Shell Todd Oil Services Ltd
Maui and Kapuni Production Stations
Monitoring Programmes
Annual Report
2014-2015

Technical Report 2015-103

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Executive summary

Shell Todd Oil Services Ltd (the Company) operates the Maui Production Station located on Tai Road, Oaonui, in the Ngapirau catchment, and the Kapuni Production Station located on Palmer Road in the Kapuni catchment. This report for the period July 2014-June 2015 describes the monitoring programmes implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental performance during the period under review, and the results and environmental effects of the Company's activities.

For the Maui Production Station, the Company holds a total of four resource consents; two relating to discharges to water, one consent to discharge emissions to the air, and one to maintain a structure in the coastal marine area. The consents include a total of 34 conditions setting out the requirements that the Company must satisfy. Wood Group M & O also holds one consent relating to the Maui Production Station. The consent is for a discharge to water, and has seven conditions setting out requirements that must be satisfied.

For the Kapuni Production Station, the Company holds a total of four resource consents; one relating to discharges to water, one to discharge emissions to the air, and two relating to structures in the Kapuni Stream. The consents include a total of 36 conditions setting out the requirements that the Company must satisfy. The Company also holds a further 31 resource consents for production activities at wellsites associated with the Kapuni Production Station.

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

The Council's monitoring programmes for the year under review included: five inspections and five water samples collected for physicochemical analysis at the Maui Production Station; five inspections and three water samples collected at the Kapuni Production Station; one biomonitoring survey of receiving waters at each of the production stations; and two ambient air quality surveys at each site.

Receiving water inspections, in conjunction with sampling conducted by both the Council and STOS during the 2014-2015 period, showed that the site discharges were not causing any adverse effects in the Ngapirau or Kapuni Streams. This was supported by the findings of the macroinvertebrate surveys.

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

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 Maui and Kapuni Production Stations were well managed and maintained.

For reference, in the 2014-2015 year, 75% 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 22% demonstrated a good level of environmental performance and compliance with their consents.

This report includes recommendations for the 2015-2016 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is the Annual Report for the period July 2014-June 2015 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Shell Todd Oil Services Ltd (STOS) for the Maui Production Station situated on Tai Road, Oaonui, and the Kapuni Production Station situated on Palmer Road, Kapuni, together with its associated wellsites.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by STOS that relate to discharges of water within the Ngapirau, Oaonui and Kapuni catchments, structures in the coastal marine area and Kapuni Stream, and emissions to air from the production station sites.

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 25th combined report by the Council for the Maui and Kapuni Production Stations.

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 through annual programmes, a summary of the resource consents held by STOS, and the nature of the monitoring programmes in place for the period under review.

Section 2 contains a description of the activities and operations conducted within the Ngapirau and Oaonui catchments and sets out the resource consents held by STOS in relation to the Maui Production Station. It presents the results of monitoring during the period under review, including scientific and technical data. It also discusses the results, their interpretation, and their significance for the environment, and makes recommendations.

Section 3 contains a description of the activities and operations conducted within the Kapuni catchment and sets out the resource consents held by STOS in relation to the Kapuni Production Station. It presents the results of monitoring during the period under review, including scientific and technical data. It also discusses the results, their interpretation, and their significance for the environment, and makes recommendations.

Section 4 presents a summary of proposed recommendations, to be implemented in the 2015-2016 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 (eg, recreational, cultural, or aesthetic);
(e) risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the 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 during the period under review, this report also assigns a rating as to the 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 (i.e. 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 compliance

- **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 2014-2015 year, 75% 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 22% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Consents summary

1.2.1 Production stations

A summary of the consents for activities at the Maui and Kapuni Production Stations is given in Tables 1 and 2. These consents are discussed in more detail in Sections 2.2 and 3.2. Copies of the consents are attached in Appendix I.

Table 1 Resource consents for activities at the Maui Production Station

Consent number	Purpose of consent	Issue Date	Next review	Expiry
0245-3	Discharge treated stormwater	11/10/2000	-	2018
0246-3	Discharge treated domestic effluent	11/10/2000	-	2018
4052-4	Discharge emissions to air	09/01/2003	2018	2024
5224-2	Pipelines	10/03/1998	-	2025
1228-4*	Discharge treated stormwater and wastewater	11/10/2000	-	2018

*This consent for the Fire Training Centre at MPS is held by Wood Group M & O

Table 2 Resource consents for activities at the Kapuni Production Station

Consent number	Purpose of consent	Issue Date	Next review	Expiry
0633-3	Discharge treated stormwater	01/08/2011	2017	2029
4054-5	Discharge emissions to air	09/11/2001	-	2017
5960-1	Erect and maintain a ford in the Kapuni Stream	13/02/2002	2017	2023
9555-1	Maintain a fire water intake in the Kapuni Stream	16/04/2013	2017	2029

1.2.2 Wellsites

STOS also holds consents for production activities at wellsites associated with the Kapuni Production Station and these are summarised in Table 3.

Table 3 Resource consents for production activities at the Kapuni wellsites

Wellsite	Consent	Purpose	Issue Date	Expiry
KA-1/7/19/20	6200-1	To discharge treated stormwater and treated site water from hydrocarbon exploration and production operations onto and into land at the KA-1/7 wellsite	16/09/2003	2017
	6646-1	To take and use groundwater from a bore as a contingency backup supply for fire fighting, well killing, workover and domestic purposes at the KA-1/7 wellsite	18/07/2005	2023
	6822-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-1/7 wellsite	21/03/2006	2023
KA-2	0611-3	To take and use groundwater from a bore as a contingency backup supply for fire fighting, well killing, workover and domestic purposes at the KA-2 wellsite	18/07/2005	2023
	3267-3	To discharge stormwater from the KA-2 wellsite into the Kapuni Stream	02/08/2011	2029
	6823-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-2 wellsite	21/03/2006	2023
KA-3	0610-3	To take and use groundwater from a bore as a contingency backup supply for fire fighting, well killing, workover and domestic purposes at the KA-3 wellsite	18/07/2005	2023
	3268-3	To discharge stormwater from the KA-3 wellsite into an unnamed tributary of the Inaha Stream	02/08/2011	2029
	6824-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-3 wellsite	21/03/2006	2023
KA-4/14	2365-3	To discharge stormwater from the KA-4/14 wellsite into an unnamed tributary of the Waiokura Stream	02/08/2011	2029
	6645-1	To take and use groundwater from a bore as a contingency backup supply for fire fighting, well killing, workover and domestic purposes at the KA-4/14 wellsite	18/07/2005	2023
	6825-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-4/14 wellsite	21/03/2006	2023
KA-5/10	6199-1	To discharge treated stormwater and treated site water from hydrocarbon exploration and production operations onto and into land at the KA-5/10 wellsite	16/09/2003	2017
	6826-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-5/10 wellsite	21/03/2006	2023

Wellsite	Consent	Purpose	Issue Date	Expiry
KA-6/11/17	3266-3	To discharge stormwater from the KA-6/11/17 wellsite into an unnamed tributary of the Inaha Stream	02/08/2011	2029
	6827-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-6/11 wellsite	21/03/2006	2023
	7114-1	To discharge liquids onto and into land from a purpose built, blow down pit at the KA-6/11 wellsite	19/06/2007	2023
KA-8/12/15/18	3265-3	To discharge stormwater from the KA-8/12/15/18 wellsite into an unnamed tributary of the Inaha Stream	02/08/2011	2029
	6828-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-8/12/15 wellsite	21/03/2006	2023
	7113-1	To discharge liquids onto and into land from a purpose built, blow down pit at the KA-8/12/15 wellsite	19/06/2007	2023
KA-9	5871-1	To discharge stormwater from hydrocarbon exploration and production operations at the KA-9 wellsite onto land and into an unnamed tributary of the Inaha Stream	23/08/2001	2017
	5873-1	To discharge emissions into the air from long-term hydrocarbon processing facilities and miscellaneous emissions at the KA-9 wellsite	23/08/2001	2017
	5874-1	To erect, place, use and maintain a pipebridge over the Kapuni Stream	23/08/2001	2017
KA-13	1105-3	To discharge stormwater from the KA-13 wellsite into the Kapuni Stream	02/08/2011	2029
	6829-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-13 wellsite	21/03/2006	2023
	7005-1	To discharge liquids onto and into land from a purpose built, blow down pit at the KA-13 wellsite	24/11/2006	2023
Ngarewa	5881-1	To discharge stormwater from hydrocarbon exploration and production operations at the Ngarewa wellsite onto and into land in the vicinity of the Inaha Stream	04/09/2001	2017
	5883-1	To discharge emissions into the air from long-term hydrocarbon processing facilities and miscellaneous emissions at the Ngarewa wellsite	04/09/2001	2017
Patea-A	6079-1	To discharge emissions to air from flaring associated with production activities and miscellaneous emissions at the Patea-A wellsite	09/12/2002	2016
	6080-1	To discharge treated stormwater, treated site water and treated production water from hydrocarbon exploration and production operations at the Patea-A Wellsite onto and into land	05/11/2002	2016
Various	6647-1	To take and use water from the Kapuni Stream for fire fighting, well killing and well workover purposes for emergency backup supply at various wellsites	27/09/2005	2023

1.3 Monitoring programme

1.3.1 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 programmes for the two production stations consisted of four primary components.

1.3.2 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.

1.3.3 Site inspections

The Maui and Kapuni Production Stations were inspected five times each 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.

1.3.4 Chemical sampling

The Council undertook sampling of both the discharges from the sites and the water quality upstream and downstream of the discharge points and mixing zones.

The Maui Production Station discharges were sampled once, and the samples analysed for ammoniacal nitrogen, conductivity, chlorides, enterococci bacteria, faecal coliforms, hydrocarbons, pH, suspended solids and turbidity. The Ngapirau Stream was sampled concurrently, and the samples analysed for the same constituents as the discharges. The Kapuni Production Station discharge was sampled once, and the sample analysed for

chlorides, conductivity, hydrocarbons, pH, suspended solids and turbidity. The Kapuni Stream was sampled concurrently, and the samples analysed for the same constituents.

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

1.3.5 Biomonitoring surveys

A biological survey was performed on one occasion in the Ngapirau Stream and on one occasion in the Kapuni Stream, to determine whether or not the discharges of stormwater from the Maui and Kapuni Production Stations were having a detrimental effect upon the communities of the streams.

2. Maui Production Station

2.1 Process description

Photo 1 Maui Production Station

The onshore Maui Production Station at Oaonui was built to process gas and condensate from the offshore Maui Field. Exploration of the Maui field began in 1969, and production commenced in 1979 from the Maui-A platform. Gas and condensate is transported 33 km from the offshore Maui-A platform to the onshore Maui Production Station via submarine pipelines. Another platform, Maui-B, was installed in 1992. Gas and condensate from Maui-B is piped 15 km to Maui-A for initial separation, and then to the production station.

The Maui Production Station separates the various hydrocarbon components, mainly by distillation. The production station supplies natural gas to the national grid and liquefied petroleum gas (LPG) is transported off-site by road tankers. Condensate is piped to storage tanks at Omata.

Facilities at the Maui Production Station include: an administration building and workshop which accommodates the control room on the upper floor; glycol trains and oil heaters located in the north west portion of the site; fractionation trains, gas trains and compressor houses; condensate storage, LPG storage and LPG load out facilities; and a flare compound that contains a 55 metre high flare stack, a radio tower, and a flare seal recovery system, located in the south western corner of the site.

The plant formerly used two flares as essential plant safety features designed to combust excess gas during planned maintenance activities, and emergency situations. A change to plant management has seen this reduced to one flare. The flare continuously burns fuel gas as a purge to prevent air ingress to the flare system (thus avoiding an explosion risk) and to maintain a pilot flame at the flare tip.

The Council is responsible for monitoring the onshore production station and pipelines within the coastal marine area (to 12 nautical miles). Monitoring of the offshore Maui-A and B platforms does not come under the jurisdiction of the Council as they are situated outside the coastal marine area.

2.2 Resource consents

2.2.1 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.

STOS holds water discharge permit **0245-3** to discharge treated stormwater from the Maui Production Station to the Ngapirau Stream. The permit was first granted in 1975. The latest renewal was issued by the Council on 11 October 2000 under Section 87(e) of the RMA. A variation to the special conditions was approved on 4 September 2013 to align the limit on suspended solids in the discharge with modern consent conditions and standards in the Council's Regional Fresh Water Plan. The consent is due to expire on 1 June 2018.

There are 6 special conditions attached to this consent.

Condition 1 requires an oily water separator and stormwater oil trap.

Conditions 2 and 3 impose limits on contaminants (hydrocarbons and suspended solids) in the discharge, and stipulate effects the discharge shall not give rise to in the Ngapirau Stream.

Condition 4 requires a contingency plan to be maintained.

Conditions 5 and 6 are review provisions.

STOS also holds water discharge permit **0246-3** to discharge treated domestic effluent from the oxidation ponds at the Maui Production Station to the Ngapirau stream. The permit was first granted in 1975. The latest renewal was issued by the Council on 11 October 2000 under Section 87(e) of the RMA. It is due to expire on 1 June 2018.

There are 6 special conditions attached to this consent.

Condition 1 requires the oxidation ponds to be properly and efficiently maintained to ensure consent conditions are met.

Condition 2 stipulates effects the discharge shall not give rise to in the Ngapirau Stream.

Condition 3 required the treatment system to be upgraded by 30 November 2000.

Conditions 4, 5, and 6 are review provisions.

Wood Group M & O holds water discharge permit **1228-4** to discharge treated stormwater and wastewater from fire fighting at the Fire Training Centre at the Maui Production Station to the Oaonui Stream. The permit was first granted in 1975. The latest renewal was issued by the Council on 11 October 2000 under Section 87(e) of the RMA. It is due to expire on 1 June 2018. STOS previously held this discharge permit. As the consent relates to the Maui site it is commented upon as part of this report.

There are 7 special conditions attached to this consent.

Condition 1 requires the settling ponds to be operated and maintained to meet the conditions of this consent.

Conditions 2 to 4 impose limits on contaminants, and stipulate effects the discharge shall not give rise to in the receiving water.

Condition 5 requires a contingency plan to be maintained.

Conditions 6 and 7 are review provisions.

The permits are attached to this report in Appendix I.

2.2.2 Air discharge permit

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.

STOS holds air discharge permit **4052-4** to discharge emissions into the air from the refining and distribution of hydrocarbons and associated processes at the Maui Production Station site. The current permit was issued by the Council on 9 January 2003 under Section 87(e) of the RMA. It was subsequently amended on 7 April 2005 to remove reference to carbon dioxide emissions in condition 5 after an amendment to the RMA. It was subsequently amended on 26 August 2005 through insertion of a new condition 10, along with amendments to conditions 5 and 18 (previously condition 17), to include emissions from a carbon dioxide removal plant. A change to special condition 5 was requested by STOS and made on 9 August 2013 to move the due date for annual reporting from May to August. The consent is due to expire on 1 June 2024.

There are 18 special conditions attached to this consent.

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

Condition 2 states that the consent holder shall minimise emissions to air by ensuring the proper and effective operation of equipment and processes.

Condition 3 requires the use of equipment to avoid, remedy or mitigate any effect on the environment.

Condition 4 requires the consent holder to undertake effective liquid separation and recovery.

Condition 5 states that the consent holder must provide the Council with a report, in August each year detailing measures to reduce emissions, gas combustion, plant efficiency, etc.

Condition 6 states that there shall be no offensive or objectionable odour beyond the boundary of the site.

Condition 7 requires the consent holder to control all emissions of sulphur dioxide to the atmosphere, and condition 8 requires the consent holder to control all emissions of nitrogen oxides to the atmosphere.

Condition 9 requires the consent holder to control all emissions of carbon monoxide to the atmosphere, and condition 10 states that the consent holder shall control all emissions of benzene to the atmosphere.

Condition 11 requires that the consent holder shall control all other emissions to the air from the site.

Condition 12 requires the consent holder to obtain approval from the Council prior to undertaking any significant alterations to the plant or equipment.

Condition 13 requires the consent holder to notify the Council whenever flaring is expected to occur for more than five minutes, and condition 14 requires notification of any incident that has an impact or a potential impact, within one week of the incident.

Conditions 15 and 16 require the consent holder to keep records of all smoke emitting incidents and continuous flaring incidents.

Condition 17 states that depressurisation of the plant shall be undertaken so that emissions of smoke are minimised.

Condition 18 is a review provision.

The permit is attached to this report in Appendix I.

2.2.3 Coastal permit

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

STOS holds coastal permit **5224-2** to place and maintain two pipelines in, under and over the foreshore and seabed in the coastal marine area between mean high water spring and the outer limit of the territorial sea. The current permit was granted by the Council on 10 March 1998 under Section 87(c) of the RMA. It is due to expire on 1 June 2025.

There are 4 special conditions attached to this consent.

Condition 1 requires the Company to notify the Council prior to maintenance works.

Condition 2 stipulates that during maintenance works the Company must minimise disturbance, and prevent the discharge of silt, debris, and contaminants to the coastal marine area.

Condition 3 requires the structures to be removed (where practicable) and the area reinstated if and when the structures are no longer required.

Condition 4 is a review provision.

The permit is attached to this report in Appendix I.

2.3 Results: water

2.3.1 Inspections

Five inspections were carried out at the Maui Production Station in the 2014-15 period. The following was found during the inspections:

15 July 2014
The site was found to be neat and tidy with all ring drains and bunds clear of contaminants. The API systems and separators were clear. Minimal flaring was being undertaken at the time of the inspection and there were no odours or smoke.

21 October 2014
The stormwater system was inspected, with ring drains and bunds clear of any contaminants. The stormwater separation unit into the Ngapirau stream was clear with a normal algal build up in the system. The sewage discharge point did not give rise to any instream effects beyond mixing zone. The pond agitator was in operation. The fire water pond was clear. There was little flaring being undertaken at the time of the inspection, with no off site odours or smoke noticed. A downwind assessment did not reveal any effects beyond the boundary of the site.

9 April 2015
The inspection was undertaken during very heavy rainfall and the Ngapirau stream was in flood and discolored at the Sandy Bay confluence. There were no odours or hydrocarbon sheen present at the beach end, and no effects of any previous discharge were evident. No odours were noted from beyond the boundary of the site down wind.

14 April 2015
The site was inspected with environmental staff from STOS. The inspection was undertaken following several days of very high rainfall, with squally conditions being experienced during the inspection. The site stormwater system had coped very well with the recent rainfall and no problems were noted. Minimal flaring was being undertaken and no odours or smoke were evident.

22 June 2015
The stormwater discharge point from the Ngapirau Stream to the foreshore was inspected following a significant rainfall event that resulted in a 'State of Emergency' being declared in Taranaki. There were no visual effects as a result of the discharge

from the Maui Production Station site. No odours or smoke were evident from the flare.

2.3.2 Results of discharge monitoring

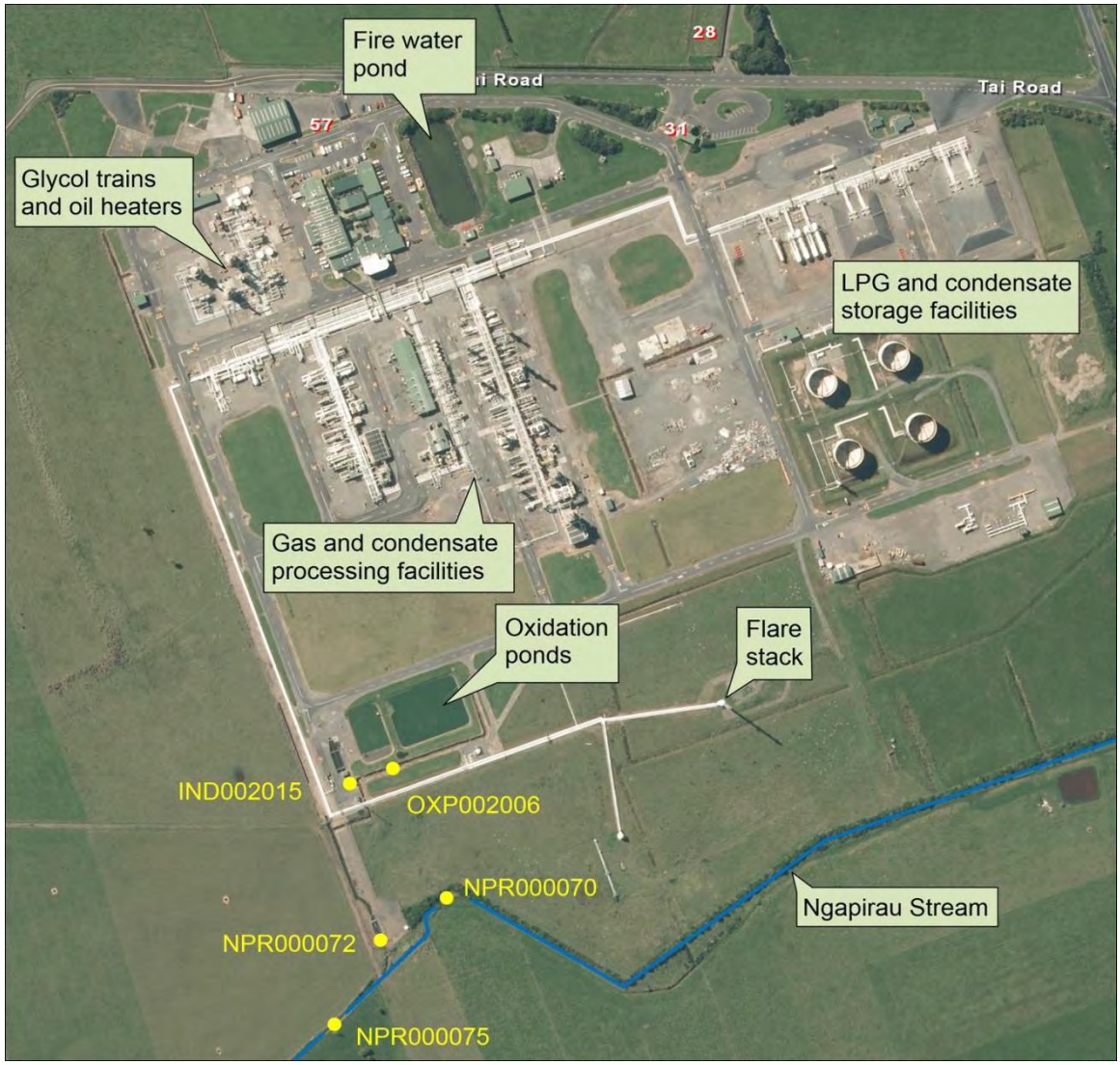

Figure 1 Maui Production Station and associated sampling sites

2.3.2.1 Site stormwater

The stormwater network at the Maui Production Station consists of open stormwater drains around the site perimeter and stormwater pipelines from the process areas. The perimeter drains also accept stormwater runoff from Tai Road and a number of adjoining farms. The main internal discharges are into the open stormwater drains at several separate points. Stormwater from the internal catchment passes through the oily water separator before moving on to the secondary oil trap located at the south-west corner of the site.

