

TAG Oil (NZ) Limited
Sidewinder Production Station
Monitoring Programme
Annual Report
2015-2016

Technical Report 2016-25

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Executive summary

TAG Oil (NZ) Limited (the Company) holds consents for a petrochemical production station located on Upper Durham Road at Inglewood, in the Waitara catchment. The Sidewinder Production Station processes oil and gas from the Company's adjacent Sidewinder wellsite. This report for the period July 2015 to June 2016 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental 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 Sidewinder Production Station, which include a total of 43 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to discharge treated stormwater and production water from hydrocarbon exploration and production operations at the Sidewinder site into the Piakau Stream, and two consents to discharge emissions related to production activities into the air at this site.

During the monitoring period, TAG Oil (NZ) Limited demonstrated an overall high level of environmental performance.

The Council's monitoring programme for the period under review included two inspections, three water samples collected for physicochemical analysis and two ambient air quality surveys.

Monitoring of the stormwater discharge from the site found that all applicable conditions in the consent were complied with. There were no adverse effects found in the receiving waters of the Piakau Stream.

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

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

For reference, in the 2015-2016 year, 71% 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 24% 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 remains at a high level.

This report includes a recommendation for the 2016-2017 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 2015 to June 2016 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by TAG Oil (NZ) Limited (the Company). The Company operates the Sidewinder Production Station situated on Upper Durham Road at Inglewood, in the Waitara 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 discharges of water within the Waitara catchment, and the air discharge permits held by the Company 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 third combined annual report by the Council for the Sidewinder 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 through annual programmes;
- the resource consents held by the Company in the Waitara catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted at the Sidewinder 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 2016-2017 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 2015-2016 year, 71% 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 24% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Process description

The Sidewinder Production Station was commissioned in late 2011 following the successful drilling and testing of the Sidewinder-1, 2, 3 and 4 exploration wells, which produce gas-rich condensate. A major site expansion to the southwest of the production station was carried out over the summer of 2012/13 to allow for the drilling of three further exploration wells in 2013. Upgrades were also made to the site facilities to allow for increased throughput of oil and gas.



Photo 1 Sidewinder Production Station and wellsite in February 2012

The facilities are designed to process up to 30 million cubic feet of gas per day, along with any associated condensate. Processed gas is exported via a 3.5 km pipeline which

was constructed to provide a connection from the Sidewinder site to the North Island gas network. Condensate is exported via a truck load-out facility.

All chemical storage is contained within bunds and isolated from the stormwater system. Stormwater from these areas is directed for treatment through a three-stage API interceptor. The site's stormwater drain system consists of open culvert ring-drains which capture general surface water run-off. All stormwater passes through two lined skimmer pits before discharging to the Piakau Stream at the southeastern corner of the site.

1.3 Resource consents

1.3.1 Water discharge permit

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

The Company holds water discharge permit **7595-1** to discharge treated stormwater and production water from hydrocarbon exploration and production operations at the Sidewinder wellsite into the Piakau Stream. This permit was issued by the Council on 11 February 2010 under Section 87(e) of the RMA. It has been varied three times since, on 14 January 2011 to account for a site name change, and 6 December 2011 to increase the size of the catchment area, and on 5 August 2014 to change the purpose of the consent to discharge directly into the Piakau Stream. It is due to expire on 1 June 2027.

Conditions 1 and 2 require adoption of the best practicable option and place a limit on the maximum catchment area.

Conditions 3 and 4 require works notifications and provision of a contingency plan.

Conditions 5 to 8 relate to the stormwater system design and bunding of hazardous substance storage areas.

Conditions 9 to 11 stipulate limits on constituents in the discharge and effects on receiving waters.

Conditions 12 to 14 relate to site reinstatement, lapse and review.

The permit is attached to this report in Appendix I.

1.3.2 Air discharge permits

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

The Company holds air discharge permit **7777-1** to discharge emissions to air associated with production activities at the Sidewinder wellsite, including flaring from well workovers, and emergency situations, and other miscellaneous activities. This

permit was issued by the Council on 7 February 2011 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Conditions 1 and 2 require notification of significant flaring events to the Council and neighbouring residents, and the maintenance of a record of all enquiries or complaints.

Conditions 3 and 4 exclude the flaring of liquid or solid hydrocarbons.

Condition 5 requires adoption of the best practicable option at all times.

Conditions 6 to 10 relate to the prevention and minimisation of emissions.

Conditions 11 and 12 require provision of an analysis of the well stream upon request and maintenance of a flaring log.

Conditions 13 and 14 are lapse and review provisions.

The Company also holds air discharge permit **7822-1** to discharge emissions into the air from the flaring of hydrocarbons arising from hydrocarbon production and processing operations, together with miscellaneous emissions, at the Sidewinder Production Station. This permit was issued by the Council on 22 June 2011 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Condition 1 requires adoption of the best practicable option at all times.

Conditions 2 to 6 detail requirements for the recording and provision of information.

Conditions 7 and 8 require notification of site alterations and instances of continuous flaring.

Conditions 9 to 13 relate to the prevention and minimisation of emissions.

Conditions 14 and 15 are lapse and review provisions.

These permits are attached to this report in Appendix I.

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 Sidewinder Production Station consisted of three primary components.

1.4.2 Programme liaison and management

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

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

1.4.3 Site inspections

The Sidewinder Production Station and wellsite was visited twice during the monitoring period. With regard to consent for the discharges to land/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 Sidewinder Production Station discharge was sampled on one occasion, and the samples analysed for chlorides, conductivity, hydrocarbons, pH, suspended solids and turbidity. The Piakau Stream was sampled concurrently, and the samples analysed for the same constituents.

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 PM10 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 volumes throughout the period.

2. Results

2.1 Water

2.1.1 Inspections

Two inspections were undertaken at the Sidewinder Production Station during the period under review. The following was found during the inspections:

22 February 2016

A perimeter inspection was undertaken of the unmanned site. The site appeared to be neat and tidy with no evidence of any off site effects.

24 March 2016

The site inspection was undertaken after very heavy overnight rain. The ring drains and bunds were clear of any contaminants and the skimmer pits were discharging clear water. The flare pit was clean, with no flaring having been undertaken recently as the wells were currently shut in.

An infestation of gorse was noted on the flare pit walls. This was considered to be a fire risk. Gorse is classed as a 'Plant Pest' in the Taranaki region and it was recommended to the consent holder that it be removed.

2.1.2 Results of discharge monitoring

Chemical water quality sampling of the discharge from the Sidewinder Production Station was undertaken once during the 2015-2016 period. The sample was collected on 30 June 2016. Table 1 presents the results. The location of the sampling site (IND002050) is shown in Figure 1.

Table 1 Results for discharge monitoring from Sidewinder Production Station

Parameter	Units	30 June 2016	Consent limits
Chloride	g/m ³	6.9	50
Conductivity	mS/m	3.5	-
Hydrocarbons	g/m ³	<0.5	15
Suspended solids	g/m ³	4	100
Temperature	Deg. C	9.9	-
pH		6.8	6.0 – 9.0
Turbidity	NTU	2.6	-

All results were in compliance with the applicable conditions of consent 7595-1 at the time of sampling.



