Cheal Petroleum Ltd
Cheal Production Station
Monitoring Programme
Annual Report
2016-2017

Technical Report 2017-46

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Executive summary

Cheal Petroleum Ltd (the Company), a subsidiary of TAG Oil New Zealand Ltd, operates a petrochemical production station located on Mountain Road at Ngaere, in the Waingongoro catchment. The Cheal Production Station processes oil and gas from the Cheal group of wellsites. This report for the period July 2016 to June 2017 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

The Company holds three resource consents in relation to the Cheal Production Station, which includes a total of 42 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to take and use groundwater for water flooding purposes, one consent to discharge stormwater and treated waste water onto land in circumstances where it may subsequently enter an unnamed tributary of the Mangawharawhara Stream, and one consent to discharge emissions related to production activities into the air at the site.

During the monitoring period, Cheal Petroleum Ltd demonstrated an overall high level of environmental performance.

The Council's monitoring programme for the year under review included seven inspections, six water samples collected for physicochemical analysis, and two ambient air quality analyses.

Stormwater system inspections showed that discharges from the sites complied with consent conditions. Receiving water inspections and sampling showed that the discharges were not causing any adverse effects on the tributary of the Mangawharawhara Stream at the time of monitoring.

There were no adverse effects on the environment found as a result of the exercise of the air discharge consent. Ambient air quality monitoring at the site showed that levels of carbon monoxide, combustible gases, PM_{10} particulates and nitrogen oxides were all below levels of concern at the time of sampling. No offensive or objectionable odours were detected beyond the boundary during inspections, and there were no complaints in relation to air emissions from the site.

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

For reference, in the 2016-2017 year, 74% 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 21% demonstrated a good level of environmental performance and compliance with their consents.

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

This report includes recommendations for the 2017-2018 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 for the period July 2016 to June 2017 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Cheal Petroleum Ltd (the Company). The Company operates a petrochemical production station situated on Mountain Road at Ngaere, in the Waingongoro catchment.

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

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

1.1.2 Structure of this report

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

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

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

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

Section 4 presents recommendations to be implemented in the 2017-2018 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;

b. physical effects on the locality, including landscape, amenity and visual effects;

c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;

d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and

e. risks to the neighbourhood or environment.

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

1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

Environmental Performance

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

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

For example:

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

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

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

Administrative performance

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

Good: Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

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

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

For reference, in the 2016-2017 year, 74% 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 21% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Process description

The Cheal-A wellsite was first established on Mountain Road at Ngaere by NZOG Services Ltd in 1995. Austral Pacific developed the neighbouring Cheal-B wellsite in July 2006 and started construction of the Cheal Production Station adjacent to the Cheal-A wellsite in late 2006. The production station was commissioned in August 2007 and the tie-in to the Cheal-B pipeline was complete in December 2007.

The owners of the Cheal facilities, including Austral Pacific Energy (NZ) Ltd, were placed in receivership in April 2009. The consents were transferred to Cheal Petroleum Ltd in October 2009 and the site is now operated by TAG Oil. The production station continued to operate during this transition. Consents for Austral Pacific's Cardiff wellsite on Brookes Road were transferred to Cheal Petroleum in December 2010. This site is now known as Cheal-C and is operated by TAG Oil as part of the Cheal group.

Consents were granted to Cheal Petroleum for construction of three additional exploration wellsites in the area, being Cheal-D, Cheal-E and Cheal-G. Construction and commissioning of a multiphase pipeline from Cheal-E to the Cheal Production Station was undertaken in the 2014-2015 year.

The production station processes oil and gas from the Cheal wellsites. Some gas is used to power the site and to generate electricity for supply. Construction of a new gas processing plant and pipelines were completed in the 2012-2013 year to process raw inlet gas to New Zealand gas specifications for delivery on

the First Gas pipeline system for domestic use. Stormwater from the Cheal-A wellsite and Production Station is collected in a large skimmer pit in the northwest corner of the site prior to discharge.

Photo 1 Cheal Production Station

1.3 Resource consents

1.3.1 Water abstraction permit

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

Cheal Petroleum Ltd holds water permit **10290-1** to take and use groundwater for water flooding purposes. This permit was issued by the Council on 8 September 2016 under Section 87(d) of the RMA. It is due to expire on 1 June 2035.

There are 17 special conditions attached to this consent.

Condition 1 requires a bore completion report is provided prior to exercising the consent.

Condition 2 states that the bore may not tap more than one aquifer.

Conditions 3 to 6 deal with the construction, protection and identification of the bore.

Condition 7 requires a water sample to be collected from the well.

Conditions 8 to 14 deal with the rate of taking, provision of water take and groundwater records, and accuracy and accessibility of the measuring equipment.

Condition 15 requires the adoption of the best practicable option to minimise adverse environmental effects.

Conditions 16 and 17 are lapse and review provisions.

The permit is attached to this report in Appendix I.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report.

1.3.2 Water discharge permit

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

Cheal Petroleum Ltd holds water discharge permit **4727-2** to discharge treated stormwater and produced water from hydrocarbon exploration and production operations at the Cheal-A wellsite and Cheal Production Station, onto and into land in circumstances where it may enter an unnamed tributary of the Mangawharawhara Stream. This permit was issued by the Council on 10 November 2011 under Section 87(e) of the RMA. Changes to the conditions were made on 29 April 2013 upon application by Cheal Petroleum to allow for an increased stormwater catchment area. It is due to expire on 1 June 2029.

There are 13 special conditions attached to this consent.

Condition 1 requires the consent holder to exercise the best practicable option to prevent or minimise effects.

Condition 2 states the size limit of the catchment from which stormwater may be discharged.

Condition 3 requires the consent holder to advise the Council seven working days prior to commencement of any site works or drilling operation.

Condition 4 requires the consent holder to maintain a contingency plan to the satisfaction of the Council, detailing measures and procedures to prevent, remedy and mitigate environmental effects of spillage or discharge.

Condition 5 requires management and maintenance of the stormwater system in accordance with information submitted in support of the consent.

Condition 6 requires all stormwater and produced water to be directed for treatment through the stormwater treatment system before being discharged.

Conditions 7 and 8 set requirements on the minimum size and design of the skimmer pits.

Condition 9 outlines standards that the constituents in the discharge shall meet.

Condition 10 states that the discharge shall not give rise to an increase in temperature of more than two degrees Celsius after allowing for a mixing zone of 25 metres.

Condition 11 states the effects that shall not occur in the receiving water as a result from the discharge, after allowing for a 25 metre mixing zone.

Condition 12 requires the consent holder to advise the Council in writing at least 24 hours prior to the reinstatement if the site, which shall be carried out so as to minimise adverse effects on stormwater quality.

Condition 13 provides for review of the consent.

The permit is attached to this report in Appendix I.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report.

1.3.3 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.

Cheal Petroleum Ltd holds air discharge permit **7906-1** to discharge emissions into the air during flaring and to discharge miscellaneous emissions from tank vents and generators arising from hydrocarbon

production activities including emergency situations and well workovers at the Cheal-A wellsite and Cheal Production Station. This permit was issued by the Council on 10 November 2011 under Section 87(e) of the RMA and is due to expire on 1 June 2029.

There are 12 special conditions attached to this consent.

Condition 1 requires the consent holder to adopt the best practicable option to prevent or minimise effects.

Condition 2 and 3 require the consent holder to keep logs of flaring and to submit a monthly flaring report to the Council.

Condition 4 requires provision to the Council of an annual report detailing activities and measures undertaken relating to flaring.

Condition 5 requires the consent holder to keep, and make available to the Council, a record of all smoke-emitting incidents.

Condition 6 states that the consent holder shall make available upon request an analysis of a typical gas and crude oil stream from the wells.

Condition 7 stated that there shall be no alterations to plant equipment or processes which may alter the nature of the flare without consulting the Council.

Condition 8 requires the Council to be notified if a flaring event is expected to exceed five minutes duration.