The stormwater from inside the bunded areas does not enter into the stormwater drains and is directed straight to the oily waste separator. The stormwater in the perimeter drains goes directly to the secondary oil trap. The treated stormwater then flows to a tributary drain which discharges to the Ngapirau Stream.

Chemical water quality sampling of the treated stormwater discharge from the production station was undertaken on one occasion during the 2014-2015 period. The location of the sampling site (IND002015) is shown in Figure 1. Table 4 presents the results of this sampling.

Table 4 Results of stormwater discharge monitoring from Maui Production Station

Parameter	Units	4 June 2015	Consent limits
Chloride	g/m^3	27.6	-
Conductivity	mS/m	16.1	-
Hydrocarbons	g/m^3	< 0.5	15
Suspended solids	g/m^3	38	100
pH		6.8	-
Turbidity	NTU	34	-

All measured parameters were within the limits stipulated by consent 0245-3 and were indicative of a clean discharge.

2.3.2.2 Domestic wastewater

STOS have treated their domestic sewage on site since 1979 using a two-pond aerobic oxidation system. The discharge is to a perimeter drain, which flows to an oily water separator where it combines with the site stormwater before being discharged to the Ngapirau Stream. The discharge to the perimeter drain was sampled once during the monitoring period. The results are presented in Table 5 and the sampling site (OXP002006) is shown in Figure 1.

Table 5 Results of oxidation pond discharge monitoring at Maui Production Station

Parameter	Units	4 Jun 2015	Site median	Site maximum
Conductivity	mS/m	18.8	25.8	46.2
Enterococci bacteria	/100 ml	700	265	10,000
Faecal coliforms	/100 ml	420	540	7,100
Ammoniacal nitrogen	g/m^3 N	0.275	2.02	14.60
Suspended solids	g/m^3	5	25	150
pH		6.9	7.2	10.0
Turbidity	NTU	4.9	6.0	57.0

Consent 0246-3, which authorises the oxidation pond discharge, does not specify any numerical limits on its constituents. However, it does require that adverse effects be prevented. The results for the period under review were typical of well-treated oxidation pond effluent which would not be expected to cause more than minor off site effects. There is also significant on site dilution of the discharge, provided by combination with the site stormwater discharge prior to reaching the Ngapirau Stream.

2.3.2.3 Combined discharge

The combined discharge from the site includes the treated stormwater discharge from process areas, the oxidation pond discharge and runoff collected in perimeter drains. It passes through a separator before entering the Ngapirau Stream. The sampling point is in the tributary between the production station site boundary and the Ngapirau Stream (site NPR000072, Figure 1). It was sampled once during the period under review. The results of this sampling are presented in Table 6.

Table 6 Results of combined discharge monitoring from Maui Production Station

Parameter	Units	4 Jun 2015	Site median	Site maximum
Temperature	Deg.C	14.0	15.1	20.8
Conductivity	mS/m	20.9	23.6	30.6
Enterococci bacteria	/100 ml	320	100	7,700
Faecal coliforms	/100 ml	210	120	12,000
Hydrocarbons	g/m^3	< 0.5	0.2	5.2
Ammoniacal nitrogen	g/m^3 N	0.125	0.119	0.584
Suspended solids	g/m^3	4	4	19
pH		6.8	7.2	7.9
Chloride	g/m^3	34.0	-	-
Turbidity	NTU	3.6	4.2	9.7

The results comply with all applicable consent conditions and indicate a reasonably clean discharge with low suspended solids and no detectable hydrocarbons. This is complemented by the results of the concurrent receiving water sampling shown in Table 9.

Every month, STOS provided the Council with the results for daily composite samples of the combined stormwater and oxidation ponds discharge, sampled downstream of the final separator. The results are summarised in Table 7.

Table 7 STOS Maui Production Station combined discharge results summary for 2014-2015

Month	Hydrocarbons (g/m^3)		Suspended solids (g/m^3)		Glycol (g/m^3)	
Consent 0245-3 limits	*15*		*100*		-	
	Max	Average	Max	Average	Max	Average
July 2014	0.6	< 0.5	20	11	0	0
August 2014	1.3	< 0.5	26	10	2	0
September 2014	0.5	< 0.5	32	10	1	0
October 2014	0.6	< 0.5	40	9	0	0
November 2014	< 0.5	< 0.5	44	17	6	0
December 2014	< 0.5	< 0.5	67	19	1	0

Month	Hydrocarbons (g/m^3)		Suspended solids (g/m^3)		Glycol (g/m^3)	
Consent 0245-3 limits	*15*		*100*		-	
	Max	Average	Max	Average	Max	Average
January 2015	< 0.5	< 0.5	32	19	0	0
February 2015	< 0.5	< 0.5	56	25	0	0
March 2015	0.5	< 0.5	42	22	1	0
April 2015	14	0.5	55	18	0	0
May 2015	7.5	0.5	54	13	< 1	0
June 2015	< 0.5	< 0.5	25	7	15	1
Days limit exceeded	0		0		No limit. Total of 8 detections.	

Both hydrocarbon and suspended solid results were low on average and below the limit stipulated by consent 0245-3 throughout the monitoring period.

Photo 2 Silt cloth installed in a perimeter stormwater drain at the Maui Production Station, April 2013

There were eight instances of low levels of glycol being detected in the Company's daily combined stormwater discharge samples during the period under review. The highest concentration was recorded on 21 June 2015 after approximately 100 mm of rain fell in the preceding days and caused residual glycol in process area drains to wash into the stormwater system and through the outfall. No adverse environmental effects were recorded as a result of these discharges.

2.3.2.4 Fire fighting, stormwater and wastewater discharge

Wood Group M & O operates a Fire Training Centre adjacent to the production station, to train personnel for fire and helicopter crash response in accordance with the Company's response plan. Fire training exercises are carried out approximately 25 times per year. Hydrocarbons (mainly LPG) are used as accelerants in training exercises. The residues accumulate in the first holding and settling pond, along with the wastewater used during exercises and stormwater.

The discharge is taken from the second pond from below the surface (to prevent entrainment of any hydrocarbon sheen) and flows to the Oaonui Stream. The wastewater and stormwater is held in the ponds for a varying amount of time depending on rainfall. Discharge only occurs when the ponds are full, which is usually only six or seven times per year due to low inflow volumes and evaporation.

The facility is inspected regularly as part of the Council's monitoring programme for the Maui Production Station. The ponds are also checked for any discharges in conjunction with sampling at the production station. No samples were collected in the 2014-2015 period, as there were no discharges sighted during inspections.

STOS samples the water in the ponds for hydrocarbon and suspended solids analyses prior to discharge. The results are provided to the Council and are presented in Table 8.

Table 8 Safety Training Centre stormwater discharge results 2014-2015

Date	Hydrocarbons (g/m^3)	Suspended solids (g/m^3)
Consent 1228-4 limits	*15*	*50*
23 July 2014	< 0.5	27
28 August 2014	< 0.5	30
30 September 2014	< 0.5	28
13 November 2014	< 0.5	10
16 February 2015 (Pond 1)	< 0.5	22
16 February 2015 (Pond 2)	< 0.5	29
16 March 2015	< 0.5	23
20 April 2015	< 0.5	14
19 May 2015	< 0.5	38
3 June 2015	< 0.5	31
23 June 2015	< 0.5	28
Median (and maximum) values	< 0.5	28 (38)

The STOS monitoring results demonstrate compliance with consent conditions and indicate that discharges from the Fire Training Centre were unlikely to cause any adverse effects in the Oaonui Stream.

2.3.3 Results of receiving environment monitoring

2.3.3.1 Chemical

The receiving stream for the treated stormwater and oxidation pond discharge, the Ngapirau Stream, arises from springs approximately four kilometres above the production station and meets the coast between the Okaweu and Oaonui Streams approximately two kilometres from the production station.

Receiving water quality sampling was undertaken in conjunction with discharge sampling at points upstream (NPR000070) and downstream (NPR000075) of the discharge. The results are shown in Table 9, and the sampling sites are shown in Figure 1.

Table 9 Receiving environment results for the Maui Production Station 2014-2015

Parameter	Units	4 June 2015	
		Upstream	Downstream
Temperature	Deg.C	14.5	14.3
Conductivity	mS/m	25.9	24.2
Enterococci	/100mL	350	400
Faecal coliforms	/100mL	142	100
Hydrocarbons	g/m^3	< 0.5	< 0.5
Ammoniacal Nitrogen	g/m^3 N	0.126	0.163
Turbidity	NTU	3.2	4.1
pH		6.7	6.8
Chloride	g/m^3	36.9	35.3
Suspended solids	g/m^3	8	6

There was little difference between measured parameters upstream and downstream of the Maui Production Station discharge, indicating that it was not causing adverse effects in the Ngapirau Stream at the time of sampling.

2.3.3.2 Biomonitoring

The Council's standard 'streambed-kick' technique was used at two established sites (NPR000100 and NPR000190, Figure 2) to collect streambed macroinvertebrates from an unnamed coastal stream on 9 December 2014. Samples were sorted and identified to provide number of taxa (richness) and MCI and $SQMCI_s$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to 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 between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

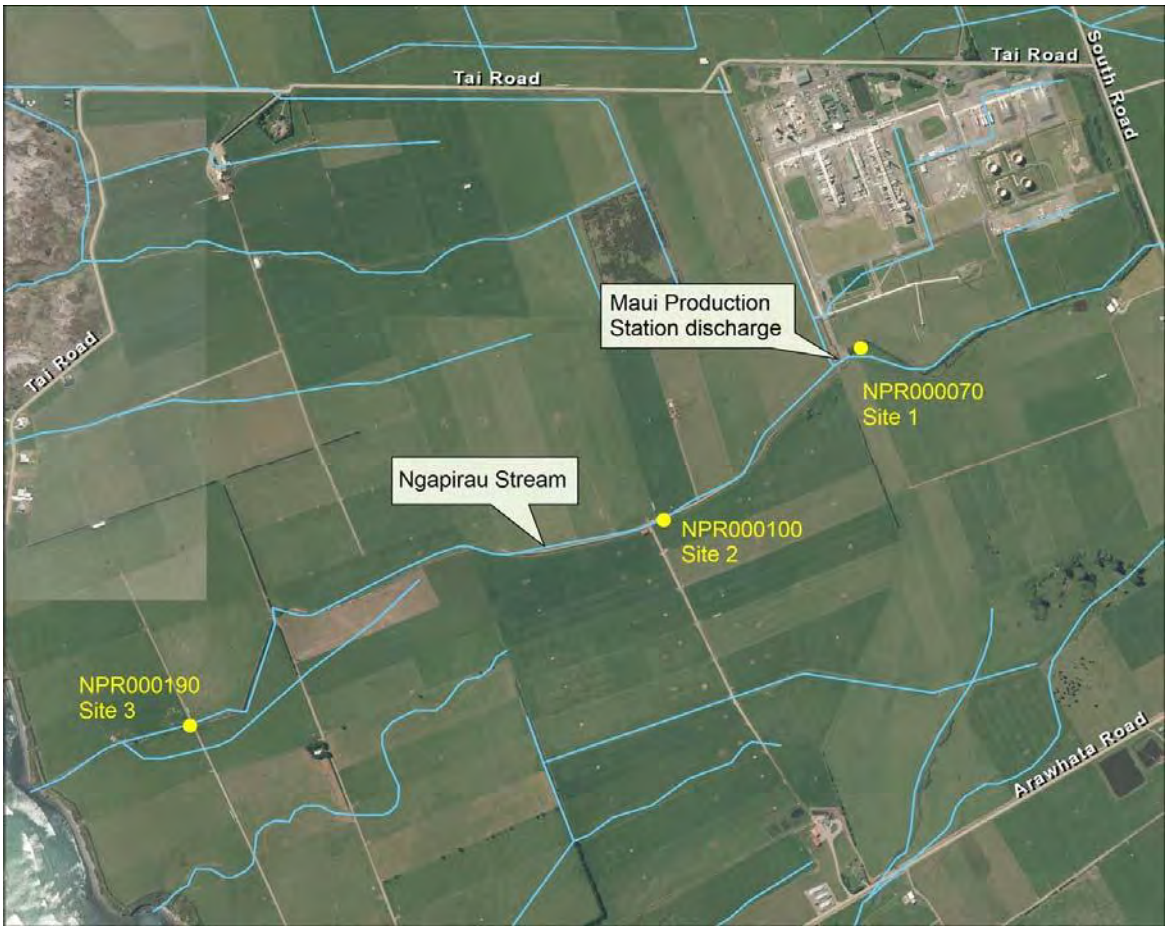

Figure 2 Biomonitoring sites in the Ngapirau Stream adjacent to the Maui Production Station

The early summer macroinvertebrate survey indicated that the discharge of treated wastes from the Maui Production Station site had not had any significant detrimental effect on the macroinvertebrate communities of the stream in comparison with the historical condition of these communities to date. The macroinvertebrate communities found at two sites downstream of the site discharge reflected the poor habitat present during a period of moderate flow conditions in summer, but also indicated that the water quality that preceded this survey was well above average.

The macroinvertebrate communities of the stream contained few 'sensitive' taxa. However, one 'sensitive' taxon was found in abundance at both sites, as were three 'tolerant' taxa. At both sites, taxonomic richness (number of taxa) was similar to the long term median, while the MCI scores were similar to (site 2) or higher than (site 3) the previously recorded maximum score for these sites. In addition, the $SQMCI_S$ scores recorded at both sites were the highest recorded to date for these sites. At site 3 there was a continuation of the improved $SQMCI_S$ results seen in recent surveys.

The MCI and $SQMCI_S$ scores indicated that the stream communities were of well above average but still poor 'health', although probably typical of communities in drain-like habitats in early summer.

The full biomonitoring report is attached to this report in Appendix II.

2.4 Results: air

2.4.1 Inspections

Air inspections were carried out in conjunction with site inspections as discussed in section 2.3.1 above. Air discharges were all found to be satisfactory, and no offensive, obnoxious or objectionable odours were noted during the inspections.

Photo 3 Emissions sources at the Maui Production Station

2.4.2 Results of receiving environment monitoring

2.4.2.1 Carbon monoxide and combustible gases

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 43 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases). The monitoring sites used in the year under review are shown in Figure 3.

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

Figure 3 Air monitoring sites at Maui Production Station for 2014-2015

The details of the sample run are summarised in Table 10 and the data from the sample run are presented graphically in Figure 4.

Table 10 Results of carbon monoxide and LEL monitoring at Maui Production Station

	Period	24/11/2014 13:03 to 26/11/2014 08:01
Max	CO(ppm)	14.1
	LEL(%)	0.20
Mean	CO(ppm)	0.11
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

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

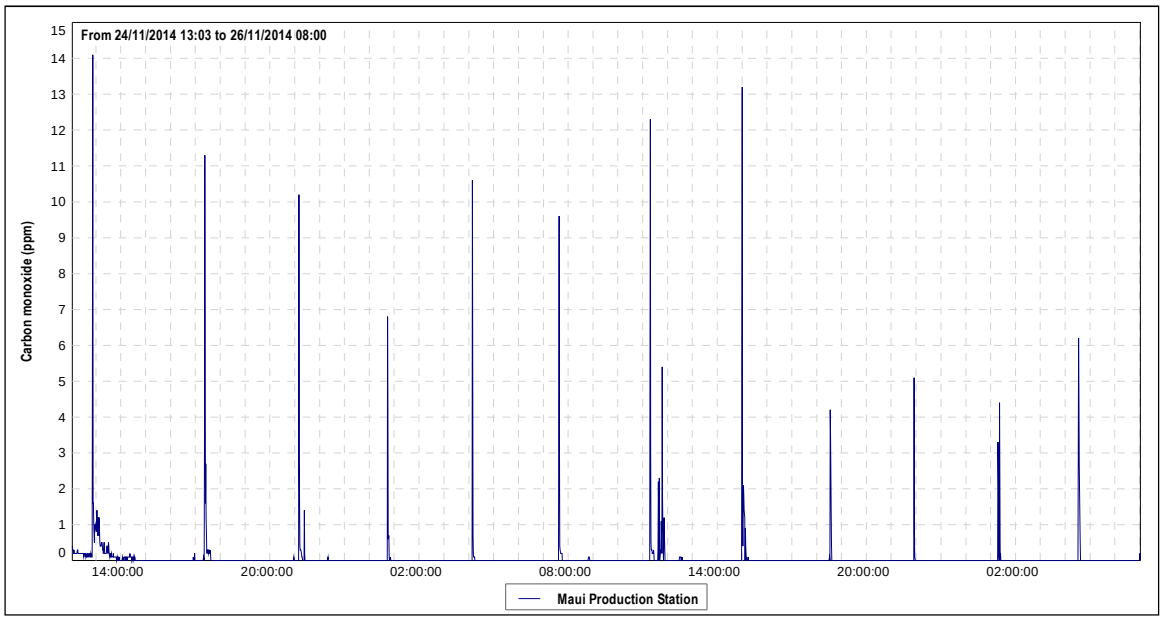

Figure 4 Ambient CO levels in the vicinity of Maui Production Station

The consent covering air discharges from the Maui Production Station has specific limits related to particular gases. Special condition 9 of consent 4052-4 sets a limit on the carbon monoxide concentration at or beyond the production station's boundary. The limit is expressed as 10 mg/m³ for an eight hour average or 30 mg/m³ for a one hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was 16.1 mg/m³ while the average concentration for the entire dataset was only 0.11 mg/m³ which comply with consent conditions. This is in line with the pattern found in previous years.

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

2.4.2.2 PM10 particulates

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

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

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

During the reporting period, a DustTrak PM10 monitor was deployed on one occasion in the vicinity of Maui Production Station. The deployment lasted approximately 43 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM10 concentrations. The location of the DustTrak monitor during the sampling run is shown in Figure 3. The results of the sample run are presented in Table 11 and Figure 5.