Figure 1 Sidewinder Production Station and associated water quality sampling sites

2.1.3 Results of receiving environment monitoring

2.1.3.1 Chemical

Receiving water quality sampling was undertaken in conjunction with discharge sampling at points upstream (PIK000159) and downstream (PIK000166) of the discharge. The results are presented in Table 2 and the sampling sites are shown in Figure 1. These sites were chosen because they provide safe access to the stream during periods of rain and are outside of the discharge mixing zone. The stretch of the Piakau Stream between these two points has very high, steep banks which would not permit easy escape in the event of rising waters.

The results indicate that the discharge was not affecting the water quality of the Piakau Stream and was in compliance with all applicable consent conditions for receiving waters at the times of sampling.

Table 2 Receiving environment results for the Piakau Stream on 30 June 2016

Parameter	Units	Upstream site PIK000159	Downstream site PIK000166	Consent 7595-1 conditions
Chloride	g/m ³	7.5	7.6	-
Conductivity	mS/m	7.2	7.2	-
Hydrocarbons	g/m ³	<0.5	<0.5	No conspicuous oil films or foams
Suspended solids	g/m ³	<2	<2	No conspicuous change
Temperature	Deg. C	9.9	10.0	< 2 Deg C increase
pH		7.4	7.4	-
Turbidity	NTU	1.4	1.4	No conspicuous change

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 period.

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 42 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 2.

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 2 Air monitoring sites at Sidewinder Production Station for 2015-2016

The details of the sample run are summarised in Table 3 and the data from the sample run are presented graphically in Figure 3.

Table 3 Results of carbon monoxide and LEL monitoring at Sidewinder Production Station

Period		30 September to 2 October 2015 (42 hours)
Max	CO(ppm)	0.20
	LEL(%)	0.20
Mean	CO(ppm)	0.10
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

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

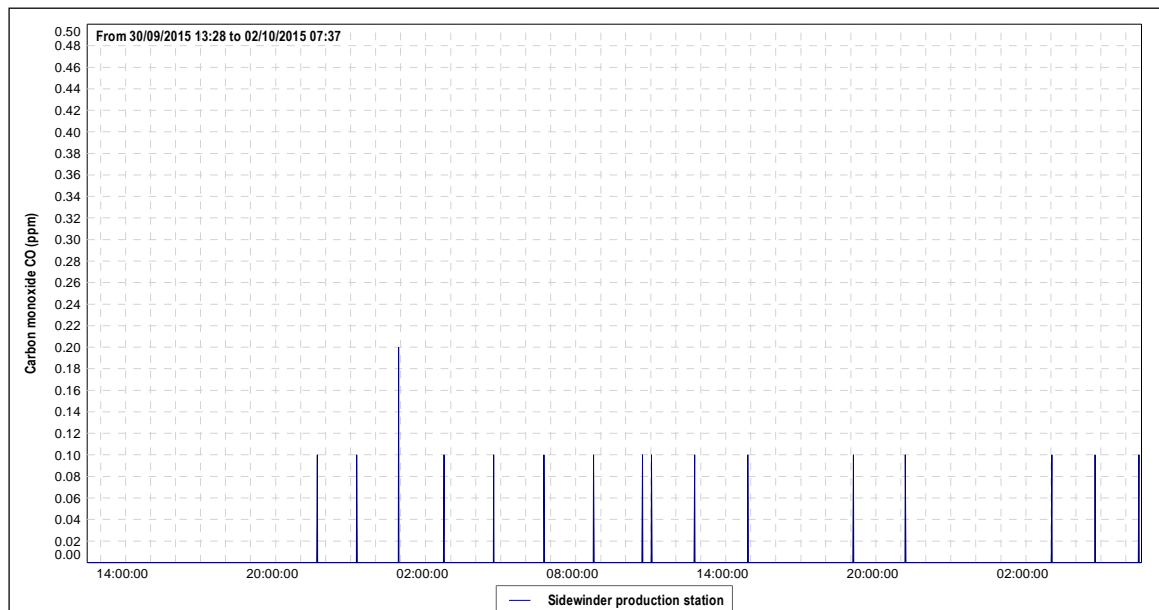


Figure 3 Ambient CO levels in the vicinity of Sidewinder Production Station

The consent covering air discharges from the Sidewinder Production Station has specific limits related to particular gases. Special condition 11 of consent 7822-1 sets a limit on the carbon monoxide concentration at or beyond the production station's boundary. The limit is expressed as 10 mg/m³ for an eight hour average, or 30 mg/m³ for a one hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was 0.23 mg/m³ while the average concentration for the entire dataset was 0.10 mg/m³, which comply with consent conditions. This is in line with the pattern found in previous years.

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

2.2.2.2 PM10 particulates

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

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

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

During the reporting period, a DustTrak PM10 monitor was deployed on one occasion in the vicinity of Sidewinder Production Station. The deployment lasted approximately 32 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 2. The results of the sample run are presented in Figure 4 and Table 4.

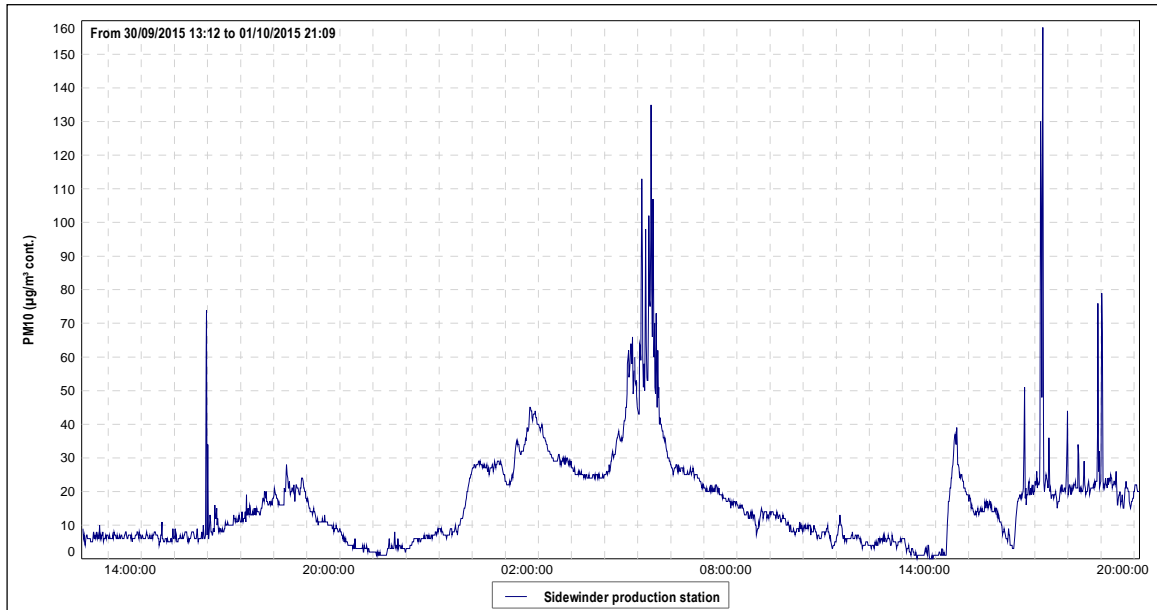


Figure 4 PM10 concentrations ($\mu\text{g}/\text{m}^3$) at Sidewinder Production Station