Condition 9 requires the consent holder to control all emissions of the specified contaminants in order that the maximum ground level concentration at the site boundary measured under ambient conditions does not exceed relevant ambient air quality standards.

Condition 10 states that the consent holder shall control emissions to the atmosphere, other than those specified in condition 9, in order that they do not cause hazardous, noxious, dangerous, offensive or objectionable effect at or beyond the wellsite boundary.

Condition 11 requires all permanent tanks used as hydrocarbon storage tanks to be fitted with vapour recovery systems.

Condition 12 is a review provision.

The permit is attached to this report in Appendix I.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report.

1.3.4 Wellsite consents

The Company also holds consents for production activities at wellsites associated with the Cheal Production Station. A summary of these consents is provided in Table 1. Production activities at Cheal-A are covered under the production station consents.

Table 1 Consents for production activities at wellsites associated with Cheal Production Station

Wellsite	Consent number	Purpose	Issue date	Expiry
Cheal-B	6814-1	To discharge emissions to air during flaring from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the Cheal-B wellsite	23/3/2006	2022
	6815-1	To discharge treated stormwater and treated produced water from hydrocarbon exploration and production operations at the Cheal-B wellsite onto and into land in the vicinity of the Ngaere Stream in the Patea catchment	23/3/2006	2022
Cheal-C	6403-1	To discharge treated stormwater, treated produced water and treated wastewater at the Cheal-C wellsite onto and into land in the vicinity of an unnamed tributary of the Mangawharawhara Stream in the Waingongoro catchment	22/7/2004	2023
	7780-2	To take and use water from an unnamed tributary of the Mangawharawhara Stream for hydrocarbon exploration activities at the Cheal-C wellsite	22/7/2014	2029
	9262-1	To discharge emissions to air associated with production activities from up to 10 wells at the Cheal-C wellsite, including: flaring associated with emergencies (including operational emergencies) and maintenance; emissions from gas treatment or production plants; and minor emissions from other miscellaneous activities	11/6/2012	2029
Cheal-D	9534-1	To discharge emissions to air associated with hydrocarbon producing wells at the Cheal-D wellsite	5/6/2013	2028
	9535-1	To discharge treated stormwater, treated surplus drilling water and treated produced water from hydrocarbon exploration and production operations at the Cheal-D wellsite, onto land and into an unnamed tributary of the Kahikatea Stream	2/4/2013	2028
Cheal-E	9549-1	To discharge emissions to air associated with hydrocarbon producing wells at the Cheal-E wellsite	1/11/2013	2028
	9550-1	To discharge treated stormwater, treated surplus drilling water and treated produced water from hydrocarbon exploration and production operations at the Cheal-E wellsite, onto land and into an unnamed tributary of the Ngaere Stream	6/5/2013	2028
Cheal-G	9614-1	To discharge emissions to air associated with hydrocarbon producing wells at the Cheal-G wellsite	5/2/2014	2029
	9615-1	To discharge treated stormwater, treated surplus drilling water and treated produced water from hydrocarbon exploration and production operations at the Cheal-G wellsite, onto land where it may enter the Tuikonga Stream	23/8/2013	2029

1.4 Monitoring programme

1.4.1 Introduction

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

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

The monitoring programme for the Cheal Production Station consisted of three primary components.

Biomonitoring of the tributary of the Mangawharawhara Stream is not undertaken in relation to activities at the production station due to the lack of a suitable upstream control site. The point of entry for any discharge that reaches the tributary is immediately below the ponds at Ngaere Gardens. Sampling and visual inspection of the stream are the main means of receiving environment monitoring.

1.4.2 Programme liaison and management

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

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

1.4.3 Site inspections

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

1.4.4 Chemical sampling

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

The combined Cheal Production Station/Cheal-A wellsite discharge was sampled twice, and the samples analysed for chloride, hydrocarbons, suspended solids, temperature and pH. The unnamed tributary of the Mangawharawhara Stream was sampled concurrently, and the samples analysed for, chloride, hydrocarbons, suspended solids, temperature and pH.

The Council also undertook sampling of the ambient air quality outside the boundary of the site. A multi-gas meter was deployed on one occasion in the vicinity of the plant, with monitoring consisting of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and

combustible gases). A PM_{10} particulate monitor was deployed concurrently with the multi-gas meter. Two nitrogen oxide measuring devices were also deployed in the vicinity of the plant on one occasion during the year under review. The Company supplied data on flaring causes and flare and fuel gas volumes throughout the period.

2 Results

2.1 Water

2.1.1 Inspections

Seven inspections were carried out at the Cheal Production Station and associated facilities in the 2016-2017 year. The following was found during the inspections:

22 August 2016

The stormwater systems including ring drains and skimmer pits were checked at Cheal-A. As noted in the previous inspection (22 June 2016), subsidence in the ring drain by the exit gate adjacent to the flare pit on the eastern boundary needed attention. The consent holder was asked to enlarge the outer bank of the ring drain to ensure that all stormwater from the site was diverted for treatment through the skimmer pits, preventing stormwater from overtopping into the adjacent paddock.

Minimal flaring was being undertaken at the time of the inspection, with no odours or smoke noted.

27 September 2016

The Cheal-A site was neat and tidy with all site stormwater systems, including ring drains, bunds, skimmer pits and separators, clear of contaminants. No flaring was evident and no smoke or odours were noted.

The Council had received notification about a rig being mobilized to the Cheal-B site, however there was no activity on the site at the time of the inspection.

A workover rig was on the Cheal-E site at the time of the inspection. The stormwater system was satisfactory. Minimal flaring was observed, with no odours or smoke noted. Empty 200 litre drums were to be removed as planned.

The Cheal-C site was secure with no activity observed at the time of the inspection.

17 October 2016

The skimmer pits at Cheal-A were slightly turbid but no hydrocarbon sheen was observed. There was good filtration in the ring drains with grasses growing. The flare pit was in operation with a minor amount of smoke observed flowing offsite. The discharge from the skimmer pit was clear. It was noted that the discharge was mixing with water discharging from the neighbouring property that was "milky" in appearance. There were no effects evident from activities occurring on the wellsite.

There was no activity at the Cheal-E site. The ring drains in most places were full of grasses which will greatly improve and lower the concentrations of suspended solid entering the skimmer pits. The skimmer pits were clear with the bottom of both pits visible. The receiving stream looked clear and healthy.

It was noted that a variety of containers were being stored near the permit office without bunds. Some of these chemicals were harmful to aquatic life and it was noted that crude oil slops had spilt onto the ground. Other areas of the site also contained IBC's that were not bunded, or where drip trays had been left onsite and crude oil had spilt onto the ground (minor amounts).

The flare was in operation and no smoke was observed.

No activity was occurring at the Cheal-B site. It was noted that there was a lot of vegetation in the ring drain, helping to reduce the concentration of suspended solid in the skimmer pits. The skimmer pits were clear with the bottom of the pits visible. The discharge looked clear, with no effects noted in the receiving environment.

The consent holder was asked to undertake works to remove unwanted containers from Cheal-E and Cheal-B and provide appropriate storage/bunding for those containers/drip trays that would remain on site.

17 January 2017

An inspection was carried out at the production station and associated well sites Cheal-B, Cheal-C and Cheal-E. In general all sites were found to be neat and tidy.

There was no discharge from the Cheal Production Station site, with ring drains and bunds secure. Minimal flaring was being undertaken with no smoke or odours noted.

There was no activity at the Cheal-B site.

Processing and testing equipment were present at the Cheal-C site. Staff were advised to cut gorse away from the shut-off valve on the skimmer pit to provide easier access to the valve if this was required for an emergency. No flaring or odours were noted.

The Cheal-E site was unoccupied. The skimmer pits were checked from outside of the compound; these were not discharging and tadpoles were present indicating good water quality. No flaring or other activity was observed.