Table 11 Daily averages of PM10 results from monitoring at Maui Production Station

	43 hours 24-26/11/2014	
24 hr. set	Day 1	Day 2
Daily average	11.26 µg/m³	15.18 µg/m³
NES limit (24 hour average)	50 µg/m³	

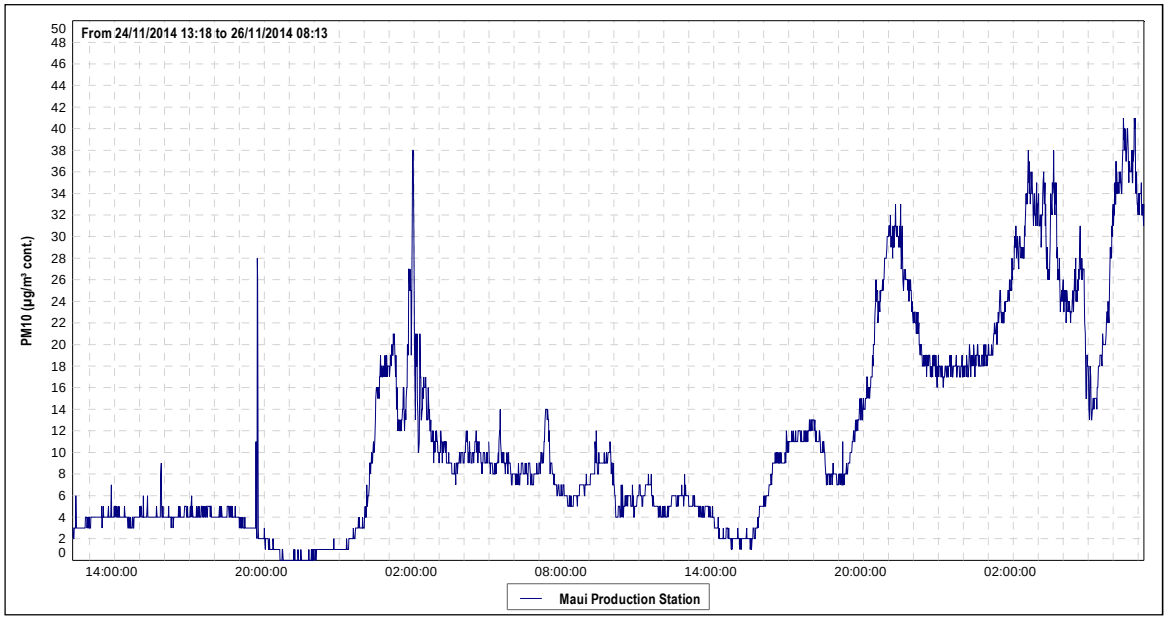

Figure 5 PM10 concentrations (µg/m³) at Maui Production Station

During the 43 hour run, from 24 November to 26 November 2014, the average recorded PM10 concentration was 11.26 µg/m³ for the first 24 hour period and 15.18 µg/m³ for the second 24 hour period. These daily averages equate to 22.5% and 30.4%, respectively, of the 50 µg/m³ value that is set by the NES. Background levels of PM10 in the region have been found to be typically around 11 µg/m³.

2.4.2.3 Nitrogen oxides

From 2014 onwards, the Council implemented a coordinated region-wide compliance monitoring programme to measure nitrogen oxides (NOx). The programme involves deploying measuring devices at 28 NOx monitoring sites (including two sites in the vicinity of Maui Production Station) on the same day, with retrieval three weeks later. This approach assists the Council in further evaluating the effects of local and regional emission sources and ambient air quality in the region.

The consent covering air discharges from the Maui Production Station has specific limits related to particular gases. Special condition 8 of consent 4052-4 sets a limit on the nitrogen dioxide concentration at or beyond the production station's boundary. The limit is expressed as 200 µg/m³ for a 1-hour average or 100 µg/m³ for a 24-hour average exposure.

NOx passive adsorption discs were place at two locations in the vicinity of the Maui Production Station on one occasion during the year under review. The discs were left in place for a period of 21 days. The calculated 1-hour and 24-hour theoretical maximum NOx concentrations found at Maui Production Station during the year under review equate to 6.45 µg/m³ and 3.40 µg/m³, respectively. The results show that the ambient ground level concentration of NOx is well below the limits set out by consent 4052-4.

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

2.4.3 Summary of flaring volumes reported by the Company

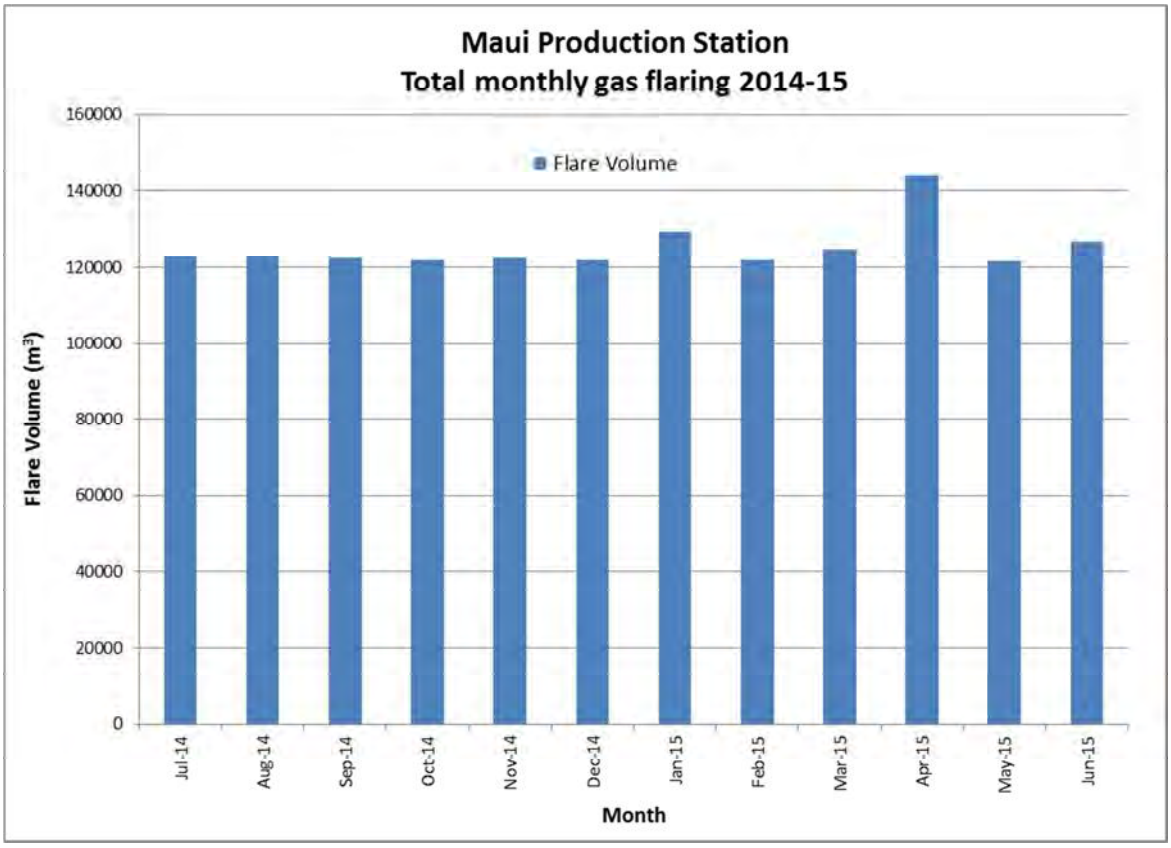

Figure 6 Monthly gas flaring for Maui Production Station under consent 4052-4

STOS provided the Council with an annual report on flaring and emissions during the 2014-2015 period, as required by consent 4052-4. A summary of flaring volumes at Maui Production Station is provided in Figure 6. The total volume flared in the 2014-2015 year was 1.50 million cubic metres of gas, which is comparable to the 1.55 million cubic metres of gas flared in the previous year.

Flaring was relatively consistent through the period (around 120,000 m^3/month), with a slight increase in April 2015 when the safety system to prevent air entering the flare stack was hit by lightening. This resulted in an additional 21,600 m^3 being flared over an eight hour period while the system was repaired.

Of the 39 flaring events in the period, 31 generated light smoke which was localised and dissipated quickly. The majority of events related to process upsets, plant repairs and ongoing maintenance. The median duration of these events was 90 minutes. No complaints were received from the public regarding flaring at the production station.

2.5 Investigations, interventions, and incidents

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

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The Incident Register (IR) 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 2014-2015 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans relating to Maui Production Station.

2.6 Discussion of site performance

Monitoring of the Maui Production Station during the 2014-2015 year found that the site was well managed. All consent conditions relating to site operations and management were complied with.

2.7 Environmental effects of exercise of consents

Receiving water inspections, in conjunction with sampling conducted by both the Council and STOS during the 2014-2015 period, showed that the discharges were not causing any adverse effects on the Ngapirau Stream. This was supported by the findings of the macroinvertebrate survey carried out in the stream.

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

2.8 Evaluation of performance

A tabular summary of the Company's compliance record for the period under review is set out in Tables 12 to 16.

Table 12 Summary of performance for Consent 0245-3

Purpose: ***To discharge treated stormwater from the Maui Production Station to the Ngapirau Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Oily water separator and stormwater oil trap operated and maintained correctly	Inspections and sampling	Yes

Purpose: ***To discharge treated stormwater from the Maui Production Station to the Ngapirau Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
2. Limits on contaminants in the discharge	Council and Company sampling	Yes
3. No effects in receiving water	Site inspections, sampling and biomonitoring	Yes
4. Contingency plan	Plan approved	Yes
5. Review/change of consent to take account of operational requirements	Not required	N/A
6. Review of consent	No further option for review	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

Table 13 Summary of performance for Consent 0246-3

Purpose: ***To discharge treated domestic effluent from the oxidation ponds at the Maui Production Station to the Ngapirau Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Oxidation ponds maintained in aerobic condition to meet conditions	Inspections and sampling	Yes
2. No effects in receiving water	Site inspections, sampling and biomonitoring	Yes
3. Upgrade treatment system by November 2000	Upgrade completed	Yes
4. Option to review consent in 2001 to assess effectiveness of upgrade	Not exercised	N/A
5. Review/change of consent to take account of operational requirements	Not required	N/A
6. Review of consent	No further option for review	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 14 Summary of performance for Consent 1228-4

Purpose: ***To discharge treated stormwater and wastewater from fire fighting at the Fire Training Centre at the Maui Production Station to the Oaonui Stream*** **(held by Wood Group M & O)**		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Settling pond operated and regularly maintained to meet conditions	Site inspections	Yes

Purpose: ***To discharge treated stormwater and wastewater from fire fighting at the Fire Training Centre at the Maui Production Station to the Oaonui Stream*** **(held by Wood Group M & O)**		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
2. Limits on contaminants in the discharge	Discharge results provided by consent holder	Yes
3. No chemicals or agents to be discharged without approval	Site inspections and liaison with consent holder	Yes
4. No effects in receiving water	Site inspections	Yes
5. Contingency plan	Plan approved	Yes
6. Review/change of consent to take account of operational requirements	Not required	N/A
7. Review of consent	No further option for review	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 15 Summary of performance for Consent 4052-4

Purpose: ***To discharge emissions into the air from the refining and distribution of hydrocarbons and associated processes at the Maui Production Station site***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise adverse effects	Site inspections and liaison with consent holder	Yes
2. Minimise emissions by appropriate selection, operation, supervision, control and maintenance of equipment	Site inspections and liaison with consent holder	Yes
3. Appropriate maintenance and operation of equipment	Site inspections	Yes
4. Treatment of flaring gas by effective liquid separation and recovery	Site inspections	Yes
5. Provision of annual report on flaring to council	Report received	Yes
6. No offensive, obnoxious or objectionable odours beyond site boundary	Site inspections	Yes
7. Limit on maximum ground level concentration of sulphur dioxide	Not measured, sampling in previous years	N/A
8. Limit on maximum ground level concentration of nitrogen oxides	Air quality monitoring	Yes

Purpose: ***To discharge emissions into the air from the refining and distribution of hydrocarbons and associated processes at the Maui Production Station site***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
9. Limit on maximum ground level concentration of carbon monoxide	Air quality monitoring	Yes
10. Limit on maximum ground level concentration of benzene	Not monitored during period under review	N/A
11. Limit on maximum ground level concentration for other contaminants	Air quality monitoring	Yes
12. Consultation with Council prior to significant alterations to plant, processes, or operations	Site inspections and liaison with consent holder	Yes
13. Notification of flaring more than five minutes in duration	Flaring notifications received	Yes
14. Notification to Council of incidents or hazardous situations	No incidents or hazardous situations to notify this period	Yes
15. Record of smoke emitting events	Site inspections, records kept by consent holder, and liaison with consent holder	Yes
16. Maintenance of log of continuous flaring incidents	Site inspections, records kept by consent holder, and liaison with consent holder	Yes
17. Depressurisation of plant to prevent dense black smoke being discharged from the flare	Site inspections, records kept by consent holder, and liaison with consent holder	Yes
18. Optional review provision	Next option for review in June 2018	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 16 Summary of performance for Consent 5224-2

Purpose: ***To place and maintain two pipelines in, under and over the foreshore and seabed in the coastal marine area between mean high water spring and the outer limit of the territorial sea***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notify Council before undertaking major maintenance works	No maintenance works undertaken	N/A
2. During maintenance works observe measures to prevent discharge and minimise disturbance	No maintenance works undertaken	N/A
3. Structures to be removed and area reinstated when no longer required	Currently operational	N/A
4. Review of consent	No further option for review	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

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 Maui Production Station was well managed and maintained.

2.9 Recommendation from the 2012-2014 Biennial Report

In the 2012-2014 Biennial Report, it was recommended:

1. THAT monitoring of consented activities at the Maui Production Station in the 2014-2015 year be amended from that undertaken in 2013-2014 to reflect the Council's changes to the structure of all monitoring programmes.

2. THAT the option for a review of resource consent 5224-2 in June 2015, as set out in condition 4 of the consent, 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 this resource consent.

These recommendations were implemented.

2.10 Alterations to monitoring programmes for 2015-2016

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 2015-2016 the monitoring of consented activities at the Maui Production Station continue at the same level as in 2014-2015. A recommendation to this effect is attached to this report.

2.11 Recommendation

1. THAT monitoring of consented activities at the Maui Production Station in the 2015-2016 year continues at the same level as in 2014-2015.

3. Kapuni Production Station

3.1 Process description

Photo 4 Kapuni Production Station

The Kapuni Production Station is located approximately in the middle of the Kapuni gas field, and adjacent to the Vector Gas Ltd facility called the Kapuni Gas Treatment Plant (KGTP). Exploration of the Kapuni Field began in 1959, and production began at Kapuni in 1969.

The function of the Kapuni Production Station is to gather the gas and condensate from the wellsites. The gas is delivered to KGPT for processing. The condensate gathered at the production station is treated and stabilised for storage and export to the Paritutu Tank Farm. LPG is delivered to the production station from KGTP for storage and export via road and rail tankers.

Three flares operate continuous pilots, which burn as yellow flames and are visible at night. The Kapuni Stream separates two of the flares from the remainder of the Kapuni Production Station site. The flares are linked to the main site by high and low pressure piping systems carried on a single span girder bridge with vehicular access via a ford through the Kapuni Stream. The flares are surrounded by farmland and the nearest dwelling is more than 300 metres from the flare stacks. The other flare is located in the north eastern corner of the site.

3.2 Resource consents

3.2.1 Water discharge permit

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

STOS holds water discharge permit **0633-3** to discharge treated stormwater from the Kapuni Production Station into the Kapuni Stream. The latest renewal was issued by the Council on 1 August 2011 under Section 87(e) of the RMA. It is due to expire on 1 June 2029.

There are 8 special conditions attached to this consent.

Condition 1 requires the consent holder to apply the best practicable option for preventing or minimising environmental effects when exercising the consent.

Conditions 2 and 3 prescribe the size of stormwater catchment and the controls that must be applied to stormwater.

Conditions 4 and 5 impose limits on contaminants in the discharge, and stipulate that the discharge shall not cause any significant adverse effect on the freshwater biological communities or the water quality of the Kapuni Stream.

Condition 6 requires a contingency plan to be maintained which outlines measures and procedures to prevent spillage or accidental discharge and measures to remedy or mitigate the effects of an accidental spillage or discharge.

Condition 7 makes it clear that any significant plant changes must be evaluated for potential implications for the consent, and condition 8 is the review provision.

The permit is attached to this report in Appendix I.

3.2.2 Air discharge permit

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.

STOS holds air discharge permit **4054-5** to discharge emissions into the air from combustion involving flaring of petroleum products incidental to the treatment of gas at the Kapuni Production Station. The latest renewal was issued by the Council on 9 November 2001 under Section 87(e) of the RMA. It was subsequently amended on 7 April 2005 to remove reference to carbon dioxide emissions in condition 5 after an amendment to the Resource Management Act 1991. A change to special condition 4 was requested by STOS and made on 9 August 2013 to move the due date for annual reporting from May to August. The consent is due to expire on 1 June 2017.

There are 13 special conditions attached to this consent.

Conditions 1, 2, 3, and 5 relate to use and maintenance of equipment to minimise emissions and impacts.

Condition 4 requires an annual report from the Company including information on flaring, emissions, plant efficiency, and mitigation measures.

Condition 6 stipulates that the discharge shall not give rise to offensive or obnoxious or objectionable odour at or beyond the site boundary.

Condition 7 requires consultation with the Council prior to significant changes on the site.

Conditions 8 and 10 relates to notifying the Council of flaring which lasts more than five minutes, and requires all practicable steps to be taken to minimise flaring.

Conditions 9 and 12 relate to record keeping.

Condition 11 stipulates that depressurisation of the plant must be carried out over a sufficient period of time to prevent dense black smoke from being discharged from the flares, except in emergencies.

Condition 13 provides for review of the consent.

The permit is attached to this report in Appendix I.

3.2.3 Land use consents

Section 13(1) of the Resource Management Act 1991 stipulates that in relation to the bed of any like or river, no person may 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 rule in a regional plan, or a resource consent.

STOS holds consent **5960-1** to erect, place, use and maintain a concrete ford on the bed of the Kapuni Stream for access purposes. The consent was issued on 13 February 2002 and is due to expire on 1 June 2023.

There are 8 special conditions attached to this consent.

Condition 1 requires initial construction and any maintenance to only be undertaken between 1 November and 30 April.

Conditions 2 and 3 relate to notification of the Council before undertaking works, and constructing and maintaining the structure in accordance with documentation submitted for the application.

Conditions 4 and 5 require the consent holder to observe every practicable measure to prevent discharges, and to minimise disturbance of the streambed.

Condition 6 stipulates that the structure shall not obstruct fish passage.

Condition 7 requires the structure to be removed and the area reinstated if the structure is no longer required.

Condition 8 provides for review of the consent.

STOS also holds consent **9555-1** to disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber. The consent was issued on 16 April 2013 and is due to expire on 1 June 2029.

There are 7 special conditions attached to this consent.

Condition 1 requires notification to the Council before undertaking works.

Conditions 2 and 3 require the adoption of the best practicable option to avoid or minimise effects on the stream bed and water quality.

Conditions 4 and 5 prohibit instream works between 1 May and 31 October and require that exercise of the consent shall not obstruct fish passage.

Conditions 6 and 7 are lapse and review provisions.

The permits are attached to this report in Appendix I.

3.3 Results: water

3.3.1 Inspections

Five inspections were carried out at the Kapuni Production Station in the 2014-2015 period. The following was found during the inspections:

1 August 2014
The site inspection was undertaken following recent heavy rainfall and high winds. Ring drains and bunds were clear of all contaminants and the skimmer pits and API separators were clean. The discharge point into Kapuni River did not give rise to any concerns. Minimal flaring was occurring at the time of the inspection and there were no smoke or odours evident.

22 October 2014
The site was inspected during routine processing operations. Minimal flaring was occurring with no odours or smoke evident off-site. Ring drains and bunds were clear, as was the API separator. The discharge point to Kapuni stream showed no effects and no instream effects were observed.

19 March 2015
Ring drains, bunds and separators were clear of contaminants. The stormwater discharge to the Kapuni stream did not show any effects of any previous discharge. No noticeable odours or smoke were emanating from the flare stack.

14 April 2015
An inspection of the KPS and associated wellsites was undertaken with STOS environmental staff following a week of very heavy rainfall. All sites were neat and tidy and storm water facilities had coped with the excessive rainfall. Some sites were

scheduled to receive some modifications to the storm water systems as part of STOS's ongoing improvement regime. No flaring was being undertaken at any of the wellsites, with just a normal production flare observed at the KPS.

29 June 2015

The site was inspected following recent extreme rainfall. There was evidence that the Kapuni River had risen to a very high level, but this had not caused any effects to the river bank or the STOS structures in and alongside it. The stormwater system had coped well with the rainfall, with all ring drains and bunds secure. Minimal flaring was occurring at the time of the inspection and no off-site effects were evident.

3.3.2 Results of discharge monitoring

Stormwater at the Kapuni Production Station is treated using two API separators. Stormwater captured beneath equipment and in bunded areas around storage facilities is directed to the first separator for initial treatment. It is then treated in a second separator prior to discharge to the Kapuni Stream. Stormwater from other areas, such as roads, is directed to the second separator.

Chemical water quality sampling of the treated stormwater discharge from the production station was undertaken once during the 2014-2015 period. Table 17 presents the results of this sampling. The location of the sampling site at the outlet of the second API separator (STW002014) is shown in Figure 7.