Table 4 Daily averages of PM10 results from monitoring at Sidewinder Production Station

	30 September to 1 October 2015 (32 hours)	
24 hr. set	Day 1	Day 2
Daily average	16.9 $\mu\text{g}/\text{m}^3$	N/A
NES limit (24 hour average)	50 $\mu\text{g}/\text{m}^3$	

During the 32 hour run, from 30 September to 1 October 2015, the average recorded PM10 concentration was 16.9 $\mu\text{g}/\text{m}^3$ for the first 24 hour period. This daily average equates to 34% of the 50 $\mu\text{g}/\text{m}^3$ value that is set by the NES. Background levels of PM10 in the region have been found to be typically around 11 $\mu\text{g}/\text{m}^3$.

2.2.2.3 Nitrogen oxides

From 2014 onwards, the Council implemented a coordinated region-wide compliance monitoring programme to measure nitrogen oxides (NO_x). The programme involves deploying measuring devices at 24 NO_x monitoring sites (including two sites in the vicinity of Sidewinder 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 consents covering air discharges from the Sidewinder Production Station have specific limits related to particular gases. Special condition 12 of consent 7822-1 sets a limit on the nitrogen dioxide concentration at or beyond the production station's boundary. The limit is expressed as 200 $\mu\text{g}/\text{m}^3$ for a 1-hour average or 100 $\mu\text{g}/\text{m}^3$ for a 24-hour average exposure.

NO_x passive adsorption discs were placed at two locations in the vicinity of the Sidewinder Production Station on one occasion during the year under review. The discs were left in place for a period of 21 days. The calculated 1-hour and 24-hour theoretical maximum NO_x concentrations found at Sidewinder Production Station

during the year under review equate to $2.8 \mu\text{g}/\text{m}^3$ and $1.5 \mu\text{g}/\text{m}^3$, respectively. The results show that the ambient ground level concentration of NO_x is well below the limits set out by consent 7822-1.

The full air monitoring report is attached in Appendix II.



Photo 2 Clean burning flare at the Sidewinder Production Station

2.2.3 Summary of flaring volumes reported by the Company

There were 26 flaring events during the period under review (compared with six in the 2014-2015 monitoring period). The majority of which related to facility start-ups and shutdowns, along with three process upsets. Light smoke was recorded on 11 occasions, however no complaints were received by the Company or the Council during the 2015-2016 period. A summary of flaring volumes at Sidewinder Production Station is provided in Figure 5.

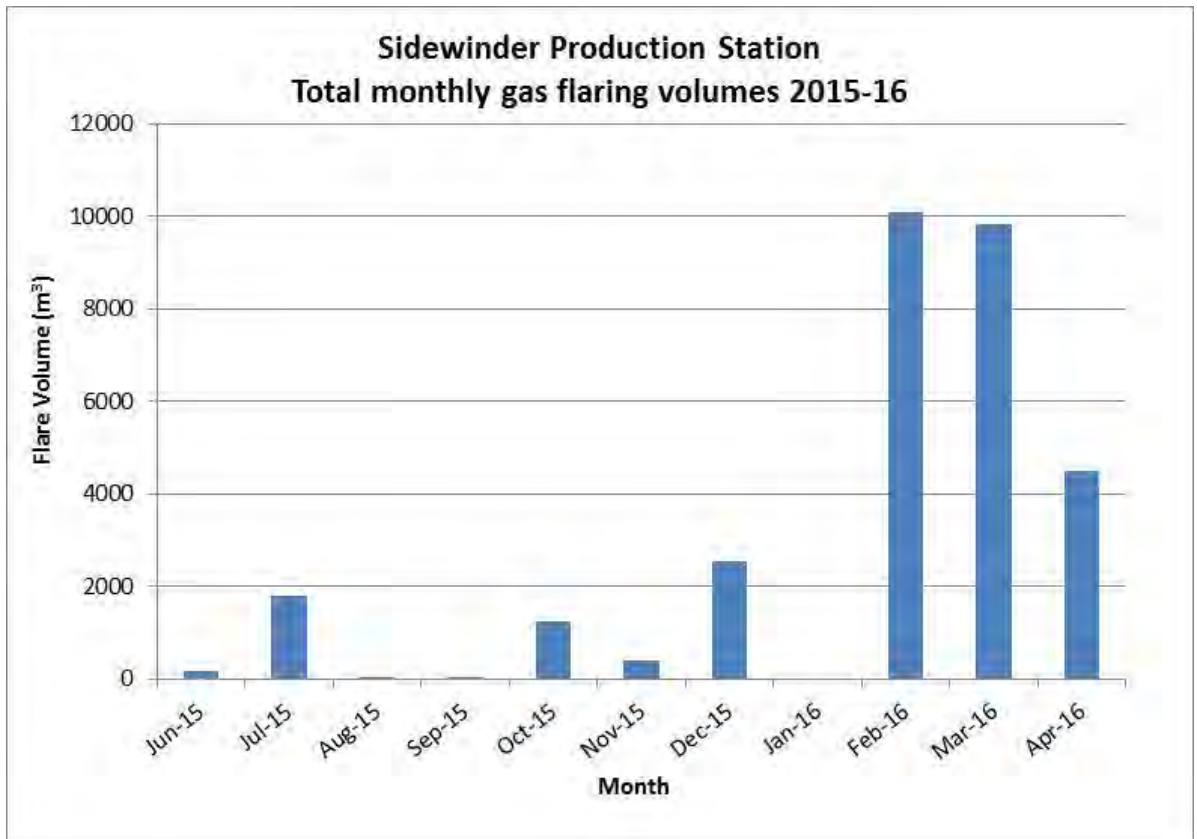


Figure 5 Monthly gas flaring for Sidewinder Production Station under consent 7822-1

2.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the 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 courses of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

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

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

In the 2015-2016 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 the Sidewinder Production Station during the 2015-2016 year found that the site was well managed. All consent conditions relating to site operations and management were complied with.

3.2 Environmental effects of exercise of consents

Stormwater system inspections showed that discharges from the site complied with consent conditions. Receiving water inspections and sampling showed that the discharges were not causing any adverse effects on the Piakau Stream.

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

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 5-7.

