

Cheal Petroleum Limited
Cheal Production Station
Monitoring Programme
Annual Report
2012-2013

Technical Report 2013 – 88

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Executive summary

Cheal Petroleum Limited holds consents for 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. It is operated by TAG Oil New Zealand Limited. This report for the period July 2012-June 2013 describes the monitoring programme implemented by the Taranaki Regional Council to assess the Company's environmental performance during the period under review, and the results and environmental effects of the Company's activities.

This report includes monitoring information specific to the Cheal Production Station programme. Results of monitoring conducted at the associated Cheal wellsites are detailed in their respective exploration monitoring reports.

The Company holds a total of two resource consents in relation to the Cheal Production Station, which include a total of 24 conditions setting out the requirements that the Company must satisfy. The Company holds 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 this site.

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

Results of samples collected of both the discharge and receiving waters were within the limits prescribed by the consent and indicated that the discharge was not having a significant adverse effect on the water quality of the tributary of the Mangawharawhara Stream. No adverse effects were detected as a result of the exercise of the air discharge permit, and there were no Unauthorised Incidents (UIs) recording non-compliance in respect of activities at the production station.

During the year, the Company demonstrated a high level of environmental performance and compliance with the resource consents. The Cheal Production Station was well managed and maintained.

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

This report includes recommendation for the 2013-2014 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 2012 – June 2013 by the Taranaki Regional Council on the monitoring programme associated with resource consents held by Cheal Petroleum Limited. The Company operates a petrochemical production station situated on Mountain Road at Ngaere, in the Waingongoro catchment. The site is operated by TAG Oil New Zealand Limited [TAG Oil].

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consent held by Cheal Petroleum Ltd that relates to discharges of water within the Waingongoro catchment, and the air discharge permit held by Cheal Petroleum Ltd to cover emissions to air from the Cheal Production Station. Results of monitoring conducted at the associated Cheal wellsites are detailed in their respective exploration monitoring reports.

One of the intents of the Resource Management Act (1991) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Taranaki Regional Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Cheal Petroleum's use of water and air, and is the fourth combined annual report by the Taranaki Regional 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 compliance monitoring under the Resource Management Act and the Council's obligations and general approach to monitoring sites through annual programmes, the resource consents held by Cheal Petroleum Ltd 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.

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 2013-2014 monitoring year.

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

1.1.3 The Resource Management Act (1991) and monitoring

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

- (a) the neighbourhood or the wider community around a discharger, and may include cultural and 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 Taranaki Regional Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each discharge source. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the Resource Management Act to assess the effects of the exercise of consents. In accordance with section 35 of the Resource Management Act (1991), the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of 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 utilization, to collectively improve management of the region's resources.

1.1.4 Evaluation of environmental and consent performance

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

- a **high** level of environmental performance and compliance indicates that essentially there were no adverse environmental effects to be concerned about, and no, or inconsequential (such as data supplied after a deadline) non-compliance with conditions.
- a **good** level of environmental performance and compliance indicates that adverse environmental effects of activities during the monitoring period were negligible or minor at most, or, 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, or, there were perhaps some items noted on inspection notices for attention but these items were not urgent nor critical, and follow-up inspections showed they have been dealt with, and any inconsequential non-compliances with conditions were resolved positively, co-operatively, and quickly.
- **improvement required (environmental) or improvement required (administrative compliance)** (as appropriate) indicates that the Council may have been obliged to

record a verified unauthorised incident involving measurable environmental impacts, and/or, there were measurable environmental effects arising from activities and intervention by Council staff was required and there were matters that required urgent intervention, took some time to resolve, or remained unresolved at the end of the period under review, and/or, there were on-going issues around meeting resource consent conditions even in the absence of environmental effects. Abatement notices may have been issued.

- **poor performance (environmental) or poor performance (administrative compliance)** indicates generally that the Council was obliged to record a verified unauthorised incident involving significant environmental impacts, or there were material failings to comply with resource consent conditions that required significant intervention by the Council even in the absence of environmental effects. Typically there were grounds for either a prosecution or an infringement notice.