22 February 2017

Inspection of the Cheal Production station and Cheal-A wellsite, and the Cheal-E wellsite revealed that the stormwater systems were operating according to design and in compliance with resource consent special conditions. Ring drains and bunds were clear of contamination and obstructions. The water quality in both skimmer pits did not give rise to any concerns and aquatic life was evident in both systems.

Minimal flaring was being undertaken at Cheal-A with no smoke or odours observed. No flaring was occurring at Cheal-E.

No activity was observed at Cheal-B, Cheal-C or Cheal-G wellsites.

20 April 2017

The site was inspected after a prolonged period of, at times, quite heavy rainfall. The stormwater and associated treatment systems were secure and all site water was being directed through the system. The site was neat and tidy.

Some flaring was being undertaken, with the flare burning cleanly and clear of smoke.

26 June 2017

The sites were inspected after a period of inclement weather; the stormwater systems had coped with the rainfall with skimmer pits on all sites observed to be clear of contaminants. No adverse downstream effects were evident.

Minimal flaring was being carried out at Cheal A with no smoke or odours observed.

2.1.2 Results of discharge monitoring

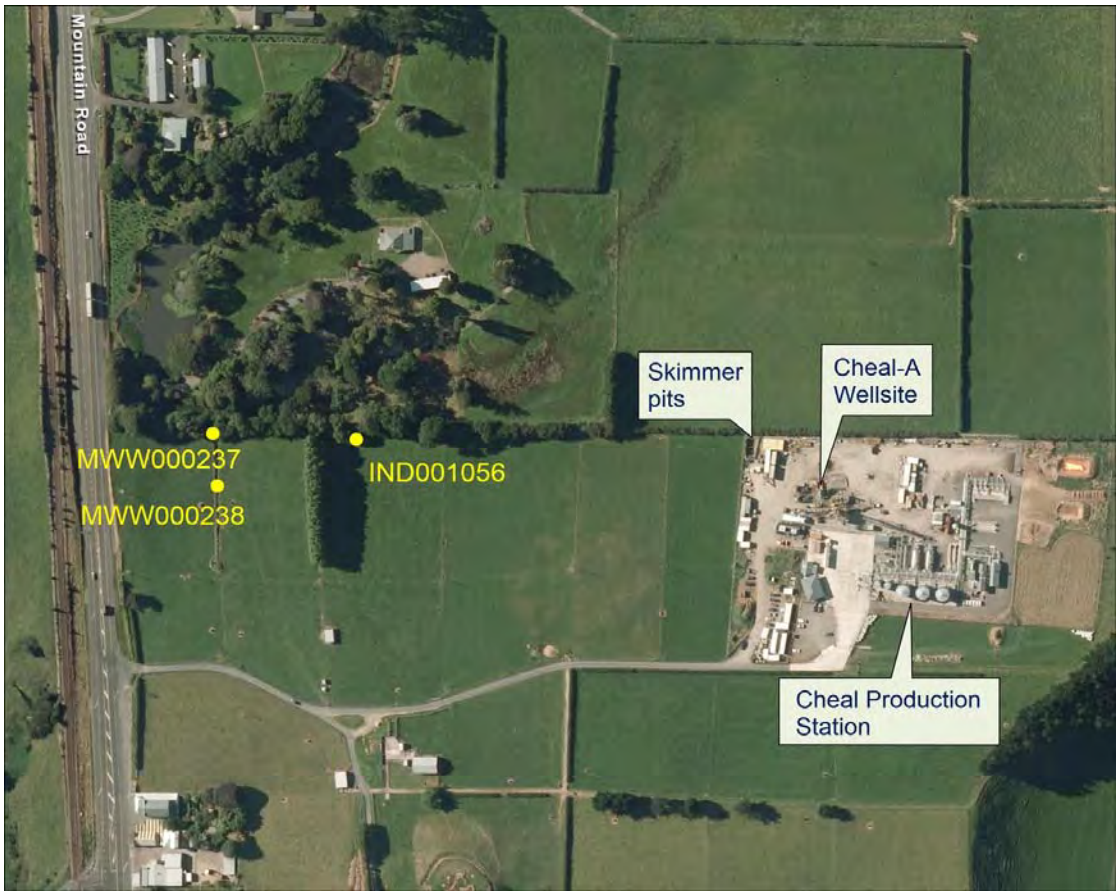

Figure 1 Location of the Cheal Production Station and associated sampling sites

Chemical water quality sampling of the combined discharge from the Cheal Production Station/Cheal-A wellsite was undertaken on two occasions during the 2016-2017 year. Table 2 below presents the results. The location of the sampling site (IND001056) is shown in Figure 1.

The results show the discharge was in compliance with the resource consent limits at the time of sampling.

Table 2 Results for discharge monitoring from the Cheal Production Station (TRC site IND001056)

Parameter	Units	14-Oct-16	12-May-17	Consent limits
Chloride	g/m^3	24.0	10.0	50
Hydrocarbons	g/m^3	<0.5	1.3	15
Suspended solids	g/m^3	25	3	100
Temperature	Deg. C	12.8	13.2	-
pH		6.0	6.1	6.0 – 9.0

2.1.3 Results of receiving environment monitoring

Chemical water quality sampling of the receiving environment was undertaken in conjunction with discharge monitoring. The results are presented in Table 3 and the sampling sites are shown in Figure 1.

Table 3 Results of receiving environment monitoring in relation to the Cheal Production Station

Parameter	Date	14-Oct-16		12-May-17	
	Units	Upstream (MWW000237)	Downstream (MWW000238)	Upstream (MWW000237)	Downstream (MWW000238)
Chloride	g/m^3	12.3	12.6	12.1	13.1
Hydrocarbons	g/m^3	<0.5	<0.5	<0.5	<0.5
Suspended solids	g/m^3	6	5	10	6
Temperature	Deg. C	13.0	13.1	12.9	12.8
pH		7.0	6.9	6.8	6.8

The results indicate that the discharge was having a negligible effect on the water quality of the tributary of the Mangawharawhara Stream, and was in compliance with all applicable consent conditions at the times of sampling.