Table 5 Summary of performance for Consent 7595-1

Purpose: To discharge treated stormwater and production water from hydrocarbon exploration and production operations at the Sidewinder wellsite into the Piakau Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of the best practicable option	Inspection and liaison with consent holder	Yes
2. Maximum stormwater catchment area	Inspection and company records	Yes
3. Notification to Council seven days prior to site works and well drilling	No site works undertaken during monitoring period	N/A
4. Maintenance of a contingency plan	Latest update received 17 July 2013	Yes
5. Design and maintenance of stormwater system in accordance application documentation	Inspection and liaison with consent holder	Yes
6. All stormwater and produced water discharged through treatment system	Inspection	Yes
7. Skimmer pits to be lined and have shut off valves	Inspection	Yes
8. Bunding and containment of hazardous substances	Inspection	Yes

Purpose: To discharge treated stormwater and production water from hydrocarbon exploration and production operations at the Sidewinder wellsite into the Piakau Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
9. Limits on constituents in the discharge	Sampling	Yes
10. Temperature increase of not more than 2 degrees Celsius in receiving waters	Sampling	Yes
11. Limits on effects in receiving waters	Inspection and sampling	Yes
12. 48 hrs notice prior to reinstatement	Site still active	N/A
13. Lapse provision	Consent exercised	N/A
14. Optional review provision	Next option for review June 2021	N/A
Overall assessment of environmental performance and compliance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 6 Summary of performance for Consent 7777-1

Purpose: To discharge emissions to air associated with production activities at the Sidewinder wellsite, including flaring from well workovers, and emergency situations, and other miscellaneous activities		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Notification prior to continuous flaring	Notifications received	Yes
2. Notification of neighbours prior to flaring	No complaints received	Yes
3. Effective liquid and solid separation prior to flaring	Inspection and notifications	Yes
4. Only gaseous hydrocarbons to be flared	Inspection and notifications	Yes
5. Adoption of best practicable option to minimise effects from the flare	Inspection and air monitoring	Yes
6. No offensive odour or smoke beyond boundary	Inspection and public notification	Yes
7. Hydrocarbon storage vessels to have vapour recovery systems	Inspection	Yes
8. Control of carbon monoxide emissions	Air monitoring	Yes
9. Control of nitrogen oxide emissions	Air monitoring	Yes
10. Control of emissions to meet WES limits for other contaminants	Explosive gases and PM10 levels also monitored	Yes

Purpose: To discharge emissions to air associated with production activities at the Sidewinder wellsite, including flaring from well workovers, and emergency situations, and other miscellaneous activities		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
11. Analysis of typical gas and condensate stream	Analysis not requested	N/A
12. Keep and maintain a flaring log	Inspection and annual flaring report	Yes
13. Lapse provision	Consent exercised	N/A
14. Optional review provision	Next option for review June 2021	N/A
Overall assessment of environmental performance and compliance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 7 Summary of performance for Consent 7822-1

Purpose: To discharge emissions into the air from the flaring of hydrocarbons arising from hydrocarbon production and processing operations, together with miscellaneous emissions, at the Sidewinder Production Station		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of best practicable option to minimise effects from the flare	Inspection and air monitoring	Yes
2. Keep and maintain a flaring log	Inspection and annual flaring report	Yes
3. Monthly flaring information supplied	Information received	Yes
4. Provision of annual flaring and air emissions report	Report received	Yes
5. Keep and maintain a record of smoke emitting incidents	Inspection and annual flaring report	Yes
6. Analysis of typical gas and condensate stream	Analysis not requested	N/A
7. Consultation prior to plant alterations which may alter flare emissions	Inspection and liaison with consent holder	Yes
8. Notification of continuous flaring	Notifications received	Yes
9. No offensive odour, dust or smoke beyond boundary	Inspection and public notification	Yes
10. No hazardous/toxic/noxious contaminants beyond boundary	Inspections and air monitoring	Yes
11. Control of carbon monoxide emissions	Air monitoring	Yes
12. Control of nitrogen oxide emissions	Air monitoring	Yes
13. Control of emissions to meet WES limits for other contaminants	Explosive gases and PM10 levels also monitored	Yes

Purpose: To discharge emissions into the air from the flaring of hydrocarbons arising from hydrocarbon production and processing operations, together with miscellaneous emissions, at the Sidewinder Production Station		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
14. Lapse provision	Consent exercised	N/A
15. Optional review provision	Next option for review June 2021	N/A
Overall assessment of environmental performance and compliance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the period under review, the Company demonstrated an overall high level of both environmental performance and administrative compliance with the resource consents as defined in Section 1.1.4. There were no unauthorised incidents recorded by the Council in relation to the Company's activities. The Sidewinder Production Station and associated wellsites were well managed and maintained.

3.4 Recommendations from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

1. THAT monitoring of consented activities at the Sidewinder Production Station in the 2015-2016 year be amended from that undertaken in 2014-2015 to take into account the reduced level of activity at the Sidewinder facility in recent years and the high level of both environmental performance and administrative compliance with the resource consents demonstrated by the Company. It is proposed that biomonitoring of the Piakau Stream is discontinued due to the hazardous nature of accessing the adjacent section of the Piakau Stream; the number of inspections be reduced from six annually to two; and the amount of time allocated for programme management is reduced commensurate with the decrease in the size of the programme.

The 2015-2016 monitoring programme was reduced accordingly.

3.5 Alterations to monitoring programmes for 2016-2017

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 2016-2017 that the monitoring programme for Sidewinder Production Station be amended from that of 2015-2016 to account for the recent increase in production and return to continuous manning at the site. The number of inspections shall be increased from two to six for the year.

4. Recommendation

1. THAT monitoring of consented activities at the Sidewinder Production Station in the 2016-2017 year be amended from that undertaken in 2015-2016 to take into account the recent increase in the level of activity at the site. It is proposed that the number of inspections be increased from two to six annually.

Glossary of common terms and abbreviations

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

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.
NES	National Environmental Standard.
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM ₁₀	Relatively fine airborne particles (less than 10 micrometre diameter).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).

RMA	<i>Resource Management Act 1991 and including all subsequent amendments.</i>
SS	Suspended solids.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
UI	Unauthorised Incident.
WES	Workplace Exposure Standards.

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

Bibliography and references

Taranaki Regional Council (2016): TAG Oil (NZ) Limited Sidewinder Production Station Monitoring Programme Annual Report 2014-2015. Technical Report 2015-101

Taranaki Regional Council (2014): TAG Oil (NZ) Limited Sidewinder Production Station Monitoring Programme Biennial Report 2012-2014. Technical Report 2014-61

Appendix I

Resource consents held by TAG Oil (NZ) Limited

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

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

Name of
Consent Holder: TAG Oil (NZ) Limited
PO Box 402
New Plymouth 4340

Decision Date
(Change): 05 August 2014

Commencement Date
(Change): 05 August 2014 (Granted Date: 11 February 2010)

Conditions of Consent

Consent Granted: To discharge treated stormwater and production water from hydrocarbon exploration and production operations at the Sidewinder wellsite into the Piakau Stream

Expiry Date: 01 June 2027

Review Date(s): June 2015, June 2021

Site Location: Sidewinder wellsite, 323 Upper Durham Road, Inglewood

Legal Description: Lot 4 DP 420600 (Discharge source & site)

Grid Reference (NZTM) 1703995E-5659276N

Catchment: Waitara

Tributary: Manganui
Ngatoro
Maketawa
Piakau

*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 1.85 ha.
3. The Chief Executive, Taranaki Regional Council, shall be notified in writing at least 7 days prior to any site works commencing, and again in writing at least 7 days prior to any well drilling operation commencing. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.
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.
5. The design, management and maintenance of the stormwater system shall be undertaken in accordance with the information provided in support of the original application for this consent and with any subsequent application to change consent conditions. Where there is conflict between the applications, the later application shall prevail, and where there is conflict between an application and the consent conditions, the conditions shall prevail.
6. All stormwater and produced water shall be directed for treatment through the stormwater treatment system identified in condition 5 before being discharged.
7. 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.