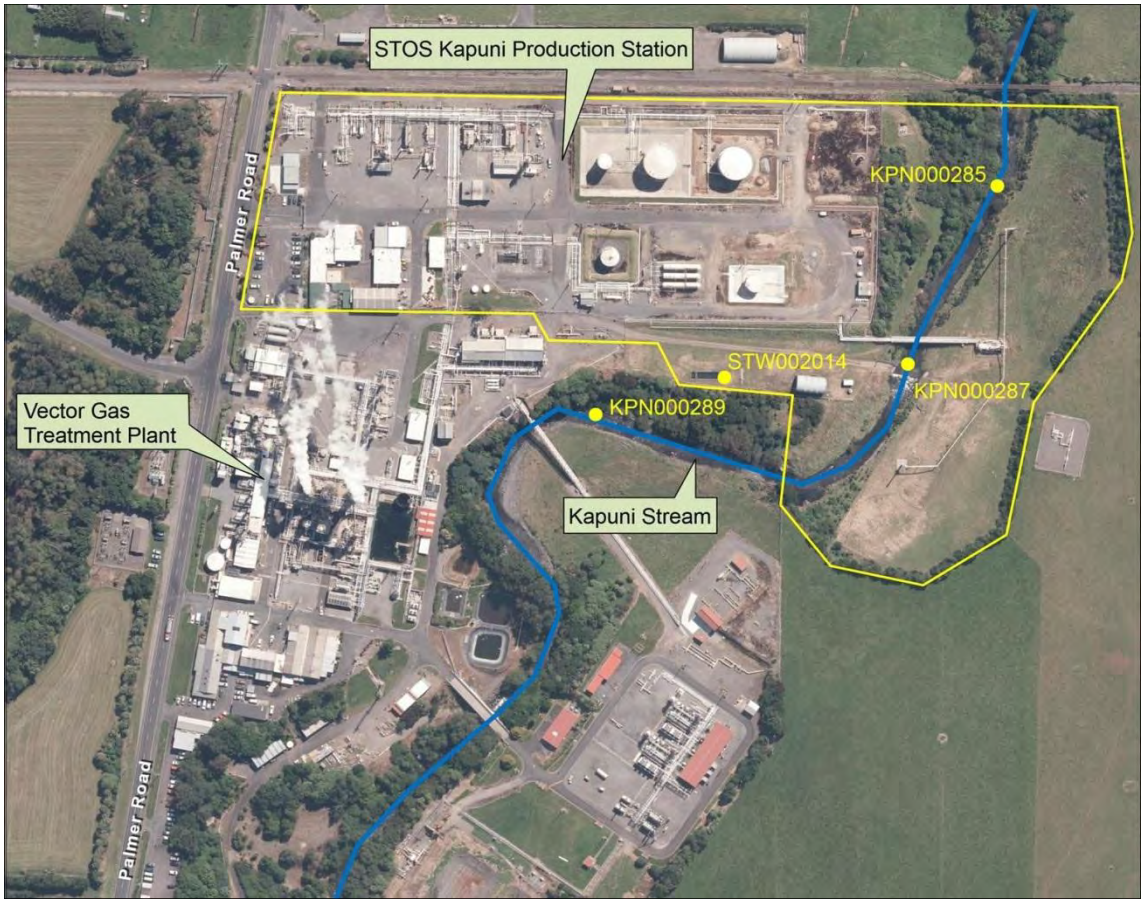

Figure 7 Kapuni Production Station and associated sampling sites

Table 17 Results of discharge monitoring from Kapuni Production Station

Parameter	Units	4 June 2015	Consent limits
Chloride	g/m^3	4.2	50
Conductivity	g/m^3	3.3	-
Hydrocarbons	g/m^3	< 0.5	15
Suspended solids	g/m^3	6	100
pH		7.0	6.0 – 9.0
Turbidity	NTU	3.9	-

The results show compliance with the conditions of consent 0633-3 at the time of sampling and are indicative of a very clean discharge.

Every month, STOS provided the Council with the results for daily composite samples of the Kapuni Production Station stormwater discharge, sampled at the outfall from the final separator. The results are summarised in Table 18.

Table 18 STOS Kapuni Production Station stormwater discharge results summary for 2014-2015

Month	Hydrocarbons (g/m^3)		Suspended solids (g/m^3)		pH	
Consent 0633-3 limits	*15*		*100*		*6.0 – 9.0*	
	Max	Average	Max	Average	Range	Average
July 2014	0.8	< 0.5	31	11	7.0 – 8.0	7.3
August 2014	1.1	< 0.5	21	11	7.0 – 7.9	7.5
September 2014	1.3	0.7	37	10	7.0 – 7.9	7.5
October 2014	2.1	< 0.5	17	9	6.8 – 7.8	7.2
November 2014	0.8	< 0.5	36	13	6.4 – 7.9	7.2
December 2014	0.6	< 0.5	47	18	6.3 – 7.8	7.1
January 2015	0.7	< 0.5	13	8	7.0 – 7.8	7.4
February 2015	0.6	< 0.5	12	8	7.1 – 8.0	7.6
March 2015	1.3	< 0.5	14	8	7.4 – 8.2	7.8
April 2015	1.0	0.7	22	8	7.4 – 8.7	7.8
May 2015	7.9	< 0.5	21	5	6.6 – 8.7	7.5
June 2015	0.7	< 0.5	28	3	6.7 – 7.5	7.0
Days limit exceeded	0		0		0	

The STOS monitoring results show a consistently clean discharge. Maximum values for hydrocarbons and suspended solids were well below the consent limits, and pH was within the acceptable range, throughout the period under review.

3.3.3 Results of receiving environment monitoring

3.3.3.1 Chemical

Chemical water quality sampling of the Kapuni Stream was undertaken in conjunction with discharge monitoring at points upstream (KPN000287) and downstream (KPN000289) of the discharge point. The results are shown in Table 19 and the sampling sites are shown in Figure 7.

There was negligible difference in receiving water quality upstream and downstream of the production station discharge. Although the suspended solids were higher at the downstream site, no visual change was observed at the time of sampling. This indicates that the discharge was in compliance with consent conditions regarding receiving environment quality.

Table 19 Receiving environment results for Kapuni Stream on 4 June 2015

Parameter	Units	Upstream KPN000287	Downstream KPN000289	Consent 0633-3 conditions
Chloride	g/m^3	9.3	9.7	-
Conductivity	g/m^3	7.3	7.3	-
Hydrocarbons	g/m^3	< 0.5	< 0.5	No conspicuous oil films or foams
Suspended solids	g/m^3	28	59	No conspicuous change
pH		7.4	7.3	-
Turbidity	NTU	13	16	No conspicuous change

3.3.3.2 Biomonitoring

The Council's standard 'kick-sampling' technique was used at two established sites (KPN000285 and KPN000289) to collect streambed macroinvertebrates from the Kapuni Stream on 19 February 2015 to assess whether stormwater discharges from the STOS Kapuni Production Station have had any adverse effects on the macroinvertebrate communities of this stream. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site. These sites are shown in Figure 7.

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 abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more relevant index if non-organic impacts are occurring. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

The late summer biological survey of the Kapuni Stream performed under very low summer flow conditions indicated that stormwater discharges from the Kapuni Production Station had not had any recent significant impacts on the macroinvertebrate communities of the stream. These communities had moderate community richnesses, although higher than that recorded in the previous survey. Similar characteristic taxa

were recorded in the communities at both sites, resulting in similar $SQMCI_S$ scores. The MCI scores were also similar, with the score recorded at the downstream site only five units less than that recorded at the upstream site, not a statistically significantly result. However, the score recorded at site KPN000289 was ten units lower than the median for this site, and this is considered a reflection of the extended period of low flow that preceded this survey.

The similarity in MCI scores between sites reflects the similar habitat present at both sites, with the lack of periphyton being an important factor. When gravel and cobble substrate supports little periphyton, the habitat is more suited to 'sensitive' taxa such as stoneflies, and less suited to snails or midge larvae. This is indicative of the absence of any recent impacts of any stormwater discharges from the Kapuni Production Station.

The full biomonitoring report is attached to this report in Appendix II.

3.3.4 Consented water abstractions

No water was abstracted under the water take consents for the Kapuni sites during the period under review.

Authorisation was given pursuant to Section 330(2)(b) of the RMA to disturb the bed of the Kapuni Stream in August 2014 and June 2015 for the purpose of undertaking maintenance on the fire water intake chamber at the Kapuni Production Station to ensure its correct operation. The clearing of debris and sediment was allowed for via emergency works provisions because the conditions of consent 9555-1 do not permit maintenance of the intake between 1 May and 31 October.

3.3.5 Kapuni wellsites blowdown pit remediations

Since 2012, STOS has pursued a programme of staged wellsite soil remediation and comprehensive groundwater monitoring at the Kapuni wellsites. A detailed description of this project and additional historical context is included in the Council's Shell Todd Oil Services Ltd Maui and Kapuni Production Stations Monitoring Programmes Annual Report 2011-2012 (Technical Report 2012-35) and the Biennial 2012-2014 Report (Technical Report 2014-41). The Company has committed to undertaking the assessment, decommissioning, impacted soil remediation and remediation validation works at wellsites where unlined pits were previously used for temporary containment of blowdown fluids from well maintenance and workovers.

Detailed decommissioning and remediation reports have been submitted to the Council for the KA-5/10, KA-8/12/15/18, KA-9 and KA-13 wellsites. Additional reports covering the remediation works at other Kapuni wellsites are being prepared. The Company's consultants have concluded that there is low risk to the stream environment on the basis of ground and surface water sampling to date.

The Company no longer uses unlined pits within its operations i.e. existing consents for discharges to blowdown pits are not being exercised. Impervious containment systems such as steel tanks, lined pits, and/or separators are now employed instead. Remediation validation works and groundwater monitoring are ongoing.

3.4 Results: air

3.4.1 Inspections

Air inspections were carried out in conjunction with site inspections as discussed in section 3.3.1 above. Air discharges were all found to be satisfactory, and no offensive, obnoxious or objectionable odours were noted during the inspections.

3.4.2 Results of receiving environment monitoring

3.4.2.1 Carbon monoxide and combustible gases

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 76 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases). The monitoring sites used in the year under review are shown in Figure 8.

Figure 8 Air monitoring sites at Kapuni Production Station for 2014-2015

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 summarised in Table 20 and the data from the sample run are presented graphically in Figure 9.

The consent covering air discharges from the Kapuni Production Station does not have specific limits related to particular gases. The Ministry for the Environment's air quality guidelines for carbon monoxide (which are based on health protection) are 30mg/m^3 averaged over a 1 hour exposure and 10mg/m^3 averaged over an 8 hour exposure period. The maximum concentration of carbon monoxide found during the monitoring run was 12.9 mg/m^3 while the average concentration for the entire dataset was only 0.23 mg/m^3 which comply with the Ministry for the Environment's air quality guidelines. This is in line with the pattern found in previous years.

Table 20 Results of carbon monoxide and LEL monitoring at Kapuni Production Station

	Period	25/06/2015 11:27 to 28/06/2015 18:05
Max	CO(ppm)	11.3
	LEL(%)	0.20
Mean	CO(ppm)	0.20
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

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

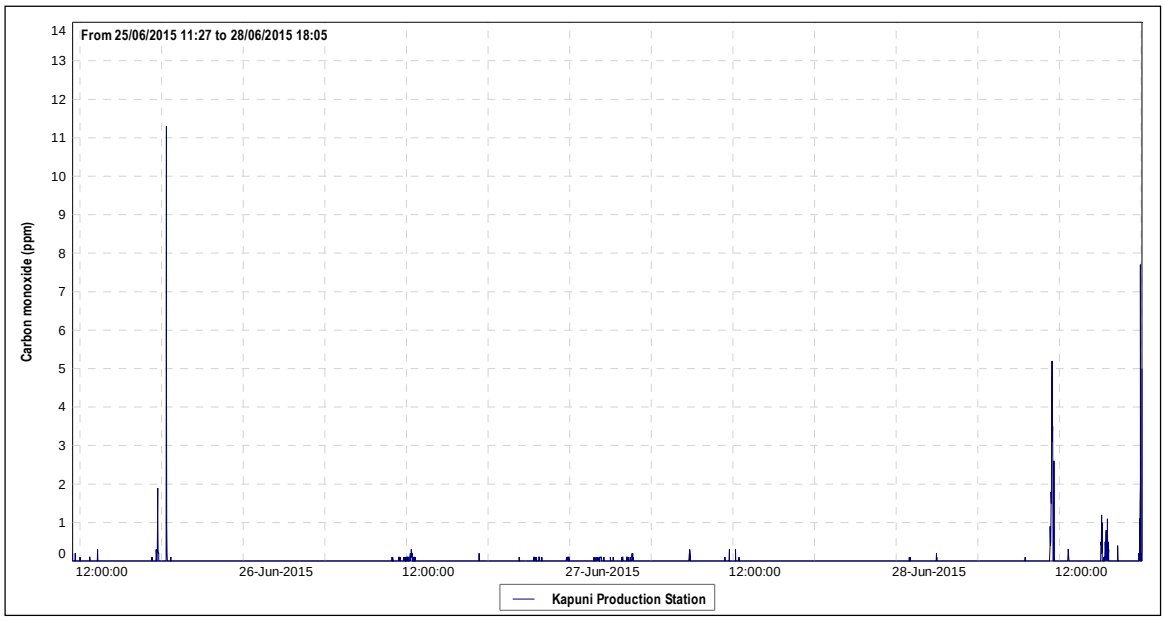

Figure 9 Ambient CO levels in the vicinity of Kapuni Production Station

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

3.4.2.2 PM10 particulates

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

Particulates can be derived from many sources, including motor vehicles (particularly diesel), solid and oil-burning processes for industry and power generation, incineration

and waste burning, photochemical processes, and natural sources such as pollen, abrasion, and sea spray.

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

During the reporting period, a DustTrak PM10 monitor was deployed on one occasion in the vicinity of Kapuni Production Station. The deployment lasted approximately 53 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM10 concentrations. The location of the DustTrak monitor during the sampling run is shown in Figure 8. The results of the sample run are presented in Table 21 and Figure 10.

Table 21 Daily averages of PM10 results from monitoring at Kapuni Production Station

	43 hours 24-26/11/2014	
24 hr. set	Day 1	Day 2
Daily average	13.15 µg/m³	21.46 µg/m³
NES limit (24 hour average)	50 µg/m³	

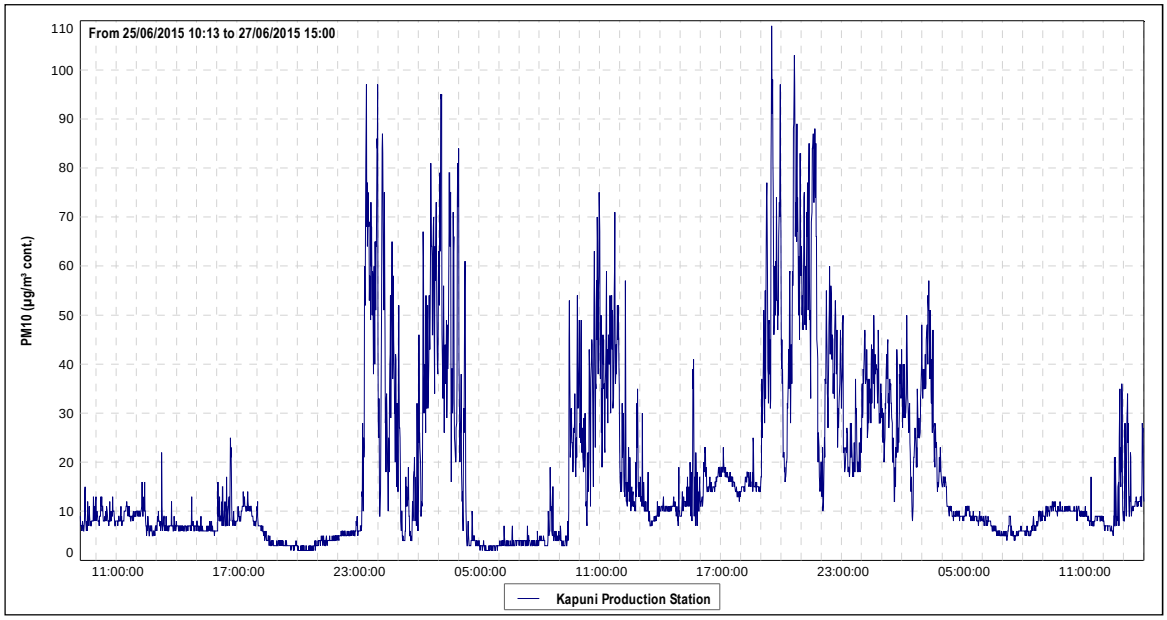

Figure 10 PM10 concentrations (µg/m³) at Kapuni Production Station

During the 53 hour run, from 25 June to 27 June 2015, the average recorded PM10 concentration was 13.15 µg/m³ for the first 24 hour period and 21.46 µg/m³ for the second 24 hour period. These daily averages equate to 26.3% and 42.9%, respectively, of the 50 µg/m³ value that is set by the NES. Background levels of PM10 in the region have been found to be typically around 11 µg/m³.

3.4.2.3 Nitrogen oxides

From 2014 onwards, the Council implemented a coordinated region-wide compliance monitoring programme to measure nitrogen oxides (NOx). The programme involves deploying measuring devices at 28 NOx monitoring sites (including two sites in the vicinity of Kapuni Production Station) on the same day, with retrieval three weeks later. This approach assists the Council in further evaluating the effects of local and regional emission sources and ambient air quality in the region.

Consent 4054-5 covering air discharges from the Kapuni Production Station does not have specific limits related to particular gases. The Ministry for the Environment's air quality guidelines for nitrogen dioxide are 200 µg/m³ for a 1-hour average or 100 µg/m³ for a 24-hour average exposure.

NOx passive adsorption discs were place at two locations in the vicinity of the Kapuni Production Station on one occasion during the year under review. The discs were left in place for a period of 21 days. The calculated 1-hour and 24-hour theoretical maximum NOx concentrations found at Kapuni Production Station during the year under review equate to 23.3 µg/m³ and 12.3 µg/m³, respectively. The results show that the ambient ground level concentration of NOx is well below the limits set out by the Ministry for the Environment's air quality guidelines.

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

3.4.3 Summary of flaring volumes reported by the Company

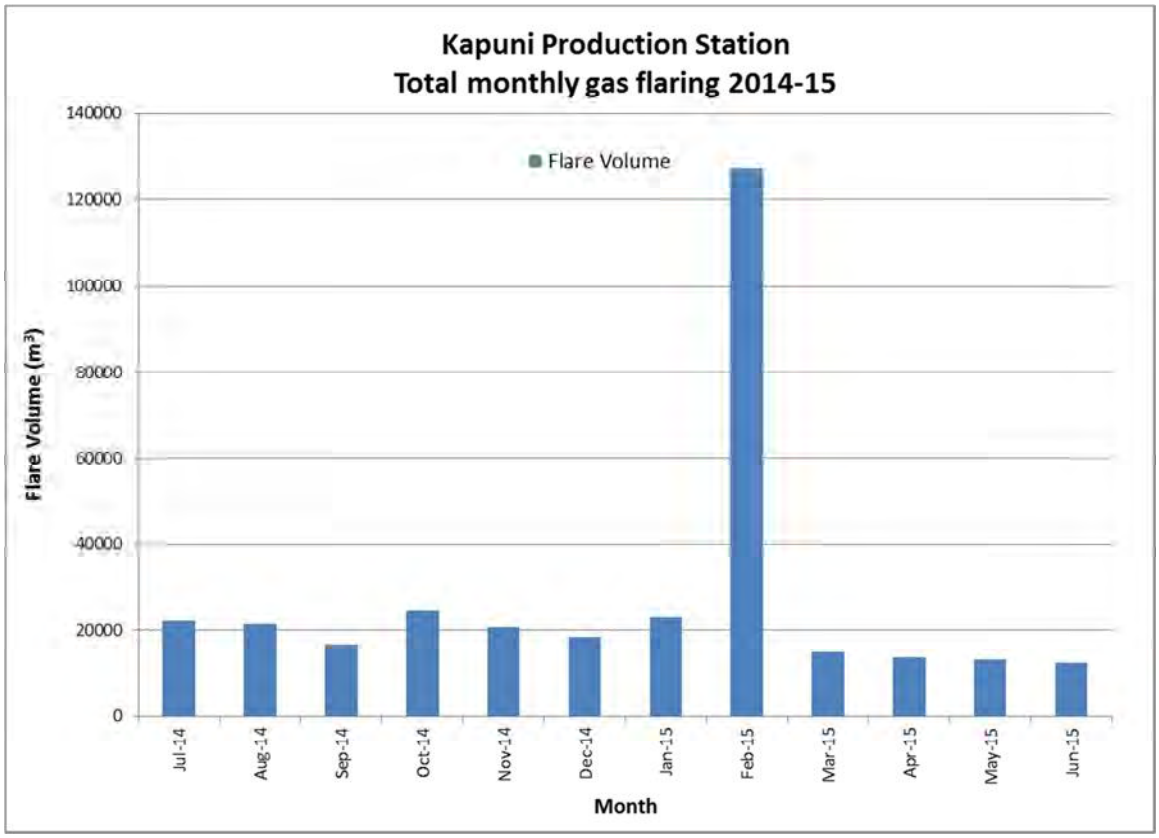

Figure 11 Monthly gas flaring for Kapuni Production Station under consent 4054-5

STOS provided the Council with an annual report on flaring and emissions during the 2014-2015 period, as required by consent 4054-5. A summary of flaring volumes at Kapuni Production Station is provided in Figure 11. The total volume flared in the 2014-2015 year was 327,700 m^3 of gas, which is a moderate increase on the 258,700 m^3 of gas flared in the previous year.