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

1.2 Background and process description

The Cheal-A Wellsite was first established on Mountain Road at Ngaere by NZOG Services Ltd in 1995. The consents for the site were subsequently transferred to Indo-Pacific Energy (NZ) Ltd in 2002, then Rata Energy Ltd in 2004, and Austral Pacific Energy (NZ) Ltd in 2005. 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 Limited 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 Rd 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 in the 2012-2013 year for construction of three additional exploration wellsites in the area, being Cheal-D, Cheal-E and Cheal-G.

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 Vector 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 discharge permit

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

Cheal Petroleum Limited holds water discharge permit **4727-2** to cover the discharge of treated stormwater and produced water from hydrocarbon exploration and production operations onto and into land in circumstances where it may enter an unnamed tributary of the Mangawharawhara Stream in the Waingongoro Catchment. It covers discharges from both the production station site, and the Cheal-A wellsite. This permit was issued by the Taranaki Regional Council on 10 November 2011 under Section 87(e) of the Resource Management Act 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 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 Chief Executive, Taranaki Regional 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 consent 5603, sections 7.2 and 8.1.

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

Condition 7 states that there should be no discharge of produced water with chloride concentration greater than 50 ppm.

Condition 8 outlines standards that the constituents in the discharge shall meet.

Condition 9 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 10 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 11 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 12 is a review condition.

The permit is attached to this report in Appendix I.

1.3.2 Air discharge permit

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

Cheal Petroleum Limited 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 Taranaki Regional Council on 10 November 2011 under Section 87(e) of the Resource Management Act 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 requires the consent holder to keep, and make available to the Council, logs of flaring.

Condition 3 requires the consent holder 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.

1.4 Monitoring programme

1.4.1 Introduction

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

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

The monitoring programme for the 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 Taranaki Regional Council in ongoing liaison with resource consent holders over consent conditions and their interpretation and application:

- in discussion over monitoring requirements
- preparation for any reviews
- renewals
- new consents
- advice on the Council's environmental management strategies and content of regional plans and
- consultation on associated matters.

1.4.3 Site inspections

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

1.4.4 Chemical sampling

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

The combined Cheal Production Station/Cheal-A wellsite discharge was sampled on two occasions, 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 biochemical oxygen demand, 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).

The full air monitoring report is attached in Appendix II.

2. Results

2.1 Water

2.1.1 Inspections

Seven inspections were carried out at the Cheal Production Station in the 2012-2013 year. The following was found during the inspections:

31 August 2012

The site around the production area was neat and tidy. Minimal flaring was occurring. Testing was being undertaken for the future supply of gas to Waihapa Production Station. An exploration drilling rig was on the wellsite (monitoring of activities relating to this was conducted under a separate Council programme). The skimmer pits, used for both production station and wellsite stormwater, had been pumped out to prevent any discharge after excessive chloride levels were found in self-monitoring tests. The truck load out area and API separator were clear of any contaminants.

17 September 2012

The site was neat, tidy and well managed. Minimal flaring was being undertaken with no resulting smoke or odours. No discharge was occurring from the skimmer pits but recent rain had elevated suspended solids content in the stormwater which may have required the pits to be cleaned out.

29 October 2012

No drilling was being undertaken at the time of inspection. Most of the exploration equipment had been moved to Cheal-B and C wellsites. The production facilities were neat and tidy. There was no discharge off site. Some silt had accumulated in the skimmer pits after recent rainfall. Minimal flaring was being undertaken. The truck load out area and separators were clear. The Company was instructed to prevent water and traces of hydrocarbons present in the A7 well cellar from overflowing and discharging to the ring drains.

12 December 2012

The site was neat and tidy. No effects from any flaring were noted. No stormwater discharge was occurring. The pipe to the skimmer pit had been displaced during connection of the new pipeline to the site. This was to be replaced prior to the end of the shift. Everything was satisfactory.