8. Any significant volumes of hazardous substances (e.g. bulk fuel, oil, drilling fluid) on site shall be:
 - a) contained in a double skinned tank, or
 - b) stored in a dedicated bunded area with drainage to sumps, or to other appropriate recovery systems, and not directly to the site stormwater system.
9. 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
chloride	Concentration not greater than 50 gm ⁻³

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

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. This consent shall lapse on 31 March 2015, 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.

14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 05 August 2014

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: TAG Oil (NZ) Limited
P O Box 262
STRATFORD 4352

Decision Date: 7 February 2011

Commencement
Date: 7 February 2011

Conditions of Consent

Consent Granted: To discharge emissions to air associated with production activities at the Sidewinder wellsite, including flaring from well workovers, and emergency situations, and other miscellaneous activities at or about (NZTM) 1703906E-5659287N

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: Sidewinder wellsite, 323 Upper Durham Road, Inglewood
[Property owner: B.F.F Limited]

Legal Description: Lot 4 DP 420600 [Discharge source & site]

Catchment: Waitara

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

General condition

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

Special conditions

1. Other than in emergencies, the consent holder shall notify the Chief Executive, Taranaki Regional Council, whenever the continuous flaring of hydrocarbons [other than purge gas] is expected to occur for more than five minutes in duration. Notification shall be no less than 24 hours before the flaring commences. Notification shall include the consent number and be emailed to worknotification@trc.govt.nz.
2. At least 24 hours before any flaring, other than in emergencies, the consent holder shall provide notification to all residents within 300 metres of the wellsite of the commencement of flaring. The consent holder shall include in the notification a 24-hour contact telephone number for a representative of the consent holder, and shall keep and make available to the Chief Executive, Taranaki Regional Council, a record of all queries and complaints received in respect of any flaring activity.
3. To the greatest extent possible, all gas that is flared must first be treated by effective liquid and solid separation and recovery.
4. Only gaseous hydrocarbons originating from the well stream shall be combusted within the flare pit.
5. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any emission to air from the flare, including, but not limited to having regard to the prevailing and predicted wind speed and direction at the time of initiation of, and throughout, any episode of flaring so as to minimise offsite effects [other than for the maintenance of a pilot flare flame].
6. The discharge shall not cause any objectionable or offensive odour or smoke at or beyond the boundary of the property where the wellsite is located.
7. All permanent tanks used as hydrocarbon storage vessels, shall be fitted with vapour recovery systems.
8. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the flare so that, whether alone or in conjunction with any other emissions from the wellsite, the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 milligrams per cubic metre [mg/m³] [eight-hour average exposure], or 30 mg/m³ one-hour average exposure] at or beyond the boundary of the property where the wellsite is located.

9. The consent holder shall control all emissions of nitrogen oxides to the atmosphere from the flare so that, whether alone or in conjunction with any other emissions from the wellsite, the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 100 micrograms per cubic metre [$\mu\text{g}/\text{m}^3$] [24-hour average exposure], or 200 $\mu\text{g}/\text{m}^3$ [1-hour average exposure] at or beyond the boundary of the of the property where the wellsite is located.
10. The consent holder shall control emissions to the atmosphere from the wellsite and flare of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides so that, whether alone or in conjunction with any emissions from the flare, the maximum ground level concentration for any particular contaminant arising from the exercise of this consent measured at or beyond the boundary of the property where the wellsite is located, is not increased above background levels:
 - a) by more than 1/30th of the relevant Occupational Threshold Value-Time Weighted Average, or by more than the Short Term Exposure Limit at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour]; or
 - b) if no Short Term Exposure Limit is set, by more than three times the Time Weighted Average at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].
11. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request, an analysis of a typical gas and condensate stream from the field, covering sulphur compound content and the content of carbon compounds of structure C₆ or higher number of compounds.
12. The consent holder shall record and make available to the Chief Executive, Taranaki Regional Council, a 'flaring log' that includes:
 - a) the date, time and duration of all flaring episodes;
 - b) the zone from which flaring occurred;
 - c) the volume of substances flared;
 - d) whether there was smoke at any time during the flaring episode and if there was, the time, duration and cause of each 'smoke event'.
13. This consent shall lapse on 31 March 2016, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for any of the following purposes:
- a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and/or
 - b) requiring the consent holder to adopt specific practices in order to achieve the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and/or
 - c) to alter, add or delete limits on mass discharge quantities or discharge or ambient concentrations of any contaminant.

Signed at Stratford on 7 February 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

Name of
Consent Holder: TAG Oil (NZ) Limited
P O Box 262
STRATFORD 4352

Decision Date: 22 June 2011

Commencement
Date: 22 June 2011

Conditions of Consent

Consent Granted: To discharge emissions into the air from the flaring of hydrocarbons arising from hydrocarbon production and processing operations, together with miscellaneous emissions, at the Sidewinder Production Station at or about (NZTM) 1703971E-5659277N

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: Sidewinder wellsite, 323 Upper Durham Road, Inglewood
[Property owner: B.F.F Limited]

Legal Description: Lot 4 DP 420600 [Discharge source & site]

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

General condition

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

Special conditions

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, 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 discharges authorised by this consent shall not, whether alone or in conjunction with any other emissions from the site arising, give rise to any levels of odour or dust or smoke that are offensive or obnoxious or objectionable at or beyond the boundary of the site as shown on attached aerial photograph [figure 1].
10. The consent holder shall not discharge any contaminant to air from the site at a rate or a quantity such that the contaminant, whether alone or in combination with other contaminants, is or is liable to be hazardous or toxic or noxious at or beyond the boundary of the site as shown on attached aerial photograph.
11. The consent holder shall control all discharges of carbon monoxide to the atmosphere from the flare, whether alone or in conjunction with any other emissions from the site, in order that the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 milligrams per cubic metre [eight-hour average exposure], or 30 milligrams per cubic metre [one-hour average exposure] at or beyond the boundary of the site as shown on attached aerial photograph.