The main reason for an increase in flaring during the 2014-2015 year was that the production station was shut down in February 2015 for plant maintenance activities, which resulted in 106,000 m^3 being flared during depressurisation of the plant.

Of the 167 flaring events reported in the period, 98 lasted for five minutes or more and only ten generated light smoke which was localised and dissipated quickly. The majority of events related to process upsets, plant repairs, wellsite configuration changes and ongoing maintenance. The median duration of these events was five minutes. No complaints were received from the public regarding flaring at the production station.

3.5 Investigations, interventions, and incidents

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

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The Incident Register (IR) 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 2014-2015 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans relating to Kapuni Production Station.

3.6 Discussion of site performance

Inspections of the Kapuni Production Station during the 2014-2015 year found that the site was well managed. All consent conditions relating to site operations and management were complied with.

3.7 Environmental effects of exercise of consents

Stormwater discharge inspections showed that discharges from the site complied with consent conditions. Receiving water monitoring inspections and sampling showed that the discharge was not causing any adverse effects on the Kapuni Stream at the time of monitoring. This was supported by the findings of the macroinvertebrate survey carried out in the stream.

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

3.8 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Tables 22-24.

Table 22 Summary of performance for Consent 0633-3

Purpose: ***To discharge treated stormwater from the Kapuni Production Station into the Kapuni Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise adverse effects	Site inspections and liaison with consent holder	Yes
2. Catchment area not to exceed 4 ha	Site inspections	Yes
3. Stormwater to be directed through a treatment system	Site inspections	Yes
4. Limit on the concentration of pH, suspended solids, hydrocarbons and chloride	Inspections and sampling	Yes
5. In-stream effects	Inspections, sampling, biomonitoring	Yes
6. Contingency plan	Plan reviewed and approved	Yes
7. Consent holder to notify Council of significant changes to processes or operations	Site inspections and liaison with consent holder	Yes
8. Review of consent	Next option for review in June 2017	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

Table 23 Summary of performance for Consent 4054-5

Purpose: ***To discharge emissions into the air from combustion involving flaring of petroleum products incidental to the treatment of gas at the Kapuni Production Station***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise adverse effects	Site inspections and liaison with consent holder	Yes
2. Minimise emissions by appropriate selection, operation, supervision, control and maintenance of equipment	Site inspections and liaison with consent holder	Yes
3. Effective liquid separation and recovery to avoid smoke emissions during flaring	Site inspections	Yes
4. Provision of annual report on flaring to council	Report received	Yes
5. Appropriate maintenance and operation of equipment	Site inspections	Yes
6. No offensive, obnoxious or objectionable odours beyond site boundary	Site inspections	Yes
7. Consultation with Council prior to significant alterations to plant, processes, or operations	Site inspections and liaison with consent holder	Yes
8. Notification of flaring more than five minutes in duration	Flaring notifications received	Yes
9. Maintenance of log of continuous flaring incidents	Information received	Yes
10. Take all practicable steps to minimise flaring	Site inspections, review of information received, liaison with consent holder	Yes
11. Depressurisation of plant to prevent dense black smoke being discharged from the flare	Site inspections, records kept by consent holder, and liaison with consent holder	Yes
12. Record of smoke emitting events and complaints	Site inspections, records kept by consent holder, and liaison with consent holder	Yes
13. Optional review provision re environmental effects, best practicable option or mass discharge quantities or ambient concentrations	No further option for review	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 24 Summary of performance for Consent 5960-1

Purpose: ***To erect, place, use and maintain a concrete ford on the bed of the Kapuni Stream for access purposes***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Construction and maintenance only between 1 November and 30 April	Inspections. No maintenance undertaken during this monitoring period	N/A
2. Notify Council before undertaking construction and maintenance works	No maintenance undertaken during this monitoring period	N/A
3. Constructed and maintained in accordance with application	Inspections. No maintenance undertaken during this monitoring period	N/A
4. During maintenance works observe measures to prevent discharge and minimise disturbance	Inspections. No maintenance undertaken during this monitoring period	N/A
5. Minimise disturbance and reinstate any disturbed areas	Inspections. No maintenance undertaken during this monitoring period	N/A
6. The structure shall not obstruct fish passage	Site inspection	Yes
7. Structures to be removed and area reinstated when no longer required	N/A	N/A
8. Review of consent	Next option for review in June 2017	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 25 Summary of performance for Consent 9555-1

Purpose: ***To disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notify Council before undertaking maintenance works	No maintenance carried out under this consent during the monitoring period	N/A
2. Adopt best practicable option to avoid or minimise effects	No maintenance carried out under this consent during the monitoring period	N/A
3. Restrict area and volume of disturbance to a practicable minimum	No maintenance carried out under this consent during the monitoring period	N/A
4. No instream works between 1 May and 31 October	Maintenance carried out in August 2014 and June 2015 under emergency works provisions to clear hazardous debris	N/A
5. Exercise of consent shall not obstruct fish passage	No maintenance carried out under this consent during the monitoring period	N/A
6. Lapse of consent	Consent has now been exercised	N/A

Purpose: *To disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
7. Review of consent	Next option for review in June 2017	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

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 Kapuni Production Station was well managed and maintained.

3.9 Recommendation from the 2012-2014 Biennial Report

In the 2012-2014 Biennial Report, it was recommended:

1. THAT monitoring of consented activities at the Kapuni Production Station in the 2014-2015 year be amended from that undertaken in 2013-2014 to reflect the Council's changes to the structure of all monitoring programmes.

2. THAT monitoring of consents 7005-1, 7113-1, and 7114-1, and of remediation works at other wellsites, continues in the 2014-2015 year at a level adequate to ensure compliance with the conditions of the consents and provisions in Regional Plans.

These recommendations were implemented.

3.10 Alterations to monitoring programmes for 2015-2016

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 2015-2016 the monitoring programme remains unchanged from that of 2014-2015. A recommendation to this effect is attached to this report.

3.11 Recommendation

1. THAT monitoring of consented activities at the Kapuni Production Station in the 2015-2016 year continues at the same level as in 2014-2015.

4. Summary of recommendations

1. THAT monitoring of consented activities at the Maui Production Station in the 2015-2016 year continues at the same level as in 2014-2015.

2. THAT monitoring of consented activities at the Kapuni Production Station in the 2015-2016 year continues at the same level as in 2014-2015.

Glossary of common terms and abbreviations

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

API separator	A device designed to separate oil and suspended solids from wastewater and stormwater, which is designed according to standards published by the American Petroleum Institute.
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.
Condy	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
IR	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
l/s	Litres per second.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
mS/m	Millisiemens per metre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are

	increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM_{10}	Relatively fine airborne particles (less than 10 micrometre diameter).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act* 1991 and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
UI	Unauthorised Incident.

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

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Appendix I

Resource consents held by Shell Todd Oil Services Ltd and Wood Group M & O

(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:	Shell Todd Oil Services Ltd Private Bag 2035 NEW PLYMOUTH 4342
Decision Date (Change):	4 September 2013
Commencement Date (Change):	4 September 2013 (Granted: 11 October 2000)

Conditions of Consent

Consent Granted:	To discharge treated stormwater from the Maui Production Station to the Ngapirau Stream
Expiry Date:	1 June 2018
Site Location:	Maui Production Station, Tai Road, Oaonui
Legal Description:	Lot 1 DP 11402 Ngatitara 7C Blk XV Opunake SD (Discharge source & site)
Grid Reference (NZTM)	1669907E-56379680N
Catchment:	Ngapirau

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

General condition

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

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

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

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

Special conditions

1. The oily water separator and the stormwater oil trap shall be operated and regularly maintained to ensure that the conditions of this consent are met.

2. The discharge shall not exceed the following concentrations:

Contaminant	Concentration
Total recoverable hydrocarbons	15 gm^{-3}
Suspended solids	100 gm^{-3}

3. After allowing for reasonable mixing, within a mixing zone extending 20 metres downstream of the discharge point, the discharge [in conjunction with any other discharge pertaining to the same property] shall not give rise to any of the following effects in the receiving water:

    a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
    b) any conspicuous change in 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, habitats or ecology.

4. The consent holder shall maintain, and regularly update, a contingency plan, outlining measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.

5. The resource consent holder may apply to the Taranaki Regional Council for a change or cancellation of any of the conditions of this resource consent in accordance with section 127(1)(a) of the Resource Management Act 1991 to take account of operation requirements or the results of monitoring.

6. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2006 and/or June 2012, 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 consent, which either were 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 4 September 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:	Shell Todd Oil Services Limited Private Bag 2035 NEW PLYMOUTH
Consent Granted Date:	11 October 2000

Conditions of Consent

Consent Granted:	To discharge treated domestic effluent from the oxidation ponds at the Maui Production Station to the Ngapirau Stream at or about GR: P20:800-999
Expiry Date:	1 June 2018
Review Date(s):	June 2006, June 2012
Site Location:	Maui Production Station, Tai Road, Oaonui
Legal Description:	Lot 1 DP 11402 Pt Ngatitara 6C 6D 6E & 7C Blocks Blk XV Opunake SD
Catchment:	Ngapirau stream between the Oaonui Stream and the Okaweu Stream

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

General conditions

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

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

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

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

Special conditions

1. The consent holder shall properly and efficiently maintain and operate the oxidation ponds system, which shall be regularly maintained in an aerobic condition, to ensure that the conditions of this consent are met.

2. That after allowing for reasonable mixing, within a mixing zone extending 20 metres below the discharge point, the discharge [in conjunction with any other discharges pertaining to the same property] shall not give rise to any of the following effects in the receiving waters:

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, habitats or ecology.

3. The consent holder shall upgrade the treatment system to avoid effects as a result of algal blooms in the oxidation ponds. The upgrade shall be in accordance with the URS New Zealand Ltd 30 August 2000 report recommendations and be completed by 30 November 2000.

4. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2001, for the purpose of assessing the effectiveness of works required under special condition 3.

5. The resource consent holder may apply to the Taranaki Regional Council for a change or cancellation of any of the conditions of this resource consent in accordance with section 127(1)(a) of the Resource Management Act 1991 to take account of operation requirements or the results of monitoring.

6. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2006 and/or June 2012, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which either were 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 11 October 2000

For and on behalf of
Taranaki Regional Council

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Chief Executive

Discharge Permit

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

Name of Consent Holder:	Shell Todd Oil Services Ltd Private Bag 2035 NEW PLYMOUTH 4342
Decision Date:	1 August 2011
Commencement Date:	1 August 2011

Conditions of Consent

Consent Granted:	To discharge treated stormwater from the Kapuni Production Station into the Kapuni Stream at or about (NZTM) 1701051E-5629618N
Expiry Date:	1 June 2029
Review Date(s):	June 2017, June 2023
Site Location:	Kapuni Production Station, Palmer Road, Kapuni
Legal Description:	Pt Lot 1 DP 5227 Blk XVI Kaupokonui SD [Discharge source] Lot 1 DP 15254 [Discharge site]
Catchment:	Kapuni

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 at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

2. The stormwater discharged shall be from a catchment area not exceeding four hectares.

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

4. Constituents of the discharge shall meet the standards shown in the following table.

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

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

5. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the Kapuni Stream:

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

6. 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.

7. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site, that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act.

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

   a) during the month of June 2017 and/or June 2023; and/or
   b) within 3 months of receiving a notification under special condition 7 above;

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

Signed at Stratford on 1 August 2011

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:	M & O Pacific Limited P O Box 265 NEW PLYMOUTH 4340
Consent Granted Date:	11 October 2000

Conditions of Consent

Consent Granted:	To discharge treated stormwater and wastewater from fire fighting at the Fire Training Centre at the Maui Production Station to the Oaonui Stream at or about (NZTM) 1669945E-5638740N
Expiry Date:	1 June 2018
Review Date(s):	June 2006, June 2012
Site Location:	Fire Training Centre, Maui Production Station, Tai Road, Oaonui
Legal Description:	Ngatitara 7C Block Blk XV Opunake SD
Catchment:	Oaonui

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

General conditions

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

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

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

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

Special conditions

1. The settling ponds shall be operated and regularly maintained to ensure that the conditions of this consent are met.

2. The discharge shall not exceed the following concentrations:

Contaminant	**Concentration**
Total recoverable hydrocarbons	15 gm^{-3}
Suspended solids	50 gm^{-3}

3. That, other than specified in condition 2, no chemicals or agents may be discharged without the written approval of the Chief Executive, of the Taranaki Regional Council.

4. After allowing for reasonable mixing, within a mixing zone extending 10 metres downstream of the discharge point, the discharge shall not give rise to any of the following effects in the receiving water:

a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
b) any conspicuous change in 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, habitats or ecology.

5. The consent holder shall maintain, and regularly update, a contingency plan, outlining measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.

6. The resource consent holder may apply to the Taranaki Regional Council for a change or cancellation of any of the conditions of this resource consent in accordance with section 127(1)(a) of the Resource Management Act 1991 to take account of operation requirements or the results of monitoring.

7. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2006 and/or June 2012, 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 consent, which either were 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 24 November 2009

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:	Shell Todd Oil Services Ltd Private Bag 2035 NEW PLYMOUTH 4342
Decision Date (Change):	9 August 2013
Commencement Date (Change):	9 August 2013 [Granted: 9 January 2003]

Conditions of Consent

Consent Granted:	To discharge emissions into the air from the refining and distribution of hydrocarbons and associated processes at the Maui Production Station site
Expiry Date:	1 June 2024
Review Date(s):	June 2018
Site Location:	Maui Production Station, Tai Road, Oaonui
Legal Description:	Ngatitara 6D & 6E Blk XVI Lot 1 DP 11402 Opunake SD
Grid Reference (NZTM)	1670046E-5638140N

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 adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants into the air from the site.

2. 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.

3. All equipment used to avoid, remedy, or mitigate any effect on the environment from the discharge of emissions into the air shall be maintained in good condition and shall be operated within design parameters at all times that the plant is in operation.

4. The consent holder shall undertake effective liquid separation and recovery, as far as is practicable, to avoid or mitigate smoke emissions during flaring.

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

   a) detailing gas combustion in the flares under condition 16, such information to be compiled on a month by month basis;
   b) detailing smoke emissions as required under condition 15;
   c) detailing any measures to reduce smoke emissions;
   d) detailing any measures to reduce flaring;
   e) providing data on the emitted and / or ambient concentrations and / or mass discharge rates and / or an emission inventory, of such contaminants the Chief Executive, Taranaki Regional Council, may from time to time specify;

f) detail current measures by the consent holder to improve plant efficiency on the site; and
g) addressing any other issue relevant to the minimisation or mitigation of emissions from the flares or from elsewhere on the site.

6. The discharges authorised by this consent shall not give rise to any offensive or obnoxious or objectionable odour at or beyond the site boundary in the opinion of an enforcement officer of the Taranaki Regional Council.

7. The consent holder shall control all emissions of sulphur dioxide to the atmosphere from the site, in order that the maximum ground level concentration of sulphur dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 350 μg m^{-3} [one-hour average exposure] or 125 μg m^{-3} [twenty-four hour average exposure] at or beyond the boundary of the site.

8. The consent holder shall control all emissions of nitrogen oxides to the atmosphere from the site, 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 100 μg m^{-3} [twenty-four hour average exposure], or 200 μg m^{-3} [one-hour average exposure] at or beyond the boundary of the site.

9. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the flare, whether alone or in conjunction with any other emissions from the site arising through the exercise of any other consent, in order that the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 mg m^{-3} [eight-hour average exposure], or 30 mg m^{-3} one-hour average exposure] at or beyond the boundary of the property on which the production station flare is located.

10. The consent holder shall control all emissions of benzene to the atmosphere from the site, in order that the maximum ground level concentration of benzene arising from the exercise of this consent measured under ambient conditions does not exceed the relevant Ministry for the Environment Ambient Air Quality Guideline for beneze [10 μg m^{-3} [annual average exposure] from 2002 until 2010 and 3.6 μg m^{-3} [annual average exposure] from 2010] at or beyond the boundary of the site.

11. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than carbon dioxide, sulphur dioxide, carbon monoxide, and nitrogen oxides, 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 site is not increased above background levels:

a) by more than 1/30th of the relevant Occupational Threshold Value-Time Weighted Average, or by more than the Short Term Exposure Limit at any time, [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour]; or
b) if no Short Term Exposure Limit is set, by more than three times the Time Weighted Average at any time, [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

12. 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.

13. The consent holder shall whenever practicable notify the Chief Executive, Taranaki Regional Council, whenever the continuous flaring of hydrocarbons (other than purge gas) is expected to occur for more than five minutes in duration.

14. Any incident having air environment impact or potential impact which has or is liable to cause significant substantiated complaint or a hazardous situation beyond the boundary of the consent holder's site, shall be notified to the Taranaki Regional Council, as soon as possible, followed by a written report to the Chief Executive, Taranaki Regional Council, within one week of the incident, with comment about the measures taken to minimise the impact of the incident and to prevent re-occurrence.

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

16. The consent holder shall keep and maintain a log of all continuous flaring incidents longer than five minutes, and any intermittent flaring lasting for an aggregate of ten minutes or longer in any 120-minute period. Such a log shall contain the date, the start and finish times, the quantity and type of material flared, and the reason for flaring. This log shall be made available to the Chief Executive upon request, and summarised annually in the report required under condition 5. All practicable steps shall be taken to minimise flaring.

17. Other than in emergencies, or during tests or exercises to simulate emergencies to a maximum frequency of twice per year, depressurisation of the plant, or sections of the plant, shall be carried out over a sufficient period of time to prevent dense black smoke from being discharged from the flares.

18. Subject to the provisions of this condition, the Council may within six months of receiving a report prepared by the consent holder pursuant to condition 5 of this consent but not more often than once every three years, or in June 2006 and / or June 2012 and / or June 2018, serve notice that it intends to review the conditions of this resource consent in accordance with section 128(1)(a) of the Resource Management Act 1991 for the purposes of:

    a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with; and / or

    b) requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and / or

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

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

Signed at Stratford on 09 August 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:	Shell Todd Oil Services Private Bag 2035 NEW PLYMOUTH 4342
Decision Date [change]:	9 August 2013
Commencement Date [change]:	9 August 2013 [Granted: 9 November 2001]

Conditions of Consent

Consent Granted:	To discharge emissions into the air from combustion involving flaring of petroleum products incidental to the treatment of gas at the Kapuni Production Station
Expiry Date:	1 June 2017
Site Location:	Kapuni Production Station, Palmer Road, Kapuni
Legal Description:	Pt Lot 1 DP 5227 Lot 1 DP 12628 Bk XVI Kaupokonui SD
Grid Reference (NZTM)	1701044E-5629660N

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 adopt the best practicable option [as defined in section 2 of the Resource Management Act 1991] to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants into the environment from the flare emissions.

2. The consent holder shall minimise the emissions and impacts of air contaminants discharged from the flares 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.

3. The consent holder shall undertake effective liquid separation and recovery, as far as is practicable, to avoid or mitigate smoke emissions during flaring.

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

   i) detailing gas combustion in the flares under condition 9;
   ii) detailing smoke emissions as required under condition 12;
   iii) detailing any measures to reduce smoke emissions;
   iv) detailing any measures to reduce flaring;
   v) providing data on the emitted and / or ambient concentrations and / or mass discharge rates and / or an emission inventory, of such contaminants the Chief Executive, Taranaki Regional Council, may from time to time specify; and
   vi) addressing any other issue relevant to the minimisation or mitigation of emissions from the flares.

5. All equipment used to avoid, remedy or mitigate any effect on the environment from the discharge of emissions into the air shall be maintained in good condition and shall be operated within design parameters at all times that the flares are in operation.

6. The discharges authorised by this consent shall not give rise to any offensive or obnoxious or objectionable odour at or beyond the site boundary in the opinion of an enforcement officer of the Taranaki Regional Council.

7. 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 flares, the consent holder shall first consult with the Chief Executive and shall obtain any necessary approvals under the Resource Management Act 1991.

8. The consent holder shall, whenever practicable, notify the Chief Executive whenever the continuous flaring of hydrocarbons [other than purge gas] is expected to occur for more than five minutes in duration.

9. The consent holder shall keep and maintain a log of all continuous flaring incidents longer than 2 minutes and any intermittent flaring lasting for an aggregate of 4 minutes or longer in any 60-minute period. Such a log shall contain the date, the start and finish times, the quantity and type of material flared, and the reason for flaring. This log shall be made available to the Chief Executive upon request, and summarised annually in the report required under condition 4.

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

11. Other than in emergencies, or during tests or exercises to simulate emergencies to a maximum frequency of twice per year, depressurisation of the plant, or sections of the plant, shall be carried out over a sufficient period of time to prevent dense black smoke from being discharged from the flares.