11 February 2013

The new pipeline installation was underway. The site had been extended. The possible need to increase the skimmer pit capacity as a result of the increased catchment area was discussed with Marcus Garrett from TAG Oil. Marcus was to refer this issue to their surveyors who were undertaking a review of the site's stormwater systems. Minor subsidence alongside the retaining wall near the skimmer pit needed to be repaired. The site was neat and tidy. No stormwater was discharging from the skimmer pits at the time of inspection. There were no odours or effects from any flaring.

29 April 2013

The site was neat and tidy. An additional skimmer pit was to be constructed on the eastern boundary. The Council was notified of this as required by consent conditions.

Minimal flaring was occurring with no resulting off site effects. Ring drains and bunds were clear and fit for purpose. Everything was satisfactory.

23 May 2013

Inspection was undertaken following significant rainfall in previous days. The skimmer pit contained discoloured water as a result of run-off from construction activities at the site. There were no visual effects from this discharge on the receiving waters. The ring drain near the generation unit had a section of damaged plastic liner. The newly constructed ring drain on the eastern boundary had collapsed. Otherwise the site was neat and tidy. The Company was directed to repair the ring drains.

2.1.2 Results of discharge monitoring

Chemical water quality sampling of the combined discharge from the Cheal Production Station/Cheal-A wellsite was undertaken on two occasions during the 2012-2013 year. The samples were collected on 22 April 2013 and 19 June 2013. Table 1 below presents the results. The location of the sampling site (IND001056) is shown in Figure 1.



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

Table 1 Results for discharge monitoring from the Cheal Production Station (TRC site IND001056)

Parameter	Units	22 April 2013	19 June 2013	Consent limits
Chloride	g/m ³	4.0	20.8	50
Hydrocarbons	g/m ³	<0.5	<0.5	15
Suspended solids	g/m ³	74	6	100
Temperature	Deg. C	15.3	13.1	-
pH		6.9	6.3	6.0 – 9.0

The results show that the discharge was in compliance with the resource consent limits on both sampling occasions.

2.1.3 Results of receiving environment monitoring

Chemical water quality sampling of the receiving environment was undertaken in conjunction with discharge monitoring on 22 April 2013 and 19 June 2013. The results are presented in Table 2 and the sampling sites are shown in Figure 1 above.

Table 2 Results of receiving environment monitoring in relation to the Cheal Production Station

	Parameter	BOD*	Chloride	Hydrocarbons	Suspended solids	Temperature	pH
Date	Unit	g/m ³	g/m ³	g/m ³	g/m ³	Deg. C	
22 April 2013	Upstream site MWW000237	16	18.2	< 0.5	51	14.9	7.0
	Downstream site MWW000238	17	9.9	< 0.5	33	15.7	6.8
19 June 2013	Upstream site MWW000237	2.0	13.6	< 0.5	7	11.3	6.8
	Downstream site MWW000238	3.5	16.2	< 0.5	8	11.5	6.8

*Biochemical oxygen demand

The results indicate that the discharge was having 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.

2.2 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

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

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 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 carbon monoxide concentration at or beyond the production station's boundary that is the same as the National Environmental Standard (NES). The NES is expressed as 10 mg/m³ (equivalent to 12ppm) for a running 8-hour mean. The maximum concentration of carbon monoxide found during the reporting monitoring period was 1.6 ppm or 1.4 mg/m³ and the average concentration was only 0.2 ppm or 0.17 mg/m³ which complies with the consent condition. This continues the pattern found in previous years.

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

2.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council eg 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 Taranaki Regional Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The Unauthorised Incident Register (UIR) includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In the 2012-2013 period, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents, in association with Cheal Petroleum's conditions in resource consents or provisions in Regional Plans in relation to the Company's activities at the Cheal Production Station.

3. Discussion

3.1 Discussion of site performance

Monitoring the Cheal Production Station during the 2012-2013 year found that the site was well managed. All consent conditions relating to site operations and management were complied with. Any issues identified during inspections were quickly resolved.

