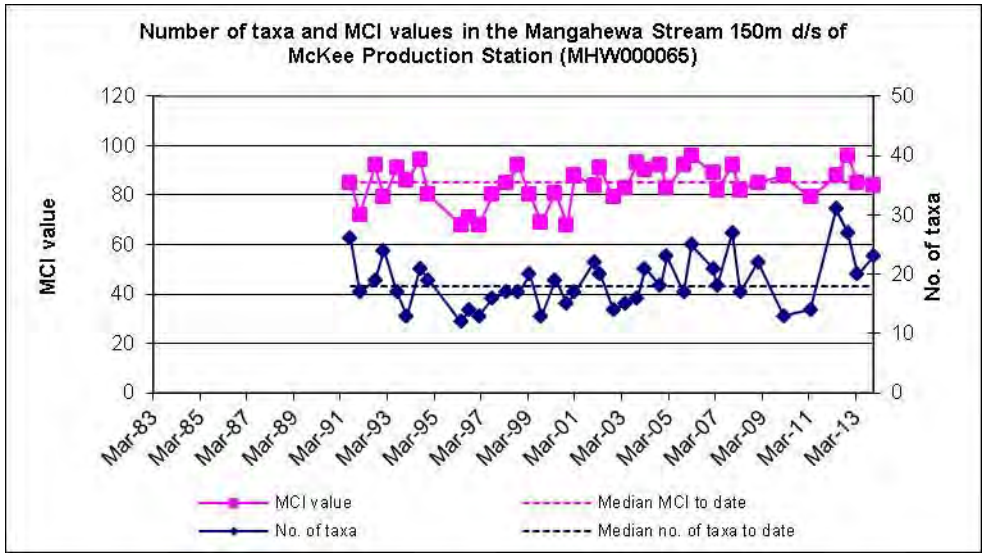

Figure 3 Number of taxa and MCI scores at site 2 in the Mangahewa Stream

Summary

The Council's standard 'kick-sampling' technique was used at two established sites to collect streambed macroinvertebrates from the Mangahewa Stream on 18 December 2013. Samples were sorted and identified to provide the number of taxa (richness), MCI score and $SQMCI_S$ score for each site.

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

This December 2013 macroinvertebrate survey was undertaken during moderate flows. The increase in flow from the previous survey resulted in a slight improvement in taxa richness. While the recovery recorded in the previous three surveys remained, there remained a slight deterioration in community health from the last survey. However, this deterioration was not to the degree recorded in April 2011, when results indicated a discharge containing hydrocarbons had entered the Mangahewa Stream prior. At the time of sampling and processing of the current survey, no hydrocarbon odour was noted from the downstream sample.

The site upstream of the production station recorded a macroinvertebrate community in above average health, with an MCI score seventeen units higher than the median, and community richness and an $SQMCI_S$ score higher than their respective medians. The site downstream recorded a taxa richness of 23, six taxa higher than the median taxa richness. The MCI and $SQMCI_S$ scores were also not significantly different to their respective medians. However, unlike the that recorded at site 1, there was no improvement in MCI score, and the $SQMCI_S$ score reduced, being significantly less than that recorded in the previous survey. This is contrary to what would be expected with the increased flows, and sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate. Although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

It is recommended that sediment samples continue to be collected and analysed for hydrocarbons.

References

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To Job Manager, C McKenzie
From Scientific Officer, B Jansma
Doc No 1479690
Report No BJ250
Date 5 March 2015

Biomonitoring of the Mangahewa Stream in relation to stormwater discharges from the McKee Production Station of Todd Taranaki Ltd, March 2014.

Introduction

This was the second of two biomonitoring surveys relating to the McKee Production Station undertaken in 2013-14 monitoring year. While sites 1, 2 and 4 were monitored by some previous surveys in the Mangahewa Stream, in order to determine recovery over this reach of the stream subsequent to a small pipeline leakage of hydrocarbon products referenced in previous surveys, documented recovery required that only sites 1 and 2 were monitored by the more recent surveys. The results from surveys performed since the 2000-2001 monitoring year are discussed in the reports referenced in this report. Previously the McKee Production Station was under Fletcher Challenge Energy ownership. It was owned for a period by Shell Todd Oil Services Ltd and was then transferred to Todd Taranaki Ltd.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from all substrate types at two sites (sites 1 and 2) in the Mangahewa Stream (Table 1, Figure 1) on 14 March 2014. This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