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

13. Subject to the provisions of this condition, the Council may within six months of receiving a report prepared by the consent holder pursuant to condition 4 of this consent but not more often than once every three years, or in June 2005 and / or June 2011, serve notice that it intends to review the conditions of this resource consent in accordance with section 128(1)(a) of the Resource Management Act 1991 for the purposes of:

    (a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with; and / or
    (b) requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and / or
    (c) to alter, add or delete limits on mass discharge quantities or discharge or ambient concentrations of any contaminant or contaminants.

Signed at Stratford on 09 August 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

TRK985224

COASTAL PERMIT

**Pursuant to the RESOURCE MANAGEMENT ACT 1991
a resource consent is hereby granted by the
Taranaki Regional Council**

Name of Consent Holder: SHELL TODD OIL SERVICES LIMITED
PRIVATE BAG 2035 NEW PLYMOUTH

Granted Date: 10 March 1998

CONDITIONS OF CONSENT

Consent Granted: TO PLACE AND MAINTAIN TWO PIPELINES IN, UNDER AND OVER THE FORESHORE AND SEABED IN THE COASTAL MARINE AREA BETWEEN MEAN HIGH WATER SPRING AND THE OUTER LIMIT OF THE TERRITORIAL SEA AT OR ABOUT GR: P20:782-999

Expiry Date: 1 June 2025

Review Date[s]: June 2005 and June 2015

Site Location: OAONUI BEACH TO OUTER LIMIT OF THE TERRITORIAL SEA, OAONUI

Catchment: TASMAN SEA 904.000

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

TRK985224

General conditions

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

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

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

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

Special Conditions

1. THAT the consent holder shall notify the Taranaki Regional Council at least 48 hours prior to undertaking any major maintenance works which could involve disturbance of, or discharge to, the coastal marine area.

2. THAT during any subsequent maintenance works, the consent holder must observe every practicable measure to prevent the discharge of silt and/or debris and/or any other contaminants to, and to minimise the disturbance of, the bed of the coastal marine area.

3. THAT where practicable, the structures licensed by this consent shall be removed and the area reinstated, if and when they are no longer required, to the satisfaction of the General Manager, Taranaki Regional Council.

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 2005 and/or June 2015, for the purpose of ensuring that the conditions adequately deal with the environmental effects arising from the exercise of this consent, which were not foreseen at the time the application was considered and which it was not appropriate to deal with at that time.

Signed at Stratford on 10 March 1998

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:	Shell Todd Oil Services Ltd Private Bag 2035 NEW PLYMOUTH 4342
Decision Date:	16 April 2013
Commencement Date:	16 April 2013

Conditions of Consent

Consent Granted:	To disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber
Expiry Date:	1 June 2029
Review Date(s):	June 2017, June 2023
Site Location:	Kapuni Production Station, 318 Palmer Road, Kapuni
Legal Description:	Lot 1 DP 5227 (Site of structure)
Grid Reference (NZTM)	1701162E-5629698N
Catchment:	Kapuni

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 with section 36 of the Resource Management Act.

Special conditions

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

2. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of sediments or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the riverbed and any adverse effects on water quality.

3. The consent holder shall ensure that the area and volume of stream bed disturbance is restricted to a practicable minimum.

4. No instream works shall take place between 1 May and 31 October inclusive.

5. The exercise of this consent shall not restrict the passage of fish.

6. This consent shall lapse on 30 June 2018, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2017 and/or June 2023 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 16 April 2013

For and on behalf of
Taranaki Regional Council

_____

Chief Executive

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:	Shell Todd Oil Services Limited Private Bag 2035 NEW PLYMOUTH
Consent Granted Date:	13 February 2002

Conditions of Consent

Consent Granted:	To erect, place, use and maintain a concrete ford on the bed of the Kapuni Stream for access purposes at or about GR: Q20:113-915
Expiry Date:	1 June 2023
Review Date(s):	June 2005, June 2011, June 2017
Site Location:	318 Palmer Road, Kapuni
Legal Description:	Pt Lot 1 DP 5227 Lot 1 DP 12628 Blk XVI Kaupokonui SD
Catchment:	Kapuni

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

General conditions

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

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

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

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

Special conditions

1. The initial construction and any further disturbance of parts of the riverbed covered by water and/or any works which may result in downstream discolouration of water shall be undertaken only between 1 November and 30 April, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

2. 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.

3. The structure[s] authorised by this consent shall be constructed generally in accordance with the documentation submitted in support of the application and shall be maintained to ensure the conditions of this consent are met.

4. The consent holder shall adopt the best practicable option to avoid or minimise the discharge of silt or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the riverbed and any adverse effects on water quality.

5. The consent holder shall ensure that the area and volume of riverbed disturbance shall, so far as is practicable, be minimised and any areas which are disturbed shall, so far as is practicable, be reinstated.

6. The structure which is the subject of this consent shall not obstruct fish passage.

7. 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.

8. 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 2005, June 2011, and June 2017, 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.

Signed at Stratford on 13 February 2002

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Appendix II

Biomonitoring reports

To Callum McKenzie; Job Manager
From Bart Jansma; Scientific Officer
Report No BJ257
Doc No 1544826
Date 24 July 2015

Biomonitoring of an unnamed coastal stream (Ngapirau Stream) in relation to waste discharges from the Shell Todd Oil Services Ltd Maui Production Station, December 2014

Introduction

This early summer biological survey of an unnamed coastal stream receiving wastewater from the Maui gas treatment plant at Oaonui was the only survey scheduled for the 2014-2015 monitoring year. The results from surveys performed since the 2001-2002 monitoring year are discussed in reports referenced later in this report.

Methods

Macroinvertebrates were collected from sites 2 and 3, in an unnamed coastal stream (Table 1, Figure 1), on 9 December 2014 by the Taranaki Regional Council. The sampling method employed was the 'streambed-kick' sampling technique, which 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). Site 1 was removed from the monitoring programme in the 2001-2002 monitoring year due to fluctuating flows (a tendency to dry up in summer), which influenced the results obtained from this site.

Table 1 Biomonitoring sites in an unnamed coastal stream related to the Oaonui Production Station

Site No.	Site Code	GPS Reference (NZTM)	Location
2	NPR 000100	E1669554 N5637641	Approximately 500 m downstream of discharges
3	NPR 000190	E1668603 N5637217	Approximately 1600 m downstream of discharges

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

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

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity

scores for certain taxa have been modified in accordance with Taranaki experience. Averaging the scores assigned to the taxa found at a site, and multiplying the average by a scaling factor of 20 produces a Macroinvertebrate Community Index (MCI) value.

The MCI was designed as a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. MCI results can also reflect the effects of warm temperatures, slow current speeds and low dissolved oxygen levels, because the taxa capable of tolerating these conditions generally have low sensitivity scores. Usually more 'sensitive' communities (with higher MCI values) 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, therefore $SQMCI_s$ values range from 1 to 10, while MCI values range from 20 to 200.

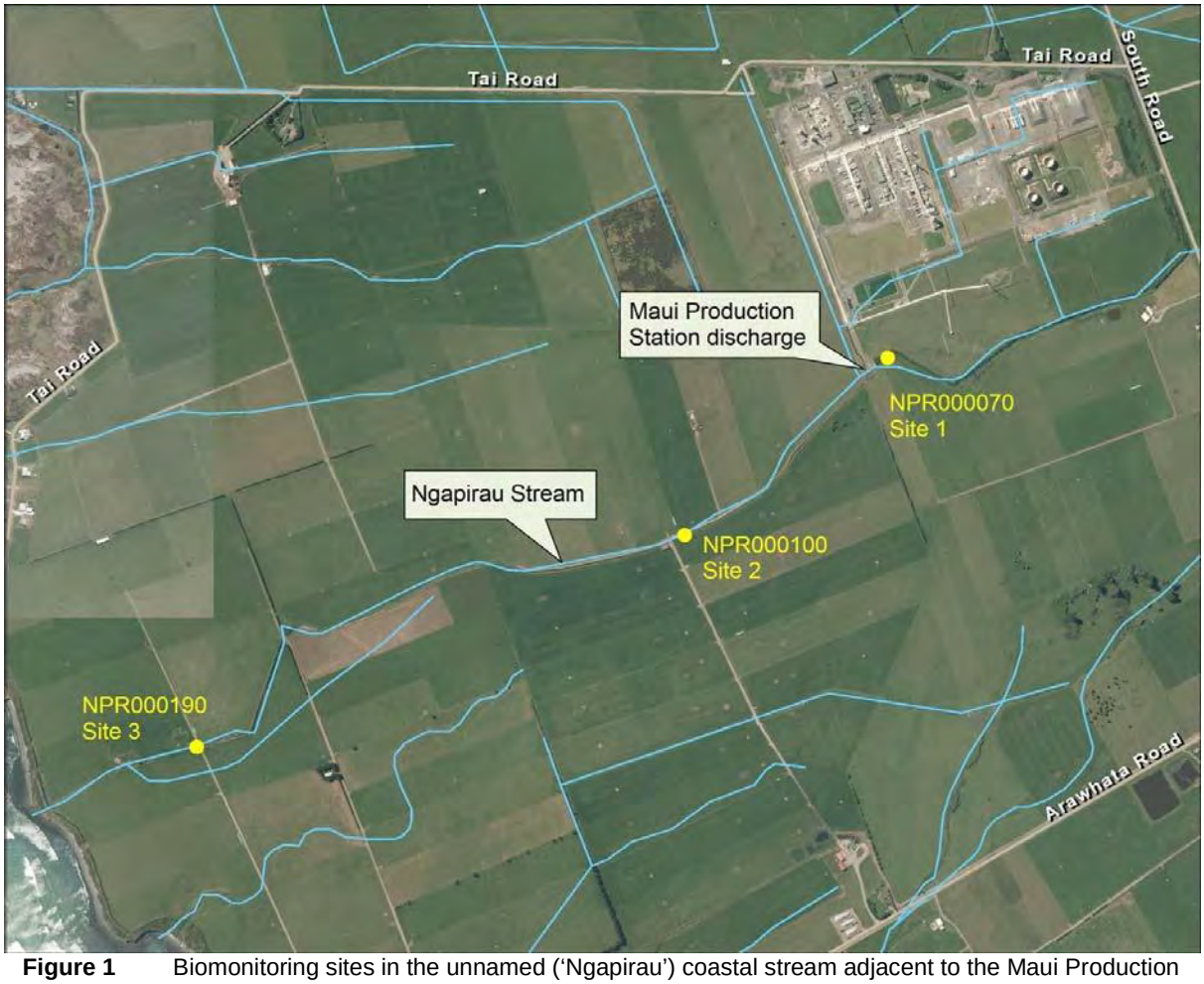

Figure 1 Biomonitoring sites in the unnamed ('Ngapirau') coastal stream adjacent to the Maui Production Station

Results and discussion

At the time of this midday survey, the water temperatures in the stream were 15.2°C at site 2, approximately 500m downstream of the production station and 16.7°C at site 3,

approximately 1,600m downstream of the production station. The moderate and steady stream flow was uncoloured and clear at both sites and followed a moderate recession period, 24 days after the most recent fresh (above 3 times median flow) in the nearby Punehu Stream.

The streambed was comprised mainly of hard clay and cobbles at site 2, with the addition of some silt, sand and gravels. The substrate at site 3 was relatively soft, and was dominated by sand, silt and gravels, although there was also a fair proportion as hard clay. Site 2 had less algae than that noted in the previous survey, with slippery films and patches of filamentous growth observed, compared with extensive patchy algal mats (some in floating mats) and widespread filamentous algae observed in December 2013. Site 3 had a similar algal biomass, with a slippery film and patches of filamentous growth also observed here. Site 2 was completely unshaded whereas site 3 was partially shaded. Unlike the previous survey, macrophyte growth was recorded in the stream at site 3. Discolouration caused by an unauthorised dairy effluent discharge to the stream upstream of the Maui Production Station discharge had been noted on some previous survey occasions but has not been seen to be occurring for at least the last seven surveys. It was noted during sampling that due to how small the stream was, there was limited habitat to sample and as a result the amount of sample collected was smaller than typical.

Microscopic analysis revealed that there were no 'undesirable heterotrophic growths' at either site consistent with the visual absence of such growths, at the time of this early summer survey.

Macroinvertebrate communities

This drain-like stream typically supports macroinvertebrate communities of limited taxonomic richness, with relatively low proportions of 'sensitive' taxa, as reflected by the MCI values. Results from previous surveys are summarised in Table 2, together with current results which are also illustrated in Figure 2.

Table 2 Numbers of taxa and MCI values recorded in previous surveys performed since June 1988 in the unnamed coastal stream receiving wastes from the Maui Production Station at Oaonui, together with current results

Site	N	Numbers of taxa			MCI values			$SQMCI_S$ (N=24)		
		Range	Median	Current survey	Range	Median	Current survey	Range	Median	Current survey
2	44	8-21	15	17	44-75	63	73	1.1-3.7	2.4	4.2
3	33	9-26	16	12	58-74	66	75	1.3-4.6	2.6	4.7

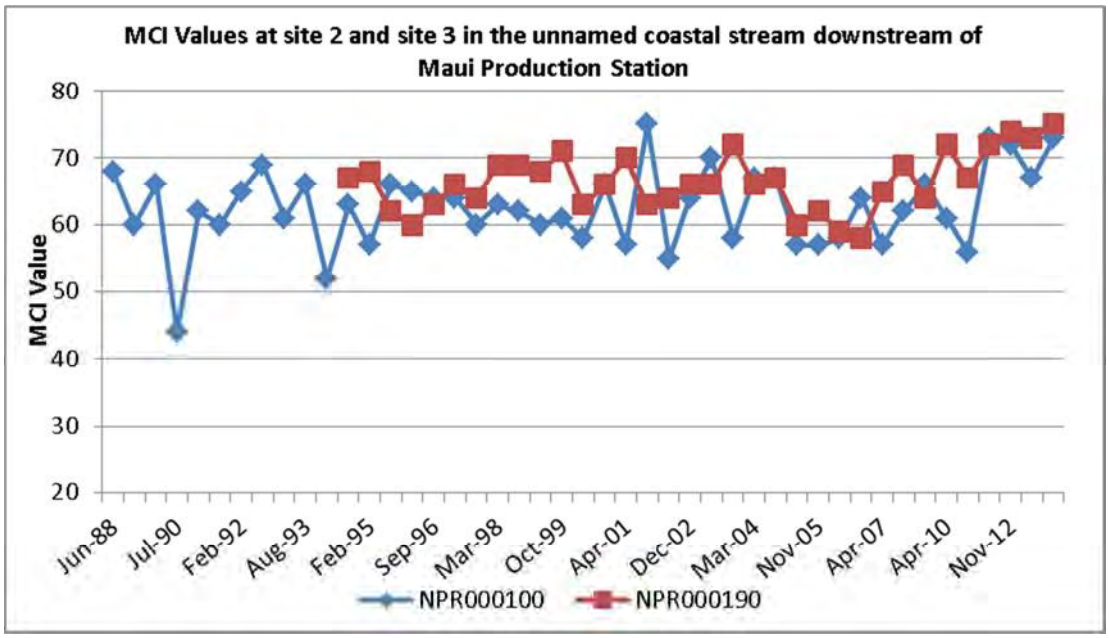

Figure 2 MCI values recorded in the unnamed ('Ngapirau') coastal stream that receives discharges from the Maui Production Station since August 1994

Table 3 Macroinvertebrate fauna of an unnamed coastal stream ('Ngapirau' Stream) in relation to the Maui Production Station, sampled on 9 December 2014

Taxa List	Site Number	MCI score	2	3
	Site Code		NPR000100	NPR000190
	Sample Number		FWB14387	FWB14388
ANNELIDA (WORMS)	Oligochaeta	1	A	C
	Lumbricidae	5	R	C
MOLLUSCA	Lymnaeidae	3	R	-
	Potamopyrgus	4	XA	A
CRUSTACEA	Ostracoda	1	A	A
	Isopoda	5	R	R
	Paracalliope	5	XA	XA
ODONATA (DRAGONFLIES)	*Xanthocnemis*	4	R	-
COLEOPTERA (BEETLES)	Elmidae	6	-	C
TRICHOPTERA (CADDISFLIES)	*Hydrobiosis*	5	C	R
	Oxyethira	2	VA	A
DIPTERA (TRUE FLIES)	*Aphrophila*	5	R	-
	Orthocladiinae	2	R	-
	Polypedilum	3	-	R
	Tanytarsini	3	R	-
	Empididae	3	R	-
	Ephydridae	4	R	-
	Austrosimulium	3	-	C
	Stratiomyidae	5	R	-
ACARINA (MITES)	Acarina	5	R	C
		No of taxa	17	12
		MCI	73	75
		SQMCIs	4.2	4.7
		EPT (taxa)	1	1
		%EPT (taxa)	6	8
'Tolerant' taxa	'Moderately sensitive' taxa		'Highly sensitive' taxa	

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

Site 2

A moderate richness of seventeen taxa was found at site 2 which was two taxa more than the median of previous values recorded at this site (Table 2) and similar to that recorded in the previous survey. The community was dominated by four 'tolerant' taxa, [oligochaete worms, extremely abundant snail (*Potamopyrgus*), ostracod seed shrimps and algal piercing caddisfly (*Oxyethira*)] and one 'moderately sensitive' taxon (extremely abundant *Paracalliope* amphipods).

This site's habitat supported a predominance of 'tolerant' taxa (59% of taxa number), resulting in the 'poor' MCI score of 73 units. This score was ten units higher than the median of all previous scores, and only two units less than the maximum score recorded of the 44 surveys performed at this site to date (Table 2, Figure 2). The extreme abundance of the 'tolerant' snail *Potamopyrgus* was tempered by the extreme abundance of the 'moderately sensitive' amphipod *Paracalliope* resulting in an $SQMCI_S$ score of 4.2 units. Although this indicates that only moderate water quality preceded this survey, this score is significantly higher than the median $SQMCI_S$ score for this site (by 1.8 units), and is the highest $SQMCI_S$ score recorded at this site to date, indicating better than average water quality. In general, the current results are well above average for this site, and not reflective of any impacts caused by the Maui Production Station discharge.

Site 3

A reduced community richness of twelve taxa was found at site 3, four taxa fewer than to the median richness for this site, and five less than that recorded upstream (Table 2). The community was dominated by three 'tolerant' taxa [snail (*Potamopyrgus*), ostracod seed shrimp and algal piercing caddisfly (*Oxyethira*)], and one 'sensitive' taxon [amphipods (*Paracalliope*)].

This softer-bottomed, nutrient enriched habitat again supported a lower than typical proportion of 'tolerant' taxa (50% of taxa number), resulting in the MCI score of 75 units. Although this score was not significantly different to the median MCI score for this site, it was one unit higher than the previously highest MCI score recorded at this site to date, and two units higher than recorded at site 2 upstream (Figure 2, Table 2). The extreme abundance of the 'moderately sensitive' amphipod *Paracalliope*, resulted in an improvement in $SQMCI_S$ score (4.7 units), from that recorded at site 2 upstream. This score is significantly higher than the median for this site, and continues the above average trend observed in the previous three surveys. The current result is the highest $SQMCI_S$ recorded at this site to date, a similar result to that recorded at site 2 upstream. Community compositions were relatively dissimilar at the two sites with 45% of the total taxa (20) found in the reach of the stream surveyed, present at both sites.

Conclusions

This early summer 2014 biomonitoring survey of a small coastal stream that receives wastewater (including treated sewage) from the Oaonui Production Station was undertaken during a relatively normal early summer period, with the stream being in recession for 24 days prior to this survey. Results indicated that the wastewater discharge had not had an impact on the macroinvertebrate communities of the stream, although the poor physical habitat conditions of this drain-like watercourse are not suitable for most 'sensitive' invertebrate taxa, and this may often limit the degree of impact of the discharges on the biological communities. The absence of 'heterotrophic growths' at both sites also indicated a lack of impacts of the discharge on the stream, with only subtle improvement in the quality

of the macroinvertebrate communities with distance downstream. The MCI values were very similar at sites 2 and 3, although the $SQMCI_S$ score improved at site 3, and this is considered to be reflection of slightly improved habitat at this site, primarily through improved shading and reduced algal growth, although overall, the scores at both sites were reflective of the poor habitats over the summer period. In general, the current results are well above average for this site, and not reflective of any impacts caused by the Maui Production Station discharge.

Summary

The Council's standard 'streambed-kick' technique was used at two established sites to collect streambed macroinvertebrates from an unnamed coastal stream on 9 December 2014. Samples were sorted and identified to provide number of taxa (richness) and MCI and $SQMCI_s$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to 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 between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

This early summer macroinvertebrate survey indicated that the discharge of treated wastes from the Maui Production Station site had not had any significant detrimental effect on the macroinvertebrate communities of the stream in comparison with the historical condition of these communities to date. The macroinvertebrate communities found at two sites downstream of the site discharge reflected the poor habitat present during a period of moderate flow conditions in summer, but also indicated that the water quality that preceded this survey was well above average.