3.2 Environmental effects of exercise of consents

Results of samples collected of both the discharge and receiving waters were within the limits prescribed by the consent and indicated that the discharge was not having a significant adverse effect on the water quality of the tributary of the Mangawharawhara Stream.

There were no adverse effects detected as a result of the exercise of the air discharge permit at the Cheal Production Station.

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 3-4.

Table 3 Summary of performance for Consent 4727-2 to discharge treated stormwater and treated production water

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspections and review of records	Yes
2. Stormwater collection from catchment area no larger than 1.3ha	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	Contingency plan received	Yes
5. Management and maintenance of stormwater system	Inspections	Yes
6. Stormwater and produced water treated through stormwater system before discharged	Inspections	Yes
7. Discharge of produced water contains less than 50 ppm chloride concentration	Sampling	Yes
8. Constituents meet specified standards	Sampling	Yes
9. Temperature increase less than 2 Degrees Celsius after 25 metre mixing zone	Sampling	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
10. No effects to receiving waters after 25 metre mixing zone	Inspections and sampling	Yes
11. Advise Council prior to reinstatement of site	Site not reinstated	N/A
12. Review provision	Next option for review in June 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

N/A = not applicable

Table 4 Summary of performance for Consent 7906-1 to discharge emissions into the air arising from hydrocarbon production activities

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	Review of records	Yes
4. Provide an annual air emission report	Reports received	Yes
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 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

N/A = not applicable

During the year, the Company demonstrated a high level of environmental performance and compliance with the resource consents as defined in Section 1.1.4. The Cheal Production Station was well managed and maintained.

3.4 Recommendation from the 2010-2012 Report

In the 2010-2012 Report, it was recommended:

1. THAT monitoring of consented activities at the Cheal Production Station in the 2012-2013 year continues at the same level as in 2010-2012.

This recommendation was implemented.

3.5 Alterations to monitoring programmes for 2013-2014

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community. The 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 2013-2014 the monitoring programme remains unchanged. A recommendation to this effect is attached to this report.

4. Recommendation

1. THAT monitoring of consented activities at the Cheal Production Station in the 2013-2014 year continues at the same level as in 2012-2013.

Glossary of common terms and abbreviations

The following abbreviations and terms are used within this report:

Al*	aluminium
As*	arsenic
Biomonitoring	assessing the health of the environment using aquatic organisms
BOD	biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate
BODF	biochemical oxygen demand of a filtered sample
bund	a wall around a tank to contain its contents in the case of a leak
CBOD	carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate
cfu	colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample
COD	chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction
Condy	conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m
Cu*	copper
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m ³ s ⁻¹)
DO	dissolved oxygen
DRP	dissolved reactive phosphorus
<i>E.coli</i>	<i>escherichia coli</i> , an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample
Ent	enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample
F	fluoride
FC	faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample
fresh	elevated flow in a stream, such as after heavy rainfall
g/m ³	grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures
incident	an event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred
intervention	action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring
investigation	action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident
l/s	litres per second

MCI	macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats
mS/m	millisiemens per metre
mixing zone	the zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point
NH ₄	ammonium, normally expressed in terms of the mass of nitrogen (N)
NH ₃	unionised ammonia, normally expressed in terms of the mass of nitrogen (N)
NO ₃	nitrate, normally expressed in terms of the mass of nitrogen (N)
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water
O&G	oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons)
Pb*	lead
pH	a numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5
Physicochemical	measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment
PM ₁₀	relatively fine airborne particles (less than 10 micrometre diameter)
resource consent	refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15)
RMA	Resource Management Act 1991 and including all subsequent amendments
SS	suspended solids
SQMCI	semi quantitative macroinvertebrate community index;
Temp	temperature, measured in °C (degrees Celsius)
Turb	turbidity, expressed in NTU
UI	Unauthorised Incident
UIR	Unauthorised Incident Register – contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan
Zn*	zinc

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

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

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- 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
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- 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 Limited



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

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

Please quote our file number
on all correspondence

Name of
Consent Holder: 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 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 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]

Catchment: Waingongoro

Tributary: Mangawharawhara

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*
www.trc.govt.nz

General condition

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

Special conditions

1. The 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 1.3 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.
6. All stormwater and produced water [with a maximum chloride concentration of 50 ppm] shall be directed for treatment through the stormwater treatment system before being discharged.
7. There shall be no discharge of produced water with a chloride concentration greater than 50 ppm.