Table 1 Biomonitoring sites in the Mangahewa Stream, sampled in relation to the McKee Production Station

Site No.	Site code	Map reference	Location
1	MHW000060	Q19:257344	Upstream of stormwater discharge and intake pond
2	MHW000065	Q19:256347	150 m downstream of McKee Production Station

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

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

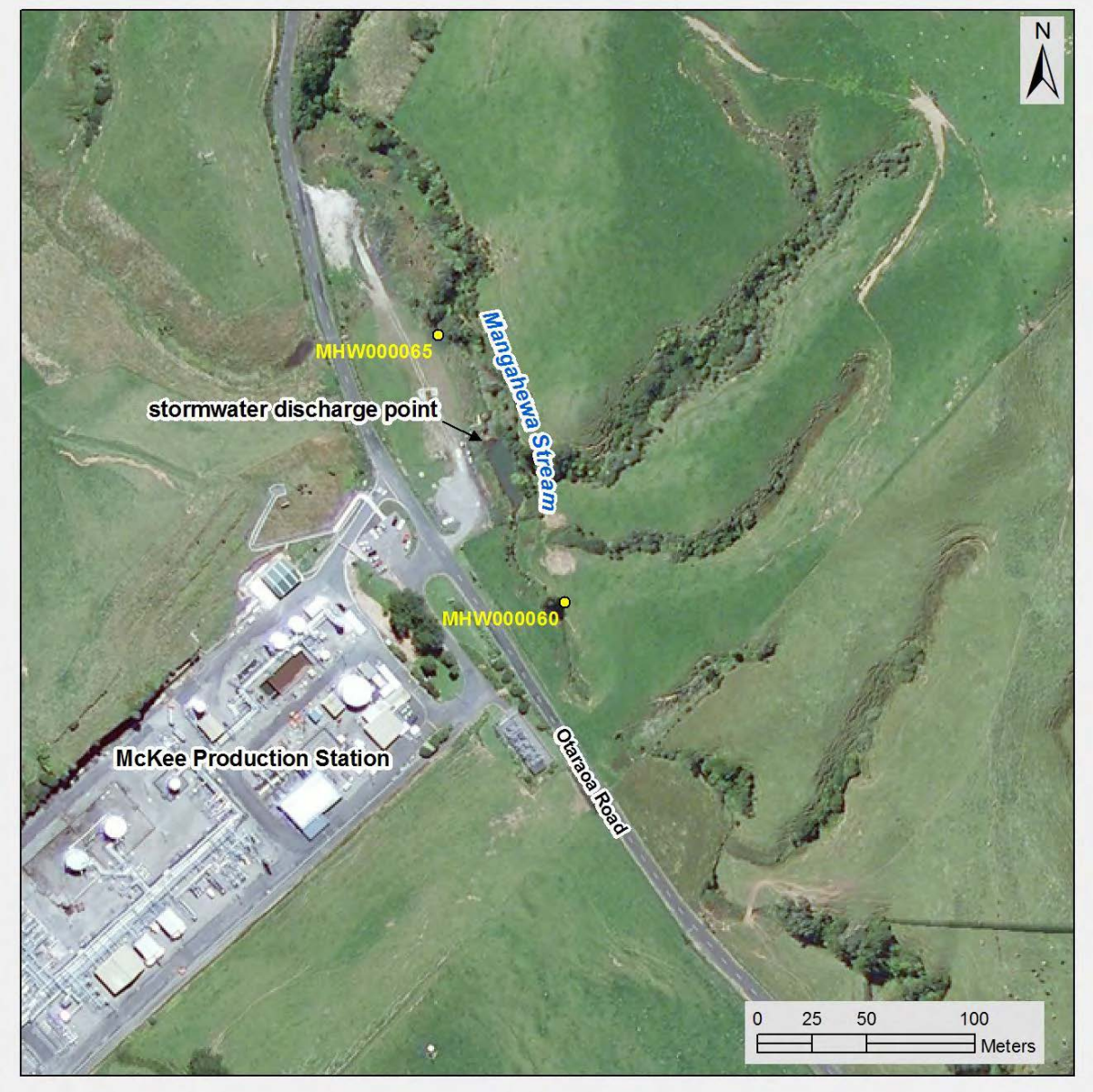

Figure 1 Biomonitoring sites in the Mangahewa Stream related to the McKee Production Station.