2.1.4 Summary of consented water abstractions reported by Cheal Petroleum

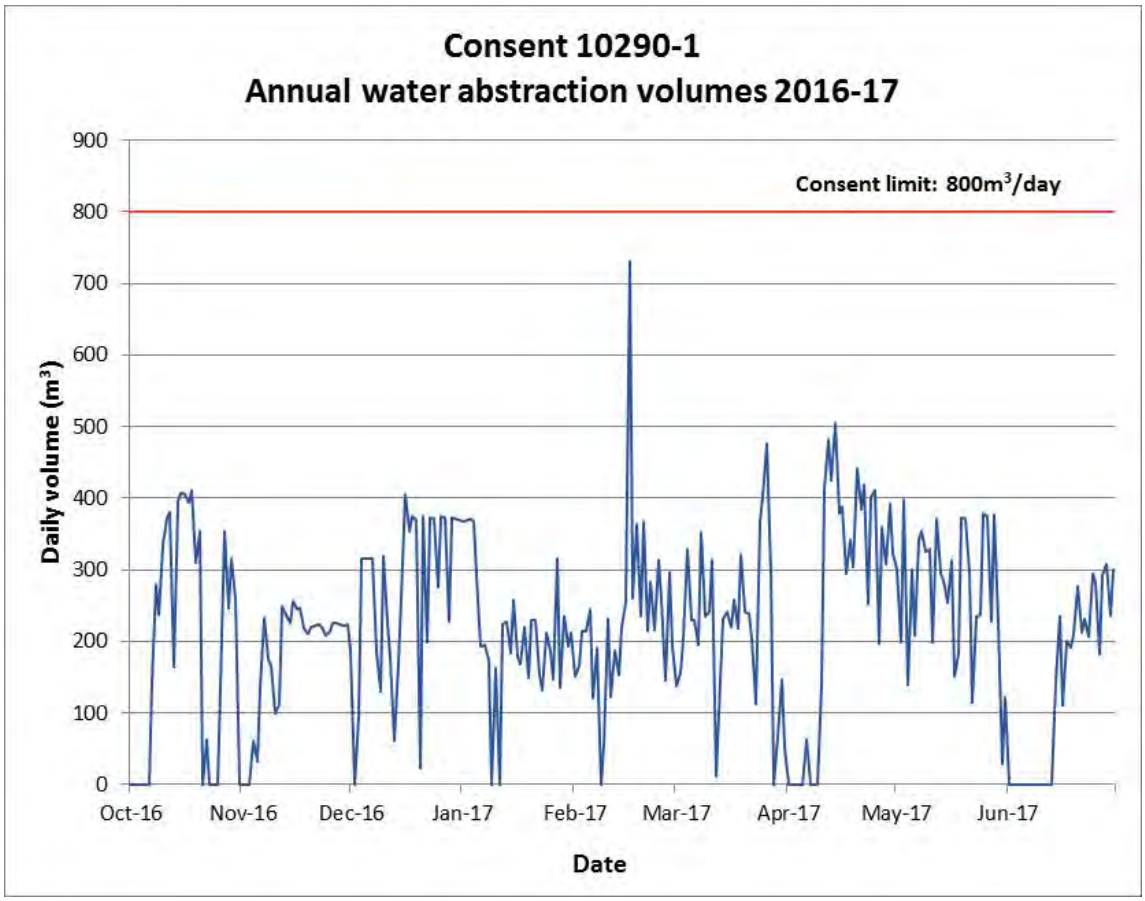

Figure 2 Daily groundwater abstraction under consent 10290-1

The consent holder supplied daily abstraction data for the period under review. Figure 2 shows that daily abstractions of groundwater under consent 10290-1 were well within the limit of 800m^3 per day.

The Cheal-C surface water take under consent 7780-2 was not exercised during the year under review.

2.2 Air

2.2.1 Inspections

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

2.2.2 Results of receiving environment monitoring

2.2.2.1 Carbon monoxide and combustible gases

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 50 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 Cheal Production Station for 2016-2017

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

The consents covering air discharges from the Cheal Production Station have specific limits related to particular gases. Special condition 9 of consent 7906-1 sets limits on the carbon monoxide, nitrogen dioxide and fine particle (PM_{10}) concentrations at or beyond the production station's boundary. The limit on the carbon monoxide is expressed as 10 mg/m^3 for an eight hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was 11.9 mg/m^3 while the average concentration for the entire dataset was 0.13 mg/m^3 which comply with consent conditions. This is similar to the results found in previous years.

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

	Period (from-to)	19 June to 21 June 2017
Max	CO(ppm)	10.4
	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/m^3
(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.

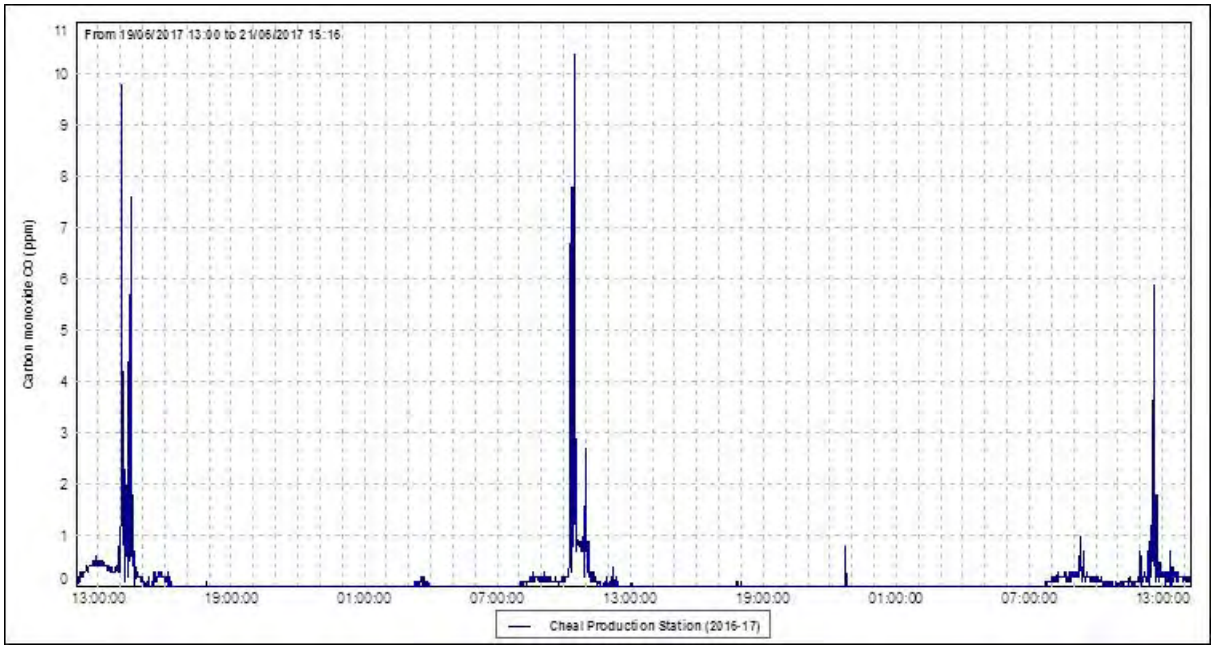

Figure 4 Ambient CO levels in the vicinity of the Cheal Production Station

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 Cheal Production Station reach any more than a trivial level.

2.2.2.2 PM_{10} particulates

In September 2004 the Ministry for the Environment enacted National Environmental Standards (NESs) relating to certain air pollutants. The NES for PM_{10} particulates is 50 µg/m^3 (24-hour average). The same limit is imposed on consent 7906-1, in condition 9, which provides for the discharge of emissions to air from Cheal Production Station.

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 PM_{10} monitor was deployed on one occasion in the vicinity of the Cheal Production Station. The deployment lasted approximately 50 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM_{10} concentrations. The location of the DustTrak monitor during the sampling run is shown in Figure 3. The results of the sample run are presented in Figure 5 and Table 5.

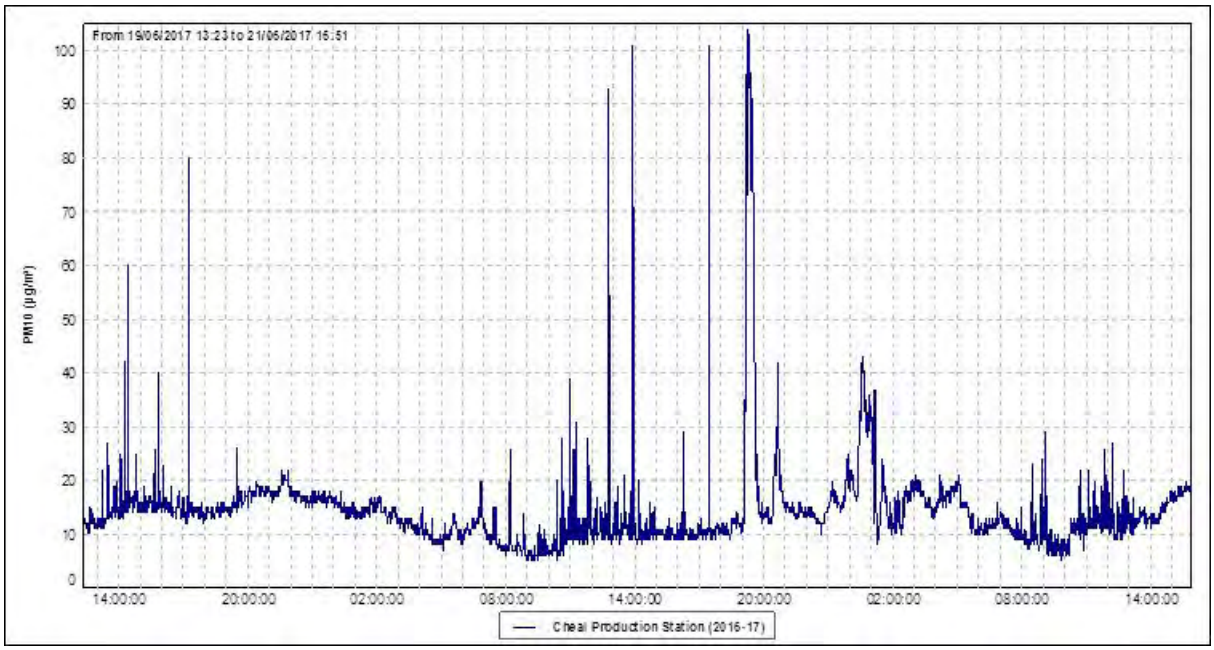

Figure 5 PM10 concentrations (µg/m³) at the Cheal Production Station

During the 50 hour run, from 19 to 21 June 2017, the average recorded PM_{10} concentration for the first 24 hour period was 13.4µg/m³ and 15.5µg/m³ for the second 24 hour period. These daily means equate to 27% and 31%, respectively, of the 50 µg/m³ value that is set by the National Environmental Standard and consent 7906-1. Background levels of PM_{10} in the region have been found to be typically around 11 µg/m³.