12. The consent holder shall control all discharges of nitrogen dioxide or its precursors to the atmosphere from the flare, whether alone or in conjunction with any other discharges to the atmosphere from the site, in order that the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 200 micrograms per cubic metre [one hour average exposure], or 100 micrograms per cubic metre [twenty-four hour average exposure], at or beyond the boundary of the site as shown on attached aerial photograph [figure 1].
13. The consent holder shall control discharges to the atmosphere from the flare of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, whether alone or in conjunction with any other emissions from the site, in order that the maximum ground level concentration for any particular contaminant arising from the exercise of this consent, measured at or beyond the boundary of the site as shown on attached aerial photograph, is not increased above background levels:
 - a) by more than 1/30th of the relevant Workplace Exposure Standard-Time Weighted Average [exposure averaged over a duration as specified for the Workplace Exposure Standard-Time Weighted Average], or by more than 1/10th of the Workplace Exposure Standard-Short Term Exposure Limit over any short period of time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour]; or
 - b) if no Short Term Exposure Limit is set, by more than the General Excursion Limit at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

Lapse and Review

14. This consent shall lapse on 30 June 2016, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
15. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the 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

Consent 7822-1

- 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 22 June 2011

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Figure 1



Aerial photograph showing site boundary [white line]

Appendix II

Air monitoring report

Memorandum

To Job Manager, Callum MacKenzie
From Scientific Officer - Air Quality, Brian Cheyne
File 1724107
Date August 03, 2016

Ambient Gas (PM10, NOx, CO and LEL) Monitoring at Sidewinder Production Stations during 2015-2016 monitoring year

Introduction

In September 2015 and January 2016 as part of the compliance monitoring programme for the Sidewinder 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 42 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 Sidewinder production station (2015-2016)

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 Sidewinder production station have specific limits related to particular gases. Special condition 11 of consent 7822-1 set a limit on the carbon monoxide concentration at or beyond the production station’s boundary. The limit is expressed as 10 mg/m³ for an eight hour average or 30 mg/m³ for a one hour average exposure. The maximum concentration of carbon monoxide found during the monitoring run was 0.23 mg/m³ with average concentration for the entire dataset was only 0.10 mg/m³ which comply with consent conditions. This is in line with the pattern found in previous years.

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

Period (from-to)		30/09/2015 13:28 to 02/10/2015 07:37
Max	CO(ppm)	0.20
	LEL(%)	0.20
Mean	CO(ppm)	0.10
	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/m³

(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 Sidewinder production station reach any more than a trivial level.

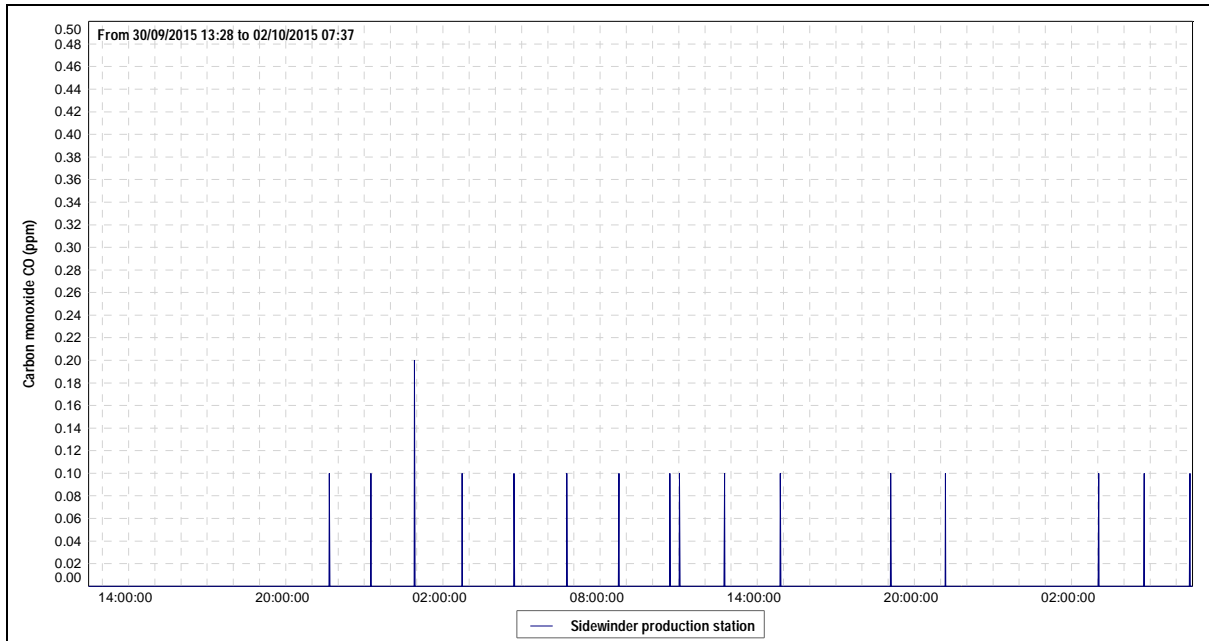


Figure 2 Graph of ambient CO levels in the vicinity of the Sidewinder production station

PM10

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

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

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

During the reporting period, a “DustTrak” PM10 monitor was deployed on one occasion in the vicinity of the Sidewinder production station. The deployment lasted approximately 32 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.

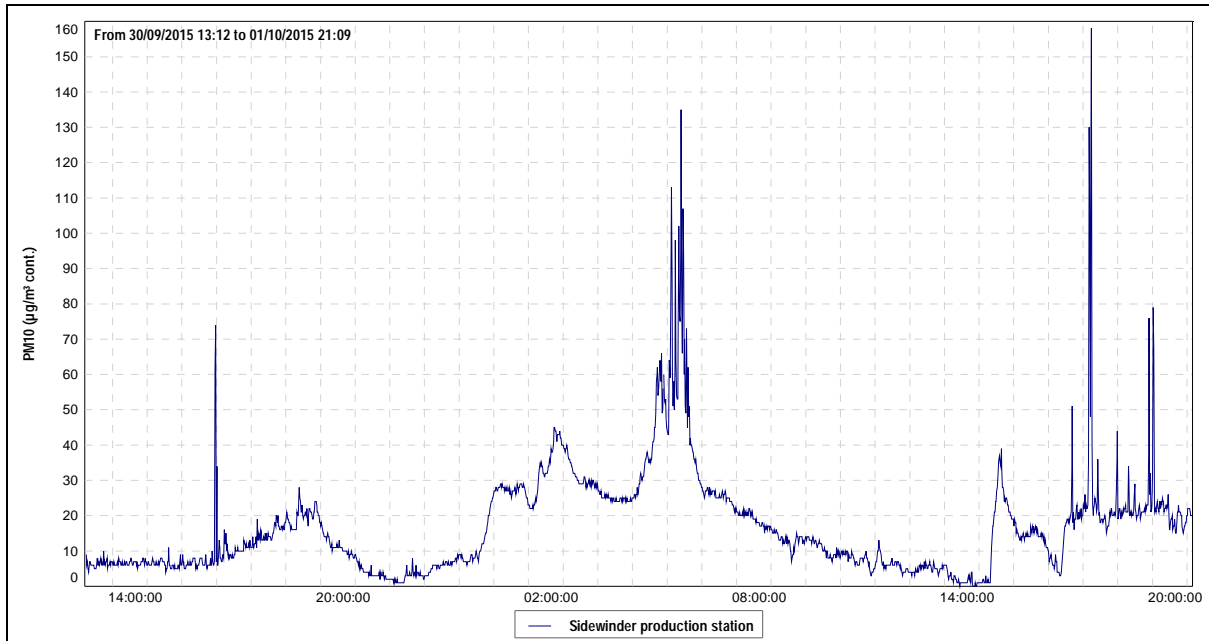


Figure 2 PM10 concentrations ($\mu\text{g}/\text{m}^3$) at the Sidewinder production station (2015-16)

	(32 hours) (30/09/2015 to 01/10/2015)	
24 hr. set	Day 1	Day 2
Daily average	16.9 $\mu\text{g}/\text{m}^3$	N/A
NES	50 $\mu\text{g}/\text{m}^3$	

Table 1 Daily mean of PM10 result during one day monitoring at Sidewinder production station

During the 32-hour run, from 30th of September to 1st of October 2015, the average recorded PM₁₀ concentration for the first 24 hour period was 16.9 $\mu\text{g}/\text{m}^3$. This daily mean equate to 33.8% of the 50 $\mu\text{g}/\text{m}^3$ value that is set by the National Environmental Standard.