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

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

Results and discussion

At the time of this early morning survey there was very low, uncoloured flow at both sites in the Mangahewa Stream. The flow at site 1 was clear, as was the flow at site 2, with the cloudiness usually noted at this, most likely from the unnamed tributary that joins that Mangahewa Stream between sites 1 and 2, not present in the current survey. It was noted that there seemed to be a lot of silt tied up in the substrate and periphyton at site 2, similar to what was observed in most of the more recent surveys.

The current survey followed 67 days after a stream fresh in excess of 7 times median flow. At site 1, upstream of the McKee Production Station, the substrate was predominantly fine and coarse gravel, with a moderate amount of sand and silt, and some cobble. Downstream of the production station at site 2 the substrate had a slightly coarser composition, with more cobble and some boulder noted. Site 1 supported patchy growths of both mats and filaments, while site 2 only had patchy growths of both algal mats and also patchy growths of moss. The downstream site was partially shaded by riparian vegetation whereas the upstream site was unshaded, with the site located between slumped pasture banks (due to localised seepages and inadequate riparian protection). Hydrocarbon odours were last noted while sampling in the April 2011 survey, with the last five surveys (including the current one) being free of this odour. It was also not apparent during processing of the sample.

Macroinvertebrate communities

This small hill country stream usually supports macroinvertebrate communities with low to moderate numbers of taxa and moderate to low proportions of 'sensitive' taxa. The results of previous surveys are summarised in Table 2, together with the current results which are also presented in Table 3 and illustrated in Figures 2 and 3.

Table 2 Numbers of macroinvertebrate taxa and MCI values recorded in previous surveys of the Mangahewa Stream in relation to the McKee Production Station from March 1983, together with current results

Site		Numbers of taxa			MCI values			SQMCI$_S$ values			
	N	Median	Range	Current	Median	Range	Current	N	Median	Range	Current
1	64	14	4-24	25	75	48-98	90	27	3.1	1.3-4.4	4.4
2	59	17	3-31	23	82	27-96	79	27	3.4	1.9-4.1	3.3

Table 3 Macroinvertebrate fauna of the Mangahewa Stream in relation to McKee Production Station discharges sampled on 14 March 2014

Taxa List	Site Number	MCI score	1	2
	Site Code		MHW000060	MHW000065
	Sample Number		FWB14184	FWB14185
NEMERTEA	Nemertea	3	R	C
ANNELIDA (WORMS)	Oligochaeta	1	C	C
HIRUDINEA (LEECHES)	Hirudinea	3	R	-
MOLLUSCA	*Physa*	3	-	R
	Potamopyrgus	4	XA	VA
CRUSTACEA	Ostracoda	1	R	R
	Paranephrops	5	R	-
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	VA	-
	Coloburiscus	7	R	-
	Deleatidium	8	R	-
	Zephlebia group	7	C	R
PLECOPTERA (STONEFLIES)	*Zelandobius*	5	-	R
ODONATA (DRAGONFLIES)	*Antipodochlora*	5	R	-
HEMIPTERA (BUGS)	*Microvelia*	3	-	R
COLEOPTERA (BEETLES)	Elmidae	6	R	-
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	R	C
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	-	C
	Hydrobiosis	5	C	A
	Neurochorema	6	R	R
	Psilochorema	6	R	-
	Oxyethira	2	C	C
	Triplectides	5	R	R
DIPTERA (TRUE FLIES)	*Aphrophila*	5	R	C
	Hexatomini	5	R	-
	Limonia	6	-	R
	Orthocladiinae	2	R	VA
	Polypedilum	3	R	C
	Tanypodinae	5	-	R
	Empididae	3	R	R
	Muscidae	3	-	R
	Austrosimulium	3	A	A
	Tanyderidae	4	R	-
ACARINA (MITES)	Acarina	5	-	C
		No of taxa	25	23
		MCI	90	79
		SQMCIs	4.4	3.3
		EPT (taxa)	8	6
		%EPT (taxa)	32	26

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

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

Site 1 (upstream of production station)

Results to date for this site are illustrated in Figure 2.