Table 5 Daily averages of PM_{10} results from monitoring at Cheal Production Station

	50 hours (19-21 June 2017)	
24 hr. set	Day 1	Day 2
Daily average	13.4 µg/m³	15.5 µg/m³
NES	50µg/m³	

2.2.2.3 Nitrogen oxides

From 2014 onwards, the Council implemented a coordinated region-wide compliance monitoring programme to measure nitrogen oxides (NOx). The programme involves deploying measuring devices at 28 NOx monitoring sites (including two sites in the vicinity of Cheal 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 Cheal Production Station has specific limits related to particular gases. Special condition 9 of consent 7906-1 sets a limit on the nitrogen dioxide concentration at or beyond the production station's boundary. The limit is expressed as 200 µg/m^3 for a 1-hour average exposure.

NOx passive adsorption discs were place at two locations in the vicinity of the Cheal 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 theoretical maximum NOx concentration found at Cheal Production Station during the year under review equates to 13.4 µg/m^3. The results show that the ambient ground level concentration of NOx is well below the limits set out by consent 7906-1.

The full air monitoring report is attached to this report in Appendix II.

2.2.3 Summary of flaring volumes reported by the Company

A summary of flaring volumes at Cheal Production Station is provided in Figure 6.

During the period under review, Cheal Petroleum kept the Council informed of all non-routine flaring at the production station. The majority of this flaring related to mechanical failures (September and October 2016). At most, light smoke was generated by these flaring events with no offsite effects. No complaints were received by the Company or the Council during the year under review.

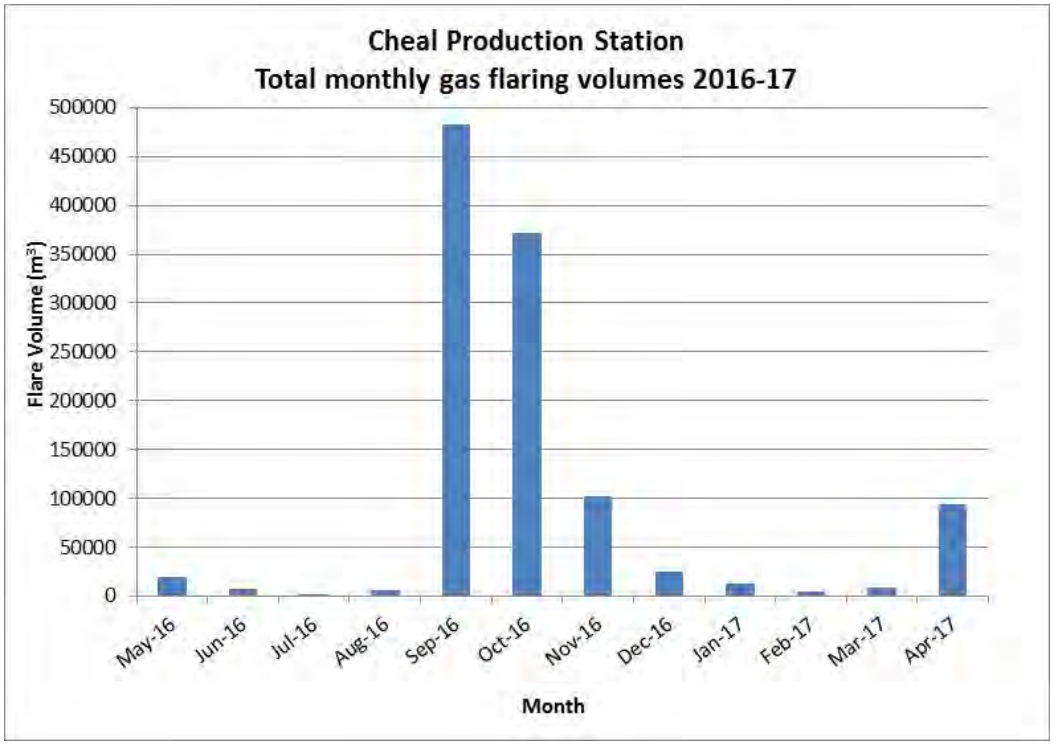

Figure 6 Summary of monthly gas flaring volumes at Cheal Production Station

2.3 Investigations, interventions, and incidents

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

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

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

In the 2016-2017 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans.

3 Discussion

3.1 Discussion of site performance

Monitoring of the Cheal Production Station during the 2016-2017 year found that the site was generally well managed. There were some minor matters noted at the Cheal-A wellsite in relation to the ring drains, and maintenance of these was undertaken by the consent holder as requested. At the Cheal-E site the consent holder was asked to move containers containing hazardous substances that were being stored without bunds.

3.2 Environmental effects of exercise of consents

Stormwater system inspections showed that discharges from the sites complied with consent conditions. Receiving water inspections and sampling showed that the discharges were not causing any adverse effects on the tributary of the Mangawharawhara Stream at the time of monitoring.

There were no adverse effects on the environment found as a result of the exercise of the air discharge consent. The ambient air quality monitoring at the site showed that levels of carbon monoxide, combustible gases, PM_{10} particulates and nitrogen oxides were all below levels of concern at the time of sampling. No offensive or objectionable odours were detected beyond the boundary during inspections and there were no complaints in relation to air emissions from the site.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 6-8.

Table 6 Summary of performance for consent 4727-2

Purpose: ***To discharge treated stormwater and produced water from hydrocarbon exploration and production operations at the Cheal-A wellsite and Cheal Production Station, onto and into land in circumstances where it may enter an unnamed tributary of the Mangawharawhara Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practicable option	Inspections	Yes
2. Stormwater collection from catchment area no larger than 3 ha	Inspections	Yes
3. Advise Council at least 7 days before site works commence	Notifications received	Yes
4. A contingency plan be maintained detailing measures to avoid, remedy and mitigate spillage or discharge	Latest update received 2012	Yes
5. Management and maintenance of stormwater system	Inspections	Mostly. Some maintenance works requested by Council

Purpose: *To discharge treated stormwater and produced water from hydrocarbon exploration and production operations at the Cheal-A wellsite and Cheal Production Station, onto and into land in circumstances where it may enter an unnamed tributary of the Mangawharawhara Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
6. Stormwater and produced water treated through stormwater system before discharged	Inspections	Yes
7. Design of skimmer pits to meet minimum size and hydrocarbon capture requirements	Inspections and sampling	Yes
8. Stormwater retention areas to be lined	Inspections	Yes
9. Constituents meet specified standards	Sampling	Yes
10. Temperature increase less than 2 Degrees Celsius after 25 metre mixing zone	Sampling	Yes
11. No effects to receiving waters after 25 metre mixing zone	Inspections and sampling	Yes
12. Advise Council prior to reinstatement of site	Site not reinstated	N/A
13. Review provision	Next option for review in June 2023	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