The macroinvertebrate communities of the stream contained few 'sensitive' taxa. However, one 'sensitive' taxon was found in abundance at both sites, as were three 'tolerant' taxa. At both sites, taxonomic richness (number of taxa) was similar to the long term median, while the MCI scores were similar to (site 2) or higher than (site 3) the previously recorded maximum score for these sites. In addition, the $SQMCI_S$ scores recorded at both sites were the highest recorded to date for these sites. At site 3 there was a continuation of the improved $SQMCI_S$ results seen in recent surveys.

The MCI and $SQMCI_S$ scores indicated that the stream communities were of well above average but still poor 'health', although probably typical of communities in drain-like habitats in early summer.

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Working Group Report No. 1. Prepared for the Ministry for the Environment. Sustainable Management Fund Project No. 5103. 57p.

To Job Manager, C MacKenzie
From Freshwater Biologist, B Jansma
File 03-02-005-13/01; 0633;
Report No BJ261
Document No 1547965
Date 30 July 2015

Biomonitoring of the Kapuni Stream in relation to the Kapuni Production Station of Shell Todd Oil Services Ltd, February 2015

Introduction

This biological survey of two sites in the Kapuni Stream was conducted to monitor effects related to the discharge of stormwater from the Kapuni Production Station. The survey fulfilled the biological monitoring requirements for this industry in the 2014-2015 monitoring year. Results from surveys performed since the 2000-2001 monitoring year are discussed in reports referenced in this report.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from two established sites in the Kapuni Stream related to the Kapuni Production Station stormwater discharge (Table 1, Figure 1) on 19 February 2015. This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

Table 1 Biomonitoring sites in the Kapuni Stream, related to the Kapuni Production Station

Site No.	Site Code	Map Reference	Location
2	KPN000285	Q20: 112914	Upstream of Kapuni Production Station
2b	KPN000289	Q20: 111914	50 metres downstream of Production Station discharge

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

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

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

Figure 1 Biomonitoring sites in the Kapuni Stream related to the Kapuni Production Station

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 a clear, uncoloured and very low flow in the Kapuni Stream and the water temperature ranged from 18.7°C at site 2 to 19.3°C at site 2b. The bed of the stream was predominantly comprised of cobble and gravel with some boulder also recorded. Thin films of periphyton were present at both sites, while site 2b also supported some patches of filamentous algae. Both sites were unshaded. This survey was performed during late summer, following a long dry period, and followed a very long low

flow period, 60 and 153 days after freshes in excess of three times and seven times median flows respectively.

Macroinvertebrate communities

Previous biological surveys in the Kapuni Stream have generally recorded macroinvertebrate communities that would be expected in clean, mid reaches of Taranaki ring plain streams. The communities have had moderate to relatively good numbers of taxa and relatively high MCI values. The results of previous surveys are summarised in Table 2 together with current results and are illustrated in Figure 2 and Figure 3. The results for site 2b also include results from the long term monitoring programme performed by Cawthron Institute/Stark Environmental for other consented discharges. The full macroinvertebrate results of this survey are presented in Table 3.

Table 2 Numbers of taxa and MCI values recorded in previous surveys in the Kapuni Stream in relation to the Kapuni Production Station since May 1987, together with current results.

Site no.	Site	Number of previous surveys	Numbers of taxa			MCI values		
			Median	Range	Current Survey	Median	Range	Current Survey
2	KPN000285	24	23	18-33	27	106	94-132	110
2b	KPN000289	108	18	9-35	30	115	90-145	105

Site 2 Upstream of Kapuni Production Station

A moderate richness of twenty-seven taxa was recorded at site 2, upstream of the Kapuni Production Station; three taxa more than the median found by 24 previous surveys (Table 2), typical of most previous surveys (Figure 2). Six 'highly sensitive' taxa were present, with the community characterised by two of these 'highly sensitive' taxa (mayfly (*Deleatidium*) and caddisfly (*Beraeoptera)*); as well as seven 'moderately sensitive' taxa (abundant mayfly (*Austroclima* and *Coloburiscus*), elmid beetles, dobson fly larvae *(Archichauliodes*), free living caddis (*Hydrobiosis*), stony cased caddis (*Pycnocentrodes*) and *Aphrophila* cranefly); and one 'tolerant' taxon (net-building caddisfly (*Hydropsyche-Aoteapsyche*)).

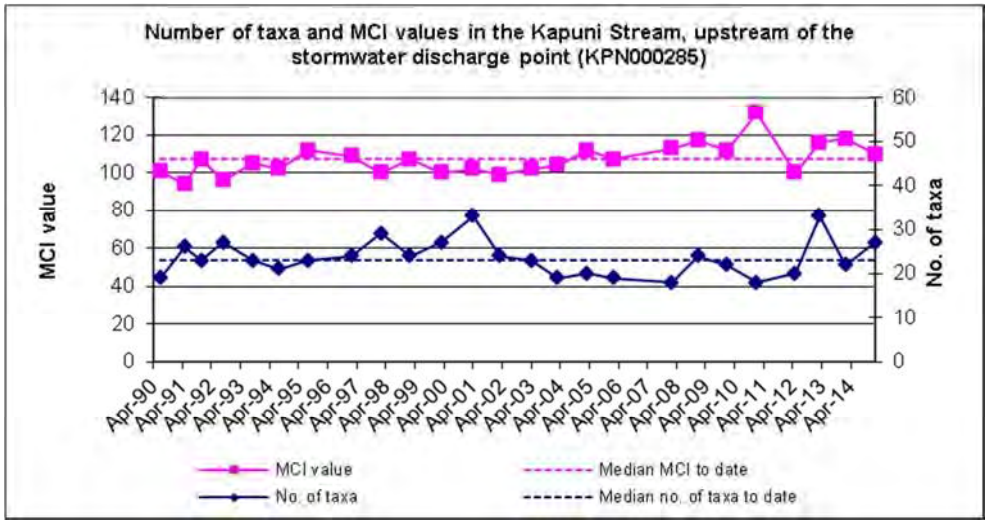

Figure 2 Number of taxa and MCI values in the Kapuni Stream upstream of STOS discharge

Table 3 Macroinvertebrate fauna of the Kapuni River re STOS Kapuni Production Station sampled on 19 February 2015

Taxa List	Site Number	MCI score	2	2b
	Site Code		KPN000285	KPN000289
	Sample Number		FWB15161	FWB15162
NEMERTEA	Nemertea	3	-	R
ANNELIDA (WORMS)	Oligochaeta	1	C	R
MOLLUSCA	*Potamopyrgus*	4	C	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	A	A
	Coloburiscus	7	VA	VA
	Deleatidium	8	XA	XA
	Nesameletus	9	C	R
	Zephlebia group	7	-	R
PLECOPTERA (STONEFLIES)	*Megaleptoperla*	9	R	R
COLEOPTERA (BEETLES)	Elmidae	6	XA	VA
	Hydraenidae	8	R	R
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	VA	A
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	VA	VA
	Costachorema	7	R	C
	Hydrobiosis	5	A	VA
	Neurochorema	6	R	R
	Psilochorema	6	R	-
	Beraeoptera	8	VA	C
	Olinga	9	C	C
	Pycnocentrodes	5	A	C
DIPTERA (TRUE FLIES)	*Aphrophila*	5	VA	A
	Eriopterini	5	C	R
	Chironomus	1	-	R
	Maoridiamesa	3	-	C
	Orthocladiinae	2	C	C
	Polypedilum	3	C	C
	Tanypodinae	5	-	R
	Tanytarsini	3	R	C
	Ephydridae	4	-	C
	Austrosimulium	3	R	R
	Tabanidae	3	R	R
	Tanyderidae	4	R	-
ACARINA (MITES)	Acarina	5	R	-
		No of taxa	27	30
		MCI	110	105
		SQMCIs	6.6	6.7
		EPT (taxa)	13	13
		%EPT (taxa)	48	43
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa		

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

The moderate proportion of 'sensitive' taxa (66% of taxa numbers) comprising the community was reflected in the MCI score of 110 units, which was slightly lower than that recorded in the previous survey, but four units higher than the median of all past survey scores (Figure 2 and Table 2).This is similar to the trend observed from 2005 to 2011, when this site recorded MCI scores well above the median score. In addition, the score was higher than the predicted score for this site (99 units), 18.1 km downstream of the National Park

boundary (Stark and Fowles, 2009). Overall, this is a higher than expected MCI score, considering the extended period of low flow that preceded this survey. A reasonable $SQMCI_S$ (6.6 units) reflected the relative dominance of 'highly sensitive' taxa in the community at this site.

Site 2b 50 m downstream of Kapuni Production Station discharge

A slightly higher richness (30 taxa) was recorded at site 2b, a further 300m downstream and 50 m below the production station stormwater discharge. This richness was twelve taxa above the median found by the long term record of 108 previous surveys at this site but eight more than that recorded by the previous (Council) survey at this site (Table 2 and Figure 3). There were six 'highly sensitive' taxa present, indicative of good preceding physicochemical water quality. The community was characterised by one 'highly sensitive' taxon (extremely abundant mayfly (*Deleatidium*)); six 'moderately sensitive' taxa (mayfly (*Austroclima* and *Coloburiscus*), elmid beetles, dobson fly larvae (*Archichauliodes*), free living caddisfly (*Hydrobiosis*), and cranefly (*Aphrophila*)) and one 'tolerant' taxon (abundant net-spinning caddisfly (*Hydropsyche-Aoteapsyche*)). All of these abundant taxa were also recorded in abundance at site 2b.

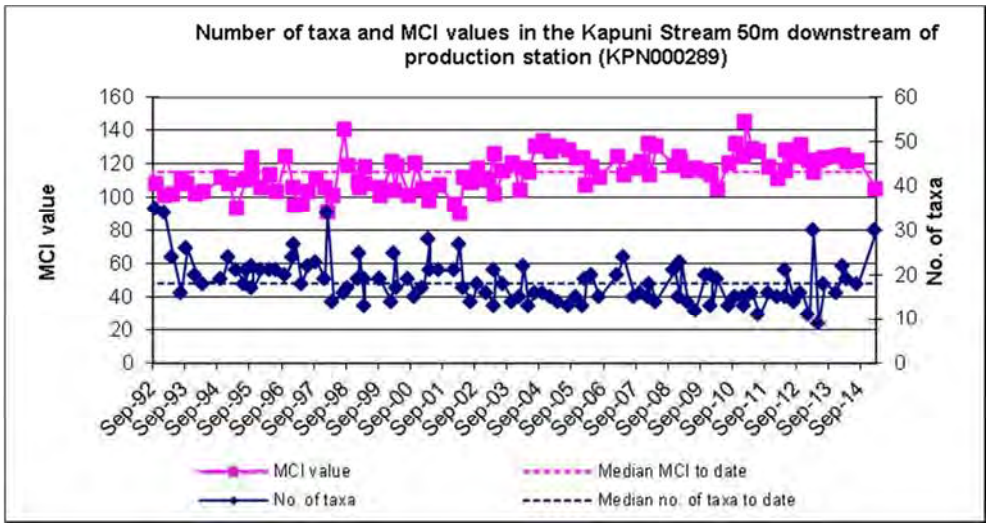

Figure 3 Number of taxa and MCI values in the Kapuni Stream 50m d/s of the Kapuni production station discharge.

There were only three significant changes in individual taxa abundance recorded between sites. Generally, the dominant taxa at the two sites were very similar, which were reflected in the $SQMCI_S$ scores, which were not statistically significantly different to each other (Table 2 and Table 3) (Stark, 1998). Similarly, the MCI score (105) was only five units less than recorded at site 2b (Stark, 1998), which was not a statistically significant difference, but ten units lower than the median for this site. This is the lowest score recorded since March 2010 (Figure 3), and reflects the long period of low flows that preceded this survey. The similarity in index scores with that recorded upstream reflects the similar habitat present at both sites, with the lack of periphyton being an important factor. When gravel and cobble substrate supports little periphyton, the habitat is more suited to 'sensitive' taxa such as stoneflies, and was less suited to snails or midge larvae.

Summary and Conclusions

The Council's standard 'kick-net' sampling technique was used at two sites to collect streambed macroinvertebrates from the Kapuni Stream to assess whether stormwater

discharges from the STOS Kapuni Production Station have had any adverse effects on the macroinvertebrate communities of this stream. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

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

This February 2015 biological survey of the Kapuni Stream performed under very low summer flow conditions indicated that stormwater discharges from the Kapuni Production Station had not had any recent significant impacts on the macroinvertebrate communities of the stream. These communities had moderate community richnesses, although higher than that recorded in the previous survey. Similar characteristic taxa were recorded in the communities at both sites, resulting in similar $SQMCI_S$ scores. The MCI scores were also similar, with the score recorded at site 2b only five units less than that recorded at site 2, not a statistically significantly result (Stark, 1998). However, the score recorded at site 2b was ten units lower than the median for this site, and this is considered a reflection of the extended period of low flow that preceded this survey, being 153 days after the last flood that exceeded a flow of seven times median. The similarity in MCI scores between sites reflects the similar habitat present at both sites, with the lack of periphyton being an important factor. When gravel and cobble substrate supports little periphyton, the habitat is more suited to 'sensitive' taxa such as stoneflies, and was less suited to snails or midge larvae and was indicative of the absence of any recent impacts of any stormwater discharges from the Kapuni Production Station.

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Appendix III

Air monitoring reports

Memorandum

To Job Manager, Callum MacKenzie
From Scientific Officer - Air Quality, Brian Cheyne
File 1660528
Date March 24, 2016

Ambient Gas (PM10, NOx, CO and LEL) Monitoring at Kapuni Production Stations during 2014-2015 monitoring year

Introduction

In January and June 2015 as part of the compliance monitoring programme for the Kapuni production station, a survey of ambient air quality sampling was carried out by the Taranaki Regional Council (the Council) in the vicinity of the plant. The main objectives were to measure:

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

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

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

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 76 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases).

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

Figure 1 Air monitoring sites at Kapuni production station (2014-2015)

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

The consent 4054-5 covering air discharges from the Kapuni Production Station does not have specific limits related to particular gases. The Ministry for the Environment's air quality guidelines for carbon monoxide (which are based on health protection) are 30mg/m^3 averaged over a 1 hour exposure and 10mg/m^3 averaged over an 8 hour exposure period. The maximum concentration of carbon monoxide found during the monitoring run was 12.9 mg/m^3 with average concentration for the entire dataset was only 0.23 mg/m^3 which comply with the Ministry for the Environment's air quality guidelines. This is in line with the pattern found in previous years.

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

Period (from-to)		25/06/2015 11:27 to 28/06/2015 18:05
Max	CO(ppm)	11.3
	LEL(%)	0.20
Mean	CO(ppm)	0.20
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

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

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

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

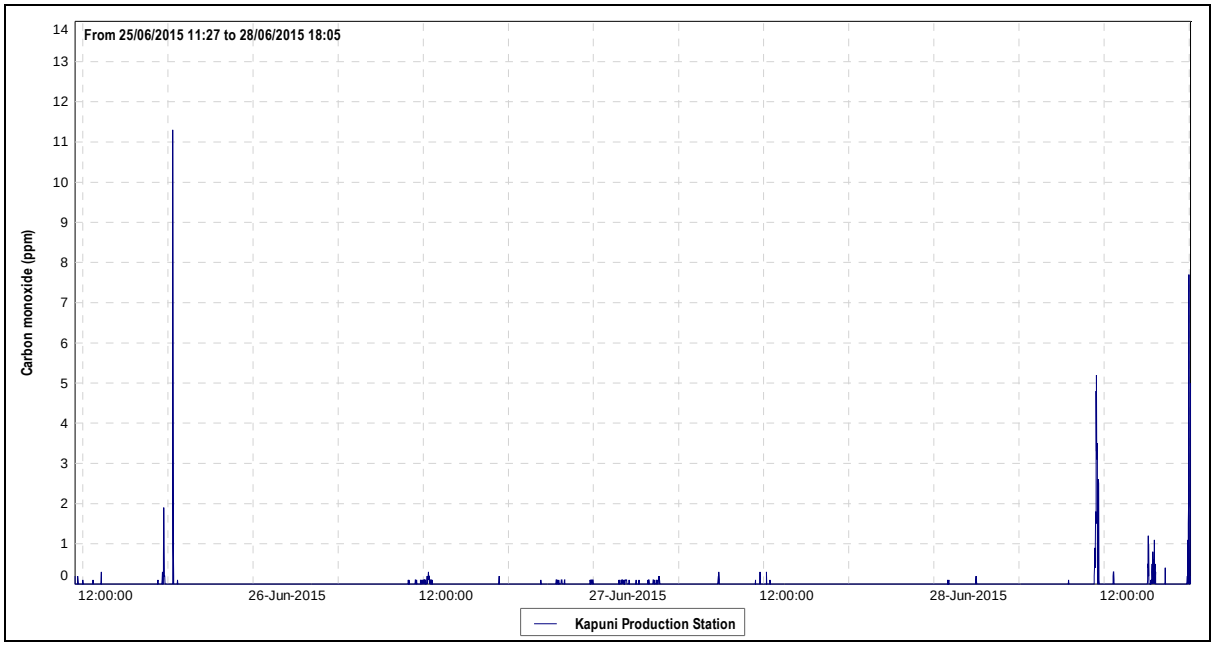

Figure 2 Graph of ambient CO levels in the vicinity of the Kapuni Production Station

PM10

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

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

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

During the reporting period, a "DustTrak" PM10 monitor was deployed on one occasion in the vicinity of the Kapuni production station. The deployment lasted approximately 53 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM10 concentrations. The location of the "DustTrak" monitor during the sampling run is shown in Figure 1.

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

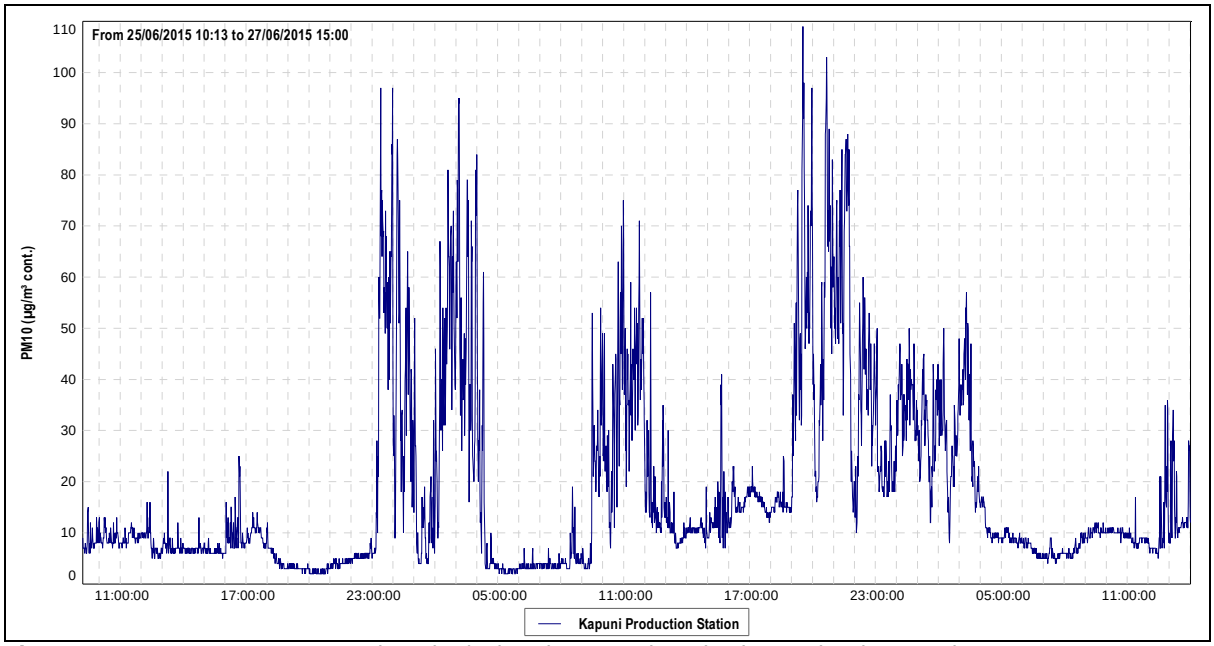

Figure 2 PM10 concentrations (µg/m³) at the Kapuni production station (2014-15)

	(53 hours) (25-27/06/2015)	
24 hr. set	Day 1	Day 2
Daily average	13.15 µg/m³	21.46 µg/m³
NES	50µg/m³	

Table 1 Daily mean of PM10 results during two days' monitoring at Kapuni production station

During the 53-hour run, from 25th of June to 27th of June 2015, the average recorded PM_{10} concentration for the first 24 hour period was 13.15µg/m³ and 21.46µg/m³ for the second 24 hour period. These daily means equate to 26.3% and 42.92%, respectively, of the 50 µg/m³ value that is set by the National Environmental Standard.

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

Nitrogen oxides (NOx)

From 2014 onwards, the Council has implemented a coordinated region-wide compliance monitoring programme to measure NOx. The programme involves deploying all measuring devices at 28 NOx monitoring sites (including two sites in the vicinity of the Kapuni production station) on the same day, with retrieval three weeks later. This approach assists the Council in further evaluating the effects of local and regional emission sources and ambient air quality in the region.