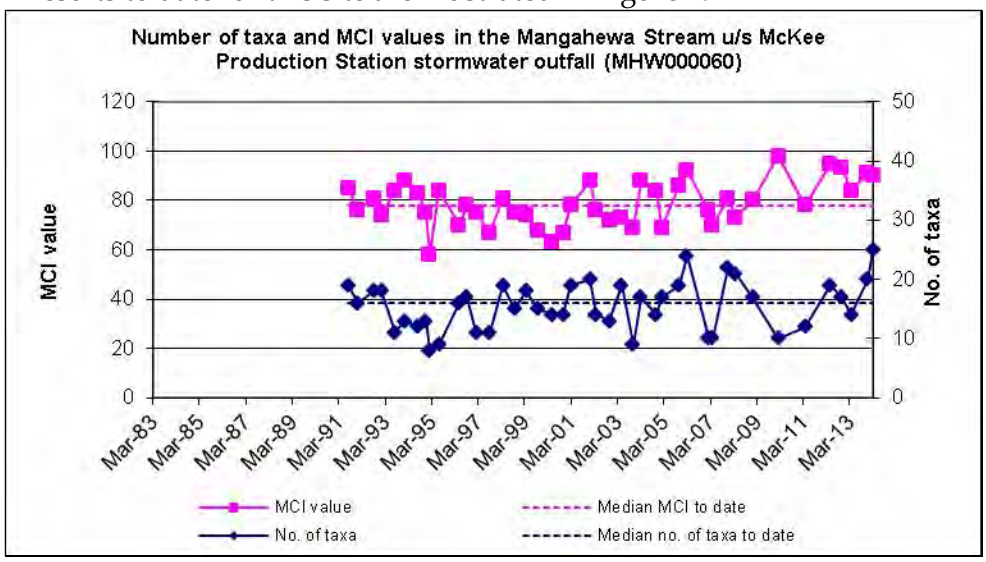

Figure 2 Number of taxa and MCI scores at site 1 in the Mangahewa Stream

A relatively high richness (25 taxa) was found at site 1, nine taxa higher than the median number of taxa from previous surveys at this site, and higher than any richness recorded of the previous 64 surveys (Table 2). This is contrary to what would be expected during low flows. The community was characterised by one 'moderately sensitive' taxon (*Austroclima* mayfly), and two 'tolerant' taxa (*Potamopyrgus* snails and sandfly larvae (*Austrosimulium*)). This is similar to the number of abundant taxa recorded in the previous survey, despite the reduction in flows noted in the current survey. The numerical dominance of the 'tolerant' snail was reflected in the $SQMCI_s$ value of 4.4 units, which on a general scale is relatively low. However, in comparison to previous surveys, it is significantly higher than the long term median for this site (Stark, 1998), and equal to the previously recorded maximum score (Table 2). It is also a slight improvement from that recorded in the previous survey (Stark, 1998). Overall, this result is a reflection of an enriched habitat dominated by a softer, finer substrate but with an improved periphyton cover. The proportion of 'tolerant' taxa present in the community (44% of taxa number) resulted in the MCI score of 90 units. This was a statistically significant fifteen units higher than the median of previous scores (Stark, 1998), but similar to that recorded in the previous survey (Figure 2, Table 2).

Site 2 (150 m downstream of production station discharges)

Results to date at this site are illustrated in Figure 3.

A taxa richness of 23 taxa was recorded at site 2, six taxa more than the median of numbers recorded from all previous surveys at this site, but equal to that recorded in the previous survey. This richness was slightly less than the richness recorded at site 1 (above the discharge) by two taxa (Table 2). This is considered a continuation of the significant recovery recorded since the February 2010 and April 2011 surveys, which recorded 13 and 14 taxa respectively. In the 2011 survey, during sample collection and processing a strong hydrocarbon odour was noted indicating that a discharge of hydrocarbons had occurred recently, which had had a toxic affect on the macroinvertebrate communities. This is further supported by the observations made during processing of that sample, that there were very few individuals recorded (10 of 14 taxa recorded less than five individuals, most only 1 or 2 specimens), and that those individuals present were very small. There were no such observations made during sampling and processing of the current sample, and coupled with

the relatively improved taxa richness, this indicates that no such discharge had preceded the current survey, similar to that concluded in the previous four surveys.

In the December 2013 survey, three tolerant taxa were recorded as abundant. In the current survey, this result was repeated, snail (*Potamopyrgus*), orthoclad midge larvae and sandfly larvae (*Austrosimulium*) recorded as abundant. This indicated little change from the previous survey, despite the reduced flows. Sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate. Although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

There were some differences in community composition between sites (only 15 of the 33 taxa recorded were common to both sites), and this resulted in a eleven unit reduction in MCI score and 1.1 unit decrease in $SQMCI_S$ score at site 3 downstream, both statistically significant reductions (Stark, 1998). The MCI score showed a five unit reduction from that recorded in the previous survey, and was not significantly different to the median score for this site (Table 2 and Figure 3). This in part reflects the reduced flow conditions observed at the time of sampling, although does not reflect the improved results recorded at site 1 upstream, which may suggest that the hydrocarbons present in the substrate may have influenced this result.