Table 7 Summary of performance for consent 7906-1

Purpose: *To discharge emissions into the air during flaring and to discharge miscellaneous emissions from tank vents and generators arising from hydrocarbon production activities including emergency situations and well workovers at the Cheal-A wellsite and Cheal Production Station*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt the best practicable option	Inspections and review of records	Yes
2. Maintain a flaring log	Review of records	Yes
3. Provide monthly flaring data	Records received	Yes
4. Provide an annual air emission report	Report received	Yes

Purpose: *To discharge emissions into the air during flaring and to discharge miscellaneous emissions from tank vents and generators arising from hydrocarbon production activities including emergency situations and well workovers at the Cheal-A wellsite and Cheal Production Station*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
5. Keep a record of all smoke emitting incidents and complaints	Review of records	Yes
6. Provide analysis of typical gas and crude oil stream from the wells	Analysis not requested	N/A
7. No alterations to plant, equipment or processes without prior consultation	Inspections and liaison with consent holder	Yes
8. Notification of flaring events longer than 5 minutes duration	Notifications received	Yes
9. Emissions are controlled in order to meet requirements of the ambient air quality standards	Air monitoring	Yes
10. All emissions to the atmosphere are controlled	Inspections and air monitoring	Yes
11. Tanks used as hydrocarbon storage vessels are fitted with vapour recovery systems	Inspections	Yes
12. Review provision	Next option for review in June 2023	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 8 Summary of performance for consent 10290-1

Purpose: *To take and use groundwater for water flooding purposes*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Provide bore completion log prior to exercising consent	Information received	Yes
2. The bore shall tap one aquifer only	Bore completion log	Yes
3. Annulus of bore to be sealed with grout	Inspection and bore completion log	Yes
4. Top of casing to be at least 300mm above concrete pad	Inspection	Yes

Purpose: *To take and use groundwater for water flooding purposes*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
5. Wellhead to be suitable protected from vehicle damage	Site inspection	Yes
6. Bore to be easily identifiable by permanent labels	Site inspection	Yes
7. Water sample to be collected and analysed	Sample collected on 10 October 2016	Yes
8. Rate of take not to exceed 8 l/sec or 800m^3 per 24 hours	Abstraction records provided	Yes
9. Water meter and datalogger to be installed at the site	Site inspection	Yes
10. Water records from 1 July to 30 June to be supplied by 31 July annually	Records supplied	Yes
11. Documentation certifying the water measuring and recording equipment to be supplied at installation and every 5 years thereafter	Documentation received	Yes
12. Council to be advised of equipment failure	Liaison with consent holder	N/A
13. Water meter and datalogger to be accessible to Council staff	Inspection	Yes
14. Record of groundwater levels to be provided	Records provided	Yes
15. Consent holder to adopt best practicable option to prevent or minimise adverse effects	Inspection and review of data	Yes
16. Lapse of consent	Consent has been exercised	N/A
17. Review provision	Next option for review in June 2023	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 9 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2009-10	4727-2	1			
	4729-1	1			
2010-12	4727-2	1			

Year	Consent no	High	Good	Improvement req	Poor
	7906-1	1			
2012-13	4727-2	1			
	7906-1	1			
2013-14	4727-2	1			
	7906-1	1			
2014-15	4727-2	1			
	7906-1	1			
	9211-1	1			
2015-16	4727-2	1			
	7906-1	1			
	9211-1	1			
Totals		14	0	0	0

During the year, 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. The Cheal Production Station and associated wellsites were well managed and maintained.

3.4 Recommendations from the 2015-2016 Annual Report

In the 2015-2016 Annual Report, it was recommended:

1. THAT monitoring of consented activities at Cheal Production Station and associated facilities in the 2016-2017 year continue at the same level as in 2015-2016.
2. THAT the option for a review of resource consents 4727-2 and 7906-1 in June 2017, as set out in conditions 13 and 12 of the consents, respectively, not be exercised on the grounds that the current conditions are considered adequate to deal with any adverse effects on the environment arising from the exercise of these resource consents.

These recommendations were implemented.

3.5 Alterations to monitoring programmes for 2017-2018

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

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

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

It is proposed that for 2017-2018 the monitoring of consented activities at the Cheal Production Station and associated facilities continue at the same level as in 2016-2017.

4 Recommendation

1. THAT monitoring of consented activities at Cheal Production Station and associated facilities in the 2017-2018 year continue at the same level as in 2016-2017.

Glossary of common terms and abbreviations

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

Biomonitoring	Assessing the health of the environment using aquatic organisms.
Bund	A wall around a tank to contain its contents in the case of a leak.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident Register	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
m^2	Square Metres.
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.
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.
Temp	Temperature, measured in °C (degrees Celsius).

UI	Unauthorised Incident.

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

Bibliography and references

Taranaki Regional Council (2017): Cheal Petroleum Limited Cheal Production Station Monitoring Programme Annual Report 2015-2016, Technical Report 2016-17

Taranaki Regional Council (2016): Cheal Petroleum Limited Cheal Production Station Monitoring Programme Annual Report 2014-2015, Technical Report 2015-89

Taranaki Regional Council (2014): Cheal Petroleum Limited Cheal Production Station Monitoring Programme Annual Report 2013-2014, Technical Report 2014-29

Taranaki Regional Council (2014): Cheal Petroleum Limited Cheal Production Station Monitoring Programme Annual Report 2012-2013, Technical Report 2013-88

Taranaki Regional Council (2013): Cheal Petroleum Limited Cheal Production Station Monitoring Programme Biennial Report 2010-2012, Technical Report 2012-74

Taranaki Regional Council (2010): Austral Pacific Energy (NZ) Limited Cheal Production Station Monitoring Programme Annual Report 2009-2010, Technical Report 2010-88

Taranaki Regional Council (2010): Austral Pacific Energy (NZ) Limited Cheal Production Station Monitoring Programme Biennial Report 2007-2009, Technical Report 2009-78

Taranaki Regional Council (2009): Austral Pacific Energy (NZ) Limited Cheal A 6 & 7 Wellsite Monitoring Programme Annual Report 2007-2008, Technical Report 2008-49

Taranaki Regional Council (2006): Rata Energy NZ Ltd & Austral Pacific Energy (NZ) Limited Cheal Production Wells Monitoring Programme Annual Report 2005-2006, Technical Report 2006-29

Taranaki Regional Council (2005): Rata Energy NZ Ltd & Austral Pacific Energy (NZ) Limited Cheal Production Wells Monitoring Programme Annual Report 2004-2005, Technical Report 2005-16

Appendix I

Resource consents held by Cheal Petroleum Ltd

(For a copy of the signed resource consent
please contact the TRC Consents 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:	Cheal Petroleum Limited P O Box 402 NEW PLYMOUTH 4340
Decision Date (Change):	29 April 2013
Commencement Date (Change):	29 April 2013 (Granted: 10 November 2011)

Conditions of Consent

Consent Granted:	To discharge treated stormwater and produced water from hydrocarbon exploration and production operations at the Cheal-A wellsite and Cheal Production Station, onto and into land in circumstances where it may enter an unnamed tributary of the Mangawharawhara Stream
Expiry Date:	1 June 2029
Review Date(s):	June 2017, June 2023
Site Location:	Cheal-A wellsite and Cheal Production Station, 4723 Mountain Road, Ngaere (Property owners: JR & RP Lightoller)
Legal Description:	Pt Sec 24 Blk VI Ngaere SD (Discharge source & site)
Grid Reference (NZTM)	1712269E-5639504N
Catchment:	Waingongoro
Tributary:	Mangawharawhara

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 1991.

Special conditions

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

2. Stormwater discharged shall be collected from a catchment area of no more than 3 hectares.

3. At least 7 working days prior the consent holder shall advise the Chief Executive, Taranaki Regional Council of the date of each of the following events:

   a) commencement of any site works, and
   b) commencement of any well drilling operation.

   If either of these events is rescheduled or delayed after advice is given, the consent holder shall immediately provide further notice advising of the new date.