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

<u>Constituent</u>	<u>Standard</u>
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

9. 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.
10. 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.
11. 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.
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 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 10 November 2011

For and on behalf of
Taranaki Regional Council



Director-Resource Management



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

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

Please quote our file number
on all correspondence

Name of
Consent Holder: 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

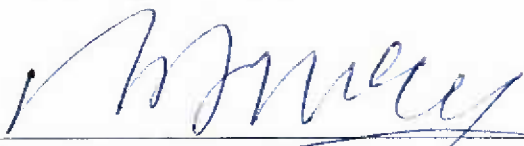
9. The consent holder shall control all emissions of carbon monoxide, nitrogen dioxide, fine particles [PM₁₀] and sulphur dioxide to the atmosphere from the site, in order that the maximum ground level concentration of any of these contaminants arising from the exercise of this consent measured under 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



Director-Resource Management

Appendix II

Air monitoring report

Memorandum

To Job Manager, Callum MacKenzie
From Scientific Officer - Air Quality, Brian Cheyne
File 7906-1, SPORDMON136, FRODO-#1300940
Date January 21, 2014

Ambient gas monitoring at Cheal Production Station, years 2012-2013

Multiple Gas Detector (QRae PGM 2000)

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

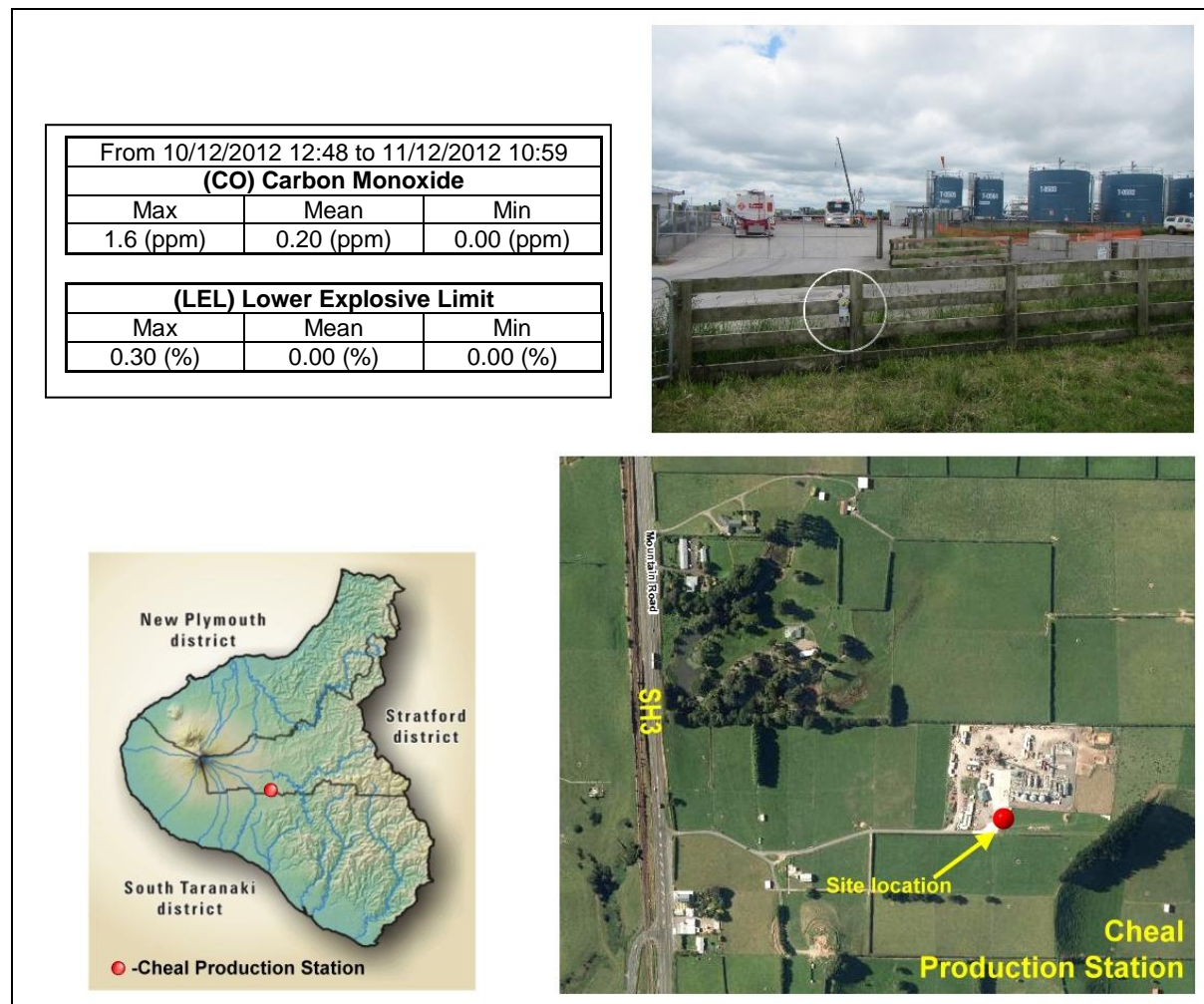


Figure 1 Air monitoring sites - Cheal Production Station (years 2012-2013)

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

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 graphically presented in Figure 2.

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 carbon monoxide concentration at or beyond the production station's boundary that is the same as the National Environmental Standard (NES). The NES is expressed as 10 mg/m³ (equivalent to 12ppm) for a running 8-hour mean. The maximum concentration of carbon monoxide found during the reporting monitoring period was 1.6 ppm or 1.4 mg/m³ and average concentration was only 0.2 ppm or 0.17 mg/m³ which complies with the consent condition. This continues the pattern found in previous years.

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

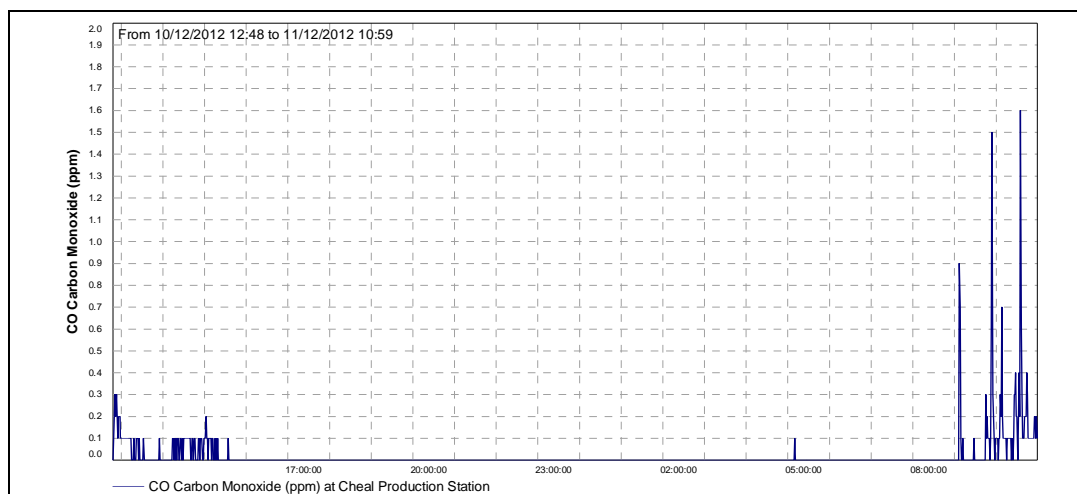


Figure 2 Graph of ambient gas levels in the vicinity of the Production Station (2012-13)