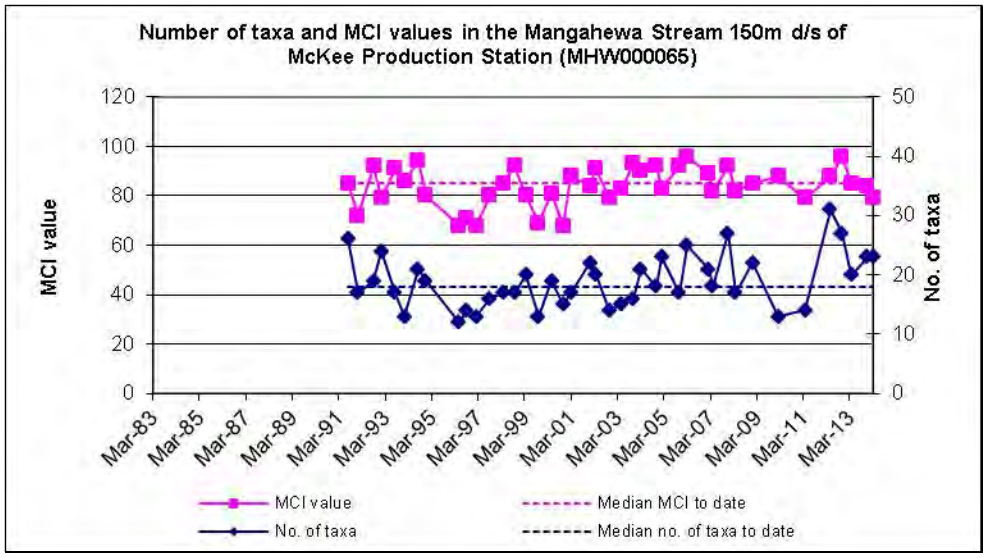

Figure 3 Number of taxa and MCI scores at site 2 in the Mangahewa Stream

Summary

The Council's standard 'kick-sampling' technique was used at two established sites to collect streambed macroinvertebrates from the Mangahewa Stream on 14 March 2014. Samples were sorted and identified to provide the number of taxa (richness), MCI score and $SQMCI_S$ score for each site.

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

This March 2014 macroinvertebrate survey was undertaken during very low flows. The reduction in flow from the previous survey did not result in a reduced taxa richness at either site, with site 1 recording a new maximum taxa richness, from 64 previous surveys. While the recovery recorded in the previous four surveys remained, there remained a slight deterioration in community health from the last survey at site 2. However, this deterioration was not to the degree recorded in April 2011, when results indicated a discharge containing hydrocarbons had entered the Mangahewa Stream prior. At the time of sampling and processing of the current survey, no hydrocarbon odour was noted from the downstream sample.

The site upstream of the production station recorded a macroinvertebrate community in above average health, with an MCI score fifteen units higher than the median, and community richness and an $SQMCI_S$ score much higher than their respective medians. The site downstream recorded a taxa richness of 23, six taxa higher than the median taxa richness. The MCI and $SQMCI_S$ scores were also not significantly different to their respective medians. However, unlike the that recorded at site 1, there was no improvement in MCI or $SQMCI_S$ score, with both being significantly less than that recorded at site 1. This is contrary to what would be expected, considering the improved results at site 1. Sediment sampling in the stream does indicate that there is an increased concentration of hydrocarbons in the substrate and although no hydrocarbon odour was noted during sampling, the increased concentration of hydrocarbons cannot be discounted as a potentially contributing factor.

It is recommended that sediment samples continue to be collected and analysed for hydrocarbons.

References

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Appendix III

Air monitoring reports

Memorandum

To Job Manager, David Olson
From Scientific Officer - Air Quality, Brian Cheyne
File 4050, FRODO- #1325623
Date March 19, 2014

Ambient gas monitoring at McKee Production Station year 2012-13

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. Deployment lasted approximately forty-eight hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases). The location of the multi-gas meter for the sampling run and summarised details of the sample are shown in Figure 1.