   Any advice given in accordance with this condition shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

4. The consent holder shall maintain a contingency plan that, to the satisfaction of the Chief Executive, Taranaki Regional Council, details 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. The contingency plan shall be provided to the Council prior to discharging from the site.

5. The design, management and maintenance of the stormwater system shall be undertaken in accordance with the information submitted in support of the consent application 5603 in particular sections 7.2 and 8.1, and consent application 7378.

6. All discharges from the site, including from any containment pit or hydrocarbon combustion facility (e.g. flare pit, thermal oxidiser), shall flow to a perimeter drain and skimmer pit. Perimeter drains shall be designed, including by having a positive grade and low permeability, to ensure that runoff flows directly to a skimmer pit without ponding.

7. Skimmer pits shall have a combined capacity of no less than 250 m^3, and be designed to retain any hydrocarbons that enter them.

8. All skimmer pits and any other stormwater retention areas shall be lined with an impervious material to prevent seepage through the bed and sidewalls, and all skimmer pits shall have a valve that can be shut off to prevent any discharge from the site.

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

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm^{-3}
total recoverable hydrocarbons	Concentration not greater than 15 gm^{-3} [as determined by infrared spectroscopic technique]
chloride	Concentration not greater than 50 gm^{-3}

10. After allowing for a mixing zone of 25 metres, the discharge shall not give rise to an increase in temperature of more than 2 degrees Celsius.

11. After allowing for a mixing zone of 25 metres, 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 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.

12. The consent holder shall advise the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the reinstatement of the site and the reinstatement shall be carried out so as to minimise adverse effects on stormwater quality. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

13. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 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 29 April 2013

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:	Cheal Petroleum Limited P O Box 402 NEW PLYMOUTH 4340
Decision Date:	10 November 2011
Commencement Date:	10 November 2011

Conditions of Consent

Consent Granted:	To discharge emissions into the air during flaring and to discharge miscellaneous emissions from tank vents and generators arising from hydrocarbon production activities including emergency situations and well workovers at the Cheal-A wellsite and Cheal Production Station at or about (NZTM) 1712310E-5639497N
Expiry Date:	1 June 2029
Review Date(s):	June 2017, June 2023
Site Location:	Cheal-A wellsite and Cheal Production Station, Mountain Road, Ngaere [Property owners: JR & RP Lightoller]
Legal Description:	Pt Sec 24 Blk VI Ngaere SD [site of discharge]

General condition

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

Special conditions

Exercise of consent

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

Recording and submitting information

2. The consent holder shall keep and maintain a log of all continuous flaring incidents lasting longer than 5 minutes and any intermittent flaring lasting for an aggregate of 10 minutes or longer in any 60-minute period. The log shall contain the date, the start and finish times, the quantity and type of material flared, and the reason for flaring. The log shall be made available to the Chief Executive, Taranaki Regional Council, upon request, and summarised annually in the report required under condition 4. Flaring, under normal operation in the low pressure flare, of rich mono-ethylene glycol degasser vapour, condensate tank vapours, non-condensibles from tri-ethylene glycol/mono-ethylene glycol regeneration and purge gas shall be excluded from this requirement.

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

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

    a) detailing gas combustion at the production station flare, including but not restricted to routine operational flaring and flaring logged in accordance with condition 2;
    b) detailing any measures that have been undertaken by the consent holder to improve the energy efficiency of the production station;
    c) detailing any measures to reduce smoke emissions;
    d) detailing any measures to reduce flaring;
    e) addressing any other issue relevant to the minimisation or mitigation of emissions from the production station flare; and
    f) detailing any complaints received and any measures undertaken to address complaints.

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

Information and notification

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

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

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

Preventing and minimising emissions

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

10. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than those expressly provided for under special condition 7, in order that they do not individually or in combination with other contaminants cause a hazardous, noxious, dangerous, offensive or objectionable effect at or beyond the boundary of the property on which the site is located.

11. All permanent tanks used as hydrocarbon storage vessels, shall be fitted with vapour recovery systems.

Review

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

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

Signed at Stratford on 10 November 2011

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Water Permit

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

Name of Consent Holder:	Cheal Petroleum Limited PO Box 402 New Plymouth 4340
Decision Date:	8 September 2016
Commencement Date:	8 September 2016

Conditions of Consent

Consent Granted:	To take and use groundwater for water flooding purposes
Expiry Date:	1 June 2035
Review Date(s):	June 2023, June 2029
Site Location:	Cheal-A wellsite, 4273 Mountain Road, Ngaere
Grid Reference (NZTM)	1712385E-5639375N
Catchment:	Waingongoro
Tributary:	Mangawharawhara

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 1991.

Special conditions

1. Before exercising this consent The consent holder shall ensure that a bore completion report (driller's log) that includes the information listed below is completed for GND2590 and provided to the Taranaki Regional Council for approval:

    a) Well/bore location in GPS Coordinates, ground RL and stick up heights;
    b) A sketch or drawing of the drilling project area, showing the location of all bores and their location in relation to nearby pertinent features;
    c) Stratigraphic log;
    d) Drilled depth and final bore depth;
    e) Screen and casing details and depths;
    f) Static water level;
    g) Water quality data collected during and after drilling;
    h) Name of bore owner;
    i) Location of the drilling project;
    j) Description of the drilling project;
    k) Project number or job reference, and resource consent number or permit if applicable;
    l) Start and finish dates of well/bore drilled;
    m) Drilling method used;
    n) Name and address of driller;
    o) Description of grouting method and volumes used;
    p) Name of personnel on site including driller, driller crew and supervisor;
    q) Name of person preparing the drilling log;
    r) Technique used and time for the well development;
    s) Any results of the tests for discharge of water.

2. The bore shall tap no more than one aquifer. All aquifers and permeable zones of differing pressure or water quality shall be sealed to prevent the interconnection or movement of groundwater between aquifers and permeable zones.

3. The annulus of the bore shall be sealed with grout to prevent fluid movement down the sides of the bore casing.

4. The top of the casing shall be no less than 300 mm above the concrete pad and the bore shall be covered or capped to prevent contaminants entering the bore and underlying groundwater.

5. The wellhead shall be suitably constructed and/or adequately protected (e.g. by fencing or a building) to ensure that it is not vulnerable to damage by any vehicles that may have access to the vicinity.

6. The bore shall be easily identifiable by permanent labels, which may be welded or engraved on the casing, or on the equivalent fixed part of the well construction or associated building. The numbering on the label shall be the bore number assigned by Taranaki Regional Council (GND2590).

7. Within 14 days of it being completed a water sample shall be collected from the well and analysed for a suite of parameters that characterise the water in the aquifer.

   Note: Unless already taken, this sample will be taken by Taranaki Regional Council staff during the monitoring inspection and the cost of analysis charged to the consent holder.

8. The rate of taking shall not exceed 8 litres per second, and the volume taken in any 24 hour period ending at midnight (New Zealand Standard Time) shall not exceed 800 cubic metres.

9. Before exercising this consent the consent holder shall install, and thereafter maintain a water meter and a datalogger at the site of taking (or a nearby site in accordance with Regulation 10 of the *Resource Management (Measurement and Reporting of Water Takes) Regulations 2010*). The water meter and datalogger shall be tamper-proof and shall measure and record the rate and volume of water taken to an accuracy of ± 5%. Records of the date, the time and the rate and volume of water taken at intervals not exceeding 15 minutes, shall be made available to the Chief Executive, Taranaki Regional Council at all reasonable times.

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

10. The records of water taken shall:

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

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

    (c) for each 12-month period ending on 30 June, be provided to the Chief Executive, Taranaki Regional Council within one month after end of that period.

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

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

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

    The documentation shall be provided:

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

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

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

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

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

14. The consent holder shall provide a record of groundwater levels interpreted from pressure transducer data.

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

16. This consent shall lapse on 30 September 2021, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

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

    a. 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; and/or

    b. to require any data collected in accordance with the conditions of this consent to be transmitted directly to the Council's computer system, in a format suitable for providing a 'real time' record over the internet.