The complete report covering region-wide NOx monitoring is attached in the Appendix to this memorandum and can also be found at the following link:
http://www.trc.govt.nz/assets/Publications/state-of-the-environment-monitoring/environmental-monitoring-technical-reports/1541533.pdf

The consent 4054-5 covering air discharges from the Kapuni Production Station does not have specific limits related to particular gases. The Ministry for the Environment's air quality guidelines for nitrogen dioxide are 100 µg/m³ for a 24 hour average or 200 µg/m³ for a one hour average exposure.

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

The calculated 1-hour and 24-hour theoretical maximum NOx concentrations found at the Kapuni production station during the year under review equates to 23.3µg/m³ and 12.3 µg/m³ respectively. The results show that the ambient ground level concentration of NO_x is well below the limits set out by the Ministry for the Environment's air quality guidelines.

Memorandum

To Job Manager, Callum MacKenzie
From Scientific Officer - Air Quality, Brian Cheyne
File 1659080
Date March 22, 2016

Ambient Gas (PM10, NOx, CO and LEL) Monitoring at Maui Production Stations during 2014-2015 monitoring year

Introduction

In November 2014 and January 2015 as part of the compliance monitoring programme for the Maui production station, a survey of ambient air quality sampling was carried out by the Taranaki Regional Council (the Council) in the vicinity of the plant. The main objectives were to measure:

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

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

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

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 43 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases).

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

Figure 1 Air monitoring sites at Maui production station (2014-2015)

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

The consents covering air discharges from the Maui production station have specific limits related to particular gases. Special condition 9 of consent 4052-4set a limit on the carbon monoxide concentration at or beyond the production station's boundary. The limit is expressed as 10 mg/m³ for an eight hour average or 30 mg/m³ for a one hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was 16.1 mg/m³ with average concentration for the entire dataset was only 0.1 mg/m³ which comply with consent conditions. This is in line with the pattern found in previous years.

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

Period (from-to)		24/11/2014 13:03 to 26/11/2014 08:01
Max	CO(ppm)	14.1
	LEL(%)	0.20
Mean	CO(ppm)	0.11
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

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

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

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

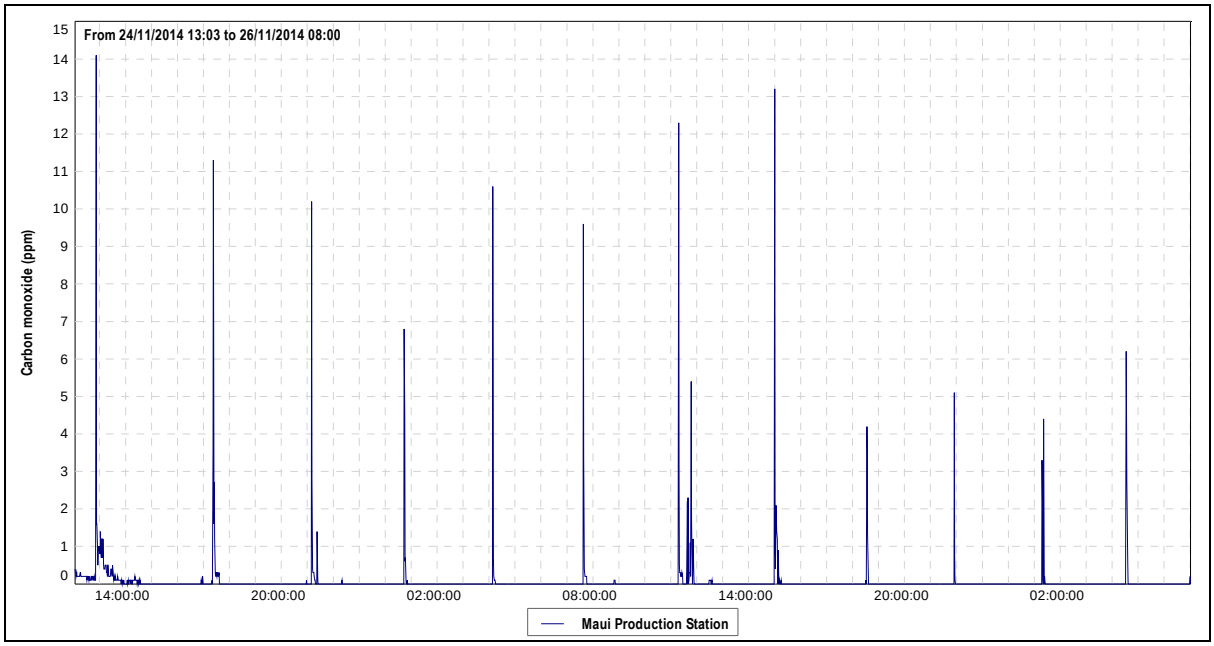

Figure 2 Graph of ambient CO levels in the vicinity of the Maui Production Station

PM10

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

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

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

During the reporting period, a "DustTrak" PM10 monitor was deployed on one occasion in the vicinity of the Maui production station. The deployment lasted approximately 43 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM10 concentrations. The location of the "DustTrak" monitor during the sampling run is shown in Figure 1.

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

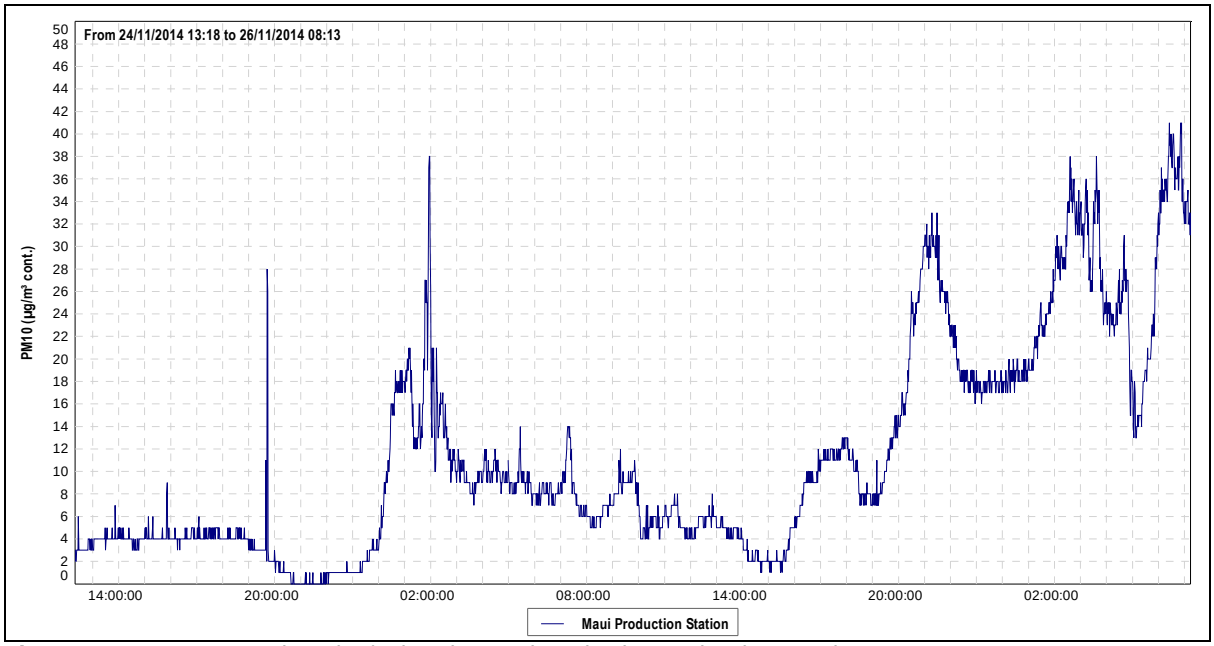

Figure 2 PM10 concentrations (µg/m³) at the Maui production station (2014-15)

	(43 hours) (24-26/11/2014)	
24 hr. set	Day 1	Day 2
Daily average	11.26 µg/m³	15.18 µg/m³
NES	50µg/m³	

Table 1 Daily mean of PM10 results during two days' monitoring at Maui production station

During the 43-hour run, from 24th to 26th of November 2014, the average recorded PM_{10} concentration for the first 24 hour period was 11.26µg/m³ and 15.18µg/m³ for the second 24 hour period. These daily means equate to 22.5% and 30.4%, respectively, of the 50 µg/m³ value that is set by the National Environmental Standard.

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

Nitrogen oxides (NOx)

From 2014 onwards, the Council has implemented a coordinated region-wide compliance monitoring programme to measure NOx. The programme involves deploying all measuring devices at 28 NOx monitoring sites (including two sites in the vicinity of the Maui production station) on the same day, with retrieval three weeks later. This approach assists the Council in further evaluating the effects of local and regional emission sources and ambient air quality in the region.

The complete report covering region-wide NOx monitoring is attached in the Appendix to this memorandum and can also be found at the following link:
http://www.trc.govt.nz/assets/Publications/state-of-the-environment-monitoring/environmental-monitoring-technical-reports/1541533.pdf

The consents covering air discharges from the Maui production station have specific limits related to particular gases. Special condition 8 of consent 4052-4 set a limit on the nitrogen dioxide concentration at or beyond the production station's boundary. The limit is expressed as 100 µg/m³ for a 24 hour average or 200 µg/m³ for a one hour average exposure.

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

The calculated 1-hour and 24-hour theoretical maximum NOx concentrations found at the Maui production station during the year under review equates to 6.45µg/m³ and 3.4 µg/m³ respectively. The results show that the ambient ground level concentration of NO_x is well below the limits set out by consent 4052-4.

Memorandum

To	Fiza Hafiz, Scientific Officer – State of the Environment Job Managers - Callum MacKenzie, Emily Roberts, James Kitto
From	Brian Cheyne, Scientific Officer – Air Quality
File	Frodo # 1545133
Date	29 July 2015

Monitoring of nitrogen oxides (NOx) levels in Taranaki near the NOx emitting sites, year 2014-2015

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

Nitrogen oxides

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

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

Environmental and health effects of nitrogen oxides

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

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

National environmental standards and guidelines

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

In any 1-hour period, the average concentration of nitrogen dioxide in the air should not be more than 200 $\mu g/m^3$.

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

In any 24-hour period, the average concentration of nitrogen dioxide in the air should not be more than 100 $\mu g/m^3$.

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

Measurement of nitrogen oxides

The Taranaki Regional Council has been monitoring nitrogen oxides (NOx) in the Taranaki region since 1993 using passive absorption discs. Research to date indicates that this is an accurate method, with benefits of simplicity of use and relatively low cost. To date 527 samplers of nitrogen oxides have been collected in Taranaki region. Discs are sent to EUROFINS ELS Ltd. Lower Hutt for analysis. Passive absorption discs are placed at the nominated sites. The gases diffuse into the discs and any target gases (nitrogen dioxide or others) are captured.

In the 2014-15 year, passive absorption discs were placed on one occasion at twenty eight sites, staked about two metres off the ground for a period of 21 days, for the purpose of Compliance Monitoring and SEM studies.

Conversion of exposure result to standardised exposure time period

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

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

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

Results

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

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

	Survey at	Site code	NOx(µg/m³) Lab. results	NOx 1/hr (µg/m³) Theoretical max.	NOx 24/hr (µg/m³) Theoretical max.
Petrochemical	McKee PS	AIR007901	4.5	15.6	8.3
		AIR007902	8.8	30.5	16.2
	Turangi PS	AIR007922	2.9	10.1	5.3
		AIR007824	3.5	12.1	6.4
	Kaimiro PS	AIR007817	1.8	6.2	3.3
		AIR007818	4.7	16.3	8.6
	Sidewinder PS	AIR007831	1.1	3.8	2.0
		AIR007832	0.8	2.8	1.2
	Maui PS	AIR008201	1.6	5.6	2.9
		AIR008214	2.1	7.3	3.9
	Kupe PS	AIR007827	Lost	N/A*	N/A*
		AIR007830	2.3	8.0	4.2
	Kapuni PS	AIR003410	5.5	19.1	10.1
		AIR003411	7.9	27.4	14.5
	Cheal PS	AIR007841	5.7	19.8	10.5
		AIR007842	5.8	20.1	10.7
	Waihapa PS	AIR007815	1.8	6.2	3.3
		AIR007816	0.5	1.7	0.9
	Ballance AUP	AIR003401	7.2	25.0	13.2
		AIR003404	6.0	21.0	11.0
Dairy factory	Fonterra	AIR002410	3.2	11.1	5.9
		AIR002711	6.8	23.6	12.5
		AIR002412	4.7	16.3	8.6
		AIR002413	3.2	11.1	5.9
SEM	NPGHS	AIR000012(NW)	7.5	26.0	13.8
		AIR000012(NE)	5.4	18.7	9.9
		AIR000012(SW)	6.2	21.5	11.4
		AIR000012(SE)	8.2	28.5	15.1
National Environmental Standard (NES) and MfE guideline				**200 (NES)**	**100 (guideline)**

*no results

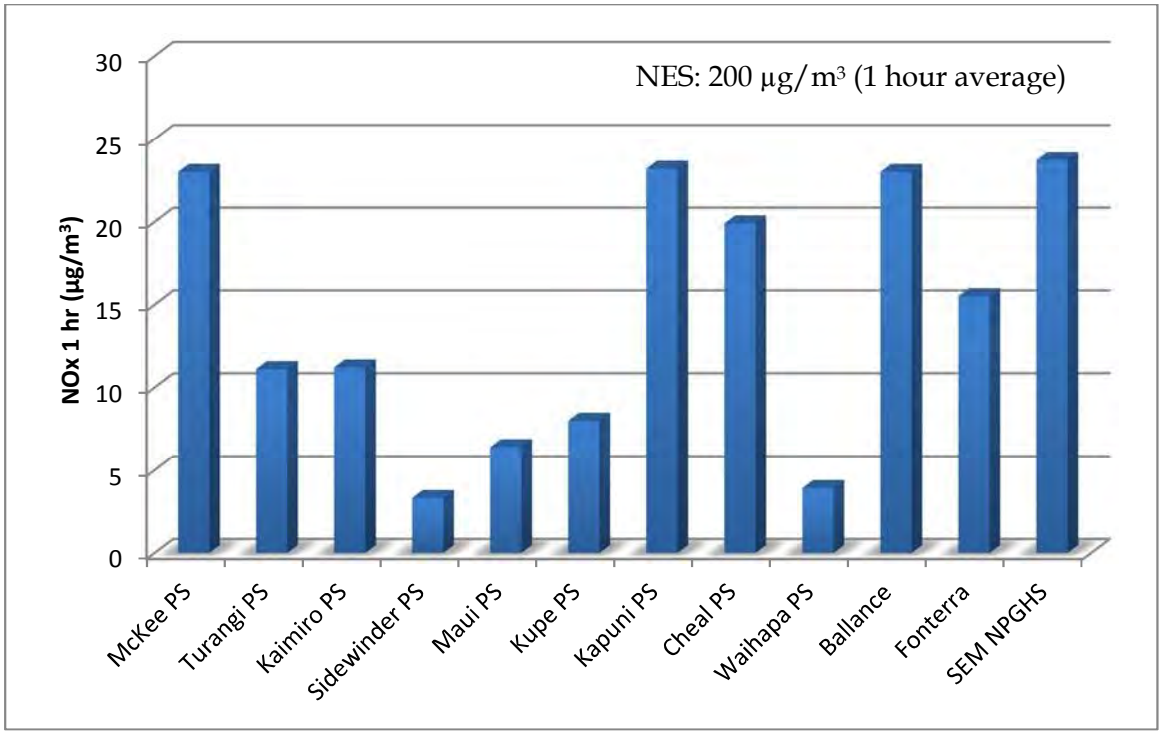

Figure 2 Average NOx levels at 12 surveyed locations throughout the region (year 2014-2015).

Discussion

The calculated 1-hour and 24-hour theoretical maximum concentrations (using a power law exponent of 0.2) ranged from 1.7 µg/m³ to 30.5 µg/m³ and 0.9 µg/m³ to 16.2 µg/m³ respectively. The highest results were obtained from the NOx emitting sites at four different locations:

1. In New Plymouth's urban area near a busy traffic intersection and next to the heavy road realignment works.
2. Around the Fonterra's Whareroa co-generation plant.
3. In Kapuni heavy industrial area around the STOS production station and Ballance ammonia/urea plant.
4. And from the sites at McKee production station and power generation plant.

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

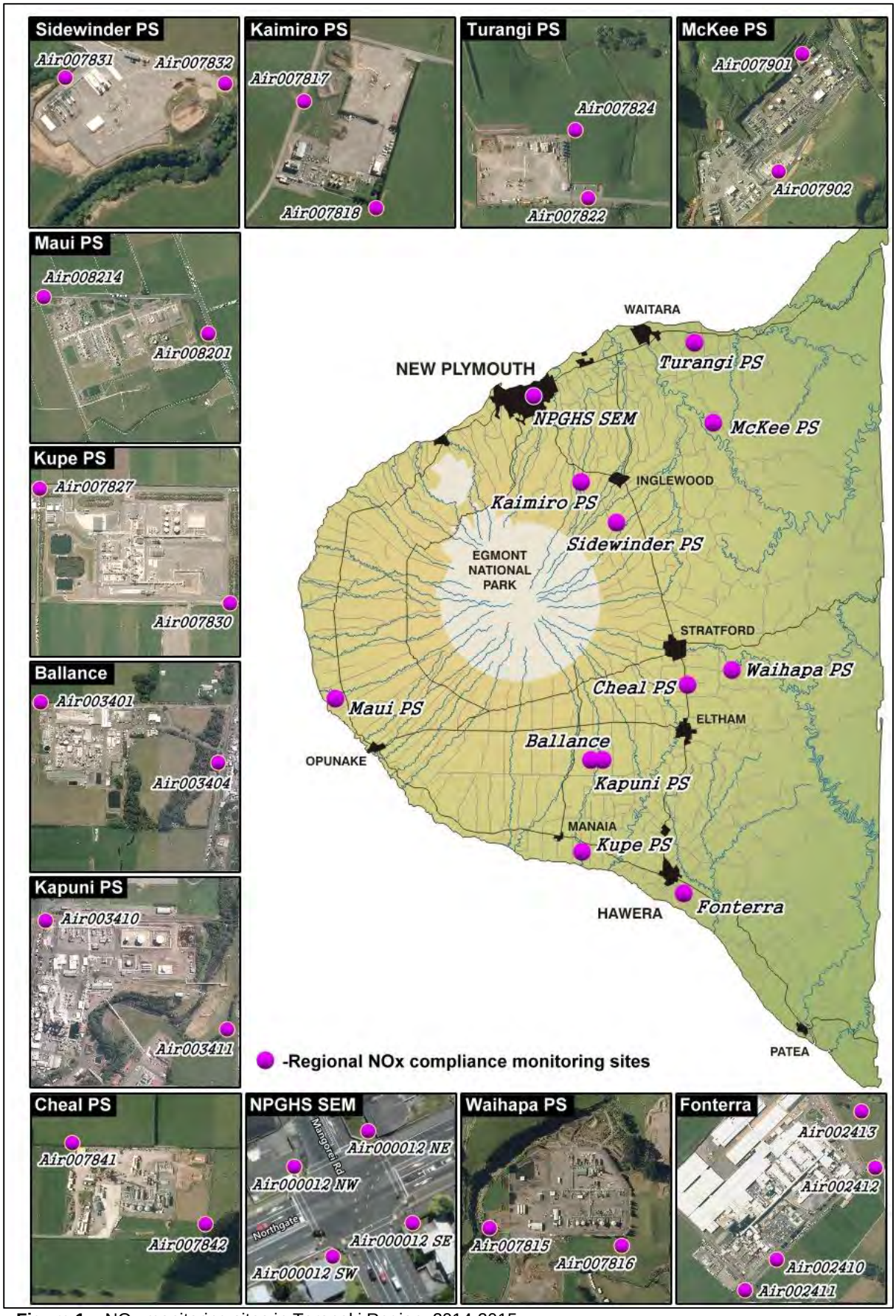

Figure 1 NOx monitoring sites in Taranaki Region, 2014-2015

Ministry for the Environment environmental performance indicator

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

Table 2 Environmental Performance Indicator air quality categories

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

Table 3 Categorisation of results

National Environmental Standard for NO2 = 200 µg/m³- 1 hour average.		
Category	**Measured values**	
Excellent	<10% of the NES, (0-20µg/m³)	**18** (67%)
Good	10-33% of the NES, (20-66µg/m³)	**9** (33 %)
Acceptable	33-66% of the NES, (66-132 µg/m³)	**0** (0%)
Alert	66-100% of the NES, (132-200 µg/m³)	**0** (0%)
Total number of samples		**27** (100%)

Conclusion

The monitoring showed that 67% of the 1-hour average results fell into Ministry's 'excellent' categories and 33% of the results lay within Ministry's 'good' category. No results ever entered the 'acceptable' or 'alert' categories, i.e., no results ever exceeded the National Environmental Standard of 200µg/m³.

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