Background levels of PM₁₀ in the region have been found to be typically around 11 $\mu\text{g}/\text{m}^3$.

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 24 NOx monitoring sites (including two sites in the vicinity of the Sidewinder 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.

The consents covering air discharges from the Sidewinder production station have specific limits related to particular gases. Special condition 12 of consent 7822-1 set a limit on the nitrogen dioxide concentration at or beyond the production station's boundary. The limit is expressed as 100 $\mu\text{g}/\text{m}^3$ for a 24 hour average or 200 $\mu\text{g}/\text{m}^3$ for a one hour average exposure.

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

The calculated 1-hour and 24-hour theoretical maximum NO_x concentrations found at the Sidewinder production station during the year under review equates to 2.75/m³ and 1.46µg/m³ respectively. The results show that the ambient ground level concentration of NO_x is well below the limits set out by consent 7822-1.

Memorandum

To Fiza Hafiz, Scientific Officer – State of the Environment
Job Managers - Callum MacKenzie, Emily Roberts, James Kitto
From Brian Cheyne, Scientific Officer – Air Quality
File Frodo # 1718841
Date 22 July 2016

Monitoring of nitrogen oxides (NO_x) levels in Taranaki near the NO_x emitting sites, year 2015-2016

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

Nitrogen oxides

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

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

Environmental and health effects of nitrogen oxides

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

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

National environmental standards and guidelines

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

In any 1-hour period, the average concentration of nitrogen dioxide in the air should not be more than 200 µg/m³.

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

In any 24-hour period, the average concentration of nitrogen dioxide in the air should not be more than 100 µg/m³.

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

Measurement of nitrogen oxides

The Taranaki Regional Council has been monitoring nitrogen oxides (NO_x) in the Taranaki region since 1993 using passive absorption discs. Research to date indicates that this is an accurate method, with benefits of simplicity of use and relatively low cost. To date more than 660 samplers of nitrogen oxides have been collected in Taranaki region. Discs are sent to EUROFINs ELS Ltd. Lower Hutt for analysis. Passive absorption discs are placed at the nominated sites. The gases diffuse into the discs and any target gases (nitrogen dioxide or others) are captured.

In the 2015-16 year, passive absorption discs were placed on one occasion at twenty four sites, staked about two metres off the ground for a period of 21 days, for the purpose of Compliance Monitoring.

Conversion of exposure result to standardised exposure time period

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

One formula in general use is of the form:

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

where C(t) = the average concentration during the time interval t, and p = a factor lying between 0.17 and 0.20. When converting from longer time periods to shorter time periods, using p = 0.20 gives the most conservative estimate (i.e. the highest calculated result for time period t₂ given a measured concentration for time period t₁). Using the 'worst case' factor of p = 0.20, the monitoring data reported above has been converted to equivalent 'maximum' 1-hour and 'maximum' 24-hour exposure levels.

Results

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

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

	Survey at	Site code	NO _x (µg/m ³) Lab. results	NO _x 1/hr (µg/m ³) Theoretical max.	NO _x 24/hr (µg/m ³) Theoretical max.
Petrochemical	McKee PS	AIR007901	1.9	6.5	3.5
		AIR007902	8.1	27.8	14.8
	Turangi PS	AIR007922	3.8	13.1	6.9
		AIR007824	3.3	11.3	6.0
	Kaimiro PS	AIR007817	1.2	4.1	2.2
		AIR007818	4.0	13.8	7.3
	Sidewinder PS	AIR007831	0.8	2.8	1.5
		AIR007832	0.8	2.8	1.5
	Maui PS	AIR008201	1.3	4.5	2.4
		AIR008214	2.4	8.3	4.4
	Kupe PS	AIR007827	2.1	7.2	3.8
		AIR007830	1.4	4.9	2.6
	Kapuni PS	AIR003410	5.9	20.3	10.7
		AIR003411	7.0	24.1	12.7
	Cheal PS	AIR007841	1.5	5.2	2.7
		AIR007842	2.0	6.9	3.6
Waihapa PS	AIR007815	1.5	5.2	2.7	
	AIR007816	2.6	8.9	4.7	
Ballance AUP	AIR003401	4.2	14.4	7.7	
	AIR003404	6.9	23.8	12.6	
Dairy factory	Fonterra	AIR002410	3.4	11.7	6.2
		AIR002711	4.8	16.5	8.7
		AIR002412	4.3	14.8	7.8
		AIR002413	4.1	14.1	7.5
National Environmental Standard (NES) and MfE guideline				200 (NES)	100 (guideline)