Signed at Stratford on 8 September 2016

For and on behalf of
Taranaki Regional Council

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B G Chamberlain
Chief Executive

Appendix II

Air monitoring report

To	Job Manager, Callum MacKenzie
From	Scientific Officer - Air Quality, Brian Cheyne
File	1892565
Date	July 04, 2017

Ambient Gas (PM10, NOx, CO and LEL) Monitoring at Cheal Production Stations during 2016-2017 monitoring year

Introduction

In January and June 2017 as part of the compliance monitoring programme for the Cheal 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 50 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 Cheal production station (2016-2017)

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 Cheal production station have specific limits related to particular gases. Special condition 9 of consent 7906-1 set limits on the carbon monoxide, nitrogen dioxide and fine particles [PM10] concentrations at or beyond the production station's boundary. The limit on the carbon monoxide is expressed as 10 mg/m^3 for an eight hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was 11.9 mg/m^3 with average concentration for the entire dataset was only 0.11 mg/m^3 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 Cheal production station

Period (from-to)		19/06/2017 13:00 21/06/2017 15:16
Max	CO(ppm)	10.4
	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 Cheal production station reach any more than a trivial level.

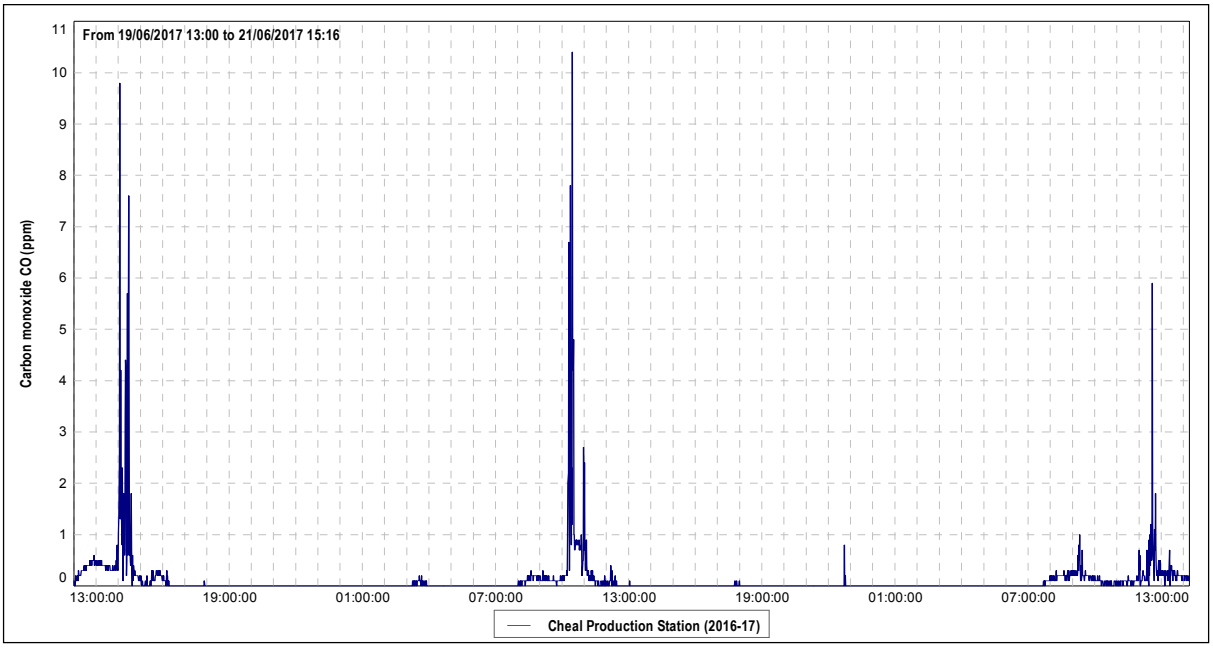

Figure 2 Graph of ambient CO levels in the vicinity of the Cheal Production Station (2016-17)

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). The same limit is imposed on consent 7906-1, in condition 9, that provides for the discharge of emissions to air from Cheal production station.

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 Cheal production station. The deployment lasted approximately 50 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.

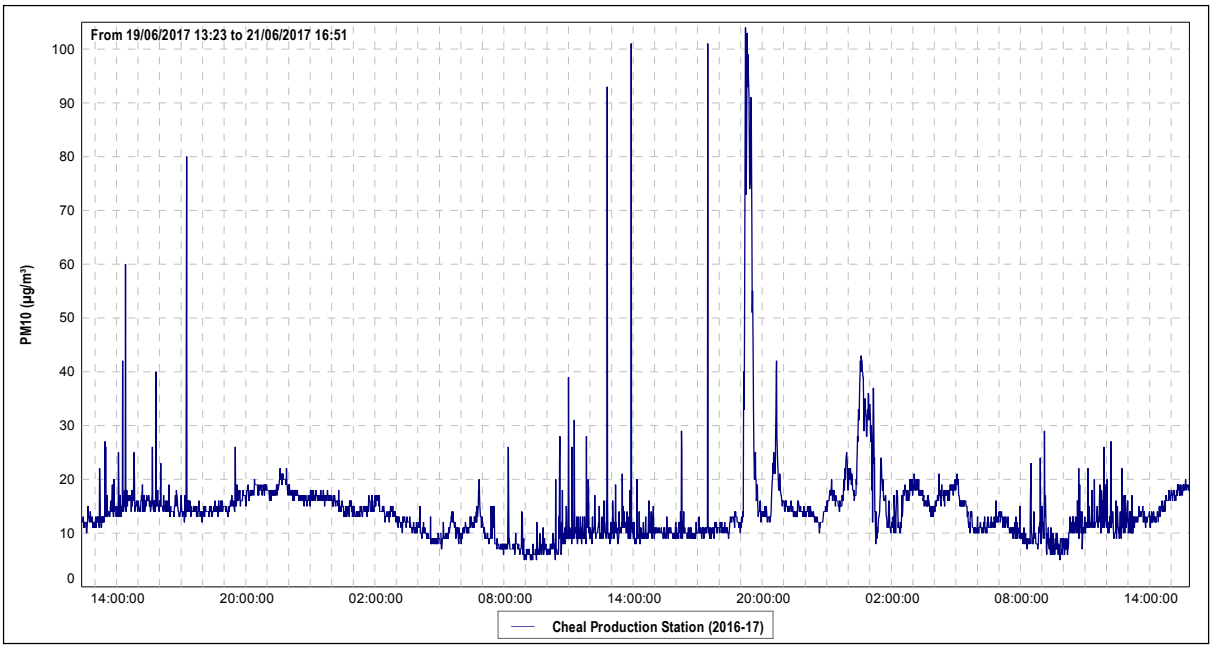

Figure 2 PM10 concentrations (µg/m³) at the Cheal production station (2016-17)

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

	(50 hours) **(19-21/06/2017)**	
24 hr. set	Day 1	Day 2
Daily average	13.4 µg/m³	15.5 µg/m³
NES	50µg/m³	

During the 50-hour run, from 19th of June to 21st of June 2017, the average recorded PM10 concentration for the first 24 hour period was 13.4µg/m³ and 15.5µg/m³ for the second 24 hour period. These daily means equate to 27% and 31%, respectively, of the 50 µg/m³ value that is set by the National Environmental Standard and consent 7906-1.

Background levels of PM10 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 Cheal 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 (TRC #1841084).

The consents covering air discharges from the Cheal production station have specific limits related to particular gases. Special condition 9 of consent 7906-1 set a limit on the nitrogen dioxide concentration at or beyond the production station's boundary. The limit is expressed as 200 µg/m^3 for a one hour average exposure.

NOx passive adsorption discs were place at two locations in the vicinity of the Cheal 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 theoretical maximum NOx concentration found at the Cheal production station during the year under review equates to 13.4µg/m^3. The results show that the ambient ground level concentration of NOx is well below the limits set out by consent 7906-1.