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

The details of the sample run are presented graphically in Figure 2**.**
The consent covering air discharges from the McKee Production Station has specific limits related to particular gases. Special condition 5 of consent 4045-3 sets a limit on the carbon monoxide concentration at or beyond the production station's boundary. The limit is expressed as 10 mg/m^3 (equivalent to 12ppm) for an eight hour average or 30 mg/m^3 (equivalent to 35ppm) for a 1 hour average exposure.
The maximum concentration of carbon monoxide found during the monitoring run was 2.3 ppm or 2.0 mg/m^3 and average concentration was only 0.2 ppm or 0.17 mg/m^3 which complies with the consent condition. This continues the pattern found in previous years.

from 01.08.2012 14:00 to 03.08.2012 08:19		
(CO) Carbon Monoxide		
Max	Mean	Min
2.3(ppm)	0.2 (ppm)	0.00 (ppm)
(LEL) Lower Explosive Limit		
Max	Mean	Min
0.20 (%)	0.01 (%)	0.00 (%)

Figure 1 Air monitoring sites – McKee production station (year 2012-2013)

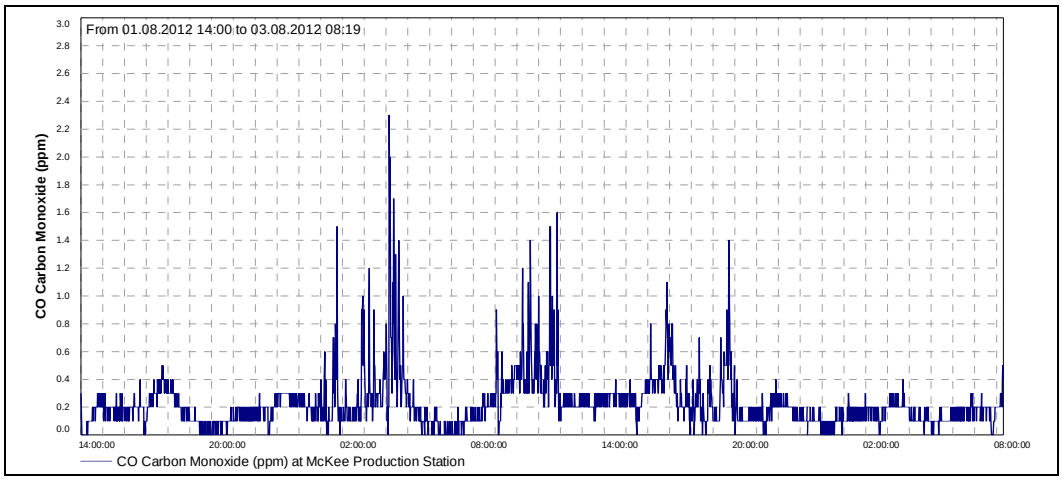
Note: (1) the instrument records in units of ppm. At 15°C

1ppm CO = 0.85 mg m^{-3}

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

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

Figure 2 Graph of ambient gas levels in the vicinity of the McKee Production station



Memorandum

To Job Manager, David Olson
From Scientific Officer - Air Quality, Brian Cheyne
File 4050, FRODO- #1414628
Date October 08, 2014

Ambient gas monitoring at McKee Production Station year 2013-14

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. Deployment lasted approximately fifty-six hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases). The location of the multi-gas meter for the sampling run and summarised details of the sample are shown in Figure 1.

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

The details of the sample run are presented graphically in Figure 2**.**

The consent covering air discharges from the McKee Production Station has specific limits related to particular gases. Special condition 5 of consent 4050-3 sets a limit on the carbon monoxide concentration at or beyond the production station's boundary:

"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 production station and wellsite are located."

The maximum concentration of carbon monoxide found during the monitoring run was 17.2 ppm or 14.6 mg / m^3 and average concentration was only 0.3 ppm or 0.26 mg / m^3 which complies with the consent condition. This continues the pattern found in previous years.

from 02/07/2013 12:50 to 04/07/2013 20:57		
(CO) Carbon Monoxide		
Max	Mean	Min
17.2 (ppm)	0.3 (ppm)	0.00 (ppm)
(LEL) Lower Explosive Limit		
Max	Mean	Min
0.20 (%)	0.01 (%)	0.00 (%)

Figure 1 Air monitoring sites – McKee production station (year 2013-2014)

Note: (1) the instrument records in units of ppm. At 15°C
1ppm CO = 0.85 mg m^{-3}
(2) See text for explanation of LEL. Because the LEL of methane is equivalent to a mixture of approximately 5% methane in air, then the actual concentration of methane in air can be obtained by dividing the %LEL by 20.

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

Figure 2 Graph of ambient gas levels in the vicinity of the McKee Production station