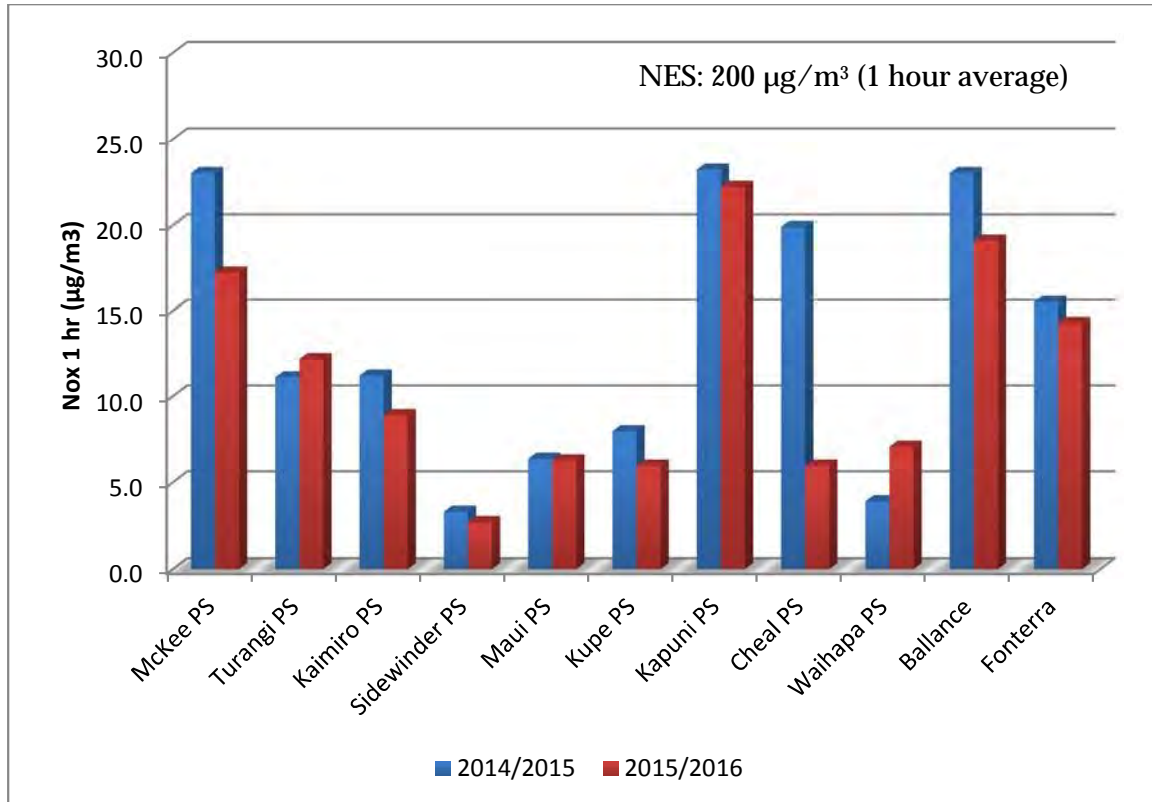


Figure 2 Average NO_x levels at 11 surveyed locations throughout the region (year 2014-2016).

Discussion

The calculated 1-hour and 24-hour theoretical maximum concentrations (using a power law exponent of 0.2) ranged from 2.8 µg/m³ to 27.8 µg/m³ and 1.5 µg/m³ to 14.8 µg/m³ respectively. The highest results in 2015-16 monitoring year were obtained from the NO_x emitting sites at four different locations:

1. Around the Fonterra's Whareroa co-generation plant.
2. In Kapuni heavy industrial area around the STOS production station and
3. Ballance ammonia/urea plant.
4. And from the sites at McKee production station and power generation plant.

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

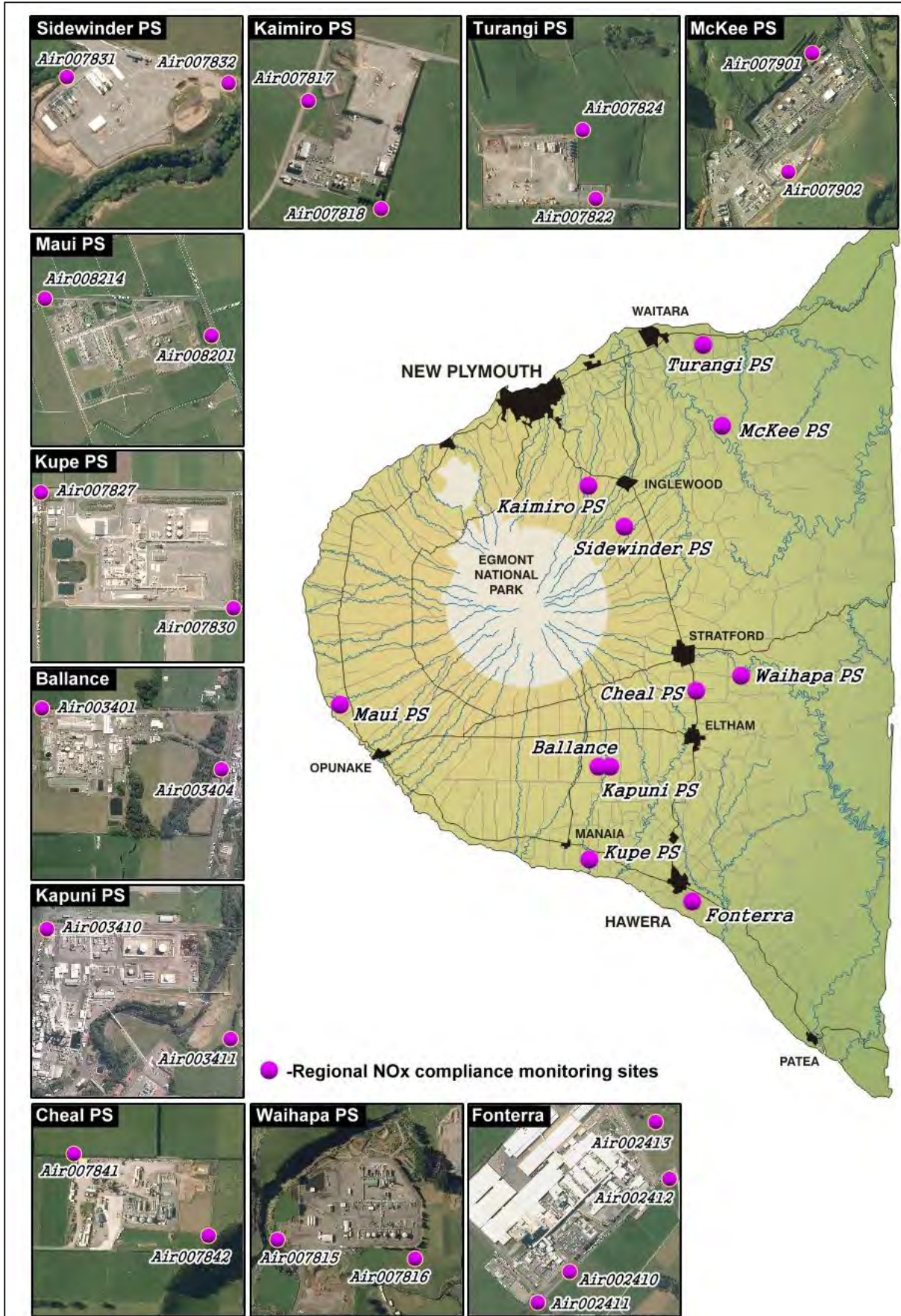


Figure 1 NOx monitoring sites in Taranaki Region, 2015-2016

Ministry for the Environment environmental performance indicator

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

Table 2 Environmental Performance Indicator air quality categories

Measured value	Less than 10% of NES	10-33% of NES	33-66% of NES	66-100% of NES	More than 100% of NES
Category	<i>excellent</i>	<i>good</i>	<i>acceptable</i>	<i>alert</i>	<i>action</i>

Table 3 Categorisation of results (2015-16 monitoring year)

National Environmental Standard for NO ₂ = 200 µg/m ³ - 1 hour average.		
Category	Measured values	
Excellent	<10% of the NES, (0-20µg/m ³)	20 (83%)
Good	10-33% of the NES, (20-66µg/m ³)	4 (17 %)
Acceptable	33-66% of the NES, (66-132 µg/m ³)	0 (0%)
Alert	66-100% of the NES, (132-200 µg/m ³)	0 (0%)
Total number of samples		24 (100%)

Conclusion

The monitoring showed that 83% of the 1-hour average results fell into Ministry's 'excellent' categories and 17% of the results lay within Ministry's 'good' category. No results ever entered the 'acceptable' or 'alert' categories, i.e., no results ever exceeded the National Environmental Standard of 200µg/m³.

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